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The Homework Assignment Preferences of Middle School Students in Science Courses in Turkey

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Abstract

In this study, we have aimed to determine homework assignment preferences of 6th-8thgrade students in science courses in Turkey's public schools. A mixed design approach was used for this research. Data was collected via both open-ended question and a "Homework Assignment Preference Scale". The results show that the 6th grade students and the 7th grade students preferred homework assignment that helped them to improve grades. On the other hand, in terms of gender, the female students preferred practice exercises, preparatory homework assignments and sought to improve their homework assignment more than the male students. In addition, we found that the seventh grade students who participated in this research preferred to do an experiment amongst their practice exercises, workbook activities and interesting activities in interactive homework assignment, as well as making a presentation as part of their preparatory homework assignment.

Keywords: Science education, middle school, homework, homework assignment preferences

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Introduction

Homework assignment has been discussed frequently in the last century and many researchers have conducted studies focused on homework assignment (Johnston, 2011). In being one of the inevitable elements of the educational process, homework assignments are important for all teaching stages. In this sense, homework assignments have been regarded as extracurricular activities that reinforce the knowledge acquired at school, allowing deeper research on the relevant subject and enable them to work in cooperation (Papandreu, 1991; Mcewan, 1998; Türkoğlu, İflazoğlu & Karakuş, 2007).

It has been reported that homework assignment provide students with effective study habits, positive attitudes, a sense of responsibility, discipline and self-study habits (National Parents Day Coalition, 1998). Moreover, homework assignments allow parents to have information about the education and school of their children through bringing together educators and parents in the United States (Department of Education, 2005), so building a bridge between home and school (Campus, 2000). Moreover, homework assignments aim for students to be prepared for lessons, reinforcing and improve what they have learnt in their lessons (Cooper, 2001), improving the learning outputs of students (Ramdass & Zimmerman, 2011), ensuring teacher-student-parent communication (Van Voorhis, 2004), and motivating students to learn in order to improve their life skills and critical thinking skills (Markow, Kim & Liebman, 2007).

Hence, many educators state that homework assignments increase academic success (Cooper, Robinson& Patall, 2006; Bembenutty, 2009; Kitsantas & Zimmerman, 2009). It has also been stated that homework assignments are employed as both a teaching strategy (Rosemond, 1990) and a teaching method (Axelrod, Zhe, Haugen, & Klein, 2009; Hong & Lee, 2000). On the other hand, it has also been stated that homework assignments have a negative effect because students spend a lot of time on it, leading to unwillingness to study at school,dependence on others and acheating habit (Özdaş, 1997).

The importance of homework assignments for science courses is indisputable when one considers that one of the goals of science course is to enable students to understand the scientific logic of everyday science events (Deveci & Önder, 2014). Gennaro and Lawrenz (1992) have investigated the effect of homework assignment on the attitudes of primary school students and their parents towards science. They reveal that homework assignments have had a positive impact on parent and student

attitudes. The 1995 Trends in International Mathematics and Science Study (TIMSS) results demonstrated that 13 year old students allocating more than one hour for their science homework assignment daily had higher success rates in science in comparison to those students who spentless time on this work (Beaton, Martin, Mullis, Gonzalez, Smith & Kelly, 1996). Various research findings have shown that homework assignments have an significant positive effect on success in science courses (Van Voorhis, 2001; Cooper, Robinson & Patall, 2006; Sabah & Hammouri, 2007; Jones, 2007).

However, diversity should be brought to homework assignment and the assignment preferences of students should be taken into consideration in order to ensure success in the homework practices implemented in science course. It may then be said that homework assignment is more important for science course which is closely associated with daily life (Milbourne & Haury, 1999).

As mentioned in the literature on science homework assignment, it is evident that homework assignment practices in Turkey are some what problematic, as there may be differences in the homework assignment preferences of students or in the form of the homework itself. Deveci (2011) has found that, from the students' perspective, the frequency of homework assignment given in a science course is as follows (from more to less frequent): research, writing (summarising), experimentation and test questions. However, the frequency of homework assignment that students preferred in a science course is as follows (from more to less frequent): experimentation, research, interesting activities, test questions, observation, reading and writing activities, homework assignment related to nature and animals, and homework related to everyday life.

Kumandaş and Kutlu (2010) found that the determination of the subject of homework by students affected the attitudes of the fifth grade students towards homework assignment. Gedik, Altıntaş & Kaya (2011) also conclude that students observed to enroll in a science course wanted to be given preparatory homework assignment. Hong and Peterson (2002) demonstrated that students preferred creative, comprehensive, preparatory and applied homework assignment. Thus, it is clear that students' preferences and requirements have not been taken into account when assigning homework in science courses in Turkey.

When the researches on difference about homework assignment preferences of students in middle school science courses were investigated, Epstein, Jackson and Salinas (1992) argued that the homework assignment given within the scope of science subjects became more engaging when homework assignment were designed

with cheap tools and materials that are easy to access and the facilities provided by the school. In his research, Van Voorhis (2003) stresses that the interactive homework assignment completed in cooperation of family members had a positive effects on science achievements and attitudes of middle school students. According to parents' views, Deveci and Önder (2013b) have listed the most preferred homework types of middle school students in science courses as conducting experiments and research about an issue, solving multiple choice questions and making observations.

With respect to science teacher views, Deveci and Önder (2014) have stated that middle school students prefer homework assignment about making experiments, designing materials, homework about daily life or natural events, and conducting research about an issue in science courses. Taş, Vural and Oztekin (2014) was identified that students were assigned homework assignment about problem solving about an issue and making research-oriented homework assignment from the teachers' point of view.

As we have understood from the studies conducted, the differences between the homework assignment preferences of students in science courses were clear from the teacher, student, and parent point of views. Some studies reported that different students have different homework assignment preferences. For instance, Deveci and Önder (2013a; 2014) highlight that the homework preferences of students varies as experimentation, research, interesting activities, test questions, observation, reading and writing activities, while homework has related to nature and animals, and homework assignments arerelated to daily life. Gedik, Altıntaş and Kaya (2011) found that students preferred preparatory homework assignment in science course.

Another study reported that students usually prefer interesting homework assignment, but do not like routine tasks focusing on writing and copying (Sharp, Keys & Benefield, 2001). Moreover, according to Ersoy and Anagün (2009), science teachers usually prefer reinforcing homework assignment. Some studies have been conducted in different subject courses reported that teachers prefer to give reinforcement-oriented homework assignment (Cooper, 2001). Consideration of student preferences, while assigning homework assignment in science courses, can have a positive effect on both student attitudes towards homework assignment and science achievement. In the same vein, Kumandaş and Kutlu (2010) have stated that the determination of the homework assignment subject by students yields positive results.

Moreover, Ersoy and Anagün (2009) have pointed out that the homework assignment preference differences of students (i.e. reinforcing homework, practice exercises and improvement practices) in science course and recommended taking into consideration all of these differences. In addition, it should be noted that there are students who doesn't want homework assignment. As a result, it can be said that there has been limited amount of research which has been performed in order to determine the differences among homework assignment preferences of students in literature. However, it can be said that homework assignment types are generally collected under three titles within the theoretical framework (Table 1) (Laconte, 1981; Doyle & Barber, 1990; Department of Education, 2003; Türkoğlu, İflazoğlu & Karakuş, 2007).

Table 1

Homework assignment types

Homework Types	Explanations
Practice Exercises	The homework assignment that allows applying, repeating, and reinforcing the knowledge and skills learnt.
Preparatory Homework	The homework assignment that aims for students to acquaint themselves with what they will learn in the next lesson.
Improvement Homework	The homework assignment that aims to improve the imagination and creativity of students and provide them with an opportunity to improve themselves.

Based on Table 1 students may be expected to prefer different homework assignment types depending on different levels of preparedness and learning styles. It has been stated that homework assignment should be individualised because students are at different learning levels (Castorena & Trujillo, 2002). Moreover, it is suggested that homework assignment should not only be interesting, but also meaningful (Ellsasser, 2007). In addition, it was stressed that the homework assignment which is given in the homework assignment design process should have a nature of attracting students' attention (Xu, 2009), especially when relatingto daily life many of the abstract concepts in science courses (Burke, 1995). Güzel, Oral & Yıldırım (2009) believe that it increases the importance of homework assignment for science courses. At this point, it may be said that difference of student homework preference should be considered with respect to variables, such as grade level, area of interest, attractiveness of assignments, and gender in order to enough benefit from homework assignment. Hence, it can be said that there is a gap in related to litearture in terms of homework assignment preferences of students.

In this regard, the homework assignment type(s) (i.e. practice exercises, preparatory homework assignment or the improvement homework assignment preferred by students in the science courses may be identified and the contents of such homework type(s) may be determined. Meanwhile, the Ministry of Education in Turkey, for the ongoing homework assignment implementations, the regulations were declared in the official web site of the National Ministry of Education as "Item 11- Variety of homework assignment subjects is determined during the meeting at the beginning of the education year for the same subject teachers. The needs of the students, talents, school, family and environment opportunities are hence considered for the identification of the homework assignment issues. Besides, some of the points are considered, such as clarity and apprehensibility of the issue, though not leading to wrong interpretations, compatibility with the curriculum (PTTB, 2004).

The research results found in the related literature have demonstrated that the homework assignment preferences of students vary (Sharp, Keys & Benefield, 2001; Castorena & Trujillo, 2002; Hong & Milgram, 1999; Castorena & Trujillo, 2002; Kumandaş & Kutlu 2010; Gedik, Altıntaş & Kaya 2011; Deveci, 2011). However, it can be said that there is not a sufficient number of studies aiming to determine the homework assignment preferences of students in science course. The present study aimed to determine the homework assignment preferences of students in science courses by using qualitative and quantitative data collection tools. At this point, it has been seen that the homework assignment preferences of the students are important. Thus, in the present study, an open-ended question aimed at revealing the desires of participants was addressed to them, besides limiting in scale the views of students.

Methodology

In order to reach to the desired level of student achievement in science education, we have tofocused on how to learn and teach better. In this way, problems have been continuously identified and scientific researches conducted in science education. Other research questions therefore come into view as a result of scientific research and the circle continues in this manner. This research was designed to explore whether students' homework assignment preferences indicate a difference in science courses. It has therefore aimed to present the difference in homework assignment preferences in a clearer manner through qualitative and quantitative data. For this reason, a mixed design approach has been adopted. Since a uniform research method would remain incapable of explaining the problem status, the mixed design was employed in the present study. Normally, this approach requires using both qualitative data collection tools and quantitative data collection tools together (e.g.

interview and questionnaire) (Creswell, 2008). According to Creswell (2009), qualitative and quantitative methods should be used together in order to strengthen the findings of a study.

The quantitative part of the research was designed in a survey method while the qualitative part of the research had a phenomenological design. In the quantitative part of the research, the survey method was adopted because it aimed to obtain the views of wide sample range through closed questions. In thesurvey method, we tried to reacha wide sample range in line with how that beliefs, attitudes and personal realities are usually researched in social sciences (Mathiyazhagan & Nandan, 2010). In the phenomenological method, we adopted a qualitative part, aiming to obtain student views through an open ended question. A phenomenological method reflects research designed to determine the experience that people participatingin research have lived, so explaining and interpreting this experience (Ary, Jacobs, Sorensen & Razavieh, 2010).

Sample

The research sample consisted of sixth, seventh and eight grade students attending the middle schools located in theAkçaabat district of Trabzon province during the 2011-2012 academic year in Turkey. The participants were students receiving education at schools located in the district where the researchers lived,being that the availability sampling method was preferred (Patton, 2002). The sample for quantitative data consisted of 559 sixth, seventh and eight grade students attending three middle schools at Akçaabat district affiliated to the Ministry of National Education, while qualitative data was acquired from 30 seventh grade students (female=18, male=12).

The qualitative datawas administered by the researcher to 30 seventh grade students who were chosen by purposeful sampling. The purposeful sampling method is regarded as the most popular method used in phenomenological research (Patton, 1990). The research sample consisted of 30 students at 7^{th} grade whose academic achievements were identified as middle level through posing open-ended question to their science teacher. The middle school level includes 5th-8th grade levels in Turkey. In this research, the reason for obtaining the qualitative data from the 7th graders was to have much more knowledge and experience on homework assignment (Deveci, 2011).

Table 2
Demographics

Variable	Category	N	%
Gender	Female	284	50,8
	Male	275	49,2
Total		559	100
Grade	Sixth	211	37.76
	Seventh	148	26,47
	Eight	200	35,77
Total		559	100

The review of Table 2 shows that the number of female students was 284, while the number of male students was 275. The numbers of female students and male students participating in the study were close to one another. With regard to grade, the number of sixth grade students was 211, the number of seventh grade students was 148 and the number of eight grade students was 200.

Data collection tools

In this section, we provide information about quantitative and qualitative data collection tools.

Quantitative data collection tool. For this research we used the "Homework Assignment Preference Scale" that has been developed by Deveci and Yiğit (2015). In this scale, the first factor was named as improvement homework assignment, the second factor was named as practice exercises, and the third factor was named as preparatory homework. The improvement homework assignment (IHA) dimension was made up of statements about the requests for homework that allow students to improve themselves by enabling them to use creative and critical thinking skills. In contrast, the practice exercises assignment (PEA) dimension was composed of statements about allowing students to perform practice exercises by using the information they obtained in theirscience course. The preparatory homework assignment (PHA) dimension, on the other hand, consisted of statements enabling students to be prepared for the subjects to be taught to them.

***Quailitative data collection tool*.** To enable students to express their opinions more clearly, the following research question was asked and the students were requested to write their opinions: "What kind of homework assignment would you like to be given in science course? Please state your reason for your preference!" This question was developed through asemi-constructed interview conducted with 5 students who are 7th graders. We planned to obtain data through the semi-constructed interview at the beginning of the research. However, this plan was relinquished after considering that students were having problems stating their views ininterviews recorded by voice recorder.

It was therefore decided that collecting data through writing text would be more convenient from the students at that age group. We decided to ask one question convenient to the research problems instead of asking many questions through considering that the participants were middle school students -one science teacher and two science education professors. Therefore, the validity and reliability of the open ended question were provided by two experts and one science teacher. The content validity was came from the view of experts that the open ended question is able to measure the intended feature. In terms of the reliability, the analysed data and the views that students wanted to give were confirmed by showing the analysed data to 4 participant students after the analysis of qualitative data. The practice stage then was started and it took approximately 15 minutes for students to complete the open ended questionnaire form. While the researcher was in the classroom for that purpose, he avoided making any statement likely to influence the participants. Moreover, the researcher made an attempt to display an objective attitude towards the opinions delivered by the participants.

Data Analysis

Firstly, the normality hypothesis of the total scores obtained from the dimensions and of the total scores obtained from the entire scale was investigated via the Kolmogorov Smirnov test. According to the results of Kolmogorov Smirnov test results, the variables did not display normal distribution ($p<.05$). Since the variables did not display normal distribution, the Mann-Whitney U test and the Krusukal-Wallis H test were employed in the analysis process (Büyüköztürk, 2009; Çepni, 2010; Baştürk, 2010; Özdamar, 2011).

The open coding technique was then employed in the analysis of qualitative data (Strauss & Corbin, 1990). Themes were defined by using the repeating codes and dialogs in order to reveal the meaning contained in the subject (Strauss & Corbin, 1998). In this coding type, the researcher reads the data through an inductive analysis, attempting to bring out important statements and so creating codes. Inductive analysis thus aims at discovering the categories, themes and patterns in the dataset (Patton, 2002). Therefore, the raw data was first read by the researcher, while unrelated data with the research problem was excluded from the analysis.

The related codes with one of the emerged codes were then gathered together and these code clusters were given a name. The themes emerged in this way. Finally, for the qualitative data, the names of the participants exhibited used code like S6, meaning student encoded by six. After completing the analysis procedures, and before analysis data, the codes and themes achieved as a result of analysis were again

investigated to make a comparison. These generated codes and themes were realised at different times by two different researchers. At this stage, the reliability of the coefficient was calculated through using the suggested formula by the Miles and Huberman (1994) of "Same opinion/Same opinion + Different opinion" by the researchers, while the compatibility rate was found as 76%.

Findings

In this part of the research, the findings obtained as a result of qualitative and quantitative data analysis are presented.

The findings obtained from the quantitative data

In Table 3, the U-test results of the student points obtained from the homework assignment preference scale were presented in accordance with gender category.

Table 3
The U-test results of the total scoresandsub-dimensionscoresobtainedbythestudentsfromthescalebygender

Variable	Category	N	MeanRank	Sum of Ranks	U	pvalue
Gender (Total)	Female	284	303.23	86119.50	32450.50	0.001
	Male	275	256.00	70400.50		
Improvement (Sub-)	Female	284	297.22	84411.50	34158.500	0.010
	Male	275	262.21	72108.50		
PracticeExercises (Sub-)	Female	284	304.41	86453.00	32117.000	0.000
	Male	275	254.79	70067.00		
Preparatory (Sub-)	Female	284	292.07	82948.50	35621.500	0.072
	Male	275	267.53	73571.50		

*p<0.05

According to Table 3, the total scores differed significantly by gender (U=32450.50, *p < 0.05). The total scores obtained by the female students from the scale were higher than the total scores obtained by the male students. The test results showed that while there was no statistically significant difference between the homework assignment preferences of the students in the preparatory homework assignment dimension in terms of gender, there was a significant difference in the practice exercises dimension and the improvement of the homework assignment dimension in terms of gender. The scores obtained by the female students from the sub-dimensions of the improvement homework assignment dimension were higher

than the scores of the male students (U=34158.50, p < 0.05), while the total scores obtained by the female students from the sub-dimensions of the practice exercises dimension were higher than those obtained by the male students (U=32117.00, p < 0.05).

Table 4
The H-Test results of the total scores obtained by the students from the scale by grade

Variable	Category	N	MeanRank	Sum of Ranks	U	pvalue	Difference
Total Score	Sixth	211	291.17	2	8.25	0.016	(6>8) (7>8)
	Seventh	148	299.13				
	Eight	200	254.06				

*p<.05

As seen in Table 4, the H-test results demonstrated that there was a statistically significant difference between the total scores obtained by the students from the scale by grade [X^2 (sd=2, n=559) =8.25, p < .05]. A U-test was carried out on the binary combinations of the groups in order to determine the groups from whose difference such variation resulted. According to the results of that U test, the total scores obtained by the sixth grade and the seventh grade students from the scale were significantly higher than the eighth grade students.

Table 5
The H-Test results of the sub-dimension scores of the students by grade

Dimensions	Category	N	Mean Rank	Sum of Ranks	U	pvalue	Difference
Improvement	Sixth	211	288.02	2	9.491	0.009	(7>8)
	Seventh	148	304.71				
	Eight	200	253.25				
Practice exercises	Sixth	211	292.86	2	4.939	0.085	
	Seventh	148	288.96				
	Eight	200	259.81				
Preparatory	Sixth	211	287.13	2	3.834	0.147	
	Seventh	148	293.57				
	Eight	200	262.44				

*p<.05

As seen in Table 5, the H-test results indicated that there was a significant difference between the homework assignment preferences of the students in the improvement homework assignment dimension interms of grade, but there was nostatistically significant difference in the practice exercises dimension and in the preparatory homework assignment dimension in terms of grade. The scores obtained

by the seventh grade students from the improvement homework assignment dimension were found to be significantly higher than those obtained by the eighth grade students [(sd=2, n=559) =9.491 p < .05].

The findings obtained from the qualitative data

In this section, the themes, codes and points of view of students are presented in Table 6; these were revealed through the open-ended questionnaire form. The opinions of the participants concerning their homework assignment preferences within the scope of science course were collected under 3 themes and 15 codes through content analysis. While the themes included Practice Exercises Assignment, Interactive Homework Assignment and Preparatory Homework Assignment, the codes consisted of experimentation, observation, research, performance homework, project assignment, play development, drama, interesting activities, group work, workbook activities, summaries, presentations, reading books, writing and multiple-choice questions. The codes revealed were explained in detail with the samples from the students responses.

Table 6

The opinions of the seventh grade students concerning homework assignment preferences

Theme	Repeating Ideas (Code)	Students	f
Practice exercises assignment	Experimentation	S3, S4, S12, S13, S14, S17, S18, S20, S21, S22, S24, S25, S27, S30	14
	Observation	S17, S18	2
	Research	S5, S6	2
	Performance homework	S16	1
	Project assignment	S15	1
Interactive homework assignment	Workbook activities	S2, S5, S7, S8, S19, S24	6
	Interesting activities	S11, S13, S14, S21, S22	5
	Group work	S1, S21, S23	3
	Play development	S8, S18	2
	Drama	S20, S4	2
Preparatory homework assignment	Summarization	S4, S5, S6, S7, S8, S9, S10, S28, S30	9
	Narration (Presentation)	S1, S9, S15, S16, S17, S20, S31	7
	Multiple-choice questions	S3, S4, S7, S16	4
	Reading	S29	1
	Writing	S31	1

According to Table 6, the data is gathered under Theme 3 and code 15. The findings were then presented according tothese theme titles.

Theme 1, practice exercises. The review of the ideas collected under the theme of practice exercises showed that a great majority of the students preferred homework, including *experimentation*. The most important reason for such a preference was that the students found these kinds of homework assignment entertaining and they became better aware of what they learnt through completing these kinds of homework assignment experiences. Some statements of the students on preferring homework assignment, including experimentation, were as follow: S18: "*I would prefer more experimental homework in science course. For instance, let's assume that we have covered a subject at school. We may do an experiment about it (and save it) when we go home. Then, we may share it with our friends at school*"; S27: "*I would like to be given homework including more coverage to experiments in science course. This is because I understand the subject better when I do experiments. It is remembered easily. That is an advantage for me*".

The opinions of the students who prefer to have *observation* and *research* included homework assignment were also collected under this theme. It may be said that the students were aware of the fact that they would learn better by observing the events taking place around them and they could acquire more knowledge about a subject by doing research. S17 explained his homework assignment preference through mentioning the observation dimension of homework assignment: "*In my opinion, slides may be prepared instead of summaries in the science course, and the relevant subjects may be covered by using such slides. The relevant subjects could be easier to understand if more coverage was given to experiments and observations rather than activities.*"

S6 explained his homework assignment preference through mentioning research dimension: "*I would prefer a homework strategy where information about the subject to be covered would be searched by using different sources. This is because a book may provide wrong information. Thus, we may learn something wrong. For this reason, the information to be provided should be searched by using different sources. In this way, we may acquire a more detailed and bigger amount of information.*"

Theme 2, interactive homework assignment. The review of the ideas collected under the theme of interactive homework assignment demonstrated that a great majority of the students preferred homework assignment including *interesting activities*, *group work* and *workbook activities*. There were also students in favour of homework assignment, including *play development* and *drama* in relation to the relevant subject. It is clear that the students under this theme preferred entertaining

situations where they would interact with different environments and people. S11 explained his homework assignment preference through mentioning interesting activities dimension as follows: "*More knowledge-based entertaining homework may be given. For instance, homework that both teach and entertain simultaneously may be given. This is because; knowledge may be more permanent and unforgettable if we, students, entertain, but not get bored, during learning.*"

It was seen that the students wanted the *activities included in the workbook* to be given to them as homework assignments. The various activities that were included in the primary education 7th grade student workbook and aimed at measuring the knowledge and skills of the students attracted the attention of some students. One examples of the students' opinion is S8:"*If the activities in the workbook are given as homework after we have covered a subject, we can understand the subject better.*"

The students also preferred homework assignment, including such activities as *group work*, *play* and *drama*, in which they would interact. When the age range of the students was taken into consideration, it was understood that the students in the age range included in the present study, like activities such as play, drama, and group work in which they interact with their peers; moreover, they learn subjects better through such activities. For example, one statement on this subject was as follows from S21:"… *when our teacher gave us homework, I wanted it to be done in group. This is because; that would enable all people to share their knowledge with their friends*".

Theme 3, preparatory homework assignment. The review of the ideas collected under the theme of preparatory homework assignment showed that the students mostly preferred the homework assignment including *summarisation* and *narration (presentation*). The students indicated that they preferred homework assignment involving *summarisation* in order to reinforce their learning and establish preliminary knowledge in regard to the subjects to be learnt. A sample quote: S6: "*I prefer summarisation as homework. This is because it enables us to have preliminary knowledge in regard to the relevant subject. In this way, it may take shorter time for us to grasp the subject because we are already prepared for it.*"

Those students who would like to be given homework assignments allowing them to read upon a subject actually preferred a homework assignment that provided them with an opportunity to make a *presentation* through being prepared for the relevant subject. It was understood from the students' statements that those students who would like to lecture on a subject do not like writing a summary. For example S9

stated that: "*Students may find a picture or a piece of information about the relevant subject and present it to the class. In this way, the subject is imprinted on one's mind.*"

Some of the students preferred homework assignments that include *writing* and *reading*. Some student opinions about this situation, which may be explained by the difference in the learning styles of students, were as follows: S29: "*I would prefer experimental homework. This is because; we can understand many things much better when we read them*"; S31: "*I would prefer homework involving writing in science course. 5 to 10 kinds of writing-oriented homework should be given on any subject at schools*".

According to the findings obtained from the qualitative data, we observed that students prefer doing experiments, summarising what was learnt at school, making presentations on any issue and the assignment of activities placed in workbooks in science classes. Below, the discussion and results are presented belonging to the findings obtained in research.

Discussion

Based on the research findings, it can be said that the homework assignment preferences of students vary significantly by gender and grade ($p<0.05$). With regard to gender, the female students had a more positive attitude towards homework assignment in comparison to the male students in terms of both the total score obtained from the scale and the total scores related to three sub-dimensions. In parallel with the results of the present study, the related literature also shows that female students have more positive attitudes towards homework assignment in comparison to male students (Hong & Milgram, 1999; Yeşilyurt, 2006; Xu, 2006; Xu, 2010).

Another interesting finding was also reported by Wagner et al. (2008). In this study, it was found that female students allocated more time to study at home compared to male students. In addition, Xu (2006) demonstrated that female high school students managed homework assignment environment and time better than male high school students do. These results may be attributed to the fact that, having a sense of responsibility, female students study more meticulously. These research findings point to the fact that female students and male students had different approaches to homework assignment. In this regard, it is possible to say that such gender-related difference may also reflect upon homework assignment preferences. These research findings indicated that female students preferred practice exercises and preparatory homework assignment more than male students do ($p< .05$).

In his research, Deveci (2011) states that female students have a more positive attitudes than male students towards assigned homework in science courses; they consider homework assignment as functional and they demonstrate more positive behaviour towards homework assignment implementations. Those results could be explained by female students being more dedicated to fulfilling out of school activities, a sense of curiosity and spending more time at home compared to male students. In contrast, male students do not prefer doing homework assignment since they encounter many sources of stimulation out of school in Turkey (e.g. spending time with friends, playing games in the district, going to internet cafés and visiting different places etc.) Thus, Serin (2010) suggests that the sense of curiosity of female 7th grade students towards science was more than the male students.

In addition, Akpınar, Batdı and Dönder (2013) state that female students had more motivation towards science learning with respect to male students at middle school level. This situation can explain the reason for attaching importance to female students to homework assignment in science courses. There can be said that existing homework assignment implementations are not for motivating or making the sensation of male students. These results partially explain the difference of homework assignment preferences with respect to gender dimension according to the findings obtained in this research.

In regard to the different grades, the sixth and the seventh grade students had a more positive attitude towards homework assignment and thus preferred more homework assignment in comparison to the eight grade students ($p < .05$). In parallel to this result, Deveci (2011) concludes that the seventh grade students had a more positive attitude towards homework assignment in comparison to the eight grade students. Akpınar, Batdi and Dönder (2013) have proposed that the motivation of 4th graders towards science learning was higher than 8th graders. This situation can also be attributed to age. It has also been reported that those seventh grade American students who were older in age find homework assignments boring and meaningless (Hong, Topham, Carter, Woznıak, Tomoff & Lee, 2000).

The difference of opinions by grade may then be attributed to the exam-focused nature of our education system. Indeed, the present study shows that an increase occurred in both the total score obtained from the HPS and the total scores obtained at sub-dimensions from the sixth grade to the seventh grade, although a decrease occurred in the scores from the seventh grade to the eighth grade ($p<0.05$). The fact that only the eighth grade students took the examination (SBS [Placement Test]) in the present system keeps them away from extracurricular teaching activities

and stimulates them to be engaged in activities preparing them for examination. While the improvement dimension was considered, it was observed that the total points of eighth grade students were especially low among the seventh and eighth grade students.

The reason for the decrease in the total scores can be related to not noticing and giving much time for improving the homework assignment of eight grade students who are preparing for the placement test which aims to improve creative and critical thinking by keeping the logical activities in the foreground. Most of the students adopt rote learning since exam evaluations are in a multiple choice format in our country and not geared towards developing high level thinking skills, such as PISA, TIMMS, and PIRLS. This situation even partially causes negative points of view about homework assignment intended to develop critical thinking and creative thinking skills. Furthermore, this situation was also mentioned in research findings from the literature that the 8th graders only prefers multiple choice based and exam oriented homework assignment (Deveci and Önder, 2013a; 2014). In this sense, 8th graders' point of views towards homework can differ from country to country, for that reason more good learning could be realised through more interesting and joyful homework by determining student homework assignment preferences.

It was remarkable that a great majority of the students preferred homework assignment, including performing experiment in science course. In fact, this situation may have resulted from the fact that the students thought they understood science subjects better by doing these kinds of homework assignment. In other words, these kinds of homework assignment entertain students who use tools and materials, so allowing them to learn by doing and experiencing. Similarly, Deveci and Önder (2013a; 2014) conclude that a great majority of the students prefer homework assignment involving practicing. Aladağ and Doğu (2009) also reached similar results.

Feldman (2004) states that teachers should give homework assignment by taking into consideration the subjects that attract the attention of students (Turanlı, 2009). In parallel with this result, students are not much able to have chance in terms of conducting experiment since laboratory conditions of middle schools are insufficient in our country. Therefore, it can be said that students consider it to be both interesting and funny to do experiments with simple materials in out of course activities. Since science issues are learnt more through making and experiencing them, then it can be said that students need to be made experiments by using simple tools and materials in out of course activities. Thus, Lee (2001) advocated that middle school students are needed to perform experiments with simple materials and tools.

It was observed that the students in favour of interactive homework assignment preferred the interesting activities which they could carry out in groups and the activities included in the course book. It can be said then that if we, as students, do not get bored and have fun during learning - in other words, if there is more fun - then knowledge will be more permanent and hard to forget. The literature includes some research results revealing that students want to be engaged in group work and with family (Deveci, 2011; Aladağ & Doğu, 2009; Van Voorhis (2001; 2003). However, Akdağ (2009) concludes that the 7th grade students delivered negative opinions in regard to the relevant course book and workbook. These results could be related in particular to activities such as filling in the blanks, repeating already learnt information in general and placing a small number of activities, including group work in workbook.

On the other hand, according to Yücel (2008), homework assignment definitely makes students active in the 7th grade social studies course. It was found that the homework assignment prepared in group were more useful. Van Voorhis (2001) finds that well-planned interactive homework assignment ensuring the participation of family had a positive effect on students' success and attitudes towards science. Van Voorhis (2003)states that when parent participation is higher, students gave more original information, and positively affected student achievement for students who were assigned interactive homework assignment supported by the parents at science courses at middle school level. As a result, students can achieve better results from the tasks realised with parents, peers and different people in cooperation; hence, this situation provides a better realisation of learning, as in the social learning theory of Vygotsy. Students absolutely require someone to discuss or share their opinions, especially in assigned homework in science courses which is hard to learn and requires reasoning.

A great majority of the students in favour of preparatory homework assignments preferred the homework assignments involving summarisation and lecturing on a subject. Since summarisation was an activity based on writing, wecan not expect the entire class to like it. However, these students noticed that they learnt better by writing preferred these kinds of homework assignment. Such students thought that they were prepared for the subject better when these kinds of homework assignment were given. Deveci (2011) concludes that a great majority of the students did not prefer homework involving summarisation. Moreover, Gedik, Altıntaş and Kaya (2011) found that the 7th grade and the 8th grade students would like to be given preparatory homework assignment in science course.

In another study, it was found that the preparatory homework given in science course increased the learning desires of students (Yuladır & Doğan, 2009). A study on biology education also reached a similar conclusion (Yeşilyurt, 2006). Another idea under this theme showed that the students preferred solving multiple-choice questions. The exam-focused nature of the current Turkish national education system forces students to be engaged in exam-oriented learning activities. Other previous studies on this subject demonstrated that students think that homework assignment should have a characteristic preparing them for examinations (Deveci, 2011; Gedik, Altıntaş & Kaya, 2011). This situation could be related both to an exam-based central education system and the readiness of students to understand science issues. Since students lack pre-knowledge, they prefer activities such as summarising to practicing.

Conclusions

As a consequence, we can conclude that there is a difference in homework assignment preference for science courses in terms of provided responses for both open-ended question and close-ended scale items. When these differences are considered in terms of grade level, it was seen that 7th graders mostly prefer development homework assignment intended for stimulating creative and critical thinking skills and preparation homework assignment in order to enable preparation for the next lesson. Here it can be said that 6th graders mostly prefer exercise homework assignment in order to do practices.

Another interesting result was that 8th graders tended to prefer three types of homework (preparation, development and practice). This situation could be related to 8th graders working for high school exams and therefore continuously setting apart more time for multiple choice questions through instruments such as special courses or preparation courses. In this context, the homework assignment preferences of students indicate difference in terms of demographic variables such as gender and grade levels. These results show the preparation of 6th graders who are at a concrete operation stage of the exercise type of homework, while 7th graders prefer the development and preparation type of homework assignment, indicating those cognitive development periods should be considered in their homework assignment implementations. In addition to the above, learning speeds, readiness and learning styles of the students in science courses, which involve hard to learn material and a large number of abstract concepts, could be causing these differences in the homework assignment preferences of students.

We have observed from the responses of students to the open-ended question that students prefer homework assignment such as making experiments, summarising materials learnt, making presentation and doing activities included in workbooks. As

it can be understood from these findings, students want to have homework assignments in type of interesting and providing more learning. Therefore, it was seen that the students preferred types of homework assignments that indicated differences. We drew attention to the fact that the "making experiments" type of homework assignment was the favourite type of homework assignment amongst all the homework assignment preferences of students. This result indicated that the homework assignment convenient to the nature of science courses was the "experiments" format could be done through simple tools and materials used by the students.

Thus, it was thought that science courses could be best learnt through experiencing and doing, while students were shown to be aware of this situation. In addition to this finding, students indicated that they tend to have more preferences for this type of homework assignment since they consider experimental type of homework assignment to be interesting and funny.

Future implications

Middle school science teachers could determine homework assignment preferences of their students before assigning a homework assignment. The type of homework assignment that students prefer could be determined using the scale implemented in this study and asking similar question to the open-ended question in this study, especially for large number of students included classroom groups. The 6th graders could mostly be assigned practice homework to do exercises at home. The frequent preference for the development and preparation type of homework assignment could be considered for 7th graders. Since senior middle school students are in the transition period to high school, we should consider whether they are preparing for an exam.

In terms of gender, it should be keep in mind that female students preferred all of the homework assignment types that involved preparation, development and practice in comparison to male students. The homework assignment preference intentions could then be increased through considering homework preference types and asking open-ended questions of the male students. Moreover, homework assignment policy could be determined specific to any branches through conducting research towards seeking to examine the difference in homework assignment preferences of students in different branches and determining the differences therein.

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