INVESTIGATING PRIVATE ELEMENTARY SCHOOL STUDENTS' ATTITUDES TOWARD ONLINE HOMEWORK IN SCIENCE LESSON IN TERMS OF EXPERIENCE, USEFULNESS AND THOUGHT

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NURHAN MUMAY YILDIZ

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Approval of the Graduate School of Social Sciences

_____

Prof. Dr. Meliha Altunışık
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

_____

Prof.Dr. Ceren Öztekin
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

_____

Assoc. Prof. Dr. Elvan Şahin
Supervisor

Examining Committee Members

Dr. Hasan Karaaslan	(METU, CEIT)	_____
Prof. Dr. Ceren Öztekin	(METU, ELE)	_____
Assoc. Prof. Dr. Elvan Şahin	(METU, ELE)	_____
Assist. Prof. Dr. H. Özlen Demircan	(METU, ELE)	_____
Assist. Prof. Dr. Didem Akyüz	(METU, ELE)	_____

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Name, Last Name : Nurhan MUMAY YILDIZ

Signature :

ABSTRACT

INVESTIGATING PRIVATE ELEMENTARY SCHOOL STUDENTS' ATTITUDES TOWARD ONLINE HOMEWORK IN SCIENCE LESSON IN TERMS OF EXPERIENCE, USEFULNESS AND THOUGHT

MUMAY YILDIZ, Nurhan

M. S., Department of Elementary Science and Mathematics Education

Supervisor: Assoc. Prof. Dr. Elvan Şahin

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The purpose of this study was to investigate private elementary school students' attitude toward online homework in science lessons. More specifically, the purpose was to examine relationship between private elementary school students' attitude toward online homework and their self-reported grade point average in science lesson. Furthermore, the difference among 5^{th}, 6^{th}, 7^{th}, and 8^{th} grade levels, in terms of their scores on online homework attitude components as experience, usefulness and thought was examined.

This study was conducted with private elementary school students in Çankaya, Ankara, Turkey by purposive sampling method. 669 elementary school students participated to the study. Attitude toward Online Homework Scale was developed by adapting two other researchers' scales and administered to the participants.

Data were analyzed by using descriptive and inferential statistics. In order to answer the first research question, descriptive information about the components of attitude was given. Correlational analysis was used to identify the relationship between each component of the attitude toward online homework and their self-reported grade point average in science lesson. Moreover, MANOVA was conducted to investigate the impact of grade level on attitude toward online homework of private elementary school students.

The results revealed that private elementary school students' self-reported grade point average in science lesson was correlated significantly with attitude toward online homework. According to the MANOVA results, the mean scores of 5^{th}, 6^{th}, 7^{th}, and 8^{th} grade level students differ in three components of attitude, namely; thought, experience and usefulness in favor of 5th grade level students for each factor, significantly.

Keywords: Online Homework, Self-Reported Grade Point Average, Science Lesson, Attitude, Grade Level

ÖZ

DENEYİM, DÜŞÜNCE VE KULLANIŞLILIK AÇISINDAN ÖZEL ORTAOKUL ÖĞRENCİLERİN FEN DERSİNDE İNTERNET ÖDEVLERİNE YÖNELİK TUTUMLARININ İNCELENMESİ

MUMAY YILDIZ, Nurhan

Yüksek Lisans, İlk Öğretim Fen ve Matematik Alanları Eğitimi

Tez Yöneticisi: Doç. Dr. Elvan Şahin

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Bu çalışmanın amacı özel ortaokul öğrencilerin fen bilimleri dersinde internet ödevi kullanmalarına yönelik tutumlarını incelemektir. Daha spesifik olarak özel ortaokul öğrencilerin fen bilimleri dersinde aldıkları notların ağırlıklı ortalaması ile internet ödevi kullanmalarına yönelik tutumları arasındaki ilişkiyi araştırmaktır. Ayrıca, 5., 6., 7. ve 8. sınıf öğrencilerin deneyim, düşünce ve kullanışlılık açısından fen bilimleri dersinde internet ödevi kullanmalarına yönelik tutum farkları incelenecektir.

Bu çalışma, amaca yönelik örneklem yöntemi ile Çankaya, Ankara, Türkiye'de okumakta olan bir özel ortaokula ait öğrencilerinin katılımı ile yapılmıştır. Bu çalışmada 669 ortaokul öğrencisi yer almıştır. Fen Bilimleri Dersi İnternet Ödevi Tutumları Ölçeği; iki farklı araştırmacının ölçeklerinin adapte edilmesi ile geliştrilmiş ve katılımcılara uygulanmıştır.

Verilerin analizinde betimleyici ve çıkarımsal istatistik kullanılmıştır. Birinci araştırma sorusunu yanıtlamak için internet ödevi tutumuna ait boyutlar ile ilgili betimleyici bilgiler verilmiştir. Özel ortaokul öğrencilerin fen bilimleri dersinde internet ödevi tutumlarının boyutları ile öğrencilerin fen bilimleri dersinde aldıkları notların ağırlıklı ortalamaları arasındaki ilişkiyi belirlemek için korelasyonal analiz kullanılmıştır. Ek olarak, ortaokul öğrencilerinin sınıf seviyelerinin fen bilimleri dersine ait internet ödevi tutumları üzerindeki etkisini araştırmak için MANOVA kullanılmıştır.

Bu çalışma, özel ortaokul öğrencilerin fen bilimleri dersinde aldıkları notların ağırlıklı ortalamaları ile internet ödevi tutumları arasında anlamlı bir ilişki bulunduğunu göstermektedir. MANOVA sonuçlarına göre; 5., 6., 7. ve 8. sınıf öğrencileri, internet ödevleri tutumlarının boyutları olan kullanışlılık, deneyim ve düşünce açısından farklı sınıf seviyelerinde, 5. sınıfların lehine anlamlı farklılık göstermiştir.

Anahtar Kelimeler: İnternet Ödevi, Ağırlıklı Not Ortalaması, Sınıf Seviyesi, Fen Bilimleri Dersi, Tutum

To My Parents; Nihat and S. Ayhan Mumay,

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And Love; Ahmet Suat Yıldız

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LIST OF ABBREVATIONS

OHW: Online Homework

THW: Traditional Homework

COHE: Chemistry Online Homework Evaluation

AQCOAC: Attitudes Questionnaire Concerning Online Assignment Checking

ATOHS: Attitude toward Online Homework in Science Lesson Scale

GPA: Grade Point Average

ISLE: Internet Based Science Learning Environment

METU: Middle East Technical University

THO: Thought

EXP: Experience

USE: Usefulness

df: Degrees of Freedom

DVs: Dependent Variables

SD: Standard Deviation

M: Mean

CHAPTER I

INTRODUCTION

As the humankind evolves, education has had a great place among research areas. What make education so important are definitely its outputs. John Dewey termed ‘education’ as specific activity of renewing experience in an individual with and within a social group (Martin, 2003). Since education is an output for individuals, how individual receive education can be categorized as formal, non-formal and informal. Dib (1988) states that formal education is a systematic education model that structured and administered according to a given set of laws and norms by teacher or institution with a must of a minimum number of student existence, generally ends up a final institutional assessment. When student, institution or instructor readiness is not required, then the non-formal education can take place. Nevertheless he describes that informal education is quite diverse from formal and non-formal education, because it is neither structured by a professional instructor or an institution, nor provides an institutional assessment.

In this study, research field was settled in an elementary school, where formal education took place. Therefore, it is required to deal with formal education. When formal education is examined across the various countries, it is concluded that the general aim of the education differs (Colardyn, Bjornavold, 2004). For example, in Turkey, elementary school curriculum in formal education reform addresses to four

fundamentals; individual, society, historical-cultural, and economical (Koç, Işıksal, Bulut, 2007). Upon these fundamentals, educational aims are shaped by needs assessment (Akpınar, 2004). With needs assessment objectives are generated, contents are prepared, educational methods are put on and evaluation takes place, in sequence. Needs assessment is conducted to point out in what fields' educational objectives should be set. These fields are termed as individual, society, subject area, and nature. Since this study is a part of "Science Lesson" as subject area in elementary grade levels, following questions are important to ask. What is the need of science lesson in order to continue to develop? How objectives should be refined in order to serve science teaching better? In order to satisfy science lesson's needs, it is important to have deep understanding on context of science learning.

Learning science in all grades focuses on developing basic and technical scientific skills, values and knowledge like for most curricula (Dow, 2006). It is aimed that teaching activities are directed to students at schools in such a way that students learn the scientific concepts as long-lasting as possible. Especially in the last two decades, a wide range of research studies have been conducted in the scope of science education giving teachers new insights to implement in elementary schools (Anderson, 2007). How to define learning and knowing science is regarded as a major question frequently asked in the context of science education, and its way goes through by understanding scientific literacy (AAAS, 2003). National Science Education Standards (2000) defines scientific literacy as both science content knowledge and reasoning this knowledge. More specifically, scientific inquiry emerges by observing, making inferences, describing, explaining, and predicting

natural phenomena through everyday experiences. Development of scientific literacy requires proper use of any kind of material by students and teachers in science learning environment (National Research Council, 2000). For this purpose, there are various science teaching approaches and models in science education. These models generate teaching strategies and techniques. Teachers use teaching strategies such a way that retention of learning can be achieved. All activities made in school and out of school aim to make students conscious about science in terms of skills, values and knowledge (Treagust, 2007). A general out of school activity is regarded as homework that is school studies or tasks which are done in or out of the class (Cooper, Valentine, 2001). Homework is also regarded as a teaching strategy among a number of teaching activities. According to Cooper (1989), giving homework is a pervasive teaching strategy used in schools. Walberg (1991) compared results of eleven reviews in instructional strategy including homework, and pointed out effect of homework on academic achievement of the students for both elementary and high school students. Also, Newby and Wintebottom (2011) describe homework policy as a tool of self and peer assessment type in schools. In Murthy's study (2007) giving homework with rubric as a regular basis is also accepted an assessment type.

Homework aims keeping students on the learning material, and structures students' work in such a way that long lasting learning is enhanced. There are different types of homework in use which are creative, extensive, preparation and practice (Altun, 2007). Those types are used for different purposes. Mostly in schools practice purpose is observed, because retention of learning is linked to the number of practice (Roediger, 2014). Additionally, for higher order thinking skills creative and

extensive ones are also be included. This is achieved by increasing in the quality of homework but decreasing quantity of its (Vatterott, 2014). For those higher order thinking skills, developing new homework practices to reinforce the mind-set is also an argument to improve retention in learning process (Tough, 2012). Additional to short term basis homework, there is also long term basis homework that many educators advice the usage of both (Kohn, 2006). Long term homework is generally in the format of a project and its evaluation includes more formative elements. It is generally for the creative and extensive homework and refines students' research skills, as well as improves real life integration capabilities. Short term homework is usually for the preparation and practice purpose and retention of the academic knowledge is considered. Homework can be assigned to the cooperative groups as well as to individuals (Kohn, 2006). Cooperative learning refers to working cooperatively in small groups to share ideas, and complete certain academic tasks (Davidson, Kroll, 1991). Researches about cooperative learning result in similar outputs that it is the most productive learning technique and it enhances the highest academic achievement among other techniques (Sharan, 1980; Slavin, 1980; Johnson et al., 1981). Among all above mentioned elements, (purpose-creative, extensive, preparation and practice-; duration-long term, short term-; receiver-cooperative group, individual-) educators try to choose best for their students regarding what they expect. In current study's context; the purpose of the homework is "practice", its duration is "short term"; and it is assigned to "individual" students.

There is a variety of thought whether giving homework provides effective learning, whether it promotes academic success, and helps students' develops

important skills like time management, taking responsibility etc. Just the discussion has been going on whether homework is really needed or not (Gill, Schlossman, 2000); different sources of homework are being evolved from day to day.

1.1. Online Homework

Internet is a way of communication, education, shopping, and changing ideas. Although today's internet's user friendly format was set in 1991, there had been other primitive format before that date. Only the informant individuals could use the computer systems. Over two decades internet has become commonplace in many aspects in our daily lives (Songer, 2007). According to the results reported by ITU in Türkiye, 48% of the country population uses internet (ICT ITU 2015 © http://www.itu.int/net4/itu-d/icteye, retrieved 28 Jan. 2015). According to a study, 78% of American children ages 12-17 go online in a regular basis; however children's use of internet in the educational purposes, especially in schools is not as common as use of internet in other purposes (Levin, Arafeh, 2002).

Since internet use is very integrated to our daily lives, recently, the usage of internet based homework (online homework) has been accelerated all over the world. Online homework (OHW) is becoming common among the schools, from primary school to college; from public school to private school; lots of teachers, students, and other users have accounts and actively use these systems (Malevich, 2011). There is no strict classification in terms of content of the online homework, because online usage is varied a lot. Reading a passage from a web site, taking online tests, playing

educational online game; preparing, sharing and receiving slides, concept maps, and electronic portfolios; researching information from web site, using e-mail or other web2 tools to post homework and so on (Zisow, 2002).

Online homework is generally in the format of an internet site. However there is a range of online homework usage. First, it differs in terms of right of use. Some are free, some requires limited free use, and some are commercial, that is subscription is needed in exchange for money annually. The payment is done sometimes by individual, and mostly by institution. Second, it differs in terms of accessing devices to the certain sites; whether smart phones, pads, or computers are used. Thirdly, it differs in terms of necessity of access. Some free or limited free online homework sites generally neither require username, password log in, nor recognize the user. They do not keep the data about user, for example, when s/he enters the site, how is his/her performance etc. They are like just practice, and usually are organized as online game in order to motivate students to visit site page. Mostly, and also in the context of the present study, the online homework site requires to log in, it is paid off by institution and supported by smart phone, pads and computers, and its content is mostly taking online tests. Here, it is curial to keep the students' homework completion control by teacher and provide penal sanction if necessary, in order to obtain full completion of homework.

There are advantages and disadvantages of online homework over traditional homework in terms of educators and students. Online homework provides immediate feedback about the wrong answers of questions, randomize questions' order, and decrease the time for grading. However it may lead students give answers with trial-

and-error strategy without reasoning; and may not be suitable for entire subject areas. (Arasasingham, et al., 2011; Revell, 2013; El-Labban, 2003; Hauk, Segalla, 2005; Palocsay, Stevens, 2008, Zerr, 2007; Al-Jarf, 2011).

A good representation of advantages and disadvantages of online homework usage is stated in the study of Bonham et al (2001);

> […](1) automated homework systems permit more practice (quantity and frequency), which encourages students to stay on top of the material; (2) they give immediate feedback and enable students to master the material by correcting their own mistakes; and (3) they eliminate the easiest form of cheating by offering randomized variables in questions for each student to solve. On the con side, (1) the computer (usually) gives no indication as to why a problem might be wrong; (2) multiple submissions could lead students to adapt a trial-and-error strategy instead of carefully thinking through the problem; and (3) simply grading a number tends to put even more emphasis on getting the final answer right by any means without actually understanding the process.

It can be inferred from this quota that understanding the mistakes and correcting accordingly is a powerful output of online homework, however grading should not prohibit the understanding the material. From this quote, 1st con side view, that is *"the computer (usually) gives no indication as to why a problem might be wrong"* is sometimes eliminated by introducing feedback section. However, this process may differ from one online homework site to another.

Traditional homework is still much in use than online homework systems. However, the online homework users' number is increasing day to day (Taraban, 2005). In order to use it among schools, we should know that how students feel about it. Whether they enjoy or not; whether they can easily use it or not, etc.

(Arasasingham, 2011). Also its usefulness and the coherence with the science education in constructivist approach are the other aspects to be considered.

1.2. Science Education Approaches and Online Homework

Constructivism is a major theoretical foundation of contemporary science education (Matthews, 2002). Constructivism is a learning approach improved by Piaget (1972), Ausubel (1968), Von Glasserfeld (1987) and Vygotsky (1978) that individuals construct their own knowledge by themselves. In order to establish this approach, various materials could be used in science teaching (Demirbaş, 2014). Those can be experimental materials or everyday usage objects in order to conceptualize the learning material. Recently, computer technologies are also counted as a constructive approach media. Using computer technologies gives students the opportunity to observe a real world experience and interact with it (Yenice, 2003) and provides opportunities to construct knowledge by analyzing and interpreting in computerized learning environments (Aydede, et al., 2010). Because the fact that in constructivism individuals are responsible from their own learning at their pace, computer technologies are alternative coherent media for constructivist approach in science education (El-Labban, 2003). Online homework is one of the computer technology application used in science lessons. In science lesson traditional homework items ranges from multiple choice, true-false, open-ended, matching, ordering, short answer etc. Those can be easily adapted to the online homework, as well. So, online homework in science lesson can be accepted compatible with the

constructivist approach of science teaching. Although, it is coherent with the constructivist approach, a science educator should always try observing the students' reasoning behind their answers, the way they answer the questions in the homework by regular question-answer sessions in the class time. That is teacher resolves the previous homework questions in class time and tries to improve students understanding by their replies.

1.3. Purpose of the Study

Homework is an expanded activity of schools all over the world. It extends beyond its boundaries from paper to online now. In order to understand whether students appreciate this extension, the purpose of this study is to investigate attitudes of students toward online homework practices in science education in terms of whether students find it useful, what experiences they are possessing, what their thoughts about online homework in science education are, and how their self-reported grade point averages in science lesson is related to their attitudes toward online homework. For these specified purposes, the following research questions guided the present study.

1.4. Research Questions

In this study private elementary school students' attitudes toward online homework in science lesson is examined. More specifically, the research questions investigated in this study are:

1) What are the private elementary school students' attitudes toward online homework in science lesson?

2) Is there a significant relationship between private elementary school students' attitudes toward online homework and their self-reported grade point average in science lesson?

3) Is there a significant grade level difference in terms of their scores on online homework experience, usefulness, and thought in science lesson?

1.5. Definition of Important Terms

(Traditional) Homework refers to school studies or tasks which are done in or out of the class (Cooper H., Valentine J., 2001). (Traditional) Homework could be also assigned to students by school teachers that are meant to be carried out during nonschool hours (Cooper H., 1989).

Online Homework (OHW) means assigning homework to students via the internet, which generally records the students' homework scores and provides feedback to them.

Grade point average (GPA) is the average of the students' scores of science lesson for particular grade levels.

Attitude is the view of a person whether positive, negative or neutral for a particular topic (Petty, Cacioppo, 1981, p.7). Attitude was measured by "Attitude toward Online Homework in Science Lesson Scale" (ATOHS) consisting of three dimensions, namely; Experience, Thought, and Usefulness.

Private Elementary School (in Turkey) is a kind of elementary schools, where parents pay for the education of their children contrary to public schools (in Turkey). In study context, the school where the OHW was implemented was an institutional private elementary school. This institutional private elementary school has branches in different cities in Turkey, and its board of directors is tied to a university having same name with this school.

1.6. Significance of the Study

There are variations of online homework studies in the literature. Those studies mostly include college level students, ranging 18-25 ages. Students in these age interval are generally accepted as they have high level of internet efficacy. This is also attributed to the experience they have compared to smaller grade levels' computer use experience (McCoy, 2010). Oppositely, in the literature, online homework usage among elementary grade level students is unheeded. However, it is obvious that smaller grade levels can also use computer and internet. They engage

with the internet at different environments (Muslu, Bolışık, 2009). Therefore the data taken from elementary grade level students is substantial.

Teachers give a number of homework in order to provide practice chance to students during a year (Altun, 2007). The quality of homework and being submitted by students in a regular basis is very important for their achievement (Voorhis, 2004), and submitting homework is a very general procedure of schools' daily routine. When it is noticed that there are a number of schools across the world, shifting traditional homework to online setting can result in dramatic impact among the school. So this study reveals some good findings and implications for teachers who give homework to their students, especially for science teachers instructing in elementary school grades.

1.7. My Motivation for the Study

My interest to the online homework in science lesson begins with the fourth year of my science teaching experience. The science department of the school where I was employed had intended to facilitate online homework in science lesson from 5^{th} grades to 8^{th} grades in order to make class time effective by decreasing time devoted to give homework feedback. Features like giving feedback via online, keeping students' homework scores easily and flexibility accessing the homework by the students excited me as a teacher. After implementation got started, I changed my point of view from online homework's beneficial features, to the students' attitudes toward online homework in science lesson; because I observed that students were

diverged in terms of feelings about online homework in science lesson. Some appreciate the online homework in science lesson much, some did not. I also observed that different grades had different feelings about online homework in science lesson. So this kind of interest that I experienced through the implementation of this system motivated me to investigate about to private elementary school students' attitudes toward online homework in science lesson. Knowing whether students' had positive attitudes toward online homework in science lesson or not was important in order to decide about continue to implement this system. Since this paper is an academic study, I went beyond from observing students about their attitudes toward online homework in science lesson, to conducting a research about it.

CHAPTER II

LITERATURE REVIEW

The current study aims to investigate private elementary school students' attitude toward online homework in science lesson, and mainly study tries to describe attitude, to show the relation between self-reported grade point average and attitude, and also to see whether there is a difference between grade levels from 5^{th} to 8^{th} and dimensions of attitude; usefulness, thought, and experience. Hence this chapter is devoted to the literature review regarding study's aim and research questions' components; internet use in science education, homework, internet use in homework, in other words, online homework (OHW) both in science lessons and other lessons, effects of OHW to students' achievement and attitude-in terms of advantages and disadvantages will be covered by collating with traditional homework.

In literature, there is a huge body of studies about above mentioned topics. In this chapter the related studies will be given in a manner that includes current study's aim and research questions' components.

2.1. Internet Technology Use in Science Education

Internet technology use in education has been expanded as the internet expands over the decades. However, assessing the effectiveness of technology use in

education does not give its results as rapid as its use (Feldman A., et al., 2000). The effects of the internet use in education should be understood closely. It is also true for internet based science learning environments. Since scientific literacy requires a proper use of technology in science learning environments, and scientific literacy aims *to acquire content knowledge and reasoning this knowledge by analyzing data, building explanations from the evidences, and engaging with the scientific questions* (National Research Council, 2000), internet technology use in science education should service these goals. The shift of science learning environments to internet based science learning environments brings some problems in terms of teachers' pedagogical adaption and lack of circumstances. Even though teachers are willing to use internet in science teaching, they mostly do not know what to do. Also lack of resources and time limit challenge them to bring internet use in science classrooms (Norum, K., et al., 1999). A study conducted with fourth and fifth grade students' motivation to use internet as a media describes that students are active to meet their *cognitive, affective, social, and personal integrative* needs. Also the content and the accessibility features of the media are the factors affecting their motivation to use internet in science lesson (Gelmez S., Yıldırım A., 2014). Since internet is a type of technology, elementary grade level students' attitude toward technology in science lesson is important to review. According to a study (Ardies J., et al., 2015) domain of attitude toward technology is defined namely, *interest, career aspirations, boredom, perceptions of consequences, percieved difficulty and gender issues*. Results of this study reveals that presence of technological toys at home has a significant positive correlation with all sub factors. Presence of technological toys in the home has a

larger effect on boys than on girls in terms of career aspirations and the perceived difficulty of technology. Students who have technological curriculum tend to have more ambition towards a technological career or study. Students are more interested in technology, are less anxious about it and have a more positive view on the consequences of technology. Boys and girls are different when it comes to their interest and ambitions regarding technology. Boys find technology less boring than girls.

A comprehensive meta-analysis embracing years 1995-2008 and derived from "The Social Sciences Citation Index" consists of 65 studies made in the area of internet use in science learning (Lee S., et al., 2011). This study generally defines internet based science learning environments (ISLEs) as online resources, searching via internet, blogs, forums, wikis, simulations, animations, virtual realities, online games, web 2.0 tools, e-portfolios, online homework (OHW) or combination of above. Beyond any doubt, the ISLEs are not restricted with those, because as previously it was discussed, internet based applications production and usage in education is rapid. This meta-analysis mainly describes two top categories. First is the role of learners' characteristics in ISLEs, and second is the learning outcomes derived from ISLEs. Of 65 studies; in 13 studies, learner characteristics and ISLE relation, and in 52 studies learning outcomes and ISLE relation are investigated. Demographics (social economic status (SES), gender, and ethnicity), prior knowledge, and self-efficacy form learner characteristics. Attitude, motivation, conceptual understanding, conceptual change, cognitive skills, and cognitive skills specific to science inquiry form learning outcomes. Synthesis from the studies shows

that female students are more self-regulated and self-paced in ISLEs than male students. However there is not any strong evidence that SES or ethnicity is related to learning in ISLEs. Students with high level of prior knowledge access more relevant information and have more sophisticate searching abilities about scientific topics. In general, students' attitude is positive toward school science and computer and network usage in science lesson. The researcher relates the outcomes with the fact that students feel comfortable when they control their own understanding. Also, it is found that high achievers have higher attitudes. However one study (Cole R., Todd J., 2003) is not parallel the general views that low achievers have higher attitudes. The argument behind this is the fact that there is a variety of different applications inherent to ISLEs. Motivation is found to positive among the students since the visualization, learning control, self-pace features of the ISLEs. Most of the study reveals that conceptual understanding is enhanced by ISLEs including OHW, as well as it is found that students' misconceptions can be altered by ISLEs. Students cognitive skills in general (self regulation, problem solving, visual-spatial ability), or in specific to science inquiry (nature of science understanding, argumentation in scientific concepts, science process skills), and ISLEs triggers a significant relation.

From the literature it can be inferred as online homework practices are counted as a technology use in science education, and before dealing with the literature of online homework applications, it is crucial to understand, and master about homework itself by reviewing its related literature too.

2.2. Homework

Homework is generally termed as extra work that is completed out of school. It is a very common practice of schools, since it is thought that it enhances students' learning in all disciplines. However the fact that learning enhancement is obtained via homework is not an entirely supported claim by the researchers. There is a body of studies in the literature about homework effects on students' academic performance, students' and parents' perceptions about homework; parental involvement, the amount of time devoting to homework, and miscellaneous aspects of homework.

Although it differs by students' grade level, neighborhood they live, individual differences; studies made in the field of research show that homework completion affects students' academic performance positively (Cooper H., et al, 1998; Bursuck W., 1994; Cool V., and Keith T., 1991). According to Hallam (2004) homework can foster learning and lead academic performance at a point; however when it exceeds its boundaries academic performances decreases. However according to Van Voorhis (2003), academic performance and homework completion is not a cause-effect result but it can be reviewed as a relationship. According to Bennett (2007), making synthesis from researchers' studies that, the fact that academic achievement and homework completion is related is not appropriate; because in the studies the achievement is observed by the teacher-created tests, which does not tell a real correlation. A study conducted with science teachers in elementary grades shows that majority of science teachers give homework because it

enhances practicing knowledge and skills learned in the class. Also they give mostly problem-solving and research type homework (Taş Y., Sungur S., Öztekin C., 2014). While everlasting researches to understand homework's value are carrying on one side; some other discussions also resume about how much homework should be given for certain grades. There is a variety of proposals about this issue. The common point is that higher grades are more eager to homework load than lower grades (Cooper H., et al., 1999; Hoover-Dempsey K., et al.; 2001; Kohn A., 2006). Van Voohirs (2004) offers that from kindergarten to second grade 20 to 30 minutes long; and 30-60 minutes long from third to sixth grades. A similar conclusion is made by Cooper H. (2001) that first grade students should receive 10 minutes long homework. For each progressing grade 10 minutes should be added to this time.

Since homework is mostly out of school activity, it often occurs in the supervision of the parents. According to Hampshire, P., et al. (2014) parents have mainly three role while involving child's homework, as prompting child to begin & stay on work, help to find direction as well as sources, and reinforce. A study conducted with science teachers in elementary grades, reveals that majority of the science teachers inform parents about their children's homework at parent-teacher meeting sessions (Taş Y., Sungur S., and Öztekin C., 2014). In Delgado-Gaitan's study (1992) parents are found to be ready to help their children with their homework. They see this situation as a parental job. Also in Leone and Richards's study (1989); it can be said that parents' perceptions about homework is strongly related to students' perceptions about homework. That is if parents have positive attitude toward homework, students also have positive attitudes. Hoover K., et al.

(2001) also relates parents' involvements have positive effects on students' academic performance. Similarly Epistein et al.'s study (2002) highly values on the parental involvement to encourage students' school works. According to them there is no else important topic than parental involvement in education. Bennett (2007) also thinks parents should be given speech right in the parent-teacher meeting sessions. Not only teacher should announce expectations about students; but also parents state their thoughts. Parent involvement in homework issue is placed value in the study of Van Voorhis (2004) as researcher gives homework general aim in the focus of parents, as he claims homework aims to set school-pupil-parent communication and homework executes parent expectation. Turanlı's study (2009) reveals that parents' thoughts about contribution of homework are much than students' thoughts for short-term as well as long-term assignments. Although parent involvement is so crucial in homework, some parents are not sure about how to involve students' homework, how to encourage or help them (Turanlı A., 2009). The parental involvement of the homework is studied in Copper et al.'s study (2000) that, autonomy support, which is indirect involvement, is positively related with student achievement, whereas direct involvement is negatively related with student achievement.

Miscellaneous aspects are other issues to consider, while evaluating homework. Muhlenbruck, et al. (2000) state that homework creates some skills as time management, which is more valuable than homework content itself. Also homework brings in other proximal student outcomes like *responsibility, confidence, persistence, goal setting, planning, and the ability to delay gratification* that a child develops himself personally (Bempechat J., 2004). Because of homework negative

effects is also seen. According to Baumgartner et al. (1993), too much homework decrease relaxing and socializing. As well as reading for fun decreases after 8 years old, since the load of homework (Yankelovich, 2006). Similarly, Hampshire et al.'s (2014) study also states that careful planned homework can help students develop organizational skills and promote self-management, so that they build self-determination skills.

2.3. Online Homework

Online Homework (OHW) systems are diverged from discipline to discipline, from institution to institution, and from grade level to grade level. For all that, in order to draw a general picture of OHW, its leading properties can be given as follow. Students can access tests, quizzes, sets of problems, interactive programs etc. via any computer network in world, also any time they want-as long as there is a due date. Generally, students get their feedback immediately as "correct" and "incorrect". Students also see the explanations of their incorrect answers as long as educators enter the explanations. Most of the time students are allowed to resubmit their homework as much as they want, furthermore either their first, best, or last attempt scores are kept, depending on how educator set the calibration. Generally gradebook is formed for each class making easy for educator to track the whole class or an individual student's homework habit.

If literature is reviewed in terms of grade level and courses; it can be said that OHW is an application mostly among college level students. Also it is seen that,

there is no distinction about the courses. The courses vary to a big extent. Since there are a variety of OHW applications spreading mathematics to physics, astronomy to business, it is rather needed to categorize the studies as science lesson and non-science lesson. Here, science lesson refers to courses like physics, astronomy, thermodynamics, chemistry, biology, and science (for elementary grades); whereas non-science lesson refers to mathematics, statistics, business, second language (Arabic, Spanish), calculus, algebra, and economics, respectively.

Also, from the literature it is seen that there is an inclination among the researchers to see the effects of OHW in terms of achievement and attitude by comparing OHW and traditional homework (THW) systems.

2.4. Online Homework in Science Lessons

Just like internet has been evolved from 1969 to now, internet use in homework (OHW) has been also evolved. At the very beginning of the internet use in society, the internet tooks its place in education too. Since homework is a very general application of the education in common, OHW has been also evolved from day to day. For example, a PLATO lesson which is designed for college physics students to submit their homework on internet in 1971 is a very first application of OHW. Sherwood (1971) states that in PLATO lessons students get their homework from any computer in the same location and link to a remote computer. Actually it is not a today known OHW application because students had to stay in the building to complete the homework. This study's results show that; students are much more

active when studying on the internet than studying on paper and pencil. Also OHW makes a lecture more valuable, and students reach finer outputs and shortcomings. Same finding is also true for the Computer Assisted Personalized Assign System (CAPA) which is applied in 1976. Since, before the lecture, teacher assistant and the lecturer know what is understood and what is not understood by the students (Kashy E., et al., 1993). To give findings from more recent study (Beichner, et al., 2007), in "The Student Centered Activities for Large Enrollment Undergraduate Programs Project" (SCALE-UP Project), lecture is formed with rich teaching activities by integrating computer applications. One part of this project, OHW is used. And study reveals that, students are more conscious about the lecture before coming class. And this allows lecturer focuses on the activities rather than spending valuable class time to misconscious situations. Okuno et al.'s study (2010) can be given as an example of OHW application in a large sized laboratory classes. Their study reveals that students are prepared next laboratory application before coming class which makes lectures much more effective. This conclusion is very similar with those PLATO (1971), CAPA (1976), and SCALE-UP (2007) lessons. Also another study which investigates relation between students' attitude toward OHW and their achievement shows that; students with high attitude also have better exam grades in a chemistry course (El-Labban, 2003). This study is significant for the current study; hence it serves one of the research questions of it, that it argues grade point average and the attitude toward OHW relation in science lesson, which is scarce among other studies in the literature.

2.4.1. OHW and THW in Science Lesson in terms of Academic Performance

A study including algebra and calculus students in a physics course reveals some facts that method of assigning homework whether online, or traditional; makes little difference on students' academic performance. Although OHW takers test and quiz averages are slightly better than traditional homework (THW) takers; it is not statistically significant. However when students future preferences are asked; mostly OHW is elected. Also OHW takers spend more time on the learning material than THW takers. Researcher also adds that giving and grading the homework is much more effective in OHW. (Bonham S., et al., 2001) Another study reveals similar findings with Bonham et al., that there is no any statistically significant difference between academic performance between OHW and THW. However there is a difference between these two studies that latter also includes different teaching methodologies as Interactive and Non-interactive. It is found that there is only significant difference between OHW and THW takers' academic performance in favor of OHW takers when they engage interactive teaching method. (Cheng K., et al., 2004). Allain and Williams's study (2006) also reveals that there is no difference between THW and OHW takers academic performance in an astronomy class. Nevermore OHW takers are reported that they spend much time outside of class, though researcher thinks that passed time may be ineffective too. Difference between students' perceptions about THW and OHW as well as their grade point average difference between OHW and THW takers in a physics course is also determined in Demirci's study (2007). The study shows that there is no statistically significant

difference between THW and OHW in terms of their GPA. However there is a significant difference test averages of OHW and THW in favor of THW. Another THW and OHW comparison is made in the study of Taraban, et al. (2005), and Babb et al. (2011). Taraban et al.'s study shows that OHW takers have high test scores in the thermodynamics course. Results show that there is a difference in terms of students' academic performance. The study's researcher believes that the difference is due to immediate feedback. And Babb et al.'s study results that implementation of OHW improved students' success in the chemistry course. In a study consisting of engineering dynamics students, it is found that OHW takers improve their test score (Flori R., et al., 2002). Similar finding is true for Dufresne et al.'s study in large enrollment physics course (2002). However these studies reveal different outcomes those Bonham et al (2001), Cheng, et al. (2004), and Allain, et al. (2006) studies by the means of OHW takers' success are improved.

Completion that is taking OHW in a frequent manner also affects students' academic performance positively. In Revell's study (2013) it is found that students who complete OHW with a 75-100% frequency, have greater grade point average (GPA). Those who complete OHW with a 50-75% frequency have lower GPA. Those who complete OHW with a 0-50% frequency whether fail or withdraw the course. It can be drawn that, students who make more practice via OHW have grater GPA, at the end of the course.

2.4.2. OHW and THW in Science Lesson in terms of Attitude

Arasasingham et al.'s (2011) attitudinal study expanding 6 years with multiple sections and multiple instructors in chemistry course reveals that OHW provides over-all benefit that students are motivated learning introductory chemistry course. And an appropriate designed OHW directs students to have a deeper understanding by providing different set of questions, giving effective feedback, and supplying a range of practice. Another interesting result is that faculty members' (teaching assistants, lecturers, and professors) attitude toward OHW also affects students' attitudes toward OHW. A similar result is found in CAPA system that students are motivated and diligent toward the course. (Kashy E., et al., 1993)

Laboratory implications are inherent part of science lessons. And for large sized classes, it is harder to meet needs of the students' laboratory experiences comparing with small sized classes. In Okuno et al.'s study (2010); compulsory OHW is used to resolve this phenomenon in a large sized introductory electronics laboratory class. Students are previously acknowledged about the next experiment via OHW. It is seen that students have positive attitude about OHW in laboratory practices, and also researcher reports that students acquire good understanding of experiments. Also in the study of Revell (2013) students' attitudinal responses show that students give high rank to OHW because they find it helpful. Students find OHW helpful especially for its features like "hint", "suggestion" and "immediate feedback". According to Babb, et al.'s study (2011); chemistry students' attitude toward OHW is also positive, and most of the students report that they would

recommend OHW to others and they think OHW should continue for the future classes. Similarly in a physics course, Demirci (2007) states that overall, computer education students' perception of OHW is positive.

2.5. Online Homework in Non-Science Lessons

A well organized survey about attitudes toward OHW in "Principles and Statistics" course is attended by different type of participants in terms of their intended major (business, liberal arts, education, science, and fine arts), gender, year in school, self-reported GPA, learning style, and existence of previous experience of computer-assisted learning (visual, auditory, tactile) which makes 687 students. Those participated students are overwhelmingly reported that OHW is useful in learning material, and less required assistance to understand. They feel predominantly positive about flexibility in pace and find feedback helpful provided by the system. It is also found that gender and learning styles are no related with attitudes toward OHW, whereas GPA and intended major are consistently related (Doorn D., et al., 2010). Although this study does not represent all the university students' attitudes toward OHW, especially those non-science lessons, yet it is a good example behalf it includes different intended major fields inside. Similar finding is true for the study in the "Introductory Finance" course (with 102 participants), that large majority of the respondents state that they find OHW helpful for improving understanding of finance concepts, and also helpful for preparing exams. (Chu S., Man H., 2010). Also Smolira's study (2008) conducted in Finance

course among undergraduate and MBA students show that students appreciate immediate feedback feature of OHW. And the study revealed that MBA students have higher satisfaction toward OHW than undergraduate students. Also researcher adds that the lag inherent in THW is a reason why previous studies about this issue show that homework does not lead students' performance. From researcher's that statement, it can be argued that, previous studies about THW effectiveness' results can be altered by replacing THW with OHW.

2.5.1. OHW and THW in Non-Science Lessons in terms of Academic Performance

In a moderate-sized algebra class, academic performance of the students who take OHW and THW are compared. And it is found that students' scores are not significantly different from each other. (Hauk S., Segalla A, 2005). Similarly in a business statistics course, students were assigned by three different OHW systems and THW, their performance were tested with a common assessment test. And it is found that homework type makes a little difference on students' academic performance (Palocsay S., Stevens S., 2008). A similar finding between THW and OHW is made in Williams' study (2012) and it is found that the OHW takers' grade average is not significantly different with those THW; besides THW takers' grade average is slightly better than OHW takers' grade average. This result makes this study unique among other studies.

On the contrary in Zerr's study (2007) whose study context allowed students "attempt, get feedback, and reattempt" sequence, revealed that calculus students' engagement with OHW yielded an overall student performance. Same evidence is found in Hirsch, and Weibel's study (2003) that there is a small but significant difference between OHW and THW takers' academic performances. Similarly, in a Spanish course, students' academic performance was tested with two different language assessment tests, and the findings indicated that there is a significant increase in grammar scores, especially vocabulary acquisition. (Sagarra N., Zapata G., 2008).

Also a study with 5^{th} grade participants showed that in mathematics course students performed better in OHW than THW with a .61 effect size, which is statistically significant. In this study OHW is given in a scaffolding manner that is feedback and hints helps students to give the answer by probing (Mendicino M. et al., 2009). A close result is also true for a study consisting of the engineering statistics course. With a quasi-experimental design; students OHW and THW takers exam scores are compared. With a .70 effect size OHW takers improved their exams' score compared with THW takers (Arora M., et al., 2013). Another study for seeking the academic performance effectiveness of OHW and THW in algebra course; it is found that students' success rate is different from each other in favor of OHW, however researcher believes that it is not an enough evidence because of inadequate number of participants; and adds that further researches should be made (Kodippili A., Senaratne D., 2008).

Qualitative and quantitative scores show that students improve their post test scores in an arabization course, students show significant difference to understand learning material, apply, and distinguish English wording to Arabic wording. According to instructors' view, students' answers become more efficient, more accurate, and students improve their critical thinking skills. Also it is seen that frequency to log into OHW system and the posttest scores is also significantly related to each other (Al-Jarf R., 2011).

2.5.2. OHW and THW in Non-Science Lessons in terms of Attitude

In the study of Hauk, and Segalla (2005) algebra students' and instructors' qualitative and the quantitative survey results showed that students and instructors felt OHW was self-regulating and at least as effective as THW. Similar finding is true for Palocsay, and Stevens's study (2008) that immediate feedback of OHW may improve students' homework attitude. However in Zerr's study (2007), calculus students reported that OHW provided high level of satisfaction and they found it very useful. Similar findings is also true for the arabization course study that students have positive attitudes toward OHW in terms of giving variety of online resources, providing opportunity to improve their ability to analyze, and inquire learning material. They benefit the immediate feedback; also report that OHW improves other skills indirectly. For example; OHW (in this study it is forum based) forms a warm climate between students and instructor, also among students. Furthermore for those

students who have low level of computer efficacy, improve their computer skills (Al-Jarf R., 2011).

2.6. Summary

Homework affects students' academic performance positively (Cooper H., et al, 1998, Bursuck W., 1994, Cool V., and Keith T., 1991) to a point, when too much homework is assigned it affects students' academic performance negatively (Hallam S., 2004). However according to Van Voorhis (2003) it is not a cause-effect; but a relation. It is suggested that lower grades should receive fewer homework than elder grades (Cooper H., et al., 1999; Hoover K., et al., 2001; Kohn A., 2006). Parental involvement is important for homework; however it should be autonomous support, rather than direct involvement (Cooper H. et al., 2000). It is found that homework can foster students some other skills like time management, responsibility, confidence, persistence, goal setting, planning, and the ability to delay gratification (Muhlenbruck L., et al., 2000; Bempechat J., 2004). However it is found that reading for fun, relaxing, and the socializing decreases because of homework (Yankelovich, 2006; Baumgartner D., et al., 1993).

Internet based science learning environments (ISLE) studies are made in the literature in the light of two categories: Learner characteristics, that is demographics (gender, ethnicity, social economic status), prior knowledge, self efficacy; and learning outcomes that is attitude, motivation, cognitive skills, cognitive skills specific to science inquiry, conceptual understanding, and conceptual change. It is

found that all the learning outcomes and learners' characteristics are related with use of ISLEs, except social economic status and ethnicity (Lee S., et al., 2011). Consequently it is found that ISLEs are not harmful to science learning, they enhance science learning. Online homework in science lesson is also seen as s a type ISLE, and it is the core of this study.

Online homework is used mostly among college level students with divergent courses. According to literature, there is little or no difference between OHW and THW takers in terms of academic performances (Bonham S., et al., 2001; Cheng K., et al., 2004; Allain R., Williams T.; 2006, Demirci N.; 2007, Hauk S.; Segalla A., 2005; Palocsay S.; Stevens S., 2008). However there are some other studies revealing that there is significant difference between OHW and THW takers in terms of academic performances in favor of OHW (Taraban R., et al., 2005; Babb M., et al., 2011; Flori R., et al., 2002; Zerr R., 2007; Hirsch L., Wiebel C., 2003; Sagarra N., Zapata G., 2008; Mendicino M., et al., 2009; Arora M., et al., 2013; Al-Jarf R., 2011). Attitudinal studies reveal that OHW is as effective as THW, and students find OHW helpful and useful, especially the feature of the immediate feedback (Arasasingham R., et al., 2011; Revell K., 2013; El-Labban, 2003; Hauk S., Segalla A., 2005; Palocsay S., Stevens S., 2008, Zerr R., 2007; Al-Jarf R., 2011).

CHAPTER III

METHOD

This chapter is devoted to the research design and variables, detailed description of study participants, instrument development process, as well as data collection, and data analyses steps.

3.1. Research Design and Variables

The main focus of this study was to investigate the private elementary school students' attitudes toward online homework in science lesson. More specifically,

1) What are the private elementary school students' attitudes toward online homework in science lesson?
2) Is there a significant relationship between private elementary school students' attitudes toward online homework and their self-reported grade point average in science lesson?
3) Is there a significant grade level difference in terms of their scores on online homework experience, usefulness, and thought in science lesson?

In this study; private elementary school students' attitudes toward online homework; in terms of experience, thought, and usefulness in science lesson were examined. Therefore, to investigate research questions *"What are the private elementary school students' attitudes toward online homework in science lesson?"* and *"Is there a significant grade level difference in terms of their scores on online homework experience, usefulness, and thought in science lesson?"* survey research design was used. Survey research is collecting information from a sample to describe some aspects or characteristics of the population of which that group is a part. The main aim of the study is to describe the characteristics of the population. Therefore, survey research is the most coherent research design for these research questions (Frankel, et al., 2012, p.393). The present study also examined the relationship between private elementary school students' attitudes toward online homework scores in terms of experience, usefulness, and thought in science lesson and their self-reported grade point average in science lesson which required an associational research design. An associational research design is exploring relationships among variables in order to explain phenomena of interest. There is no manipulation of the variables; however it often provides guidance for subsequent experimental studies (Frankel, et al., 2012, p.368).

3.2. Study Context

In the present study, the online homework that was used by the private elementary school students was formed by creating quiz on a site.

The procedure of assigning online homework can be summarized as the following:

1) Science teachers prepared the questions, feedback explanations and then embedded them to the internet through the medium of online homework site.

2) Each weekend, one online homework was assigned for each grade level about science concepts they learnt in that week. At the end of a year each grade level took 30 online homework.

3) Additionally, some weekdays one or more than one homework was assigned for each grade level. However, in some weeks some grade levels did not take any homework because of other school circumstances, and grade level traits.

The features of online homework used in study context can be summarized as the following:

1) Video, figure could be embedded to the assignment.

2) Different type of question items like multiple choice, true-false, open-ended, matching, ordering, fill-in, and pop up was created (see Appendix A).

3) It gave immediate feedback to students when student completes homework. It formed a table showing what percentage a student scored. A student could see which answers that s/he made wrong and right. Then all wrong answers' right explanations were shown on (see Appendix B).

4) All homework could be taken again and again by the students that allow students make more practices. Teachers could see students' either first attempt, last attempt, or best attempt depending on which mode teachers chose during assigning the test.

5) Students' attempts were recorded by time and score.

The assessment in online homework procedure used in the present study can be summarized as the following:

1) Teachers could see all the grades of students from the gradebook (see Appendix C), and s/he could direct and motivate students verbally to increase the score by making them reattempt the homework.

2) If a student did not do homework, school rules were putting on. The first absence of the homework ended up with verbal warning; second absence of the homework ended up with parent warning; and third absence of the homework ended up with depriving from the club lesson.

The role of science teachers in terms of OHW: Generating questions, forming quiz, controlling other teachers' generated questions, making improvements, assigning the test online, announcing students that the quiz was assigned verbally in class time. After test's due date was expired, devoting 5-10 minutes to explaining the questions in class time, controlling quiz completence from the gradebook, and giving penal sanction if necessary.

Technical facilities of students and teachers: Before implement OHW in science lesson, students' computer ownership and internet access was questioned. And teachers got a session to learn how to enter questions to OHW system. Teachers obtained username and password to edit questions in OHW system. Also each student was assigned a user name and password at the beginning of the each year. Online classes were formed at the beginning of the each year. Students logged in

OHW system via their username and password to enter quiz at their home. If students had temporary technical problems, they were allowed to enter the system at the school computer laboratory. Teachers prepared, and assigned test at school, or at their home.

Institutional point of view in terms of OHW: School management paid for OHW system for each semester, supported teachers' need, and helped teachers to give penal sanction to certain students.

3.3. Participants and Sampling Procedure

The target population could be regarded as all elementary private school students that use online homework in Turkey. Apart from one institutional private elementary school students; the online homework users in Turkey are neither available nor organized. In current study, students' readiness in terms of having computer at home, having internet connect was searched, and risk analysis was made before beginning OHW in science lesson. The risk analysis showed that all students have personal computer and internet connection at home. After the implementation began, Turkey Qualification Association (KALDER) rewarded the science teachers and the school management due to OHW implementation in science lesson. Therefore accessible population of the present study was identified as students of that institutional private school which have branches in Ankara, Kayseri, Denizli, and Mersin. Sample of the present study was constituted of 5^{th}, 6^{th}, 7^{th}, 8^{th} grade level students at the private school using online homework in Çankaya, Ankara, Turkey.

There were 754 students that used online homework in that school. 669 students from all grade levels were reached from 754 students which makes 89%; which can be accepted high enough to represent study's accessible population. In Table 3.1, a descriptive statistics about participants' grade level is seen. Within 669 participants, there are 140 8^{th} grade students with percentage 20,9%; 170 7^{th} grade students with percentage 25.4%; 164 6^{th} grade students with percentage 24.6; and 195 5^{th} grade students with percentage 29.1%.

Table 3.1Grade Level of the Main Study Participants

	Frequency	Percent	Valid Percent
8th grade	140	20,9	20,9
7th grade	170	25,4	25,4
6th grade	164	24,5	24,5
5th grade	195	29,1	29,1
Total	669	100,0	100,0

In Table 3.2 a descriptive statistics about participants' online homework completion in science lesson is seen. Participants who thought they completed the 0-19% of total given online homework was described as "least completion"; 20-39% of total given online homework was described as "less completion"; 40-59% of total given online homework was described as "normal completion"; 60-79% of total given online homework was described as "good completion"; 80-100% of total given online homework was described as "most completion".

4.3% of the participants reported that they completed online homework as "least completion"; 4.0% of them reported that they completed online homework as "less completion"; 6.1% of them reported that they completed online homework as

“normal completion”; 21.1% of them reported that they completed online homework as “good completion”; and 64.4% of them reported that they completed online homework as “most completion”. This finding is presented in order to give evidence that most of the students completed their homework in a high completion level.

Table 3.2 Main Study Participants’ Online Homework Completion

	Frequency	Percent	Valid Percent
Least completion (0-19% of homework)	29	4,3	4,3
Less completion (20-39% of homework)	27	4,0	4,0
Normal completion (40-59% homework)	41	6,1	6,1
Good completion (60-79% homework)	141	21,1	21,1
Most completion (80-100% homework)	431	64,4	64,4
Total	669	100,0	100,0

In present study the purposive sampling technique was used. A purposive sampling is a type of nonrandom sampling that is most effective when one needs to study a certain cultural domain with knowledgeable experts within. However the researcher should explain the reasons (Tongco, 2007). Since, in current study, researcher aimed to identify sample’s characteristics about online homework, sample had been constituted by participants who were experienced with online homework. Until all participants from all grade levels received the survey questionnaire, they had experienced online homework in science lesson for 15 months.

3.4. Data Collection Instrument

In order to access the studies done in the field of online homework attitudes, the available databases from all over the relevant media including METU associateship as well as Google Scholar and ULAKBIM Turkish National Databases were searched. In this study data was collected by the "Attitudes toward Online Homework in Science Lesson Scale" (ATOHS) (see Appendix D) which was developed by the researcher through adapting two scales. Adapted scales were previously developed by other researchers, which are "Attitudes Questionnaire Concerning Online Assignment Checking" scale (AQCOAC) (Pundak, et al, 2013) (see Appendix E), and "Chemistry Online Homework Evaluation" scale (COHE) (Babb, et al., 2011) (see Appendix F). Both scales were used after permission had obtained from researchers.

The aim of Pundak, et al.'s study (2013) in which AQCOAC scale was used was investigating the participants' attitude toward online homework in engineering introductory courses. From 28 items 15 items were selected to be adapted. The aim of the Babb, et al.'s study (2011) in which COHE scale was used was investigating the participants' attitude toward online homework in chemistry course. From 44 items 18 items were selected to be adapted. AQCOAC, and COHE were 5-point scale.

Items from AQCOAC, COHE were adapted and revised according to language and meaning unity. Also, in the process of adapting scales; coherence with

the current study context and the research questions were considered. Adapted items of the AQCOAC and COHE are seen in Table 3.3, and

Table 3.4 respectively.

Table 3.3 Adapted Items of AQCOAC

Number	Item
#1	Practicing with the Online Assignment Checker (OAC) imposes a heavy learning burden on the student in comparison with practice in other courses with no OAC.
#2	I think it is important to answer all the questions on the OAC by myself to gain a better understanding of the subject matter.
#3	Because I practice with OAC I find the lectures more interesting
#8	Practicing with OAC give me a better preparation for the lesson in comparison to courses that have no online practice.
#10	My involvement in the course has not increased as a result of my practice the OAC.
#11	My achievements in the course did not improve after I submitted the assignments through the OAC.
#12	Submission of assignments through the OAC is the most appropriate method for students in the 21st century, in comparison to submission in hard copy.
#13	Feedback given by OAC is methodical and effective in comparison to feedback given in other courses.
#16	The immediate feedback given by the OAC encourages me to perform the assignments.
#24	As a result of the online practice I am more willing to learn topics associated with the course.
#25	The questions that appear in the OAC encourage higher order thinking no less than questions given regular homework in other courses.
#28	Usually I solve the questions completely and then submit the final solution through the OAC

Table 3.4 Adapted Items of COHE

Number	Item
#3	I would have completed the online homework assignments even if they were not to be graded.
#6	Besides online homework and laboratory homework, I did none of the other homework recommended on the homework sheet
#8	I generally understood the questions within the online homework assignments.
#9	I could complete the online homework assignments with little outside help.
#11	For numerical questions, I worked out the answers with pencil and paper before submitting an answer within the online homework assignment.
#12	I never tried to figure out my mistakes on questions I answered wrong within the online homework.
#13	Overall, my experience with the online homework was negative.
#15	The online homework was worth the effort.
#19	The online homework assignments were relevant to what was presented during lecture.
#20	The online homework assignments did not further my understanding of chemistry concepts.
#21	The online homework assignments were challenging.
#22	The online homework assignments made me think more about chemistry than I would have otherwise.
#26	I felt more prepared for my exams this semester than for previous chemistry courses.
#29	My chemistry study was spread out over more days this semester than during previous semesters.
#35	My attitude toward chemistry has improved since taking Chem 116.
#39	I have told my friends about the online homework and have recommended that they not take a chemistry class with online homework.

After deciding the previously formed two scales' items showed in Table 3.3, and Table 3.4 that fitted the purpose of this study; researcher added 10 items which fit the study context and the research questions. After then, science teachers who were employed on the school where the main study was conducted were asked to give advice about the scale items. They commented on items of the scale, and the light of their comments; 2 items are also added to scale by the researcher. In this way, expert view was also taken. Consequently, the present study's data was collected by the ATOHS. ATOHS was a 5-point scale. The aim of the scale was to investigate private elementary school students' attitudes toward OHW in terms of experience (EXP), thought (THO), and usefulness (USE) in science lesson. There were initially 48 items in the ATOHS; 5 items were used to get descriptive information from the participants; 5 items were discarded because participants did not understand the directions. 7 items were discarded during preliminary analysis of the instrument, and 31 items were used to measure factors of the attitudes toward online homework in science lesson.

3.5. Piloting the Instruments

Two different perspectives were considered in identifying sample size of the pilot study. One view is that pilot study sample is 10% of the full-case study sample (Lackey & Wingate, 1998). And other view is that pilot study sample size depends on the context of study; researcher can decide on sample size in order certain conditions to be met. These means there is no a strict boundary for pilot sample size

(Burns & Grove, 2005). Main study is carried on with 669 participants and 10% of it makes 68 participants. Pilot study survey is done with 85 students. Since 85 is bigger than 68 pilot study sample size is sufficient. Schools in which pilot scale were applied and the school in which main scale was applied related with each other by means of belonging same school institution. Participants of pilot study were private elementary school students in fifth grade from Kayseri, Denizli, and Mersin, which are located in different geographical regions of Turkey. In main and pilot study, study context resembled with each other. Students used same online homework site, they received similar penal sanction in case they did not do their homework. However, there were some practical differentials between pilot study and main study participants' OHW usage. In pilot study, students received less OHW assignment than main study participants received. School teachers decided to start up OHW usage in science lessons with 5^{th} grades in Kayseri, Mersin and Denizli schools. Hence 6^{th}, 7^{th}, 8^{th} grade levels students are not aware about OHW in the schools where pilot study is carrying on.

In Table 3.5 a descriptive statistics about participants' OHW completion in science lesson is seen. Participants who thought they completed the 0-24% of total given OHW was described as "least completion"; 25-49% of total OHW was described as "less completion"; 50-74% of total given OHW was described as "normal completion"; 75-100% of total given OHW was described as "most completion". 1.2 % of the participants reported that they completed OHW as "least completion"; 49.4% of them reported that they completed OHW as "less completion"; 23.5% of them reported that they completed OHW as "normal

completion"; 25.9% of them reported that they completed OHW as "most completion". This finding is presented in order to give evidence that only approximately half of the students did care OHW. This may be because pilot study participants were newly started to use online homework and received less OHW compared to the main study.

Table 3.5 Pilot Study Participants' OHW Completion

	Frequency	Percent	Valid Percent
Least completion (0-24% of homework)	1	1,2	1,2
Less completion (25-49% of homework)	42	49,4	49,4
Normal completion (50-74% homework)	20	23,5	23,5
Most completion (75-100% homework)	22	25,9	25,9
Total	85	100,0	100,0

3.6. Preliminary Instrument Analysis

This part is devoted to preliminary instrument analysis for the instrument development purposes. More specifically, validity and reliability evidences for the data collecting instrument are explained.

3.6.1. Validity Evidences for Data Collecting Instrument

To give evidence for content-related validity, researcher followed some procedures. Researcher showed all items to researchers in the field of science

education. They were asked to give recommendations about items for both language intelligibility and suitability to dimensions. After obtaining recommendations, and revising the items accordingly, researcher got an appointment from Academic Writing Center, METU. Researcher translated all the items that are pooled from English to Turkish. Academic Writing Center personnel and researcher together evaluated each item one by one in terms of their relation with study context and meaning. Thereby both the meaning of the items was not changed and items became in accordance with the study context. After translating items from English to Turkish, a Turkish Literature and Turkish teacher who was employed in the school where the main study was carried on, looked and gave advice on the items and made some improvements in terms of language rightfulness and suitability to the sample understanding. After all, METU Social Science Ethics Committee permission was obtained (see Appendix G). Finally, the pilot study and main study is conducted.

After data was collected from pilot and main study, first data cleaning was made, and then negative-meaning items were reversed. Finally, to give evidence for construct-related validity; exploratory factor analysis was applied by using the IBM SPSS Statistics Version 21 software programme to establish the factor structure of ATOHS. Explanatory factor analysis was used in order to see how many factors there were and if there were correlated factors. Principal component analysis (PCA) was used for factor extraction. With PCA, similarities and differences can be seen; patterns are illustrated easily for big data. Also without much data loss, researcher can compress the data (Smith, 2002). In order to annotate factors, direct oblimin

rotation was made. Because using varimax rotation factors are simplified by maximizing the variance of the loadings within factors (Tabachnick & Fidell, 1996).

Before conducting the explanatory factor analysis, sample size assumption was checked. According to Nunally (1978, as cited in Pallant, 2007) there should be 10 cases for each item. In this study, there were 31 items and 669 participants. According to the Nunally (1978), the ratio of factor to independent variable is sufficient; so the sample size assumption was assured. About the strength of the correlations among the items, Tabachnick and Fidell (1996) recommended to check correlation matrix. Inspection of the correlation matrix revealed the presence of many coefficients of .3 and above. Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) values also gave information about the factorability of the data. The Bartlett's test of sphericity should be significant ($p<.05$) for the factor analysis to be considered appropriate. The KMO value should be greater than .6 (Tabachnick & Fidell, 1996). For this study, seen in Table 3.6 the Kaiser-Meyer-Olkin (KMO) was .960, exceeding the recommended value of .6 Kaiser (1960). Also Bartlett's test of sphericity (1954) reached statistical significance ($p=.000<.05$), supporting the factorability of the correlation matrix.

Table 3.6 KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,960
Bartlett's Test of Sphericity	Approx. Chi-Square	8445,382
	df	465
	Sig.	,000

Table 3.7 Explanatory Factor Analysis of ATOHS

	Component		
	1	2	3
Q6		,318	
Q7			-,482
Q8			-,603
Q9r			-,436
Q10r		,538	
Q11			-,495
Q13			-,677
Q14			-,356
Q15	,717		
Q16	,578		
Q17	,609		
Q18	,476		
Q20	,572		
Q21	,539		-,357
Q23	,558		
Q24r		,489	
Q25r		,524	
Q26	,654		
Q27	,492		-,310
Q28	,692		
Q29	,584		
Q30	,809		
Q31r	,489		
Q32	,779		
Q33			-,457
Q34r		,506	
Q35	,824		
Q36	,668		
Q37	,635		,304
Q39	,730		
Q41r		,614	
Q42	,631		
Q22	,485		-,325
Q43r		,533	

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

To avoid too much factor extraction, scree plot was looked in order to see how many factors there were. As shown in Figure 3.1 third factor seems to be breaking point in the scree plot which means there are three factors which are above the break point. Explanatory factor analysis also gave three factors. Cross loaded items are excluded from the test, so seven items are discarded from the test. Since, these items were loaded to three factors.

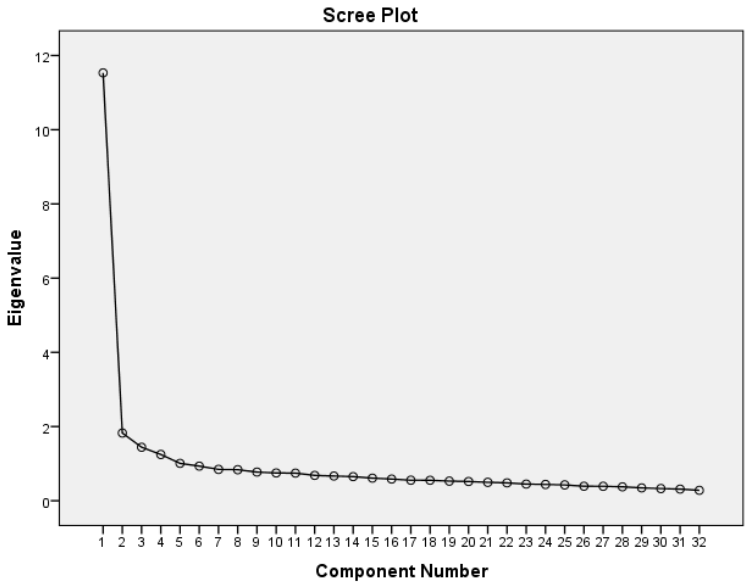

Figure 3.1 Scree Plot

Items are renamed with its factor name as THO for thought (Table 3.8), EXP for experience (Table 3.9) and USE for usefulness (Table 3.10)

THO factor measures private elementary school students' thought about online homework usage in science lesson. More explicitly, this factor measures students' need for use of online homework in science lesson.

Table 3.8 Renumbering ATOHS for THO Factor

ATOHS Number	Item in ATOHS	Renumbering for THO factor
Q6	Besides online homework, I did none of other homework given by my teacher.(reversed)	THO1
Q10	Practicing with the OHW imposes a heavy learning burden on the student in comparison with practice in other courses with no OHW. (reversed)	THO2
Q24	The online homework assignments did not further my understanding of science concepts. (reversed)	THO3
Q25	The online homework assignments were challenging. (reversed)	THO4
Q34	Overall, my experience with the online homework was negative. (reversed)	THO5
Q41	Because online homework saves the homework completion, I prefer traditional one. (reversed)	THO6
Q43	If I complete OHW, its main cause is its penalties. (reversed)	THO7

EXP factor measures private elementary school students' ability while using online homework in science lesson. More explicitly, whether they are comfortable assigning their homework online or not is examined.

Table 3.9 Renumbering ATOHS for EXP Factor

ATOHS Number	Item in ATOHS	Renumbering for EXP factor
Q7	I solve the questions completely and then submit the final solution through the OHW.	EXP1
Q8	For numerical questions, I worked out the answers with pencil and paper before submitting an answer within the OHW	EXP2
Q9	I never tried to figure out my mistakes on questions I answered wrong within the online homework.(reversed)	EXP3
Q11	The OHW is worth the effort.	EXP4
Q13	I understand the questions within the OHW	EXP5
Q14	To answer the questions within the OHW provides me understand the subject matter better.	EXP6
Q33	I would have completed the OHW even if they were not to be graded.	EXP7

USE factor measures private elementary school students' appreciations while using online homework in science lesson. More explicitly, whether they are aware about online homework's advantages or not is examined.

Table 3.10 Renumbering ATOHS for USE Factor

ATOHS Number	Item in ATOHS	Renumbering for USE factor
Q15	Practicing with OHW give me a better preparation for the lesson in comparison to courses that have no online practice.	USE1
Q16	My achievements in the course improve after I submitted the assignments through the OHW.	USE2
Q17	Submission of assignments through the OHW is the most appropriate method for students in the 21st century, in comparison to submission in hard copy.	USE3
Q18	Feedback given by OHW is methodical and effective in comparison to feedback given in other courses.	USE4
Q20	The immediate feedback given by the OHW encourages me to perform the assignments.	USE5
Q23	The questions that appear in the OHW encourage higher order thinking at least questions given regular homework in other courses.	USE6
Q26	The OHW makes me think more about science concepts than I would have traditional homework	USE7
Q28	Due to OHW, I felt more prepared for my science exams than other courses' exams.	USE8
Q29	Due to OHW, my science study was spread out over more days than other courses' exams.	USE9
Q30	Because I practice with OHW, I find the lectures more interesting.	USE10
Q31	My involvement in the course has not increased as a result of my practice the OHW. (reversed)	USE11
Q32	As a result of the OHW, I am more willing to learn topics associated with the course.	USE12
Q35	Due to OHW, my attitude toward science lesson as improved.	USE13
Q36	I recommend taking OHW in science lesson to my friends who do not take OHW.	USE14
Q37	I prefer doing my assignments as OHW rather than traditional way.	USE15
Q39	Since OHW lets me spending time on computer, I prefer OHW rather than traditional way.	USE16
Q42	Since OHW lets my teacher to track my scores more often, I more frequently do my assignments at OHW.	USE17

3.6.2. Reliability Evidences for the Data Collecting Instrument

For current study, Cronbach's coefficient alpha was calculated to examine the reliability. The reliability is important for a scale, because it gives important information about the consistency of the scale (Cronbach, 1951).

For all items in the ATOHS, the alpha yields .93. According to Cronbach (1951, as cited in Pallant, 2007) the internal consistency of the scale can be interpreted as satisfactory. More specifically, to give evidence about reliabilities within each factor; Table 3.11 is showed.

Table 3.11 Alpha Value within THO, EXP, and USE Factors

Factors	Cronbach's Alpha	N of Items
THO	,70	7
EXP	,73	7
USE	,93	17

Cronbach alpha coefficient values of within THO, EXP, USE were calculated as .70, .73, and .93 respectively, which can be interpreted as satisfactory (Cronbach, 1951, as cited in Pallant, 2007). Furthermore, deleting any of the items did not increase Cronbach alpha coefficient value which indicates that all of the items have a positive impact on reliability. To sum up, there seems to be no problem for the internal consistency of each dimension of ATOHS.

3.7. Data Analysis

Data, which were gathered from the private elementary school students, were imported to IBM SPSS 21. By using descriptive and inferential statistics techniques the data were analyzed. Descriptive statistics were useful tool to depict the vast number of data. And inferential statistics was an important tool for drawing conclusions from them. Grade level information was coded from 2-5, corresponding from 8^{th} grade to 5^{th} grade, while grade average point was coded from 1-5 corresponding from high average to low average. Online homework completion was coded from 1-5 corresponding from best effort to least effort.

The missing data was changed with the mean of the item. Moreover, the pair wise case was used in analysis in order not to lose all data of an individual when there is a non-response item.

For the first research question; *"What are the private elementary school students' attitudes toward online homework in science lesson?",* descriptive information about attitude toward online homework of private elementary school students was given. For the second research question; *"Is there a significant relationship between private elementary school students' attitudes toward online homework and their self-reported grade point average in science lesson?*, Pearson Correlation is used in determining whether there is a relationship or not between variables. Effect size, the strength and the direction of the relationship are also computed by this analysis. For the third research question; *"Is there a significant grade level difference in terms of their scores on online homework experience,*

usefulness, and thought in science lesson?", MANOVA is computed in order to see the impact of the grade level to the factors of attitude of private elementary school students toward online homework in science lesson.

3.8. Internal Validity Threat

Since the application of the study is a must for the students because of school policy, i.e. doing homework regularly, all students attend online homework practice for a year; by that mortality is tried to be handled extensively, however, since the attendance of the test is an academic research, participants are allowed to complete the test by the basis of willingness, and some students were absent at the test day, so mortality is happened. 84 students over 754 students did not take the survey which makes approximately 11% of whole participants.

Data is collected in science classes with similar size, in terms of lightening, temperature, desk structure. Data collection time spreads to one week, during this week no exam was taken place. Data collectors are only science teachers of the school which are met before the data collection session and given same explanation about the direction of data collection by the researcher.

History threat can be handled not fully but partially, because researcher is also a teacher in that school, so examination dates, activities and other external circumstances are known by the researcher and the instrumentation time is decided accordingly, I said partially because it is difficult to know what happens in the life of 669 participants at that time.

Subject characteristics threat is handled by including all the school students to the test, so different groups forming risk is decreased extensively. Since it is not a longitudinal study, maturation risk is also not a threat.

3.9. External Validity Threat

For the current study, data is collected from one school, in Çankaya, Ankara, Turkey. However in order to generalize the results participants should be selected across the region. Since the study context is not suitable to collect data no matter any region in country, the purposive sampling is made. This may damage the study itself that is; results may not be reflecting the general tendency. However the literature has many examples of this kind of situation. The studies in the literature are conducted specific to mainly one course, because from one online homework site to another, study context differs (Sherwood B., 1971, Kashy E., et al., 1993, Beichner, et al., 2007, Okuno T., et al., 2010, El-Labban, 2003, Bonham S., et al., 2001, Allain R., and Williams T., 2006, Demirci N., 2007, Taraban R. et al., 2005, Babb M., et al., 2011, Arasasingham R., 2011).

3.10. Limitations of the Study

There are some limitations of current study in terms of data collection, subject, and generalizability. In this study, students are questioned about their experience, thought, and usefulness of online homework, so some students may

answer the questions in terms of their teacher may expect from them. Also some students may misstate about their online homework completion. In current study's scale, there was one item about participants' grade point average depending on their exam scores in science lesson. Since it was not suitable to acquire students' GPA in science lesson by matching their name from the administration because of the ethic reasons, students were asked to express their science lesson exam scores average in intervals. Some students may overgrade, or misgrade their exam scores to define their GPA in science lesson. And this may lead misinformation for the study. However this kind of possibilities is inherent to research studies' nature since there is concept as "self-reported GPA" in the research studies. These are the subject-source limitations.

Since the study is instrumented for 669 students, their school organization should not be interrupted. So the questionnaires are instrumented in their science lessons. This situation makes the study expand to one week. This forms the instrumentation decay also, which is an internal threat. Another limitation of this study is generalizability problem. According to literature, online homework usage in Turkey differs. There is either no online homework usage or disorganized online homework usage in elementary schools. Because online homework usage in a systemic way is seen in one school, only this school's data is collected. Since one school can not represent all the population, this problem appears as a generalizability limitation.

CHAPTER IV

RESULTS

This chapter devoted to the results describing private elementary school students' attitudes toward online homework in science lesson. Furthermore, relationship between private elementary school students' self-reported grade point average and their attitudes toward online homework in science lesson were described.

4.1. Private Elementary School Students' Attitudes toward Online Homework in Science Lesson

What are the attitudes of private elementary school students' toward online homework in science lesson?

The present study aims to explore private elementary school students' attitudes toward online homework in science lesson. Descriptive statistics were utilized for this specified purpose. Table 4.1 presents the results of descriptive statistics regarding the students' attitudes toward online homework with respect to the dimensions of ATOHS.

Table 4.1 The Results of Descriptive Statistics with respect to the Factors of ATOHS

	Mean	Std. Deviation	Skewness	Kurtosis
THO	3,5825	,82562	-,458	-,281
EXP	3,8657	,76791	-,872	,628
USE	3,1883	,96441	-,396	-,528
TOTAL	3,4303	,77794	-,498	-,304

According to Table 4.1, the highest mean score of attitude toward online homework in science education belongs to experience factor (EXP) whereas the lowest mean score was calculated for the factor of usefulness (USE). These results indicated that most of the participants are generally have positive experience while using online homework in science lesson. Also these students have moderate ideas about OHW, and they find it useful, respectively. Also skewness and kurtosis values are between -2 and +2 showing that the scores of the participants are normally distributed in each factor.

In order to get an in-depth understanding of students' attitudes toward online homework, descriptive statistics were also carried out for the items used to assess the dimensions of ATOHS. Table 4.2 presents the results of descriptive statistics covering frequencies for the items loaded on thought (THO) factor. Table 4.3 presents the results of descriptive statistics covering frequencies for the items loaded on experience (EXP) factor. Table 4.4 presents the results of descriptive statistics covering frequencies for the items loaded on usefulness (USE) factor.

Table 4.2 The Results of Descriptive Analysis of THO Dimension's Items

	Percent (%)					
	Totally disagree	Dis agree	Un decided	Agree	Totally agree	Total
THO1: Besides online homework, I did none of other homework given by my teacher. (reversed)	10,8	11,8	20,8	27,8	28,8	100,0
THO2: Practicing with the OHW imposes a heavy learning burden on the student in comparison with practice in other courses with no OHW. (reversed)	13,5	11,8	24,2	17,2	33,3	100,0
THO3: The online homework assignments did not further my understanding of science concepts. (reversed)	10,3	10,2	11,7	26,9	41,0	100,0
THO4: The online homework assignments were challenging. (reversed)	10,3	11,7	23,0	22,6	32,4	100,0
THO5: Overall, my experience with the online homework was negative. (reversed)	13,3	7,9	17,6	24,7	36,5	100,0
THO6: Because online homework saves the homework completion, I prefer traditional one. (reversed)	19,1	10,9	22,0	15,2	32,7	100,0
THO7: If I complete OHW, its main cause is its penalties. (reversed)	12,6	8,1	13,6	15,7	50,1	100,0
THO	12.8	10.4	19.0	21.4	36.4	100.0

Participants highly support the THO 7 item that is "*If I complete OHW, its main cause is its penalties. (reversed)*". It can be said that participants did not agree that they do OHW because they are punished otherwise. However participants are in doubt about THO4 item that is "*The online homework assignments were challenging (reversed)".* Also participants are not sure to support THO6 item that is *"Because online homework saves the homework completion, I prefer traditional one (reversed)".* They hesitate not to do OHW, though.

Table 4.3 The Results of Descriptive Analysis of EXP Dimension's Items

	Percent (%)					
	Totally disagree	Dis agree	Un decided	Agree	Totally agree	Total
EXP1: I solve the questions completely and then submit the final solution through the OHW.	2,8	1,3	5,5	13,9	76,4	100,0
EXP2: For numerical questions, I worked out the answers with pencil and paper before submitting an answer within the OHW	18,4	8,8	17,3	23,9	31,5	100,0
EXP3: I never tried to figure out my mistakes on questions I answered wrong within the online homework.(reversed)	7,9	8,2	13,2	24,4	46,3	100,0
EXP4: The OHW is worth the effort.	9,0	7,3	19,4	26,2	38,1	100,0
EXP5: I understand the questions within the OHW	4,2	3,6	11,1	29,0	52,2	100,0
EXP6: To answer the questions within the OHW provides me understand the subject matter better.	7,5	7,9	19,0	24,8	40,8	100,0
EXP7: I would have completed the OHW even if they were not to be graded.	18,1	8,8	25,1	21,1	26,9	100,0
EXP	9,7	6,6	15,8	23,3	44,6	100.0

Participants highly support the EXP1 item that is *"I solve the questions completely and then submit the final solution through the OHW."* Because it is a very usual routine of submitting the OHW in this way in the study context; they may also choose "save for later" option; however they do not delay this behavior. However participants are in doubt about EXP6 item that is *"To answer the questions within the OHW provides me understand the subject matter better."* Also participants are not

sure to support item EXP7 that is *"I would have completed the OHW even if they were not to be graded."* Since doing homework is a graded part of the study context, imaginarily not grading format is preferable for the participants.

Table 4.4 The Results of Descriptive Analysis of USE Dimension's Items

	Percent (%)					
	Totally disagree	Dis agree	Un decided	Agree	Totally agree	Total
USE1: Practicing with OHW give me a better preparation for the lesson in comparison to courses that have no online practice.	18,7	12,9	30,0	19,3	19,1	100,0
USE2: My achievements in the course improve after I submitted the assignments through the OHW.	11,2	10,6	24,8	30,0	23,3	100,0
USE3: Submission of assignments through the OHW is the most appropriate method for students in the 21st century, in comparison to submission in hard copy.	16,4	8,4	20,2	17,9	37,1	100,0
USE4: Feedback given by OHW is methodical and effective in comparison to feedback given in other courses.	10,9	8,1	17,6	22,3	41,1	100,0
USE5: The immediate feedback given by the OHW encourages me to perform the assignments.	16,7	13,0	26,3	22,9	21,1	100,0
USE6: The questions that appear in the OHW encourage higher order thinking at least questions given regular homework in other courses.	14,3	13,9	19,7	24,4	27,7	100,0
USE7: The OHW makes me think more about science concepts than I would have traditional homework	15,5	14,9	29,1	20,9	19,4	100,0
USE8: Due to OHW, I felt more prepared for my science exams than other courses' exams.	18,5	15,1	23,8	21,4	21,2	100,0
USE9: Due to OHW, my science study was spread out over more days than other courses' exams.	21,4	16,7	25,6	18,1	18,2	100,0

USE10: Because I practice with OHW, I find the lectures more interesting.	24,1	21,5	20,6	17,2	16,6	100,0
USE11: My involvement in the course has not increased as a result of my practice the OHW. (reversed)	17,5	14,9	19,4	19,6	28,6	100,0
USE12: As a result of the OHW, I am more willing to learn topics associated with the course.	16,9	20,5	24,8	22,0	15,8	100,0
USE13: Due to OHW, my attitude toward science lesson as improved.	19,7	15,8	23,8	20,2	20,5	100,0
USE14: I recommend taking OHW in science lesson to my friends who do not take OHW.	26,5	12,3	19,7	19,3	22,3	100,0
USE15: I prefer doing my assignments as OHW rather than traditional way.	27,2	10,3	19,1	16,9	26,5	100,0
USE16: Since OHW lets me spending time on computer, I prefer OHW rather than traditional way.	21,5	13,5	21,5	19,3	24,2	100,0
USE17: Since OHW lets my teacher to track my scores more often, I more frequently do my assignments at OHW.	16,3	9,4	19,3	28,0	27,1	100,0
USE	18,4	13,6	22,7	21,2	24,1	100,0

Participants highly support the USE4 item that is *"Feedback given by OHW is methodical and effective in comparison to feedback given in other courses."* In the study context, each question's answers are written online by teachers; students are immediately got the explanations of their wrong or blank answers, so that they get immediate feedback, which they found valuable. Also participants are not sure to support item USE10 that is *"Because I practice with OHW, I find the lectures more interesting."* Participants do not find science lesson interesting because of their OHW experience.

4.2. Relationship between Private Elementary School Students' Attitudes toward Online Homework and Their Self-Reported Grade Point Average in Science Lesson

Is there a relationship between private elementary school students' attitudes toward online homework and their grade point average in science lesson?

Pearson product-moment correlation coefficients were computed among private elementary school students' science lesson exam average and each component of attitudes toward online homework in science lesson. Science lesson exam average was assessed through an item of the survey in the present study. Participants were asked to select point interval of their science lesson exam scores. In study design this situation is described as self-reported grade point average in science lesson. For attitude analysis, mean scores for each component were computed. Before conducting correlation analysis, preliminary analyses were performed to ensure no violation of the normality, linearity, and homoscedasticity assumptions of correlation analysis.

4.2.1. Assumptions of Correlation Analysis

- Normality: Visual examination of the histograms, distribution curves and normal Q-Q plots in SPSS indicated no apparent violations of normality assumption. Skewness and kurtosis statistics indicated an acceptable range of departure from a normally distributed population for all measures. All of the

skewness and kurtosis values were between the range of -2 and +2. This means normal distribution. Most of the skewness values were negative indicating negatively skewed distribution.

- Linearity: Visual examination of the scatter plot revealed that there was no violation of this assumption since the distribution was not in curve shape but in linear shape.
- Homoscedasticity. The assumption of homoscedasticity, which is the variance of errors, was the same for all variables. The visual examination of standardized scatter plots (P-P plots), histogram, bell-curve distribution and normal plots showed that there was no violation of the assumption.

Table 4.5 Correlations between Attitudes toward Online Homework and Self-Reported Grade Point Average

	Pearson Correlation (r)	Coefficient of Determination (r^2)	Covariance	N
USE	,18	0,03	2,37	669
EXP	,21	0,04	2,15	669
THO	,29	0,08	3,24	669
TOTAL	,24	0,07	2,52	669

Correlation is significant at the 0.01 level (2-tailed).

The results of correlational analysis were presented in

Table 4.5. The relationship between private elementary school students' attitudes toward online homework and their self-reported grade point average in science lesson was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. There was a significant, positive

correlation between THO score and grade point average, r = .29, n = 669, p < .0005 at α = .01, with high grade point average associated with high THO score, with medium effect. There was a significant, positive correlation between EXP score and grade point average, r = .21, n = 669, p < .0005 at α = .01, with high grade point average associated with high EXP score, with small effect. There was a significant, positive correlation between USE score and grade point average, r = .18, n = 669, p < .0005 at α = .01, with high grade point average associated with high USE score, with small effect. There was a significant, positive correlation between TOTAL score and grade point average, r = .24, n = 669, p < .0005 at α = .01, with high grade point average associated with high TOTAL score, with small effect.

4.3. Grade Level Differences in Students' Attitudes toward Online Homework in Science Lesson in terms of Experience, Usefulness and Thought

Is there a difference between 5th, 6th, 7th, and 8th grades, in terms of their scores on online homework experience, usefulness and thought in science lesson?

There are three dependent variable that are experience, usefulness, and thought scores of participants toward online homework in science lesson; and one independent variable that is participants' grade with four levels (5th, 6th, 7th, and 8th); therefore multivariate analysis of variance (MANOVA) is conducted to investigate mean differences among them. MANOVA is simply an ANOVA with several

dependent variables. However conduct separate ANOVA for each dependent variables may conclude Type-1 error. Using MANOVA can decrease this risk. (Pallant, 2007) This is why in this research question; MANOVA is preferred rather than a series of ANOVA. There some preliminary assumption testing takes place in order to check sample size, normality, outliers, linearity, homogeneity of regression, multicollinearity and singularity, homogeneity of variance-covariance matrices.

4.3.1. Assumptions of Correlation Analysis

- Sample Size: There were more cases in each cell than the number of dependent variable. There were 3 dependent variables and the sample was 669. Therefore, this assumption was not violated.
- Normal distribution: In this study there are three dependent variables and one independent variable with four levels. This makes 12 cells. (4x3=12). Normally, 20 times for each cell ensure robustness. The calculation yields to be 240. (20x12=420). However the sample size of this study is 669; this means normality is assured by sample size. Still, multivariate normality and univariate normality are checked to see outliers additionally. From Table 4.6 it is seen that all dependent variables' skewness and kurtosis values are in the scale of +2 and -2 points. This means univariate normality is assured. For multivariate normality the Mahalanobis distance is examined. From the Chi-square table (Tabachnick & Fidell, 1996) critical value for three dependent variables is 16.27. This study's maximum Mahalanobis distance value for

three dependent variable is 20.55 (Table 4.6), when visual examination is made from data view; MAH_1 which is generated by SPSS, it is seen that only two participants with id 184. and 598. exceed outliers.

Table 4.6 Multivariate Normality of THO, EXP, USE Scores

	Min.	Max.	Mean	Std. Deviation	N
Predicted Value	2,25	4,57	3,62	,47	669
Std. Predicted Value	-2,91	2,03	,00	1,00	669
Standard Error of Predicted Value	,040	,182	,074	,024	669
Adjusted Predicted Value	2,23	4,58	3,62	,470	669
Residual	-2,268	2,333	,000	1,009	669
Std. Residual	-2,242	2,307	,000	,998	669
Stud. Residual	-2,247	2,328	,000	1,001	669
Deleted Residual	-2,278	2,375	,000	1,015	669
Stud. Deleted Residual	-2,254	2,335	,000	1,002	669
Mahal. Distance	,030	20,554	2,996	2,804	669
Cook's Distance	,000	,024	,002	,002	669
Centered Leverage Value	,000	,031	,004	,004	669

a. Dependent Variable: gradelevel

- Outliers: Although Mahalanobis distance value is exceeded for two participants; Cook’s distance is still below 1, that is, .24 (Table 4.6). Hence, these two cases are remained in the study. Additionally, the outliers can be accepted since there was a reasonable size data file (Pallant, 2007).

- Linearity: In order to check linearity scatterplots are generated for each dependent variable pairs. The scatterplots revealed that there is no apparent violation of linearity assumption.

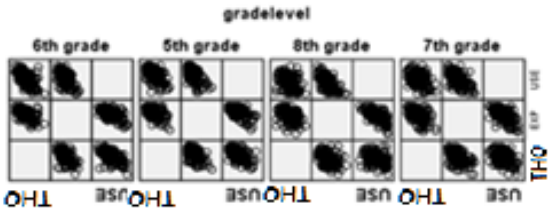

Figure 4.1 Matrix Scatter Dot Graph of Grade Level and Dimensions of Attitude

- Multicollinearity and singularity: From the Table 4.7 it is seen that correlations between dependent variables scores are ranged from .522 and .956. There are values that exceed of .8 critical value for pearson correlation (r) value and there are also below values. This shows that dependent variables are moderately correlated. Hence multicollinearity and singularity are also assured.

Table 4.7 Correlation Among the Components of Attitude

	USE	EXP	THO	TOTAL
USE	1	,642**	,554**	,956**
EXP	,642**	1	,522**	,784**
THO	,554**	,522**	1	,732**
TOTAL	,956**	,784**	,732**	1

**. Correlation is significant at the 0.01 level (2-tailed).

- Homogeneity of variances: Levene's Test of Equality of Error Variances is checked to assure this assumption. According to results, the error variance of the dependent variable was not equal across groups for all dependent variables. This assumption is not assured for EXP (p= .001). However it is assured for THO (p= .29) and USE (p= .10)

After the assumptions of MANOVA are checked, the statistical analysis regarding MANOVA is performed. The results show that there is a significant mean difference among 5^{th}, 6^{th}, 7^{th}, and 8^{th} grade level participants on the combination of three dependent variables F (3,669) = 17.37, p = .000; Wilks' Lambda = .80; partial eta squared = .072 indicating medium effect size.

To investigate whether 5^{th}, 6^{th}, 7^{th} or 8^{th} grade participants differ in all dependent variables or not, between-subjects effects are examined. When the results for the dependent variables are considered separately, Bonferonni adjusted alpha level is computed in order to avoid Type 1error (Tabachnick & Fidell, 2007, p.70). Hence, alpha level .05 is divided by 3 (there are three dependent variables) that equals to .017, which is the new alpha level to reach statistical significance. After setting new alpha level; it is obtained that all the dependent variables are statistically significantly different from each other grades; THO, F (3, 669) = 29.34, p = .000, partial eta squared = .12 medium effect size (Cohen 1988, pp. 284–7); EXP, F (3,669) = 24,27, p = .000, partial eta squared = .099 medium effect size (Cohen 1988, pp. 284–7); USE, F (3,669) =43.76, p = .000, partial eta squared = .17 large effect

size (Cohen 1988, pp. 284–7). The results of the follow- up pairwise comparisons were illustrated in Table 4.8

Table 4.8 Follow-up Pairwise Comparisons

Source	Dependent Variable	df	F	Sig.	Partial Eta Squared
Grade level	THO	3	29,344	,000*	,117
	EXP	3	24,274	,000*	,099
	USE	3	43,755	,000*	,165

* Significant at Bonferonni adjusted alpha level of .017

Table 4.9 Multiple Comparisons

Tukey HSD Dependent Variable: TOTAL

(I) gradelevel	(J) gradelevel	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
8th grade	7th grade	-,32415*	,08059	,000	-,5317	-,1166
	6th grade	-,48494*	,08125	,000	-,6942	-,2757
	5th grade	-,91230*	,07822	,000	-1,1138	-,7108
7th grade	8th grade	,32415*	,08059	,000	,1166	,5317
	6th grade	-,16079	,07728	,161	-,3598	,0383
	5th grade	-,58815*	,07409	,000	-,7790	-,3973
6th grade	8th grade	,48494*	,08125	,000	,2757	,6942
	7th grade	,16079	,07728	,161	-,0383	,3598
	5th grade	-,42736*	,07481	,000	-,6200	-,2347
5th grade	8th grade	,91230*	,07822	,000	,7108	1,1138
	7th grade	,58815*	,07409	,000	,3973	,7790
	6th grade	,42736*	,07481	,000	,2347	,6200

*. The mean difference is significant at the 0.05 level.

According to the statistics obtained from the analysis, there is a statistically significant mean difference in thought scores for 5^{th} grades (M = 3.97, SD = .72) for

6^{th} grades, (M = 3.60, SD = .78); for 7^{th} grades, (M = 3.44 , SD = .80) and for 8th grades, (M = 3.20, SD = .82); F = 29.344, p < .017 (two-tailed) in favor of 5^{th} grades. And, the magnitude of the differences in the means is medium (eta squared = .117).

According to the statistics obtained from the analysis, there is a statistically significant mean difference in experience scores for 5^{th} grades (M = 4.20, SD = .65) for 6^{th} grades, (M = 3.90, SD = .63); for 7^{th} grades, (M = 3.66, SD = .83) and for 8th grades, (M = 3.61, SD = .81); F = 24.274, p < .017 (two-tailed) in favor of 5^{th} grades. And, the magnitude of the differences in the means is medium (eta squared = .099).

According to the statistics obtained from the analysis, there is a statistically significant mean difference in usefulness scores for 5^{th} grades (M = 3.70, SD = .82) for 6^{th} grades, (M = 3.20, SD = .89); for 7^{th} grades, (M = 3.07, SD = .87) and for 8th grades, (M = 2.60, SD = .97); F = 43.755, p < .017 (two-tailed) in favor of 5^{th} grades. And, the magnitude of the differences in the means is large (eta squared = .165). Table 4.10 represented the group statistics regarding each dependent variable.

Table 4.10 All Group Descriptive Statistics

	Grade level											
	8th grade			7th grade			6th grade			5th grade		
	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
THO	3,20	,82	140	3,44	,80	170	3,60	,78	164	3,97	,72	195
EXP	3,61	,81	140	3,66	,83	170	3,90	,63	164	4,20	,65	195
USE	2,60	,97	140	3,07	,87	170	3,20	,89	164	3,70	,82	195

CHAPTER V

DISCUSSION

This chapter includes summary, discussions, conclusions drawn from the results of current study as well as implications and recommendations for future studies related to attitudes toward online homework (OHW) in science lessons.

5.1. Discussion on Private Elementary School Students' Attitudes toward Online Homework in Science Lesson

The results of the current study revealed that in science lesson, private elementary school students generally had positive thoughts about online homework (M = 3.58); to give more specific example from the lowest mean of THO factor, in THO6 item (M = 3.32); participants thought that they did not use OHW, just because it saved their OHW completion information. In traditional homework, keeping students' homework completion is not as neat as in OHW, because OHW generates a gradebook; even students go back to previously assigned test, OHW gradebook keeps this information, which is sometimes impossible in traditional homework setting. Or in traditional homework for an undone homework, teacher may not track the students' homework pattern perfectly as in OHW. This implies that participants did not mind about consequences of that undone homework caught by the teacher.

This can be counted as a positive thought about OHW. Similarly in THO3 item (M = 3.78) participants thought that OHW further their understanding. This can be because of the properties that OHW provides to the users; i.e. feedback part, colored-figure images, keeping scores, multiple question types etc. The results of the present study were consistent with the findings of a previous research study conducted by Babb M., et al.'s study (2011). Participants attending the chemistry course stated that they could recommend the online homework.

The current study results also reveal that, in science lesson private elementary school students were generally able to use OHW while experiencing it. In this factor (EXP), whether students had difficulties or not were also assessed. Because feeling comfortable with the computer setting and the internet, in other words having computer efficacy should be considered as an important issue while the attitudes toward OHW were examined. Among three factors the highest score belongs to experience factor. In this factor, it is inferred that students feel comfortable with OHW (M = 3.86). The results of the present study were consistent with the findings of a previous research study conducted by Flori et al.'s study (2002). The participants' experience in OHW was regarded as significant factor in shaping their attitudes toward OHW.

In the current study, even if results of USE factor was not high as in THO and EXP factors; in science lesson, private elementary school students found OHW useful (M = 3.2). More specifically, in item USE10 (M = 2.81) most of the students totally disagree/ disagree the fact that they found the science lesson interesting because they practiced with the OHW. This result implies that students did not

attribute their interest toward science lesson to the OHW. This can be because; OHW is not only interaction that students subjected in science lesson. There are lots of class-time activities. Students may refer their interest in science lesson to those activities. Another item, USE14 (M = 3.00) is crucial to discuss; because 38.8 % of the students totally disagree/disagree and 41.6 % the students totally agree/agree with this item, which can be counted very close results. Students' response to the item whether they recommend the OHW to friends who do not take OHW is almost same. It can be inferred that overall in science lesson, private elementary school students did not mostly preferred the OHW that they not sure to recommend others to use OHW. Item USE4 has the highest mean score (M = 3.75) within USE factor. Students highly supported that feedback given by the OHW is effective, and appreciated the feedback section of the OHW. Similar results were consistent with the findings of previous research studies conducted that students found OHW useful since it served hint and immediate feedback (Revell K., 2013, Bonhom S., et al., 2001, Cheng K., 2004, Dufrense R, et al., 2002, Taraban R., et al., 2005, Allain R., Williams T., 2006, Demirci N., 2007, Arasasingham R., et al., 2011, Babb M., et al., 2011, Pundak D. et al., 2013).

5.2. Discussion on Relationship between Private Elementary School Students' Attitudes toward Online Homework and Their Grade Point Average in Science Lesson

The results showed that there was a significant relationship between self reported grade point average and each factor, and total score of attitude. Self reported grade point average and thought factor's scores were correlated with medium effect; between self reported grade point average and experience factor's scores were correlated with small effect. Self reported grade point average and usefulness factor's scores were correlated with small effect. And self reported grade point average and all scale's items' scores were correlated with small effect.

This situation does not imply as a cause-effect relationship. In other words; it cannot be said that participants get high grade point since they have high attitudes toward online homework in science lesson, or they get online homework in science lesson, because the method of the study is not designed as if it investigates a cause-effect. In order to be a cause-effect study there would be pre and post-test, as well as experiment and control group. Since the study context and school regulations were not suitable for such a method design. Mostly it can be expressed that there is a relationship between self-reported grade point average and attitude with its factors. Literature also supports this study's claim that students with high academic performance have positive attitudes toward OHW in science lesson (El-Labban, 2003). There are also other studies explaining OHW improves students' academic performance at least as much as traditional homework (Taraban, et al., 2005, Babb et

al., 2011, Flori R., et al., 2002, Dufresne et al., 2002). However there is also other studies claim that there is not a significant difference in terms of academic performances between traditional homework and online homework takers (Bonham S., et al., 2001, K., et al., 2004, Allain, et al., 2006). In present study, neither academic achievement was measured, nor was study design experimental. Therefore; academic performance between online homework and traditional homework comparison is not possible, however researchers' previous studies support current study's finding that there is a relationship between private elementary school students' attitude toward online homework in science lesson and their self-reported grade point average in science lesson.

5.3. Discussion on Differences of 5th, 6th, 7th, and 8th Grade Students' Attitudes toward Online Homework in Science Lesson

The current study is conducted with elementary school students in Turkey. Ministry of National Education defines elementary school's grade level begins from 5th and ends to 8th. This corresponds to the age interval approximately 10 to 13 years old. According to the current study's result there is significant difference among 5th to 8th grade level students in terms of attitude toward online homework in science lesson. When examining three factors; thought, experience, and usefulness; for all scores there is significantly difference in favor of 5th grades. They are more eager to submit their homework via internet compared to the other grades. To investigate factor by factor, difference is large in usefulness score, medium in experience score,

and medium in thought score. From this, it can be said that students in 5th grades appreciate profits of online homework, feel comfortable with online homework setting, and have positive thoughts toward online homework in science lesson more than other grades do.

In literature there is not enough study covering 5th, 6th, 7th, and 8th grade students' attitude toward online homework in science lesson. Mostly, studies that investigate attitude toward online homework in science lesson are carried out with college levels participants. However comparison of attitude toward online homework among grade levels is rare, still. In Smolira's study (2008), it was found that graduate students in business administration appreciated online homework more than undergraduate students did. There is a contrast here in terms of age sequence. In current study smaller grades are more eager to OHW, whereas in Smolira's study (2008) elder grades appreciate online homework more than smaller grades. This can be because of age characteristics. In current study, for example, it is observed that 5th graders can follow their school responsibilities -including homework routines- more eagerly. 5th graders are generally 11 years old. Erickson (1963) defines this age as "school age", in other words "industry vs. inferiority". Child needs to expand understanding of world, and learn basic skills required for school success. Basic task is to achieve a sense of industry, which refers to setting and attaining personal goals. Failure to do so results in a sense of inadequacy. This can be accepted as an important reason for such a difference why 5th graders have paramount scores in each factors comparing to 6th, 7th, 8th graders. However; when the grade levels increase, students may draw back their school responsibilities. Erickson (1963) defines age

interval 12-18 which includes 6th, 7th, and 8th graders as “Adolescence”, in other words “Identity vs. role confusion”: A time for testing limits, for breaking dependent ties, and for establishing new identity. Major conflicts center on clarification of self identity, life goals, and life's meaning. Failure to achieve a sense of identity results in role confusion.

5.4. Conclusion

This study aimed to find descriptive information about the private elementary school students’ attitude toward online homework in science lesson in Turkey.

The findings of descriptive analysis can be used as foreknowledge in further researches. Furthermore the relationship between private elementary school students’ attitude in terms of experience, usefulness, and thoughts and their self-reported grade point average (GPA) is investigated to make clear the point that academic performance and the attitude toward online homework is related. As well as, it is aimed to make contribution of relationship between academic performance and OHW attitude in science lesson to the further researches, especially for elementary grade levels.

Moreover, it is aimed to see difference among the elementary school grade levels in terms of attitude toward online homework in science lesson. For experience, usefulness, and opinion factor 5^{th} grade students different from older grade levels significantly. This finding can be also used as foreknowledge in further researches.

Since in current study quantitative survey was used in order to see general tendency of participants features, some participants might not reflect their features. For this purpose qualitative survey could be applied for those participants, this situation may be considered for further researches.

5.5. Implications for Science Educators about Online Homework Regulations

From the birth of the internet, education has been a major aim to connect. The birth of the internet is developed by, ARPA (Advanced Research Projects Agency), in 1969. It goes online in order to connect four U.S. research-based universities to each other; also it is designed for education, government organizations. This was the very primitive form of today-known "internet". Even it was that primitive form, educational purposes are forehand among other needs. Nevermore, nobody had pronounced the name of "internet" yet. In 1982, the word "Internet" is used for the first time, and today known internet is evolved. International Telecommunication Union's latest (2014) statistics releases the fact that 42% of world's population (estimated 7,1 billion) use internet which makes 3 billion people (ICT Facts and Figures, International Telecommunication Union 2015 © http://www.itu.int/en/ITU-D/Statistics/Documents/facts/ICTFactsFigures2014-e.pdf, retrieved 07 Jan. 2015). Specifically, as showed in Figure 5.1, in Turkey 48% of the population use internet which makes 34 million people (ICT ITU 2015 © http://www.itu.int/net4/itu-d/icteye, retrieved 28 Jan. 2015).

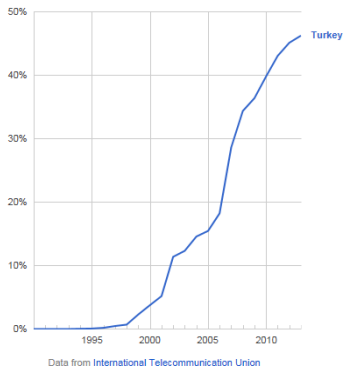

Figure 5.1 Percentage of the Individuals Using Internet in Turkey

A study conducted by Orhan and Akkoyunlu (2004) revealed that in Turkey, the need of internet usage among elementary school students with ages 10-14, ranged according to purposes. 39.3% of the participants used internet for seeking information, communication, and playing game; whereas 13.9% of the participants used internet seeking information for their homework.

When current study's results and the need of internet usage among elementary school students are considered together, it may give an idea to the science lesson educators to select the OHW practices as an option in their teaching professionals. In current study, students' readiness in terms of having computer and internet connect at home was searched, and pilot implementation and risk analysis were made before beginning online homework implementation in science lesson. All students had personal computer and internet connection at home. Consequently, Turkey Qualification Association (KALDER) rewarded the science teachers and the school management due to OHW implementation in science lesson. However when it is intended to generalize online homework in science lesson to nationwide; students' grade level, readiness, opportunities, affordance and other unpredicted circumstances

should be closely evaluated by the school management and the educators before deciding to implement OHW in science lessons as it is made in the current study context. After deciding to implement online homework in science lesson and leaving the students with their struggle alone is not an appropriate way to track. First, teacher must be sure about students' overall readiness, and then teacher should guide certain students; who have low computer efficacies, technical problems, individual differences, or who suffer to adapt to new system. After these circumstances are met, then teacher should inform the students about what is assigned, what the test name is, when it should return etc, s/he writes on board and devotes some time to explain it in class time. Teacher should often track the gradebook of online homework, if it is provided. S/he should direct students for undone assignments. If those students are insistent about avoiding the homework, school penal sanction regulations should be put on, as it is made in the traditional homework.

It should not be misunderstood that when online homework is intended to implement in a school, teachers will not assign another type of homework. Students may take online homework and traditional homework with a combination. That is, when online homework is assigned to a class, meanwhile making experiment, preparing a project, solving problems can also be assigned to same class. This situation increases the development chance of students who have low computer efficacies, technical problems, individual differences, or who suffer to adapt to new system. Most of the time online homework sites offer feedback section, for the wrong answer of the students. However, students may not understand the explanations, or simply do not read the explanations at home. After assignment's due

date ends, teacher should devote some extra time in class to explain for grey area of the questions, and try to motivate students to read feedback part, by explaining its fruitfulness for them.

Since this study was implemented in the private elementary school, students' technical readiness, in terms of personal computer and internet connection existence did not generate any risk. During the process, they had minor connection problems, or disabilities which were guided by the teachers successfully. However, when it is thought in nationwide circumstances all students may not have personal computer or internet connection. Even though they have these equipments, for large class size, teacher may not sufficient in terms of time and patience for those students who have low computer efficacies, technical problems, individual differences, or who suffer to adapt to new system. There are some online homework systems which have ready tests inside, however most of the time teachers generate questions through the medium of online homework site, as in this study context, teachers do. For both situations, those teachers who have not enough computer efficacies may suffer to use the online homework systems. So online homework should be used in the schools after all these circumstances are carefully evaluated, it should not be imposed, however be presented as an option for the teacher. Yet, it should not be ignored that future students and teachers may have high computer efficacies, because technology oriented skills, and studies about online homework continue to develop and expand.

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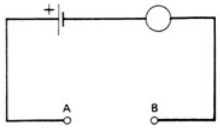
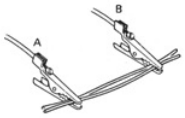
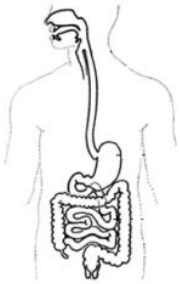
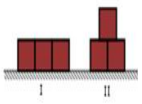
APPENDICES

APPENDIX A

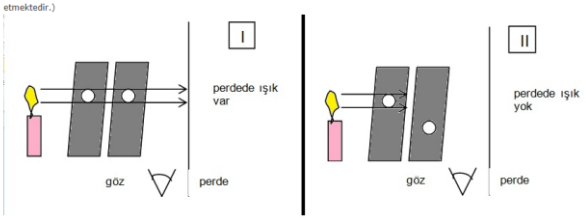
Qestion Types in OHW Used in the Study Context

Ordering Type Question Example	8. Ses dalgalarının kulak kepçesine ulaştıktan sonra işitmemize kadar geçen sürede izlediği yolu sıralayınız. (1 point)  Oval pencere Çekiç kemiği Salyangoz Beyin Kulak zarı Örs kemiği Üzengi kemiği Kulak yolu İşitme sinirleri
Multiple Correct Type Question Example	4. Can laboratuvarda yaptığı deneyde şekildeki gibi bir test devresi kurmuştur. Devreyi tamamlamak için krokodil kabloların ucuna 30 cm uzunluğunda nikel krom teli tutturarak ampul parlaklığını gözlemlemiştir. Can krokodil kabloların uçlarını birbirinden uzaklaştırdığında aşağıdaki sonuçlardan hangilerine ulaşır? (1 point)   Ampul daha parlak yanar. Akım azalır. Devrenin direnci azalır. Devrenin direnci artar. Akım artar. Ampul daha sönük yanar.

Multiple Choice Type Question Example	3. Şekilde aşağıdaki organlardan hangisi **yoktur?** (1 point)  ○ Mide ○ Ağız ○ Böbrek ○ Bağırsaklar
Matching Question Type Example	6. Tabloda verilen ve a, b, c, d olarak belirtilen yerlere gelmesi gereken kavramları harflerle eşleştiriniz. (Besinlerde çoğunlukla bulunan besin gruplarını dikkate alınız.) (1 point) Besin / Görevi / Besin Grubu Çikolata / Enerji Verici / 1 Yumurta / 2 / Protein Kalsiyum / 3 / 4 1 2 3 4 a. Karbonhidrat b. Düzenleyici c. Mineral d. Yapıcı Onarıcı e. Protein
Fill-in Question Type Example	10. Küp şeklinde özdeş tuğlalar şekildeki gibi zemin üzerinde durmaktadır. Şekil I'de basınç 60 Pa olduğuna göre, Şekil II'de basınç kaç Pa'dır? (Not:Sadece sayısal değer yazınız) _____ Pa (1 point)  I II

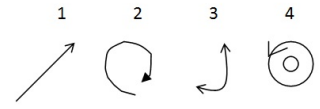
APPENDIX B

OHW Generated Feedback

<table>
<tr>
<td>OHW generated table showing what percentage a student scored</td>
<td>
Thank you. Your responses have been automatically graded. Here are your results.
<table>
<tr><th colspan="4">Score Summary</th></tr>
<tr><th>(Click on question number to jump to question.)</th><th></th><th>points earned</th><th>points possible</th></tr>
<tr><td>Question 1</td><td>incorrect</td><td>0</td><td>1</td></tr>
<tr><td>Question 2</td><td>incorrect</td><td>0</td><td>1</td></tr>
<tr><td>Question 3</td><td>incorrect</td><td>0</td><td>1</td></tr>
<tr><td>Question 4</td><td>correct</td><td>1</td><td>1</td></tr>
<tr><td>Question 5</td><td>correct</td><td>1</td><td>1</td></tr>
<tr><td>Question 6</td><td>correct</td><td>1</td><td>1</td></tr>
<tr><td>Question 7</td><td>incorrect</td><td>0</td><td>1</td></tr>
<tr><td>Question 8</td><td>incorrect</td><td>0</td><td>1</td></tr>
<tr><td>Question 9</td><td>correct</td><td>1</td><td>1</td></tr>
<tr><td>Question 10</td><td>correct</td><td>1</td><td>1</td></tr>
<tr><td></td><td>Score: (50%)</td><td>5</td><td>10</td></tr>
</table>
</td>
</tr>
<tr>
<td>Examples of feedback to wrong answers</td>
<td>
5. Şekilde verilen durumu okuyunuz. Görselle ilgili doğru bilgileri işaretleyiniz.(Şekil üzerinde levhalar mukavvayı, yuvarlaklar deliği ifade etmektedir.)


• Bu deney ışığın doğrusal yolla yayılmasını ispat eder. (correct answer, your response)
• I. durumda göz ışığı algılar. (correct answer)
• II. durumda göz ışığı algılar.
• Bu deneyde II. durumda gölge oluşur. (correct answer)
• Bu deneyde gölgenin oluşması, ışığın doğrusal yolla yayıldığını ispat eder. (correct answer)
• Bu deney gölge boyunun değişkenlerini belirlemek için yapılmıştır.
• Bu deney gölge koyuluğunun değişkenlerini belirlemek için yapılmıştır. (your response)
Feedback: Aynı hizada olan mukavva delikleri sayesinde görmemiz ışığın doğrusal yolla yayıldığının ispatıdır. Işık eğrilemediği için ışık ışınlarının ulaşmadığı yer aydınlatılamaz. Böylelikle gölge oluşur. Bu da ışığın doğrusal yolla yayıldığını ispatlar. Gölge boyu ve koyuluğu ile ilgili herhangi bir değişken değiştirilmediği için bu deney gölge koyuluğu ve büyüklüğünü test etmez.
Points earned: 0 out of 1

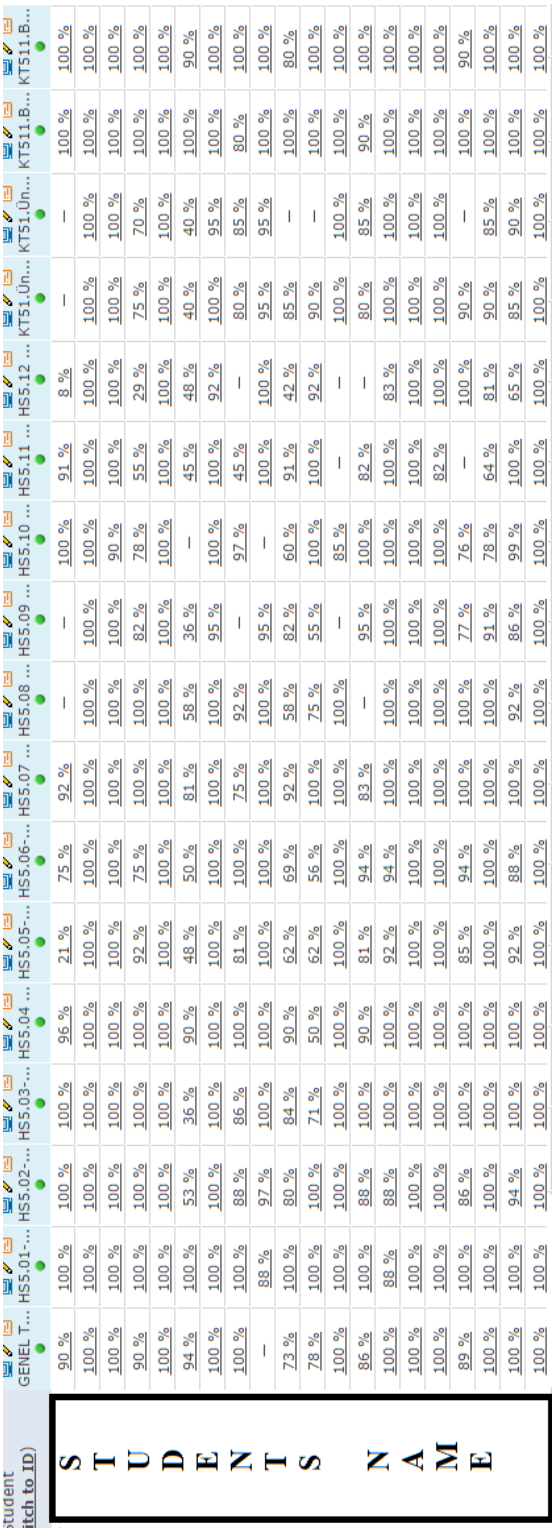
10. Match the sentences with the terms below.
<table>
<tr><th></th><th>Correct answers</th><th>Your responses</th><th></th></tr>
<tr><td>I can see completely when I look through it.</td><td>Transparent</td><td>Semi-Transparent</td><td>(incorrect)</td></tr>
<tr><td>I can see partially when I look through it.</td><td>Semi-Transparent</td><td>blank answer</td><td>(incorrect)</td></tr>
<tr><td>I can not see when I look through it.</td><td>Opaque</td><td>blank answer</td><td>(incorrect)</td></tr>
</table>
Feedback: Cismin arkasındaki maddeleri görebiliyorsak saydam (transparent), göremiyorsak opak (opaque), kısmen görüyorsak yarı saydamdır. (semi-transparent)
Points earned: 0 out of 1

Şekildeki görselden hangisi ya da hangileri ışığın yayılmasını gösterir?


• 1 (correct answer, your response)
• 2 (your response)
• 3
• 4
Feedback: Işık doğrusal bir yol izler.
Points earned: 0 out of 1
</td>
</tr>
</table>

APPENDIX C

Gradebook of OHW Used in the Study Context



APPENDIX D

Main Study Survey (Attitude toward Online Homework in Science Lesson Survey)

Aşağıdaki her maddenin karşılığı olanı kağıda, ilgili seçeneğini (A, B, C, D, E) optik forma işaretleyiniz.

NO						
1	Fen bilimleri dersi öğretmeninizin internet üzerinden verdiği ödevleri yapma oranınızın aralığını yuvarlak içine alınız ve optik forma işaretleyiniz. **A.**%0-%19 **B.**%20-%39 **C.**%40-%59 **D.%**60-%79 **E.**%80-%100					
2	Bu sene boyunca fen bilimleri dersinden **yaklaşık** olarak aldığınız **sınav notlarınızın ortalamasının aralığını** yuvarlak içine alınız ve optik forma işaretleyiniz. **A.**%0-%19 **B.**%20-%39 **C.**%40-%59 **D.%**60-%79 **E.**%80-%100					
3	Sınıf seviyenizi yuvarlak içine alınız ve optik forma işaretleyiniz. **A.** 5.sınıf **B.** 6. sınıf **C.** 7. sınıf **D.** 8. sınıf					
	Aşağıda verilen ifadelerden size en uygun olanı **işaretleyiniz.** (5=Kesinlikle katılıyorum, 4=Katılıyorum, 3=Karasızım, 2=Katılmıyorum, 1=Kesinlikle katılmıyorum) **Not: Ayrıca optik form için**; Kesinlikle katılıyorum A, Katılıyorum B, Karasızım C, Katılmıyorum D, Kesinlikle katılmıyorum E, olacak şekilde **işaretleyiniz.** **İnternet üzerinden verilen fen bilimleri dersi ödevleri,**	**Kesinlikle katılıyorum** **A**	**Katılıyorum** **B**	**Kararsızım** **C**	**Katılmıyorum** **D**	**Kesinlikle katılmıyorum** **E**
4	Derste işlenen konularla ilgilidir.	5	4	3	2	1
5	Bu ödevler dışında öğretmenimin verdiği diğer ödevleri yapmam. (Çalışma kitabı, model ödevleri, poster ödevleri vb)	5	4	3	2	1
6	Dışardan (veli, kitap, arkadaş, internet siteleri, yardımcı kitap vb) destek **almadan** tamamlarım.	5	4	3	2	1
7	Önce soruları tamamen çözer ardından "Submit" ("Ödevi tamamla") tuşuna basarım.	5	4	3	2	1
8	Sayısal sorularda kağıt-kalemle işlem yaptıktan sonra cevabı işaretlerim.	5	4	3	2	1
9	Bu ödevlerde hatalarımı anlamaya çalışmam.(Sorular için girilen cevapları okumam.)	5	4	3	2	1

10	İnternet üzerinden yapılmayan diğer derslerin ödevlerine göre daha fazla zorlanırım.	5	4	3	2	1
11	Verdiğim emeğe değerdir.	5	4	3	2	1
12	Zaman kaybıdır.	5	4	3	2	1
13	Soruları anlayarak yaparım.	5	4	3	2	1
14	İnternet üzerinden fen ödevi yaparken soruları kendi başıma cevaplamam konuyu daha iyi anlamamı sağlar.	5	4	3	2	1
15	İnternet üzerinden ödev verilmeyen derslerle karşılaştırdığımda, internet üzerinden ödev yapmak fen dersine daha iyi hazırlanmamı sağlar.	5	4	3	2	1
	İnternet üzerinden verilen fen bilimleri dersi ödevleri,	**Kesinlikle katılıyorum** **A**	**Katılıyorum** **B**	**Kararsızım** **C**	**Katılmıyorum** **D**	**Kesinlikle katılmıyorum** **E**
16	Dersteki akademik başarımı arttırır.	5	4	3	2	1
17	Daha teknolojik olduğu için normal şekilde ödev yapıp, teslim etmeye göre 21.yüzyıla daha uygun bir yöntemdir.	5	4	3	2	1
18	Sağladığı geri bildirim, diğer derslerin sağladığı geri bildirime göre hızlı olması açısından daha sistemlidir.	5	4	3	2	1
19	Yanlışlarımı düzeltme fırsatı vermesi konuyu daha iyi anlamama yardımcı olur.	5	4	3	2	1
20	Anlık geri dönüt almak, ödevi yapmamda beni yüreklendirir.	5	4	3	2	1
21	Fen bilimleri dersinde öğrendiğim bilimsel bilgiyi günlük hayatta daha iyi uygulayabilmemi sağlar.	5	4	3	2	1
22	Sorular, derste tartışılan konuları daha iyi anlamamı sağlar.	5	4	3	2	1
23	En az diğer ödevler kadar düşünme becerilerimi (yaratıcı düşünme, kritik düşünme vb) geliştirir.	5	4	3	2	1
24	Fen bilimleri ile ilgili kavramları daha iyi anlamamı **sağlamaz**.	5	4	3	2	1
25	Beni zihinsel anlamda zorlar.	5	4	3	2	1
26	Beni, normal şekilde verilen ödevlere göre fen konularını daha çok düşünmeye yönlendirir.	5	4	3	2	1

27	Haftalık son tarihlerinin olması beni daha düzenli çalışmaya yönlendirir.	5	4	3	2	1
28	İnternet üzerinden fen ödevi verilmesi sayesinde fen sınavlarına diğer sınavlara göre daha hazırlıklı girdiğimi hissederim.	5	4	3	2	1
29	İnternet üzerinden fen ödevleri verilmeye başlandığından beri fen sınavlarına çalışmak için daha fazla zaman ayırıyorum.	5	4	3	2	1
30	İnternetten ödev yaptığım için dersi daha ilginç buluyorum.	5	4	3	2	1
31	İnternet üzerinden ödev yapmak derse olan katılımımı **arttırmaz**.	5	4	3	2	1
32	İnternet üzerinden fen bilimleri dersi ödevlerini yaptığım için ders ile ilgili konuları öğrenmeye daha hevesliyim.	5	4	3	2	1
33	İnternet üzerinden yapılan fen bilimleri dersi ödevleri notlandırılmasaydı bile bu ödevleri çözmeye devam ederdim.	5	4	3	2	1
34	Genel olarak bu ödvler ile ilgili deneyimim **olumsuzdur**.	5	4	3	2	1
35	Fen bilimleri dersine karşı ilgimi arttırır.	5	4	3	2	1
36	İnternet üzerinden ödev veren siteleri tanımayan arkadaşlarıma internet üzerinden fen bilimleri dersi ödevini yapmalarını tavsiye ederim.	5	4	3	2	1
	İnternet üzerinden verilen fen bilimleri dersi ödevleri,	**Kesinlikle katılıyorum** **A**	**Katılıyorum** **B**	**Kararsızım** **C**	**Katılmıyorum** **D**	**Kesinlikle katılmıyorum** **E**
37	Genel olarak internet üzerinden fen bilimleri dersi ödevi yapmayı, normal şekilde ödev yapmaya tercih ederim.	5	4	3	2	1
38	Fen Bilimleri dersi öğretmenim bu ödevlerin sonuçlarını takip etmeseydi bile, bu ödevleri kendimi geliştirmek adına yapardım.	5	4	3	2	1
39	Bilgisayar başında vakit geçirerek ödev yapmama olanak sağladığı için bu ödevleri yapmayı severim.	5	4	3	2	1
40	İnternet üzerinden fen ödevi yapmamın ana nedeni bu ödevlerin bana sağladığı yararlardır.	5	4	3	2	1
41	Ödevin çözülüp çözülmediğinin kaydedilmesi ödevden kaçmamı engellediği için normal şekilde verilen ödevi tercih ederim.	5	4	3	2	1
42	Bu ödevlerin normal şekilde yapılan ödevlere göre daha sık takip ediliyor olması, bu ödevlerimi daha sık yapmamı sağlıyor.	5	4	3	2	1
43	İnternet üzerinden fen ödevi yapıyorsam bunun ana nedeni cezalardır.	5	4	3	2	1

	İnternet üzerinden verilen fen ödevlerinin bazı avantajları aşağıda verilmiştir. Bu özellikleri sizin için en az önemli olandan (1) en çok önemli olana doğru (5) 1'den 5'e kadar sıralayınız. **Her rakamı yalnızca bir sefer kullanınız.** Not: Optik form için; Çok önemli A, Önemli B, Biraz önemli C, Önemli değil D, Hiç önemli değil E	**Çok önemli** **A**	**Önemli** **B**	**Biraz önemli** **C**	**Önemli değil** **D**	**Hiç önemli değil** **E**
44	Anında geri bildirim veriyor olması	5	4	3	2	1
45	Başarının yüzdeliğini vermesi	5	4	3	2	1
46	Yeniden çözülebiliyor olması	5	4	3	2	1
47	Öğretmenimin daha iyi takip ediyor olması	5	4	3	2	1
48	Yaptığım ödevi liste şeklinde sunması	5	4	3	2	1

Katılımınız için teşekkürler, optik işaretlemelerinizi kontrol ediniz...

APPENDIX E

AQCOAC Scale Items

Below you will find 26 statements that may or may not fit your understandings concerning the integration of an Online Assignment Checker (OAC) in this course. You are asked to grade each statement with a circle around a number between 1 and 5. The meaning of these grades appears in the following scale:

1	2	3	4	5	0
completely disagree	disagree	Neutral	Agree	Completely agree	Irrelevant

Please relate to each statement by marking the number next to the statement that most closely expresses your feeling. If you do not understand one of the statements or it is irrelevant, choose 0. If you understand the statement but you have no clear opinion, choose 3.

OAC means Online Assignment Checker

	Statement	Attitude
1	Practicing with the OAC imposes a heavy learning burden on the student in comparison with practice in other courses with no OAC.	0 1 2 3 4 5
2	I think it is important to answer all the questions on the OAC by myself to gain a better understanding of the subject matter.	0 1 2 3 4 5
3	Because I practice with OAC I find the lectures more interesting	0 1 2 3 4 5
4	I prefer to submit assignments in writing on using the OAC.	0 1 2 3 4 5
5	The lecturer thinks the exercises are important during the course and relates to the difficulties that arise.	0 1 2 3 4 5
6	My chances of succeeding in the course improve because of the consistent exercises on the OAC.	0 1 2 3 4 5
7	Practicing with OAC during the course do not help me to understand the scientific terms learned in the course	0 1 2 3 4 5
8	Practicing with OAC give me a better preparation for the lesson in comparison to courses that have no online practice.	0 1 2 3 4 5
9	I sometimes use my friends' homework without having answered the homework questions in the OAC by myself.	0 1 2 3 4 5
10	My involvement in the course has not increased as a result of my practice the OAC.	0 1 2 3 4 5
11	My achievements in the course did not improve after I submitted the assignments through the OAC.	0 1 2 3 4 5
12	Submission of assignments through the OAC is the most appropriate method for students in the 21st century, in comparison to submission in hard copy.	0 1 2 3 4 5

	Statement	Attitude
13	Feedback given by OAC is methodical and effective in comparison to feedback given in other courses.	0 1 2 3 4 5
14	The opportunity given to correct mistakes when submitting assignments in a course through the OAC helps me to gain a better understanding in the course.	0 1 2 3 4 5
15	It's possible to guess the correct answers in OAC even without solving the assignment questions.	0 1 2 3 4 5
16	The immediate feedback given by the OAC encourages me to perform the assignments.	0 1 2 3 4 5
17	Because I practice with the OAC I can apply in a better way the scientific information learned in the course.	0 1 2 3 4 5
18	Work with the online assignments does not arouse my curiosity to go deeper into the scientific phenomena studied in the course.	0 1 2 3 4 5
19	Succeeding in the course is important for my professional development, so that I think it is important to learn to answer the assignments by myself.	0 1 2 3 4 5
20	It's impossible to succeed in a course when you get the correct answers from friends, without reading and solving the questions that appear in the OAC.	0 1 2 3 4 5
21	During the lecture the lecturer does not spend time on the subjects that appeared in the OAC.	0 1 2 3 4 5
22	The questions asked in the OAC help me to understand the subject matter discussed in the course.	0 1 2 3 4 5
23	During the lectures or the tutorials in the course there is sometimes discussions about the difficulties arose from practicing in the OAC.	0 1 2 3 4 5
24	As a result of the online practice I am more willing to learn topics associated with the course.	0 1 2 3 4 5
25	The questions that appear in the OAC encourage higher order thinking no less than questions given regular homework in other courses.	0 1 2 3 4 5
26	The assignments presented on the OAC fits the subject matter studied in the course.	0 1 2 3 4 5
27	Sometimes when I am temporarily stressed, I tend to get my friends' homework, without solving the OAC questions by myself.	0 1 2 3 4 5
28	Usually I solve the questions completely and then submit the final solution through the OAC	0 1 2 3 4 5

APPENDIX F

COHE Scale Items

Fall 2006
C. Eugene Bennett Department of Chemistry
Chem 116 Online Homework Evaluation

Please evaluate the Chem 116 Online Homework Assignments on a scale of a-e with "a" representing the highest rating or strong agreement with the given statement and "e" representing the lowest rating or strong disagreement with the statement. Please mark the appropriate letter on the Scantron sheet provided. Mark only one answer for each statement.

Scale: a = strongly agree
b = agree
c = neutral (or neither agree or disagree)
d = disagree
e = strongly disagree

		Rating: strongly agree → strongly disagree
Online Homework Completion		
1.	I completed all of the online homework assignments.	-a- -b- -c- -d- -e-
2.	I completed few of the online homework assignments.	-a- -b- -c- -d- -e-
3.	I would have completed the online homework assignments even if they were not to be graded.	-a- -b- -c- -d- -e-
4.	I only completed the online homework assignments because they were worth a portion of my grade.	-a- -b- -c- -d- -e-
5.	The online homework assignments average being worth 10% of my final numerical grade was high enough to make me complete the online homework assignments.	-a- -b- -c- -d- -e-
6.	Besides online homework and laboratory homework, I did none of the other homework recommended on the homework sheet.	-a- -b- -c- -d- -e-
Online Homework Understanding		
7.	I looked over the graded online homeworks in order to learn from my mistakes.	-a- -b- -c- -d- -e-
8.	I generally understood the questions within the online homework assignments.	-a- -b- -c- -d- -e-
9.	I could complete the online homework assignments with little outside help.	-a- -b- -c- -d- -e-
10.	I guessed at the answers to the online homework assignments.	-a- -b- -c- -d- -e-
11.	For numerical questions, I worked out the answers with pencil and paper before submitting an answer within the online homework assignment.	-a- -b- -c- -d- -e-

		Rating: strongly agree				strongly disagree
12.	I never tried to figure out my mistakes on questions I answered wrong within the online homework.	-a-	-b-	-c-	-d-	-e-
Online Homework Attitudes						
13.	Overall, my experience with the online homework was negative.	-a-	-b-	-c-	-d-	-e-
14.	In the future, I would be less apt to take a course that included online homework.	-a-	-b-	-c-	-d-	-e-
15.	The online homework was worth the effort.	-a-	-b-	-c-	-d-	-e-
16.	After this experience, I would be more apt than before to take a course that included online homework.	-a-	-b-	-c-	-d-	-e-
17.	The online homework assignments were a waste of time.	-a-	-b-	-c-	-d-	-e-
18.	Given the choice, I would choose mandatory quizzes over mandatory online homework assignments.	-a-	-b-	-c-	-d-	-e-
19.	The online homework assignments were relevant to what was presented during lecture.	-a-	-b-	-c-	-d-	-e-
20.	The online homework assignments did not further my understanding of chemistry concepts.	-a-	-b-	-c-	-d-	-e-
21.	The online homework assignments were challenging.	-a-	-b-	-c-	-d-	-e-
22.	The online homework assignments made me think more about chemistry than I would have otherwise.	-a-	-b-	-c-	-d-	-e-
Online Homework Study Habits						
23.	The weekly deadlines for online homework assignments were helpful by encouraging me to study in a more consistent manner.	-a-	-b-	-c-	-d-	-e-
24.	I spent less time cramming for chemistry exams this semester than for previous chemistry courses.	-a-	-b-	-c-	-d-	-e-
25.	To study for the chemistry exams, I typically pulled all nighters.	-a-	-b-	-c-	-d-	-e-
26.	I felt more prepared for my exams this semester than for previous chemistry courses.	-a-	-b-	-c-	-d-	-e-
27.	I spent more time doing homework for this class than for any other class.	-a-	-b-	-c-	-d-	-e-
28.	I only studied chemistry on the days the online homework was due and the night before the exam.	-a-	-b-	-c-	-d-	-e-
29.	My chemistry study was spread out over more days this semester than during previous semesters.	-a-	-b-	-c-	-d-	-e-
30.	I worked on my own to complete the online homework assignments.	-a-	-b-	-c-	-d-	-e-

		Rating: strongly agree				strongly disagree
31.	I worked with a group of students to complete the online homework assignments.	-a-	-b-	-c-	-d-	-e-
32.	If not for the online homework, I would not have completed any homework for this class.	-a-	-b-	-c-	-d-	-e-
	Online Homework Perceived Grades					
33.	I received higher scores on the four hourly exams due to my completion of the online homework assignments.	-a-	-b-	-c-	-d-	-e-
34.	I will receive a higher letter grade in Chem 116 due to my completion of the online homework assignments.	-a-	-b-	-c-	-d-	-e-
	Online Homework Chemistry Attitudes					
35.	My attitude toward chemistry has improved since taking Chem 116.	-a-	-b-	-c-	-d-	-e-
36.	The online homework helped to improve my attitude toward chemistry.	-a-	-b-	-c-	-d-	-e-
37.	I would be more likely to consider majoring in chemistry after having taken this course.	-a-	-b-	-c-	-d-	-e-
	Other					
38.	I recommend that the online homework assignments be used for future Chem 116 classes.	-a-	-b-	-c-	-d-	-e-
39.	I have told my friends about the online homework and have recommended that they not take a chemistry class with online homework.	-a-	-b-	-c-	-d-	-e-
40.	I used the online textbook extensively when completing the online homework assignments.	-a-	-b-	-c-	-d-	-e-
41.	This is my first attempt at taking and passing Chem 116. (a=1st attempt, b= 2nd attempt, c=3rd attempt, d=4th attempt, e=I don't think I'll be passing Chem 116 this time.)	-a-	-b-	-c-	-d-	-e-
42.	What is your gender? (a=male, e=female)	-a-				-e-
43.	What is your class status? (a=freshman, b=sophomore, c=junior, d=senior, e=other)	-a-	-b-	-c-	-d-	-e-
44.	Is your major science related, health field related, or other? (a=science such as chemistry, physics, biology, etc. c= health related such as pre-med, pre-pharm, pre-dental e=other)	-a-		-c-		-e-
44.	Did you take Chem 115 at WVU? (a= yes, e= no)	-a-				-e-

APPENDIX G

Orta Doğu Teknik Üniversitesi İnsan Araştırmaları Etik Kurulu

Gönüllü Katılım Formu

Özel ortaokul öğrencilerin internet üzerinden yapılan fen bilimleri dersi ödevlerine ilişkin algıladıkları motivasyon ve tutumlarının belirlendiği bu çalışmanın araştrmacısı Nurhan Mumay Yıldız'dır. Bu çalışma, Orta Doğu Teknik Üniversitesi İlköğretim Fen ve Matematik Bölümü alanında yapılmaktadır. Çalışmanın amacı öğrencimizin internet üzerinden yapılan fen bilimleri dersi ödevine ait tutumlarını ölçmek ve uygulamanın iyileştirilmesine katkıda bulunmaktır. Katılım internet üzerinden ödev yapmanın sağladığı; anlık geri dönüt verme, cevap sağlama, heryerden ulaşılma gibi potansiyel yararların öğrenciler üzerinde olumlu etki yapıp yapmadığını araştırarak, bu tarz uygulamaların yaygınlaştırılmasını ve geliştirilmesine olanak sağlayacağı öngörülmektedir. Katılımcılardan beklenen 1 ders saati (40 dakika) içinde anket sorularını yanıtlamaları ve sağlanan optik forma işaretlemeleridir. Bu çalışmanın anket uygulama aşamasında öğrencilerin 1 ders kaybı yaşamaları dışında herhangi bir risk faktörü görülmemektedir.

Katılım gönüllüdür ve çalışma esnasında herhangi bir yaptırıma maruz kalmadan çekilme özgürlüğüne sahiptir. Öğrenci isimlerinin tez yazma aşamasnda kesinlikle kullanılmayacağını ve verilerin araştırmacı dışında hiç bir 3. Şahslarla paylaşılmayacağını taahhüt ederim. Herhangi bir soruda araştırmacıya ulaşmaktan kesinlikle çekinmeyiniz.

Nurhan Mumay Yıldız

Tunahan Mah. Tunahan Sitesi. 6N Blok, No:27Eryaman/Etimesgut/ANKARA-TÜRKİYE

0505 911 11 64

e143486@metu.edu.tr

Araştırma amacı hakkında bilgilendim **Katılmaya gönüllüyüm**

İmza: İmza:

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER

ORTA DOĞU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY

DUMLUPINAR BULVARI 06800
ÇANKAYA ANKARA/TURKEY
T: +90 312 210 22 91
F: +90 312 210 79
ueam@metu.edu.tr
www.ueam.metu.edu.tr

Sayı: 28620816/ 402 – 974

11.11.2014

Gönderilen : Doç. Dr. Elvan Şahin
İlköğretim Bölümü

Gönderen : Prof. Dr. Canan Sümer
IAK Başkanı Vekili

İlgi : Etik Onayı

Danışmanlığını yapmış olduğunuz İlköğretim Fen ve Matemtik Eğitimi Bölümü öğrencisi Nurhan Mumay'ın "Invastıgatıng Private Elementary School Students' Attitudes Toward Online Homework in Science Lesson and Their Perceptions About Online Homework in Terms of its Usefulness and Fruitfulness" "Özel Ortaokul Öğrencilerin İnternet Üzerinden Yapılan Fen Bilimleri Dersi Ödevlerine İlişkin Tutumları ve Kullanışlığı, Yararlığı Hakkındaki Görüşleri" isimli araştırması "İnsan Araştırmaları Komitesi" tarafından uygun görülerek gerekli onay verilmiştir.

Bilgilerinize saygılarımla sunarım.

Etik Komite Onayı

Uygundur

11/11/2014

Prof.Dr. Canan Sümer
Uygulamalı Etik Araştırma Merkezi

APPENDIX H

TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü	
Sosyal Bilimler Enstitüsü	X
Uygulamalı Matematik Enstitüsü	
Enformatik Enstitüsü	
Deniz Bilimleri Enstitüsü	

YAZARIN

Soyadı : Mumay Yıldız
Adı : Nurhan
Bölümü : İlköğretim Fen ve Matematik Eğitimi

TEZİN ADI:

Investigating Private Elementary School Students' Attitudes toward Online Homework in Science Lesson in terms of Experience, Usefulness and Thought

TEZİN TÜRÜ : Yüksek Lisans [X] Doktora [ ]

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. [ ]
3. Tezimden bir (1) yıl süreyle fotokopi alınamaz. [X]

TEZİN KÜTÜPHANEYE TESLİM TARİHİ:

APPENDIX I

Turkish Summary

DENEYİM, DÜŞÜNCE VE KULLANIŞLILIK AÇISINDAN ÖZEL ORTAOKUL ÖĞRENCİLERİN FEN DERSİNDE İNTERNET ÖDEVLERİNE YÖNELİK TUTUMLARININ İNCELENMESİ

1. GİRİŞ

İnsanoğlu geliştikçe, eğitim üzerine yapılan çalışmalara verilen önem artmıştır. Bunun nedeni ise eğitimin çıktılarıdır. John Dewey, eğitimi, bireyin sosyal çevrede deneyimini zenginleştirecek aktiviteler olarak tanımlamıştır (Martin, 2003). Eğitim formal, informal ve formal olmayan şekilde üç kategoride gruplandırılmıştır (Dib, 1988). Formal eğitim, bireyin, yapılandırılmış bir ortamda, profosyonel eğitimciler tarafından, belli bir sayıda öğrenci varlığında ve genellikle bir kurumsal değerlendirme ile neticelenen deneyim kazanmasıdır. Bu çalışmada araştırma konusu ilköğretim okulunda geçtiği için, formal eğitimin elementlerini incelemek gerekmektedir. Formal eğitim ülke ülke değerlendirildiğinde genel amaçların farklılaştığı görülür (Colardyn, Bjornavold, 2004). Türkiye'de eğitimin genel amaçları ihtiyaç analizi ile başlar (Akpınar, 2004). İhtiyaç analizi ile amaçlar belirlenir, içerik hazırlanır, eğitim durumları ortaya konulur ve değerlendirme yapılır. Amaçların belirlenmesinde bireysel, sosyal, konu alanı ve doğa alanları dikkate alınır. Bu çalışma fen bilimleri dersi konu alanı için yapılmış olduğundan, bu konu alanı ile ilgili bazı önemli sorular sormamız gerekmektedir. Fen dersi konu alanının

ihtiyaçları nelerdir? Bu konu alanı için kazanımlar nasıl daha iyi adapte edilir? Bu gibi sorulara cevap aramak için fen bilimleri dersini öğrenme üzerine daha derin bilgiye ihtiyaç duyarız.

Fen bilimleri dersini öğretmek tüm seviyeler için temel ve teknik beceriler, değerler ve bilimsel bilgiler kazandırmak demektir (Dow, 2006). Bu da fen okuryazarlığından geçmektedir (AAAS, 2003). Fen okuryazarlığı ile öğrenci günlük hayat olgularına açıklama getirmeye çalışır. Bu durumu geliştirmek için fen bilimleri dersi ortamlarında uygun metaryelleri kullanmak gerekmektedir (National Research Council, 2000). Bu amaçla fen bilimleri dersinde öğretim model, teknik ve stratejilerden faydalanılır. Bu yöntem ve teknikler sınıf içinde olduğu gibi sınıf dışında da uygulanabilir. Cooper'a göre (1989) ödev verme çok sık kullanılan bir sınıf-dışı öğretim yöntemidir. Buna ek olarak Newbyi Wintebottom (2011) ve Muthy (2007) de ödev vermeyi hem öğretim yöntemi hem de değerlendirme yöntemi olarak görmüştür.

Ödev, öğrenciyi öğrenilen malzeme üzerinde tutmayı amaçlar. Değişik amaçta kullanılan ödevler vardır: tekrar ettirici, geliştirmeci, hazırlayıcı ve yaratıcı. Genellikle okullarda öğrencilere tekrar ettirici ödevler verilmektedir (Altun, 2007). Ödevlerin süreleri değişkenlik gösterir. Kimisi kısa, kimisi uzun vadeli ödevlerdir. Ödevler alıcıya göre de değişkenlik gösterir kimi zaman bireysel, kimi zaman grup ödevi olarak öğrencilere atanır. Bu çalışmada verilen ödevler tekrar ettirici amaçta, kısa vadeli ve bireyseldir. Ödevin faydalı olup olamdığı ile ilgili literatürde çokça araştırmaya rastlayabiliriz. Yapılan çalışmalara göre ödev öğrencilere öğrenilen konular üzerinde düşünme ve tekrar yapma fırsatı verdiği için faydalıdır. Ödevler

öğrencilerin akademik başarısını arttırır (Cooper H., et al, 1998; Bursuck W., 1994; Cool V., and Keith T., 1991). Ayrıca öğrencilere yan faydalar da kazandırır, bu faydalardan bazıları zaman yönetimi, organizasyon yapma yeteneği, sorumluluk almadır (Bempechat J., 2004; Muhlenbruck, et al. 2000). Ancak ödevin olumsuz özelliklerinin olduğunu ortaya koyan çalışmalar vardır ki bunlardan bazıları oyun oynamak, dinlenmek ve kitap okumak için ayrılan zamanın ödev yapma nedeni ile azaldığını ortaya koymuştur (Baumgartner et al., 1993; Yankelovich, 2006). Ödevlerin belirli yaş gruplarına belirli ağırlıklarda verilmesi önerilmektedir. Küçük sınıflara daha az zaman alan ödev verilmesi, yaş seviyesi arttıkça ödev için ayrılan sürenin artması gerektiği savunulur (Cooper H., et al., 1999; Hoover-Dempsey K., et al.; 2001; Kohn A., 2006).

Geleneksel ödevler dışında, günümüzde teknolojinin gelişmesiyle internet üzerinden yapılan ödevler türemiştir. Uluslararası Telekominikasyon Birliği'nin (ITU) yaptığı bir araştırmaya göre Türkiye'de nüfusun %48'i internet kullanmaktadır. İlköğretim öğrencilerin ise yaklaşık %14'ü internet, ödev araştırmalarında kullandığı bilinmektedir (Orhan and Akkoyunlu, 2004). Öğrencilerin internetten ödev anlamaında faydalanmaları genel olarak internet sitesinden bir metin okumak, çevrimiçi test çözmek, eğitici çevrimiçi oyun oynamak, bilgisayar sunusu hazırlamak, sunmak, paylaşmak, kavram karikatürü hazırlamak, e-portfolyo hazırlamak, çevrimiçi bilgi araştırmak, ödev gönderme amaçlı e-posta kullanmak ve web 2.0 araçlarını kullanmaktır (Zisow, 2002). Bu çalışmada geçen internet ödevi ise internet sitesinden çevrimiçi testler çözmek olarak belirlenmiştir. İnternet ödevlerinin öğrenciler ve fen eğitimcileri açısından avantajları ve

dezavantajları vardır. Anlık geri dönüt vermesi, yanlış cevapların doğrularını belirtmesi, her yerden ve her zaman ulaşılabiliyor olması, soruların yerlerini karıştırması, ve puanlamada kolaylığı genel olarak faydalarındandır. Ancak öğrencinin deneme-yanılmaya yönlendirmesi, verdiği cevabı sorgulatmaması dezavantajlarındandır (Bonham et al., 2001). İnternet ödevinin yapılandırıcı fen eğitimi yaklaşımına uygun olup olmadığını irdelemek önemlidir. Yapılandırıcı yaklaşıma göre, öğrenciler kendi hızlarında öğrenmelerinden sorumludur. Bu yolda öğrencilere meteryaller sunulması önemlidir. Bilgisayar ve internet yapılandırıcı fen öğretimine uygun bir medya olarak kabul edilmektedir (El-Labban, 2003). Çünkü bilgisayar ve internet ile bireyselleştirilmiş eğitim programı sağlanır, bu da öğrencilerin kendi hızında öğrenmeleri için uygun bir medya sağlar.

Fen bilimleri dersinde özel ortaokul öğrencilerin internet ödevlerinin kullanmasına yönelik tutumlarının araştırılması önemlidir, çünkü literatürde genellikle üniversite öğrencileri arasında yapılan çalışmalar mevcuttur. Ancak bilinmektedir ki, internet kullanma yaşı çok düşmüştür ve daha küçük yaş grubundaki öğrenciler de eğitimlerinde interneti kullanabilmektedirler. Bu nedenle ortaokul yaş grubundaki öğrencilerle yapılacak bu çalışma gelecek araştırmalar için önem teşkil etmektedir. Bu çalışmayı yapma motivasyonum, araştırmacı olarak aynı zamanda çalışmanın yapıldığı okulda bir fen bilimleri deris öğretmeni olmam ve internet ödevini kullanıyor olmamdır. İlk etapta ilgimi daha çok sistemin yararları çekmiş iken, daha sonraları öğrencilerin internet ödevi yapmalarındaki tutumları arasındaki farklılık daha çok ilgimi çekmeye başlamıştır. Bu da yapmış olduğum gözlemleri akademik bir dayanağa yaslama ihtiyacı doğurmuştur.

Bu çalışmanın amacı fen bilimleri dersinde özel ortaokul öğrencilerin internet ödevlerinin kullanışlılık, deneyim, düşünce açısından tutumlarını belirlemek, akademik başarıları ile tutumları arasındaki ilişkiyi göstermek ve tutumların sınıf seviyeleri açısından farklılığı olup olmadığını araştırmaktır.

2. LİTERATÜR TARAMA

Literatürde internet ödevi ile ilgili çalışmalar genellikle ünivesite seviyesinde katılımcılar ile yapılmıştır. İnternet ödevinin uygulandığı konu alanları ise matematikten biyolojiye, işletmeden istatistiğe değişkenlik göstermektedir. Literatüre bakıldığında internet ödevlerinin hem fen derslerinde hem de diğer derslerde akademik başarı ve tutumu ile ilşkili olduğu görülmektedir. Fen bilimleri dersinde akademik başarı ile öğrencilerin internet ödevlerine olan tutumları arasında olumlu ilişki olduğu görülmüştür. (Taraban R., et al., 2005; Babb M., et al., 2011; Flori R., et al., 2002; Zerr R., 2007; Hirsch L., Wiebel C., 2003; Sagarra N., Zapata G., 2008; Mendicino M., et al., 2009; Arora M., et al., 2013; Al-Jarf R., 2011). Yine de internet ödevi ve geleneksel ödev alan öğrencilerin akademik başarısı arasında anlamlı fark bulunmayan çalışmalar da mevcuttur (Bonham S., et al., 2001; Cheng K., et al., 2004; Allain R., Williams T.; 2006, Demirci N.; 2007, Hauk S.; Segalla A., 2005; Palocsay S.; Stevens S., 2008). İnternet ödevine ilişkin tutumların incelendiği çalışmalarda internet ödevinin en az geleneksel ödev kadar etkili olduğu ortaya konulmuştur, ancak öğrenciler internet ödevini geleneksel ödeve göre daha kullanışlı ve yardımcı bulmuşlardır, bunun da ana nedenini verdiği anlık geri dönüt olarak

belirtmişlerdir (Arasasingham R., et al., 2011; Revell K., 2013; El-Labban, 2003; Hauk S., Segalla A., 2005; Palocsay S., Stevens S., 2008, Zerr R., 2007; Al-Jarf R., 2011).

3. YÖNTEM

Bu çalışmada Türkiye, Ankara, Çankaya'da aynı okulun 5., 6., 7., 8. sınıflarında okuyan 669 özel ortaokul öğrencilerine anket uygulanmıştır. Türkiye'de internet ödevi ya yaygın değildir ya da düzensiz olarak uygulanmaktadır. Bu nedenle okulun, fen bilimleri dersinde internet ödevi kullanımından dolayı KALDER kalite ödülüne layık görülmesi ve öğrencilerin internet ödevi deneyimlerinin olması sadece bir okulun öğrencilerinin katılımcı olarak tercih edilme sebebidir.

Fen bilimleri dersinde özel ortaokul öğrencilerin internet ödevlerinin tutumları anket yöntemi ile, akademik başarı ve tutumları arasındaki ilişki korelasyon ile, sınıf seviyeler arasındaki tutum farklılığı ise MANOVA ile belirlenmiştir.

Bu çalışmada anket sorularını oluşturmak için iki farklı araştırmacının anket maddeleri, izinleri doğrultusunda alınmış, çalışmanın yapısına ve araştırma sorularına göre adapte edilerek yeni bir anket oluşturulmuştur. Bu maddelerin oluşturulmasında fen eğitimi alanında çalışan akademik personelden görüş alınmış, dil doğruluğu ve uygunluğu ODTÜ'de Akademik Yazma Merkezi tarafından araştırmacı ile birlikte düzeltilmiş, ek olarak da uygulamanın yapılacağı okulda çalışan Türkçe öğretmeni tarafından düzeltilmiştir. ODTÜ Etik kurul tarafından uygulamanın yapılma izni alınmıştır. "Fen Bilimleri Dersi İnternet Ödevi Tutumları

Ölçeği" adını alan bu ölçek 48 maddeden oluşmuştur. Bu maddelerden 5 tanesi tanımlayıcı bilgiler içermektedir. 5 tanesi anket uygulama aşamasında öğrenciler tarafından anlaşılmadığı için kullanılmamıştır. 7 tanesi ise faktör analizi sonucunda çıkarılmıştır. Sonuç olarak 31 adet madde fen bilimleri dersinde özel ortaokul öğrencilerin internet ödevlerinin kullanışlılık, deneyim, düşünce açısından tutumlarını ölçmek amaçlı kullanılmıştır. Yapılan açımlayıcı faktör analizine göre 7 madde düşünce faktörünü, 7 madde deneyim faktörünü, 17 madde ise kullanışlılık faktörünü ölçmüştür. Tüm maddeler 5'li likert ölçeği olarak belirlenmiş olup, 5 en yüksek, 1 en düşük değeri ölçmektedir. Çalışmanın ana uygulanması yapılmadan önce pilot çalışması aynı okulun Denizli, Kayseri ve Mersin'de yeralan şubelerinde 5.sınıf öğrencilerine uygulanmıştır. Pilot çalışmada sadece 5.sınıf öğrencilerin katılımcı olmasının sebebi, bu okullarda İnternet Ödevini sadece 5.sınıfların kullanıyor olmasıdır. Pilot çalışma anketine katılan öğrenci sayısı 85'tir. Ana çalışmanın güvenilirliği düşünce faktöründe .70, deneyim faktöründe .73, kullanışlılık faktöründe .93 çıkmış olup tüm maddelerin kendi içinde güvenilirliği .93'tür.

Veri toplama uygulamanın yapıldığı okulda çalışan fen bilimleri dersi öğretmenleri tarafından yapılmıştır. Veri toplamadan önce dikkat edilmesi gerekenler araştırmacı tarafından bu kişilerle paylaşılmıştır. Veri toplama her sınıf için 1 ders saati sürmüş olup, tüm okulda aynı özellik ve fiziksel şarttaki sınıflarda yapılmıştır. Verilerin toplanması toplamda 1 hafta sürmüştür. Bu süre kapsamında okulda herhangi bir sınav ve sosyal aktivite yapılmamıştır. Uygulama- internet ödevi

kullanımı- okul kararı olduğu için öğrencilerin tamamının katılımı söz konusu iken, ankete katılım gönüllülük esasına dayanmıştır.

Araştırmanın iç geçerliliğini etkileyebilecek unsurlardan biri 754 öğrenciden 669'unun ankete katılmasıdır. Ancak aradaki kayıp toplam sayının %11'i olduğundan çalışmanın geçerliliğini etkilememiştir. Araştırmada internet ödevi ile ilgili deneyimli öğrenciler bulunma zorunluluğundan katılımcılar aynı okuldan seçilmiştir, bu çalışmanın genellenebilmesinin kısıtlı olmasına neden olabilir. Bu durum dış geçerliliğini etkilemiş olabilir. Ancak literatüre bakıldığında bu şekilde yapılmış çalışmalar mevcuttur. Bu çalışmanın sınırlarından biri öğrenciler fen dersinden aldıkalrı puanları kendileri belirtmiştir. Öğrencilerden bazıları notlarını yüksek ya da düşük belirtmiş olabilir. Bu durum da literatürde sıkça karşılaşılan bir durumdur. Çalışmanın 1 haftaya yayılması da bir sınırlılık olarak kabul edilebilir.

Bu çalışmada kullanılan internet ödevi için fen bilimleri dersi öğretmeni her eğitim öğretim yılı başında internet ödevi sitesinde sınıflar oluşturur ve her öğrenci özelinde kullanıcı adı ve şifresi yaratır. Bu bilgileri eğitim-öğretim senesinin başında öğrenciler ile paylaşır. Öğrenciler kendilerine ait bu bilgiler ile fen bilimleri dersi ödevlerine erişir. İnternet ödevlerinin yapısı şu şekilde özetlenmiştir.

1. Fen bilimleri dersi öğretmenleri internet üzerinden sorular hazırlar, daha sonra onları internetteki ödev portalına entegre eder.
2. Her haftasonu, o hafta öğrendikleri konulardan bir adet olmak üzere her seviyeden öğrenciye toplamda senede 30 adet internet ödevi tanımlanır.
3. Fen bilimleri dersi öğretmenleri ödevlere görsel ve vidyo ekleyebilir.

4. Fen bilimleri dersi öğretmenleri, çoktan seçmeli, doğru-yanlış, açık uçlu, eşleştirme, sıralama, boşluk doldurma gibi soru tipleri ile sorular yaratabilir.

5. İnternet ödevindeki soruları çözen öğrenci hangi sorulara doğru, hangierine yanlış cevap verdiğini ve toplam puanını gösteren bir tablo ile karşılaşırlar.

6. Tüm sorular yeniden çözülebilir, öğrencilerin aldıkları sonuçların ya ilki, ya sonuncusu, ya da en iyisi sisteme kaydolur. Bu; ödevi yaratan öğretmenin ödev ayarlarını nasıl yaptığına bağlıdır.

7. Öğrencilerin internet ödevine girişleri zaman ve puan olarak kaydolur.

8. Öğrenciler önceden oluşturduğu sınıfın ödevi çözme yüzdesini "Puan Defterinden" (Gradebook) bakarak anında görebilir.

9. Bir öğrenci ödevini yapmadığında okulun geleneksek ödevdeki okul yaptırım kuralları geçerli olur.

10. İnternet ödevi kullanımı için kurum (okul) her sene belli bir ücret ödemektedir.

Yukarıda sıralanan özellikler bu internet ödevinin okuldaki adaptasyonu sonucu oluşmuştur. İnternet sitesinden internet sitesine, okuldan okula bu uygulamalar değişkenlik gösterecektir.

4. SONUÇLAR

Özel ortaokul öğrencilerinin fen bilimleri dersinde internet ödevi kullanımına yönelik tutumlarının ortalama değerleri faktör boyutunda bakıldığında, düşünce faktörü 3.6, deneyim faktörü 3.9, kullanışlılık faktörü ise 3.1 olup, tüm maddeler

bazında 3.4 puan ortalamasına sahiptir. Skewness ve kurtosis değerleri -2 ve +2 aralığında olduğu için normal bir dağılıma sahiptir.

Daha derinlemesine bilgi sahibi olmak için, faktörlere detaylı bakıldığında her faktör için en yüksek ve en düşük maddeler şu şekilde tespit edilmiştir. Katılımcılar düşünce faktöründe 7 numaralı maddeyi "İnternet ödevlerini yapmamın ana nedeni cezalardır. (ters çevrilmiş)" en çok desteklemişlerdir. Öğrenciler bu ödevi ceza alacakları için yapmadıklarını söylemektedirler. Bu da "öğrencilerin yaptırımla karşılaşmamak için değil ödevi yapmayı istedikleri için ödevi yaptıklarını" çıkarımına ulaşılmasını sağlar. Aynı şekilde, katılımcılar düşünce faktöründe 6 numaralı maddeyi "İnternet ödevi, ödevleri kaydettiği için geleneksel ödevi tercih ederim (ters çevrilmiş)." en az desteklemişlerdir. Katılımcılar deneyim faktöründe 1 numaralı maddeyi "Önce soruları tamamen çözer, ardından 'tamamla' butonuna basarım." en çok desteklemişlerdir. Bunun nedeni bu şekilde ödevi tamamlama ödevin yapısında bir durum olduğu içindir. Aynı şekilde, katılımcılar deneyim faktöründe 7 numaralı maddeyi "İnternet ödevi puanlandırılmasaydı bile ödevi çözmeye devam ederdim." en az desteklemişlerdir. Ödev yapmak okul kuralları açısından öğrenciler için zorunlu bir durum olduğu için, yapılma zorunluluğu olmadığı hayali durumu onları daha çok cezbetmiştir. Katılımcılar kullanışlılık faktöründe 4 numaralı maddeyi "Fen bilimleri dersi internet ödevinde verilen geri dönüt diğer derslerin ödevleri ile karşılaştırıldığında daha etkilidir." en çok desteklemişlerdir. Bu durum, öğrencilerin yaptıkları hataların nedenlerini anlık öğrenmeleri açısından oldukça önemlidir. Aynı şekilde, katılımcılar kullanışlılık faktöründe 10 numaralı maddeyi "İnternet ödevi deneyimi nedeniyle fen dersini daha

ilginç bulmuyorum.” en az desteklemişlerdir. Bunun nedeni, öğrencilerin fen bilimleri desinde karşılaştıkları tek durumun bu ödevler olmaması, diğer ödevlerin ve sınıf içi aktivite ve deneylerin de varlığıdır.

Özel ortaokul öğrencilerinin fen bilimleri dersi internet ödevlerine ilişkin tutumlarının, ağırlıklı fen bilimleri dersi sınav ortalaması ile ilişkisnin de araştırıldığı bu çalışmada, öğrenciler fen bilimleri dersinde aldıkları notları kendileri belirtmiştir. Pearson korelasyonuyla sınav notu ile düşünce faktörü arasında anlamlı olumlu yönde korelasyon bulunmuştur, r=.29, n=669, p<.0005, ve $\alpha = .01$, yüksek düşünce faktörü puanı, yüksek ağırlıklı ortalma ile eşleşmektedir, korelasyonun etki büyüklüğü ortadır. Pearson korelasyonuyla sınav notu ile deneyim faktörü arasında anlamlı olumlu yönde korelasyon bulunmuştur, r=.21, n=669, p<.0005, ve $\alpha = .01$, yüksek deneyim faktörü puanı, yüksek ağırlıklı ortalma ile eşleşmektedir, korelasyonun etki büyüklüğü azdır. Pearson korelasyonuyla sınav notu ile kullanışlılık faktörü arasında anlamlı olumlu yönde korelasyon bulunmuştur, r=.18, n=669, p<.0005, ve $\alpha = .01$, yüksek kullanışlılık faktörü puanı, yüksek ağırlıklı ortalma ile eşleşmektedir, korelasyonun etki büyüklüğü azdır. Pearson korelasyonuyla sınav notu ile tüm tutum arasında anlamlı olumlu yönde korelasyon bulunmuştur, r=.24, n=669, p<.0005, ve $\alpha = .01$, yüksek tüm tutum puanı, yüksek ağırlıklı ortalma ile eşleşmektedir, korelasyonun etki büyüklüğü azdır.

5., 6., 7. ve 8.sınıf özel ortaokul öğrencilerinin fen bilimleri dersi internet ödevleri tutumları arasında farklılık olup olmadığı MANOVA ile ortaya konulmuştur. Sınıf seviyeleri arasında anlamlı farklılık vardır. F (3,669) = 17,37, p = .000; Wilks’ Lambda = .80; kısmi eta squared= .072, etki büyüklüğü ortadır. Tüm

seviyelerin birbiri arasındaki farklılıkları deneyim, kullanışlılık, düşünce faktörleri puanlarına göre incelendiğinde, 5.sınıf seviyesindeki öğrencilerin 6., 7. ve 8.sınıf öğrencilerinden anlamlı olarak farklıdır. Düşünce boyutunda bu farklılığın etki büyüklüğü orta seviyedir (eta squared = .117). Deneyim boyutunda bu farklılığın etki büyüklüğü orta seviyedir (eta squared = .099). Kullanışlılık boyutunda bu farklılığın etki büyüklüğü yüksek seviyedir (eta squared = .165). 8.sınıf-7.sınıf, 8.sınıf-6.sınıf ve 8.sınıf-5.sınıf öğrencilerin tutumları arasındaki farklılık anlamlıdır. Aynı şekilde 7.sınıf-8.sınıf, 7.sınıf- 5.sınıf arasındaki farklılık anlamlıdır. 6.sınıf-5.sınıf arasındaki farklılık anlamlıdır. 7.sınıf-6.sınıf arasında anlamlı farklılık bulunmamaktadır.

5. TARTIŞMA

Bu çalışmada elde edilen sonuçlar literatürde var olan çalışmalarla benzerlik göstermektedir. Flori ve diğerlerinin çalışması (2002) öğrencilerin deneyimlerinin olumlu olması internet ödevlerine karşı olumlu tutum geliştirmelerine neden olmaktadır. Aynı şekilde internet ödevini kullanışlı bulan öğrenciler internet ödevlerine karşı olumlu tutum geliştirmektedirler. Çünkü internet ödevi anlık geri dönüt vermekte bu da öğrenmelerini kolaylaştırmaktadır (Revell K., 2013, Bonhom S., et al., 2001, Cheng K., 2004, Dufrense R, et al., 2002, Taraban R., et al., 2005, Allain R., Williams T.,2006, Demirci N., 2007, Arasasingham R., et al., 2011, Babb M., et al., 2011, Pundak D. et al., 2013).

Bu çalışmanın sonucu ile paralel olarak diğer çalışmalarda da akademik başarısı yüksek öğrencilerin internet ödevlerine karşı tutumlarının yüksek olduğu görülmüştür (El-Labban, 2003). Ayrıca bazı diğer çalışmalara göre internet ödevi en az geleneksel ödevler kadar öğrencilerin akademik başarısını geliştrimektedir (Taraban, et al., 2005, Babb et al., 2011, Flori R., et al., 2002, Dufresne et al., 2002). Ancak geleneksel ödev ve internet ödevi alan öğrencilerin akademik başarıları arasında anlamlı bir farklılık görülmemiştir takers (Bonham S., et al., 2001, K., et al., 2004, Allain, et al., 2006). Genel olarak literatürde internet ödevi tutumları arasındaki ilişki üniversite seviyesinde öğrencilerin katılımı ile gerçekleşmiştir. Bu nedenle ortaokul öğrencilerinin internet ödevleri ve tutumları ile ilgili araştırma azdır. Literatürdeki çalışmalarda sınıf seviyeleri arasında farklılık da bu nedenle irdelenmemiştir. Literatürdeki çalışmalarda sadece işletme dersi alan lisans ve yüksek lisans öğrencileri arasında karşılaştırma yapılmıştır. Yüksek lisans öğrencileri lisans öğrencilerine göre internet ödevlerine karşı daha olumlu tutuma sahiptir (Smolira, 2008). Bu çalışmada ise 5. sınıf öğrencileri kendinden daha büyük seviyedeki öğrencilere göre internet ödevlerine karşı daha yüksek tutuma sahiptir. Bu farklılığın nedeni iki çalışmada yer alan öğrenci grubunun yaş özellikleri ile ilgilidir. 5.sınıftan 8.sınıfa doğru sınıf seviyesi artarken öğrencilerin yaş özellikleri değişmektedir. Erikson'a göre (1963) 5.sınıf seviyesindeki öğrencilerin bulunduğu yaş seviyesi "okul çağı" ya da "başarıya karşı aşağılık duygusu" olarak adlandırılmaktadır. Bu dönemin özellikleri arasında doğayı anlama çabası ve merak vardır, derslere karşı ilgileri yüksektir. Erikson'a göre (1963) 8. Sınıf öğrencilerin bulunduğu yaş seviyesi "ergenlik" ya da "kimlik kazanımına karşı rol karmaşası"

olarak adlandırılmaktadır. Bu grubun özellikleri arasında sınırları test etme, kuralları delme ve yeni kimlik sahibi olma gibi özellikler vardır. Bu nedenle ödevlere karşı tutumlarının kendisinden daha küçük seviyedeki öğrencilere göre daha az olması beklenebilir bir durumdur.

İnternet ödevinin fen bilimleri dersinde kullanımı sırasında dikkat edilmesi gereken bazı durumlar vardır. İnternet ödevi kullanımı hayata geçirilmeden önce çalışmanın yapıldığı okulda öğrencilerin bilgisayara sahip olup olmadıkları, internet erişimlerinin bulunup bulunmadığı gibi bazı risk faktörleri araştırılmıştır. Bu araştırmanın sonucuna göre öğrencilerin tamamı bilgisayara ve internet erişimine sahiptir. Ayrıca öğretmenler internet ödevine soru girişi yapabilecek imkan ve bilgiye sahiptirler. Öğrenciler arasında genel olarak sistemi kullanma ile ilgili problem yaşanmamıştır. Ancak zaman zaman öğrencilerin geçici bilgisayar ve internet problemlerinde öğretmenleri ile iletişime geçilmesi ile birlikte bu problemler aşılabilmiştir. Yine de süreç devam ederken bazı öğrencilerin bireysel farklılıkları nedeni ile sisteme adapte olamadıkları gözlenmiştir. Fen bilimleri dersinde internet ödevlerinin kullanımının genele yayılmasında bu nedenle bazı problem durumları meydana çıkabilir. Öğrenciler evde bilgisayar ve/veya internet erişimine sahip olmayabilirler. Öğretmenler internet ortamında soru girişi yapacak bilgi ve imkana sahip olmayabilir.

Okullarda, fen bilimleri dersinde internet ödevlerinin kullanılması bir zorunluluk olarak görülmemeli, imkan ve okul durumları gözetilerek seçenek olarak öğretmen insiyatifinde olmalıdır. İnternet ödevi tercih edilmesi durumunda ise, diğer türdeki geleneksel ödevler tamamen devre dışı bırakılması yerine, internet ödevi ile

birlikte bu tür ödevlere başvurulması faydalıdır. Yine de unutulmamalıdır ki gelişen teknoloji ve teknoloji eğitimleri ile hem gelecekteki öğretmenler hem de öğrenciler teknolojiye daha çok erişebilecek ve daha iyi bilişim okuryazarlığına sahip olacaktır. Bu nedenle internet ödevleri ile ilgili çalışmaların gelişerek devam etmesi gelecek eğitim ve öğretim durumlarına katkı sağlayacaktır.