UTILIZATION OF LEARNING OBJECTS IN SOCIAL STUDIES LESSON: ACHIEVEMENT, ATTITUDE AND ENGAGEMENT

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ABSTRACT

UTILIZATION OF LEARNING OBJECTS IN SOCIAL STUDIES LESSON: ACHIEVEMENT, ATTITUDE AND ENGAGEMENT

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This study aimed to compare 6th grade students who used learning objects and did not use learning objects in their social studies lessons in terms of their academic achievement, attitudes toward the lesson and engagement in the lesson. Further it investigated the teachers' and students opinions about using learning objects in the instructional process.

To achieve the aforementioned aims, both qualitative and quantitative methods were used to collect data throughout the spring semester of 2011-2012 academic year. The participants of this study were 137 students studying at the 6th grade in a public primary school in Bolu. An experimental study was conducted to compare students' achievement, their attitudes toward social studies lesson, and their engagement in the social studies lesson with and without using learning objects. Using the survey method, students' evaluations of their learning objects were examined. Students were observed in the classroom environment during the experimentation in order to reveal how they used the learning objects. Teachers and students were interviewed to elicit their opinions about using learning objects in the instructional and the learning process. Quantitative data were analyzed using descriptive statistics such as mean and variance, and inferential statistics like paired-samples t-test, independent samples t-test, Mann Whitney U-test, Wilcoxon signed rank test for paired samples test and Spearman's rho test. On the other hand, qualitative data were analyzed through content analysis.

The quantitative findings of the study showed that experimental group students' scores were significantly higher than those of the control group students in the social studies achievement test, attitude scale and course engagement scale. Students in the experimental group had positively evaluated the learning objects of the study. In addition, positive correlation was identified between the achievement and course engagement, and between the achievement and learning object evaluation scores. The qualitative results of the study indicated that the characteristics and design principles of learning objects influenced the course achievement, attitude and engagement of students.

These emerging results and the discussion have some important implications for teachers and instructional designers. The study contributes to a well-grounded understanding of learning objects approach and provides a basis for further empirical studies on learning objects.

Keywords: Learning objects, Social Studies Lesson, Achievement, Course Engagement, Attitude

ÖZ

SOSYAL BİLGİLER DERSİNDE ÖĞRENME NESNELERİNİN KULLANIMI: AKADEMİK BAŞARI, TUTUM VE DERSE KATILIM

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Bu çalışma ilköğretim 6. sınıf sosyal bilgiler dersinde öğrenme nesnesi kullanan ve kullanmayan öğrencileri akademik başarıları, derse yönelik tutumları ve derse katılımları açısından karşılaştırmayı amaçlamıştır. Ayrıca bu çalışma, öğretmenlerin ve öğrencilerin, öğretim sürecinde öğrenme nesneleri kullanmaları konusundaki düşüncelerini derinlemesine incelemiştir.

Çalışmanın amacını yerine getirmek için nicel ve nitel veri toplama yöntemleri bir arada kullanılmıştır. Çalışmanın katılımcıları Bolu'da bir ilköğretim okulunda 6. sınıfta bulunan 137 ilköğretim öğrencisidir. Çalışma 2011-2012 akademik yılının bahar döneminde gerçekleştirilmiştir. Öğrenme nesnesi yaklaşımı ile öğretim yapılan öğrenciler ve klasik öğretim yöntemi uygulanan öğrencilerin akademik başarıları, sosyal bilgiler dersine katılımları ve sosyal bilgiler dersine yönelik tutumları arasında fark olup olmadığını incelemek için deneysel araştırma yöntemi kullanılmıştır. Sosyal bilgiler dersinde öğrenme nesnesi kullanan öğrencilerin öğrenme nesnelerine yönelik değerlendirmelerini ortaya çıkarmak için tarama modelinden yararlanılmıştır. Öğrenme nesnelerinin nasıl kullanıldığını ortaya çıkarmak için gözlem yapılmıştır. Ayrıca, öğretmenin ve öğrencilerin öğrenme nesnesi yaklaşımına yönelik düşüncelerini öğrenmek için görüşme yöntemi kullanılmıştır. Nicel verilerin analizinde ortalama ve varyans gibi betimsel istatistikler ile ilişkili örneklemler için t-testi, ilişkisiz örneklemler için t-testi, Mann Whitney U-testi, ilişkili ölçümler için Wilcoxon işaretli sıralar testi ve Spearman rho testi gibi açımlayıcı istatistik teknikleri kullanılmıştır. Nitel veriler içerik analizi yöntemi ile çözümlenmiştir.

Araştırmanın nicel bulguları başarı testi, tutum ölçeği ve derse katılım ölçeğinde deney grubu öğrencilerinin puanlarının kontrol grubu öğrencilerinin puanlarından anlamlı derecede yüksek olduğunu göstermektedir. Deney grubu öğrencilerinin öğrenme nesnelerine yönelik olumlu görüşleri oluşmuştur. Ek olarak, öğrencilerin akademik başarıları ile öğrenme nesnesi değerlendirme sonuçları arasında ve akademik başarıları ile derse katılımları arasında pozitif ilişki bulunmuştur. Araştırmanın nitel bulguları öğrenme nesnelerinin özelliklerinin ve tasarım ilkelerinin öğrencilerin başarılarını, tutumlarını ve derse katılımlarının olumlu etkilediğini ortaya koymaktadır.

Bu çalışmada ortaya çıkan sonuçlar ve tartışmaların öğretmenler ve öğretim tasarımcıları için önemli göstergeleri vardır. Bu çalışma öğrenme nesnesi kavramının anlaşılmasına katkıda bulunmaktadır ve öğrenme nesneleriyle öğrencilerin performansının çalışılması için bir temel oluşturmaktadır.

Anahtar kelimeler: Öğrenme nesneleri, Sosyal Bilgiler dersi, başarı, derse katılım, tutum

To My Family,

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CHAPTER 1

INTRODUCTION

This section addresses the reasons for this study by describing the origins and the aims of the study. This chapter explains that the research explores the potentials of using learning objects at social studies learning environments. Besides these, the research questions, the significance of the study, the definition of the terms and limitations of the study are explained.

1.1. Background of the Study

Scarce of online programs and multimedia software have been produced to facilitate learning and instruction processes. Although teachers have access to those scarce of materials, they use the technology infrequently and in limited ways (Cuban, Kirkpatrick & Peck, 2001). Some of the issues associated with low use of technology in the classroom are lack of computers, lack of quality software, lack of time, technical problems, teachers' negative attitudes toward technology, inadequate funding, resistance to change, insufficient administrative support, lack of computer skills, lack of incentives, scheduling difficulties, insufficient training and lack of vision (Ertmer, 1999; Lim, & Khine, 2006; Schoepp, 2005) as well as the traditional approach to software or multimedia design. Traditional software approaches are where an individual resource would tend to focus on the common parts of the syllabi designed for specific level courses in particular disciplines. Computer-based learning materials rapidly become unusable because the technology evolves rapidly and because they are too expensive. Also, traditional design approaches do not place the final users at the center of the design process. Producers' production model failed to recognize teachers' actual instructional processes and produced large chunks of content. So, when teachers first obtain those instructional materials, they often separate the materials into different pieces (Reigeluth & Nelson, 1997). Then they recombine or replace these parts to support their instructional goals. In addition, as Merrill (1999) stated in his instructional transaction theory (ITT), in authoring systems for computer-based instruction, the student is presented with a record containing subject-matter content and the software guides the student. In this model of instructional computing, there is a serious limitation; except for the branching strategy, all other strategies are hidden in the record and therefore not available to the instructional system for additional processing. In addition to the problems of early computer-based instruction mentioned above is the production of computer-based materials like a textbook model instead of small and reusable content model.

Problems of common computer-based instruction lead researchers and instructors to move from creating and delivering large and inflexible courses to producing content objects consisting of slots for different related elements of knowledge (Merrill, 1999). Consequently, the design, development, delivery and utilization of instructional materials have changed. An instructional technology called "learning object" is mentioned as a ring of the chain because of its reusability, scalability, adaptability, and potential generativity (Wiley, 2001).

Although there is not a consensus on the definition of leaning objects, the first proposed definition is that learning objects (LO) are "any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning" (IEEE, 2002). Wiley (2001, p.6) asserts that the definition of learning objects by IEEE is too broad and he redefines a LO as "any digital resource that can be reused to support learning." Inherent in the term LO is the idea that instructional designers can develop small computer-based learning materials that can be reused many times in different contexts. An LO can be a single page of text, a graphic, a video, animation or simulation with some learning objectives. Learning objects are different from other instructional media as they are reusable, interoperable and flexible. In contrast, traditional

instructional materials are designed and developed for one type of target audience, for instructional objective and for context in mind (McGee & Katz, 2005).

To promote interoperability and reusability of learning objects, they are cataloged in digital libraries. Metadata which means categorical data about data is used to identify the learning objects. Information about the structure, content, description, and administration of learning objects is identified within metadata. In order to provide reusability of learning objects, different metadata standards such as Learning Object Metadata (LOM) by the Institute of Electrical and Electronics Engineers (IEEE) and Dublin Core Metadata (DCM) of Dublin Core Metadata Initiative (DCMI) have been proposed. The resources tagged with metadata are made accessible to learners, instructors, instructional designers etc. through online portals, collections or "Learning Object Repositories (LORs)" (Namuth, Fritz, King, & Boren, 2005). The purpose of a repository is providing safe storage and delivery of the resources as well as the facilitation of their reuse and sharing. A LOR provides access to digital educational materials and its content or metadata reflects an interest in potential instructional uses of digital sources (Tzikopoulos et al., 2007). Some educational institutions such as European Union's ARIADNE, MERLOT (Multimedia Educational Resource for Learning and Online Teaching), and Australia's free network EdNA have developed and published LORs which offer a wide variety of learning objects.

Many authors, namely the most enthusiastic believers of learning objects, believe that learning objects approach has the potential to transform education to a new level (Gibbons, Nelson & Richards, 2002; Hodgins, 2002). The promises of learning objects may include cost-effectiveness, reusability, modifiability, and adaptability (Nurmi & Jaakkola, 2006). Because of their flexible nature, learning objects and learning objects systems can be used to support a variety of learning theories and instructional strategies (Parrish, 2004). In addition, Kay and Knaack (2008) state that learning objects have positive effects on teacher attitude, and student attitude and performance in secondary school classrooms. Although cost-effectiveness, reusability, modifiability and adaptability may be the promises of learning objects, they may be more complex and problematic at first glance for the learning environments in which the learning objects would be used. The criticism of learning objects has mainly seen in the flawed views of knowledge, learning and teaching underlying the learning objects approach (Nurmi & Jaakkola, 2006). Jonassen and Churchill (2004) claim that while learning objects are effective for supporting declarative knowledge acquisition, they may be insufficient for supporting complex problem solving with the current official standards. They also commented that the official standards for learning objects were probably unable to support meaningful, problem-based learning.

As any instructional materials, learning objects themselves are not guarantee for high learning performance and meaningful learning. Wiley (2001) states that in order to facilitate learning, instructional design theory must be adopted with any learning object, and successful learning object integration has three components; an instructional design theory, a learning object taxonomy, and prescriptive connecting material that integrates instructional design to the learning object taxonomy. In addition, Nurmi and Jaakkola (2006), and McCormik and Li (2006) argue that in order that learning objects approach to be successful to fulfill its goals, they should be used in carefully designed learning environments. Also, they assume that the pedagogy should be integrated into the learning object rather than in the interaction of the way the teachers fit into their own pedagogy and that of the learning objects activity. The success of learning object approach is connected to its potentials to facilitate student-centered learning activities, different instructional methods and the economy of learning resources.

1.2. Purpose of the Study

Learning objects are getting great interest in recent instructional approaches, particularly in online and computer based learning environments. But do they really work and how are they used by teachers and students? In order to assist in the learners, instructors and instructional leaders to gain a better understanding of the value of learning objects, the primary purpose of this study was

to compare students who used learning objects and those did not use in the instruction of social studies lesson in terms of their academic achievement, attitudes toward social studies lesson and their course engagement. In addition, this study aimed to investigate the social studies students' interaction and engagement with learning objects and to gain better understanding of their and teachers' evaluation of instruction with learning objects.

1.3. Research Questions

This research was guided with the following primary research question: *What is the effect of using learning objects on sixth grade students' academic achievement, attitudes toward and engagement in social studies lesson?*

The primary research question was guided with the following sub-questions:

1. How do students rate the learning objects in terms of
    a. their perceived learning,
    b. quality of the learning objects, and
    c. engagement with the learning objects?
2. Is there a significant difference between the achievement scores of students who use learning objects and who do not use learning objects in social studies lessons?
3. Is there a significant difference between the students who use learning objects in the social studies lesson and those who do not use in terms of attitudes toward social studies lesson?
4. Is there a significant difference between course engagement scores of students who use learning objects and who do not use learning objects in social studies lessons?
5. Is there a relationship between the students' academic achievement and their course engagement?
6. Is there a relationship between the students' learning objects evaluation and their achievement?
7. What are the students' and the teachers' opinions about using learning objects in the instruction of social studies?
8. How did the students and teachers use the learning objects in the learning environment?

1.4. Significance of the Study

Some large projects have been implemented to develop and share learning objects such as Context e-learning with Broadband Technologies (CELEBRATE) by European Union and eduSource by Canada. As the use of learning objects for teaching and learning is becoming more widespread in learning environments, most of the literature on learning objects is about the definition, potential benefits and pitfalls, and the potential designs of learning objects. The vast majority of studies have focused on use of learning objects in higher education and web-based learning environments. In spite of the potential benefits and pitfalls of learning objects and use of learning objects in higher and web-based learning environments, many of the efforts have focused on integrating learning objects with cognitive information processing and instructional systems design (Bannan-Ritland, Dabbagh & Murphy, 2001). However, little systematic research has been done to examine the effects of learning objects on primary school students' learning outcomes in learning environments. This study reveals the use of learning object systems in primary schools.

A number of learning object repositories which hold lots of learning objects and share them freely have been produced. The majority of learning objects in those repositories are on science and mathematics. In addition, several studies which focused on the effects of learning objects on those study fields have been conducted. In contrast, very few learning objects regarding the learning and teaching of social studies have been created. However, the number of research on the use of learning objects in social studies is very scarce. So, this study investigates the effects of using learning objects on the construction of knowledge in social studies lesson.

Researchers have adopted several techniques to evaluate the learning objects. Haughey and Muirhead (2005) discussed a model to assess the learning objects which included the integrity, usability, learning, design, and values criteria dimensions. That model is based on the assessment of the learning objects by the instructors, instructional designers, or content experts. Nesbit, Belfer and Vargo (2002) have proposed a Learning Object Review Instrument (LORI) to enable a convergent participation model for learning object evaluation. In that model, the participants such as learners, instructors, subject matter experts, instructional designers, and developers collaboratively evaluate the learning objects. Others have adopted different models to evaluate the learning objects in terms of design (Bradley & Boyle, 2004; Krauss & Ally, 2005), use (Bradley & Boyle, 2004; Buzetto-More & Pinhey, 2006), and learning outcomes (Bradley & Boyle, 2004; MacDonald et al., 2005). Most of those studies evaluate the learning objects from the viewpoint of teachers, instructional designers, or content developers neglecting the actual use and opinions of students. This study brings out the students' use of and interaction with the learning objects and their evaluation of using the system in terms of perceived learning, quality of the system and engagement with learning objects.

Research about students' attitudes towards lesson show that students' attitudes is a good predictor of their knowledge level, performance in the learning process, academic achievement, and interest (Demir & Akengin, 2010). Students that have positive attitudes toward social studies, tend to perform better than those with negative attitudes. With the use of instructional technology in learning environments, there is promising evidence of relationship between technology-enhanced learning environments and students' attitudes toward social studies lesson (Heafner, 2004). Although there are some studies investigating the effects of learning objects on students' attitudes toward mathematics or science at primary or secondary level (Çakıroğlu, 2008; Türel, 2008), related studies in the social studies field is scarce (Yarar Kaptan & Şeyihoğlu, 2011). This study fills the gap in this field in the literature. In addition, by investigating the effects of learning objects on students' affective learning, contribution of learning objects to the traditional learning environments will be discussed comprehensively.

Learner engagement is regarded as one of the crucial factors for successful teaching and learning. Engaged students learn better and effective teaching arouses and sustains student engagement. It is possible that student engagement is neglected in academic studies in which the LO based instruction and learning are analyzed. Accordingly, there is a need to examine the student engagement in regard to LO approach. So, this study analyzes the effect of LO based instruction process on students' engagement in the social studies lesson.

1.5. Limitations

1. This study is limited to a sample size of 137 students at 6th in Sakarya Primary School in Bolu.
2. The limited sample size for this study may affect the generalizability of the study.
3. The validity of the responses to the instruments used in this study was limited to the honesty of the students.
4. The qualitative results of this study were limited to the perceptions of the students and social studies teacher.
5. Another limitation of this study is the use of observation method. There is a possibility of observer bias anytime data are obtained from observations.

1.6. Definition of Terms

Learning objects: "any reusable digital resource that is encapsulated in a lesson or assemblage of lessons grouped in units, modules, courses, and even programmes" (McGreal, 2004).
Student engagement: "psychological process, specifically, the attention, interest, investment, and effort students expend in the work of learning" (Marks, 2000).
Attitude: "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1998, p.269).

CHAPTER 2

LITERATURE REVIEW

This section of the study includes theoretical perspectives of the study and relevant research studies from the literature that the researcher used through the research.

2.1. Background for Learning Objects

The scholars contributing to the development of theory on learning objects have not come up with a common definition, or with a term used to describe learning objects. McGreal (2004) showed the different terms have been used in defining learning objects:

- Asset,
- Content object,
- Educational object,
- Information object,
- Knowledge object,
- Learning object,
- Learning resource,
- Media object,
- Raw media element,
- Reusable information object,
- Reusable learning object,
- Unit of learning,
- Unit of study.

The logic of the learning objects concept lies behind the Object-Oriented Programming (OOP) which is a paradigm from computer science (Wagner, 2002). OOP highly values the creation of objects that can be reused. OOP depends on the creation of software with some combinations of discrete objects without the need of writing codes. The main idea lying behind the learning objects is that instructional designers or educators build small chunks of instructional content that can be reused in or with different contexts (Wiley, 2001).

Although technology-based instruction has contributed to effective learning, its high initial costs have been a concern to individuals and organizations in the field of education and training. To reduce the initial costs, the concept of learning objects has been adopted from the computer science field (Tozman, 2004).

Although learning object concept was brought to instructional technology field by scholars of the field such as Dr. M. David Merrill, Dr. Charles Reigeluth and others, Gibbons, Nelson and Richards (2001) claim that in 1969, Gerard valued the idea of designing small curricular units and combining them, like mechanical building set, to make greater particular programs. These theories offer dividing content into smaller particles, and then re-combine those particles to meet specific learning goals.

The idea of using reusable digital resources in instruction is not new. In fact, the first major theoretical work on the idea was done by David Merrill and his colleagues when they developed the Component Display Theory (CDT) (1983). This theory was a significant contribution to the field of instructional technology as it represented one of the first attempts at separating instructional strategy from instructional content. CDT categorizes learning into two dimensions: content (facts, concepts, procedures, and principles) and performance (remembering, using and

generalities). The theory states that designers can effectively develop learning strategies by combining individual aspects of these two dimensions.

Merrill and his colleagues continued working on this theory and the CDT evolved over the next two decades. In the early 1990s, Merrill and his colleagues developed the Instructional Transaction Theory (ITT) (Merrill & ID2 Research Group, 1993). ITT involved the concept of using small self-contained units of information or instruction, known as knowledge objects. Merrill explored the possibility of manipulating these knowledge objects using algorithms or transactions as called by Merrill to represent different instructional strategies. It was believed that by building appropriate transactions, certain steps of the instructional design process could be automated and therefore the efficiency would increase (Merrill, 1999). Merrill and Thompson (1999) tested the theory when they aided in the development of the IDXelerator™, an authoring system implementing the notion of learner centered instruction. They founded that the use of knowledge objects and transactions increases authoring efficiency by at least 50%. They also stated that the use of knowledge objects increases the effectiveness of instruction by using scientifically verifies instructional strategies consistent with instructional outcomes. Since then, numerous researchers, instructional designer, and educational and technology related organizations have looked into this notion of separating strategy form instructional content.

2.2. Metaphors

Metaphors are used to explain learning object in order to support translating ideas form one domain to another (Bennett & McGee, 2005). For example, the learning object community has used LEGO metaphor to clarify the learning object concept (Hodgins, 2002). Hodgins watched his two children playing with Legos, and observed that one preferred instructions, directions and a pre-determined end state, and the other preferred complete freedom and creativity of constructing things, and noticed that they combined Legos in regard to their characteristics and their special needs. This metaphor has contributed to the comprehension of learning objects as a concept.

The LEGO analogy has been used by learning objects community. However, this metaphor may limit people's conceptualization of learning objects. LEGO's three important characteristics of combination of each LEGO with any other LEGO, assembling of LEGO block in any manner, and simplicity of combining LEGOs restrict people's thought of what a learning object is and its potentials (Wiley, 2001). They cannot be easily combined like LEGO blocks with any other learning objects.

Another analogy on learning objects was made by using the atom molecules. Atom as a small particle in the universe can make up big and different constructions by combining or recombining with other atoms. The differences between the atom and the LEGO metaphor were stated by Wiley (2001, p.12):

- "Not every atom is united with every other atom.
- Atoms can only be convened in certain structures prescribed by their own internal structure.
- Some training is required in order to combine atoms".

As a reflection of the analogy to instruction, the atom metaphor indicates that each and every learning object is not compatible with every other learning object. Atomic analogy makes learning object more complicated but explains it more realistically (Paulsson & Naeve, 2006).

Paquette and Rosca (2002) offer the organic metaphor and claim that although the atom metaphor resolves some shortcomings of the LEGO metaphor, but it is still inefficient. Knowing the anatomy of the combined system is not sufficient, its philosophy and dynamics should also be considered. They believe that small learning objects are useful, but learning objects containing the entire course will not work, and also context and the actors should be considered.

In addition to the metaphors above, Parrish (2004) emphasized the importance of finding the right metaphor and offers the film montage (the sequencing of images in motion pictures) analogy. This analogy is based on the arrangement of motion pictures in a movie. Films are made up of different combinations of films, photographs, or clips. Each combination has different effect on groups as in instruction. To this metaphor, comprehensively thought object orientation and integration of learning objects are required, and indicates thinking about the nature of learning and instruction roughly (Bennett & McGee, 2005).

2.3. Definition of Learning Objects

The term learning object was first introduced to the computer based instruction as "Learning Architectures, APIs and Learning Objects" by Wayne Hodgins in 1994 (Polsani, 2003). Because the concept is relatively new, there are almost as many definitions as the number of organizations and research groups (McGreal, 2004). To date, there is not a consensus on the definition of learning object concept. Furthermore there is not an agreement even on the terms used to describe learning objects. Many scholars attributed to the development of the definition of the learning object concept. Those definitions focus on how they are developed, how they are used, and how they are stored (Smith, 2004). McGreal (2004, p.23) examined the definitions of learning objects and derived four types of meaning. They are (1) learning objects could be everything, (2) learning objects could be anything digital, (3) learning objects could be anything that has an educational purpose, and (4) learning objects are only digital objects that have an instructional objective.

The most common and well known definition of learning objects was made by IEEE Learning Objects Standards Committee (LTSC) in 2001. LTSC (2001, p.5) defines learning objects as:

> Learning Objects are defined here as any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning. Examples of technology-supported learning include computer-based training systems, interactive learning environments, intelligent computer-aided instruction systems, distance learning systems, and collaborative learning environments. Examples of Learning Objects include multimedia content, instructional content, learning objectives, instructional software and software tools, and persons, organizations, or events referenced during technology supported learning.

This definition was found to be too broad to include non-digital environments. According to Wiley (2001, p.6), a learning object is "'any digital resource that can be reused to support learning". His definition encompasses chunks of resources in the Internet, but is sufficient to be used (Altun, 2009).

The emergence of standards, state of the results from the research, and the appearance of theoretical perspectives on learning objects in time, more definitions emerged. Kay and Knaack (2005) emphasize that the definitions on learning objects focus on technological or pedagogical dimensions of learning objects. Regarding technology based definitions; key features of learning objects include accessibility, ease of use, and reusability. On the other side, the definitions based on pedagogy of learning objects focus on instructional design, interaction, clear instructions, formative evaluation, and learning theory. Some of other definitions in the literature are:

- "A reusable information object is granular, reusable chunk of information that is media independent" (Cisco Systems, 2003, p.7).
- "Any digital reusable resource that is encapsulated in a lesson or assemblage of lessons grouped in units, modules, courses and even programmes" (McGreal, 2004, p.28).
- "The smallest independent structural experience that contains an objective, a learning activity and an assessment" (L'Allier, 1997).
- "Interactive digital resources illustrating one or a few interrelated concepts" (Cochrane, 2005, p.33).
- "Interactive web-based tools that support the learning of specific concepts by enhancing, amplifying, and/or guiding the cognitive processes of learners" (Kay & Knaack, 2005, p.231).

The main principle of learning objects is that learning objects are instructional particles that should be reused in different learning environments (Salas & Ellis, 2006). There are several other definitions of learning objects in the literature, and they show that there are different approaches and applications on the definition of learning objects. So, a common, good working definition of learning object is needed, and should be developed.

2.4. Properties of Learning Objects

According to the learning objects approach, the content is accessible in small particles. Each particle has different roles in the learning environment. Each particle should communicate with the learning systems by using a standardized method, the operations in the particle is that particles functioning, the learning system should control the learners' movement between particles, and each particle should have description that enables learners, instructors and designers to search for.

Learning object's potential has its roots in computer science and instructional technology. Those potentials show up the properties of learning objects. The characteristics of learning objects in the literature are reusability, granularity, interoperability, accessibility, adaptability, discoverability, durability, manageability, and generativity.

Reusability: One of the main reasons for the attractiveness of learning objects lies in its reusability in different contexts. Even, some authors use the name "Reusable Learning Objects" instead of learning objects concept. Reusability is defined as the reuse of learning objects in different contexts (McGreal & Roberts, 2003). Reasons for use are both educational and economic (Collis & Strijker, 2003). The cost of developing learning materials for instruction can be countless. Reusability has the potential of reducing time, effort and cost of developing instruction and instructional materials.

Flexibility of learning objects determines its reusability. If a learning object is developed for reuse in different contexts, it can be reused much more easily than material that has to be rewritten for each new context. Reusability of learning objects is closely related with independency of learning objects from contextual design. The more context-free design and development of learning objects, the more reusability of them.

Research shows that the reusability of learning objects which are big units of instruction is low, and learning objects which are modularized into small units of instruction have higher reusability potential (Salas & Ellis, 2006). Most learners can use a learning object which is designed by considering its reusability with no need to revising or distribution cost. A well designed flexible learning object can be used by different students as well as by different people working for different activities, jobs or for different disciplines (Smith, 2004).

Granularity: The most difficult problem the learning objects designers face is their granularity. Granularity refers to the size of the learning object in terms of content and its functionality as well as degree of detail or precision contained in a learning object (McGreal & Roberts, 2003). It could be a content object, a lesson, a module or a course. There is a negative relationship between granularity and reusability. The finer the granularity, the greater the potential to use a learning object again. By having well-structured and well-grained learning objects, reusability of the learning object can be achieved (Silveira et al., 2007).

Interoperability: Instructional components developed for a context and developed with a tool or platform can be used in different contexts, with different devices and platforms (McGreal & Roberts, 2003). Learning objects can work in different operating systems, hardware or browsers. Learning objects should be created in a way that they are independent of delivery mechanisms so that they are not restricted for reuse in the same delivery mechanism. The IMS and SCORM specifications enable interoperability of learning objects.

Accessibility: Learning content should always be accessed in anywhere. They can be accessed from away and distributed to many locations (McGreal & Roberts, 2003). Metadata standards allow indexing of learning objects and support their accessibility.

Adaptability: With the help of learning objects, instruction could be adapted to individual and organizational needs (McGreal & Roberts, 2003). As needs of individuals and organizations require the specification of content and design, learning objects support the just-in-time approach which refers to the customization of learning when needed.
Discoverability: It refers to the easy finding of instructional objects by users when needed (Smith, 2004). The entity which is used to make learning objects discoverable, accessible and searchable is metadata which is used for categorizing or describing them (Friesen, 2001).

Durability: Sustainable learning objects are not affected with update of hardware and software. In addition, in case of new versions, they can work with no need of big changes (Karaman, 2005). The compliance of learning objects with metadata standards extends its life.

Generativity: Learning objects can be aggregated automatically in order to meet the individual needs of learners. It also means that learner can take the control and determine the learning path (McGreal & Roberts, 2003).

Manageability: Learning objects can be updated, revised and combined for several purposes. These characteristics show that the learning objects are manageable (Hamel & Ryan-Jones2002).

2.5. Learning Object Models

It would be difficult for instructors to find the needed digital resources, to share them or to apply them in different learning contexts without standardization. Instructional technology industry focusing on design, development and utilization of computer-based instruction is affording on standardization in order to expand the use of web and the Internet based education. Learning object, as building blocks for several instructional technologies, has a potential to spread of the technology based education. The intensive collaboration of professionals, supporters and customers makes learning objects the basic economic unit of education.

In order to take the advantage of learning objects in learning environments, learning objects should be developed with revolutionary and flexible models (Verbert & Duval, 2004). In recent years, in order to develop and standardize technologies for computer-supported learning, there have been great efforts by learning communities. The Advanced Distributed Learning Initiative (ADL, 2004), the IMS Global Learning Consortium (IMS, 2006), and the Open Knowledge Initiative (Eduworks and O.K.I. Leadership, 2002) are few examples.

Learning content models identify different kind of learning objects and their components (Balatsoukas, Morris & O'Brien, 2008). They describe the learning objects, identify learning object components and repurpose them. There are some learning object content models, for example the Sharable Content Object Reference Model (SCORM) (ADL, 2004) and the Cisco Systems RLO/RIO Model (Cisco Systems, 2003).

One of the learning content models developed by ADL initiative and named as Sharable Content Object Reference Model (SCORM) provides the interoperability, accessibility and reusability of web-based learning content. The SCORM is a model "…that references a set of interrelated technical standards, specifications and guidelines designed to meet high-level requirements for learning content and system" (ADL, 2004, p.31). SCORM specifications and guidelines are developed with the integration of technology developments from groups such as Instructional Management Systems Global Learning Consortium Inc. (IMS), Aviation Industry Computer-Based training Committee (AICC), Alliance of Remote Instructional Authoring & Distribution Networks for Europe (ARIADNE), and IEEE's LTSC. SCORM specifications are bundled into technical documents. These documents are categorized under three main topics: the Content

Aggregation Model (ACM), the Run-Time Environment (RTE), and Sequencing and Navigation (SN) (ADL, 2004). The concepts presented in these documents are shown in Table1.

Table 1. SCORM Concepts and Their Specifications

Document	**Concepts Presented**
Content Aggregation Model (ACM)	Assembling, labeling and packaging of learning content
Run-Time Environment (RTE)	LMS's management of the RTE, which includes launch, content to LMS communication, tracking, data transfer and error handling
Sequencing and Navigation (SN)	Sequencing content and navigation

The components of SCORM Content Model are assets, sharable content objects (SCOs), activities, a content organization and content aggregations. An asset is an electronic representation of media, text, images, audio, web pages or other data. An SCO is the lowest level of granularity of a learning resource and may be combination of one or more assets. A learning activity may consist of other activities (sub-activities) and is the learner's progress through the instruction. A content organization is a map which shows the proposed use of the content objects during the strictly structured instructional activities. Content aggregation describes the process of combining a set of functionally related content objects, and the entity created as part of process (ADL, 2009).

As ADL was established by US Department of Defense (DoD), the understanding of military training can be seen in the SCORM running principle (Friesen, 2004). SCORM adopted the "command and control" approach to learning as shown in Figure 1.

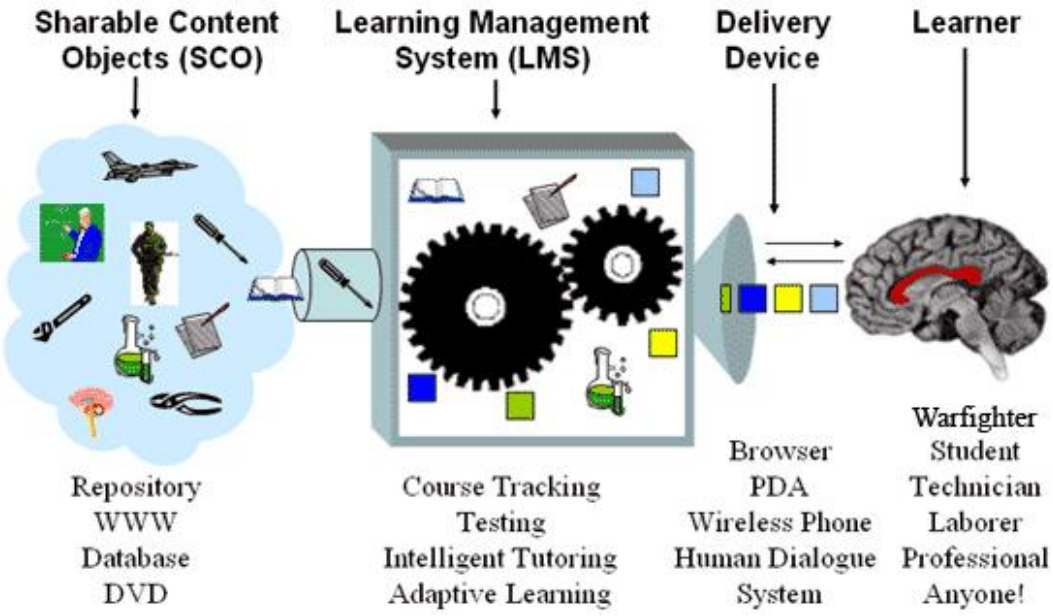


Figure 1. ADL Learning Model

Another well-known learning object model known as Reusable Information Object / Reusable Learning Object (RIO/RLO) is developed by Cisco Systems which proposes moving from large and inflexible courses to granular objects which are reusable, searchable and modifiable, and independent of a delivery media (Cisco Systems, 1999). Their strategy is based on Merrill's CDT and Clark's modification of information mapping of CDT, and built on the reusable information object (RIO). An RIO is a granular and reusable chunk of information which is independent of a delivery media. According to model, RIOs can be combined or re-combined to form more complicated lessons called reusable learning object (RLO). The terms "RLO" and "RIO" are replaced by "lesson" and "topic," respectively in order to prevent confusion (2003). A reusable learning object takes its roots from a learning objective, consists of content, practice, and assessment structures, and is tagged with metadata (Figure 2).

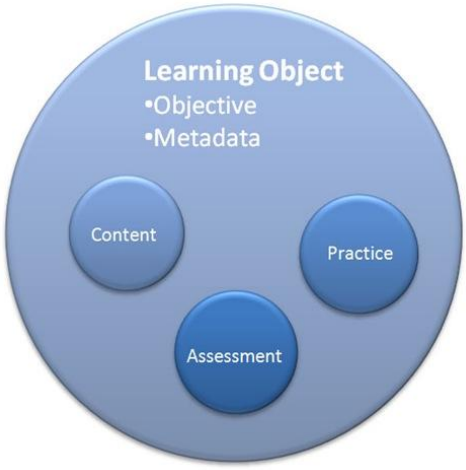


Figure 2. Cisco Systems' Learning Object Structure

According to Cisco Systems' directive course hierarchy, a topic is a self-contained reusable information object grouped into five information types; concepts, facts, procedures, processes, and principles. Five to nine (7 ± 2) topics are combined with overview, summary, practice, and assessment to form a reusable learning object. Learning objects could be combined to form a hierarchy of module, course, or curriculum (Figure 3) (Cisco Systems, 2003).

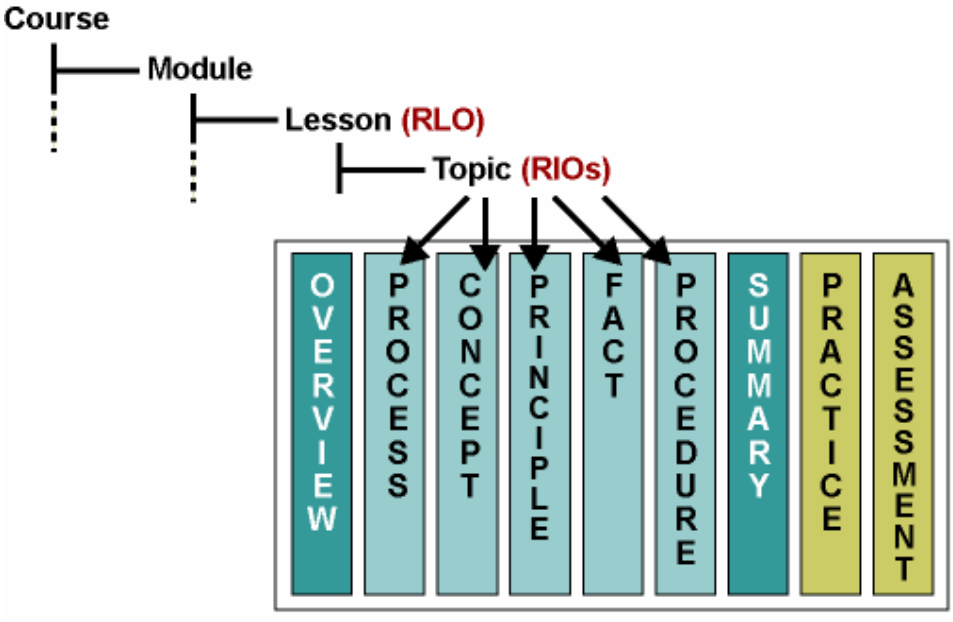


Figure 3. Cisco Systems' Learning Objects Hierarchy

2.6. Metadata

The increase in image, text, and video type digital materials made difficult to make search and attain the intended. Richards and Hatala (2005) noted that objects placed on the Internet did not necessarily make the object available to users. General web search tools were too broad, and searches usually returned too much information. In order to develop standards and specifications for learning objects, national and international committees, and other organizations have been struggling. Use of international standards may provide time and cost savings, may make the use of learning technologies in a wider range and efficiently. In turn, it may produce better learning, training and education.

A solution is to index the learning object with metadata to identify the object, its location, and to further describe the object. At the core of a learning object is metadata, which handles the description, identification and positioning of main materials as well as letting multiple users share and distribute them efficiently. Metadata is like bibliographic information about records in a library catalogue. This enables electronic tools to index the structural, descriptive, content, and administrative characteristics of a document simply by using specified identifying tags (White, 2005). White (2005) described these categorizations as follows:

- *Structural metadata*: defines the architectural information about document,
- *Content metadata*: defines the related information about the document,
- *Descriptive metadata*: defines the type of the document,
- *Administrative metadata*: defines the workflow information about document.

Metadata is widely defined as data about data (Wiley, 2000). Hodgson (1998) found the general definition unhelpful, added the intended use of metadata and described it as “any structured descriptive information about other data; that is used to aid the identification, description, location and management of web resources”. Specifically metadata is “structured information that describes characteristics of a learning object” (Mwanza & Engeström, 2005, p.454). Metadata is used to enhance organization of content and to increase the effectiveness of content retrieval over the Internet (Zhang & Jastram, 2006). The unique feature of learning objects is that metadata has been added to learning objects in order to help in the search and retrieval of them (Schatz, 2005). Metadata enhances searching of learning objects, facilitates management and maintenance of them, and aids filter and selection of the relevant learning for a specific learning context.

Much of the more work on metadata focuses on identifying the creator, subject, title, and other data needed to search and manage objects (Vuorikari, Manouselis & Duval, 2006). However, there is standardization in metadata. DCM and LOM are some mostly used standardizations in order to facilitate the referencing, searching, accessing and updating of content elements. Dublin Core Metadata Initiative (DCMI) is an organization aimed to the adoption of interoperable metadata standards and the development of specialized metadata vocabularies for the improvement of information retrieval and discovery systems (DCMI, 2006). DCMI took the LOM and IMS proposal as basis and proposed the Dublin Core Metadata (DCM) Standards that is simple but effective element set to describe network resources. It is not developed for educational objects, and does not have elements about the pedagogical characteristics of objects. The standard consists of 15 data elements. The elements are categorized by Hillman (2001) into three main groups; content, intellectual property and instantiation. Table 2 illustrates these groups as regards to their functions.

Table 2. Fifteen Data Elements of DCM (From DCMI, 2004)

Category	Element	Description of Element
Content	Coverage	The extent or scope of the content of the resource
	Description	An account of the content of the resource
	Type	The nature or genre of the content of the resource
	Relation	Reference to a related resource
	Source	Reference to a resource from which the present resource is derived
	Subject and Keywords	Topic of the content of the resource
	Title	Name given to the resource
Intellectual property	Contributor	An entity responsible for making contributions to the content of the resource
	Creator	An entity primarily responsible for making the content of the resource
	Publisher	The entity responsible for making the resource available
	Rights	Information about rights held in and over the resource
Instantiation	Date	A date associated with an event in the life cycle of the resource
	Format	The physical or digital manifestation of the resource
	Identifier	An unambiguous reference to the resource within a given context
	Language	A language of the intellectual content of the resource

LOM standards were introduced by IEEE's LTSC to provide a semantic model for describing the properties of the learning objects (Suthers et. al., 2001). The purpose of LOM is "to facilitate search, evaluation, acquisition, and use of learning objects, for instance by learners or instructors or automated software processes" (LTSC, 2002, p.5). In contrast to DCM standards, LOM is specifically designed for educational objects, and covers general, technical, semantic and pedagogical characteristics of learning objects. LOM standards have nine-top level hierarchical metadata structure (LTSC, 2002, pp.10-42), which is presented in the following table (see, Table 3).

Table 3. Nine Top-level Categories of LOM

Category	Description
General	Presents general information that describes this learning object as a whole
Life cycle	Describes the history and current state of this learning object and those entities that have affected this learning object during its evolution.
Meta-metadata	Information about metadata record itself rather than the learning object that this record describes
Technical	Describes the technical requirements and characteristics of this learning object.
Educational	Describes the key educational or pedagogic characteristics of this learning object.
Rights	Describes the intellectual property rights and conditions of use for this learning object.
Relation	Defines the relationship between this learning object and other learning objects.
Annotation	Presents comments on the educational use of this learning object, and information on when and by whom the comments were created.
Classification	Describes where this learning object falls within a particular classification system.

2.7. Learning Object Repositories

Most educational institutes, by using metadata which can provide more precise outcomes, develop educational libraries in order to provide more quality instructional objects. Repositories are established by educational authorities, professional enterprises or commercial organizations. Sometimes, in order to provide cost-savings, organizations work collaboratively (Clyde, 2004). A Learning Object Repository (LOR) is defined as a large storage area for learning objects that enables users to find and reuse learning objects (Hatala and Nesbit, 2001).

The development of available, cost efficient, and effective Learning Object Repositories was a missing element required for the development of relevant materials and learning paradigms in the classroom (Porter et al. 2000). Creating learning objects, and providing access to them, are prime motivators for developing learning object repositories. A learning object repository (LOR) consists of objects, structures which store metadata about objects and an interface which provides searching with object management system by using metadata (Cebeci, 2003). These digital repositories hold much more metadata about each learning object to help learners, instructors and systems to retrieve more relevant documents instead of searching within the full text (Vercoustre & McLean, 2005).

Two parts of a learning object are the learning content and its metadata. The ideal learning content is modular and freestanding, non-sequential, able to fulfill a single learning objective, accessible to wide communities, comprehensible and complete, and not embedded within formatting. Developing techniques for the learner to contextualize information deployed learning objects effectively, and learning objects empower learners by enabling them to participate more actively.

There is a need to LORs in educational organizations in order to:

- Share and reuse digital objects.
- Access to several learning materials.
- Improve the quality of the learning experience.
- Provide the different learning and teaching styles.
- Minimize the costs of creating and accessing to resources.
- Provide the long-term sustainability of digital resources.
- Share learning material within and across organizations. (Doctor & Ramachandran, 2007)

The usability of an LOR depends on the quality of learning objects, as well as its characteristics on access, search, store and etc. Cebeci (2003, p.3) stated the characteristics of LORs as following:

- Search/find: This ability enhances searching and finding of learning object/s intended.
- Quality control: The system ensures that the technical, pedagogical dimensions and metadata are evaluated.
- Retrieve: Learning objects intended should be retrieved from database easily.
- Submit: Objects should be submitted to the system with required privileges by the users.
- Store: LORs should store the object in order to be used when needed.
- Publish: LORs should present their metadata in order that other LORs can utilize the learning objects.
- Organizing: LORs should provide opportunities to revise both learning objects and metadata.

There are two types of LORs. First type is true repositories which focus on particular subjects or themes and physically store their own learning objects. For example, an organization designs and develops the objects and provides their maintenance. The second type is a clearinghouse repository which opens the doors to other repositories or individual learning objects. They do not contain any learning objects, but they address the effective learning objects and repositories by presenting the links of the web sites containing the objects (Namuth et al, 2005).

Repositories allow the delivery and sharing of learning objects. Mega learning objects repositories such as MERLOT, CAREO and Wisconline are now available. Two repositories recognized throughout the worldwide learning object community are ARIADNE and MERLOT, and AtaNesA is a nationwide learning object repository.

ARIADNE is an acronym that stands for The Alliance of Remote Instructional Authoring and was developed with efforts of the European Union and the Swiss Government. The website of ARIADNE is http://www.ariadne-eu.org. ARIADNE's Knowledge Pool System, or KPS, focuses on delivery and reuse of learning objects. Searching tools in KPS allow users to find objects in the Local Knowledge Pool. It was fully based on LOM to the specific requirements of the ARIADNE community. To increase the interoperability of ARIADNE learning objects with other repositories, the execution board and the members represented the ARIADNE metadata according to the LOM standard, which enables other repositories to share this metadata (Najjar et. all, 2003).

Another worldwide learning object repository which is supported by twenty-three partner organizations in the U.S. and Canada is the Multimedia Educational Resource for Learning and On-Line Teaching (MERLOT). MERLOT is a collection of learning objects designed primarily to improve learning and teaching within all levels of education from preschool to higher education. It allows users and experts to evaluate the learning objects. MERLOT is free and contains peer-reviewed collection of over 39,000 learning objects including simulations, animations, tutorials, exercises, and other organized learning materials developed for different disciplines and contexts.

A nationwide learning object repository is AtaNesA. AtaNesA is an acronym that stands for Ataturk University Object Repository. AtaNesA, designed and developed at Ataturk University Kazım Karabekir Education Faculty, is a collection of more than 9000 learning objects related with chemistry, physics, biology, mathematics, instructional technologies, and computer programming languages. To increase the reusability of the learning objects, AtaNesA adopted the LOM standard. Different than other repositories, AtaNesA let users to comment about the objects, adding them to the basket, and see the metadata (Karaman, 2005).

2.8. Use of Learning Objects in Learning Environments

As learning objects are granular, they are easily adopted to different learning contexts and relatively easy to use ad reuse. In addition, reusability of learning objects permits them to be used by large communities if they are located in well organized and searchable learning object repositories (Gadanidis, Gadanidis, & Schindler, 2003). Learning objects may be interactive tools that support different instructional approaches and strategies. For example, they may be used as exploration tools, information sources, assessment models and objects of discussion (Ilomaki, Lakkala and Paavola, 2006). In addition, learning objects may have graphical components which help learners concretize abstract concepts. Furthermore, learning objects may help learners to reduce their cognitive load. They can be used to let students to investigate more complex relationships (Sedig & Liang, 2006). Finally, learning objects may allow learners to have a certain degree of control over their learning environments.

In this part of the study, in association with the research questions, related studies about the use of learning objects in several learning environments are presented in three different categories; learning objects' effects on learning, students' attitudes toward lesson, and course engagement.

2.8.1. Effects of Learning Objects on Learning

In the literature, there are some studies investigating the use of learning objects in learning environments in terms of students' performance. However, the number of those studies is scarce. Although there are studies on learning objects, they are about the design, development, and reusability of learning objects. In addition, Sosteric and Hesemeier (2002), Nurmi and Jaakkola (2005, 2006) and Kay and Knaack (2005, 2007a) emphasized the scarce of studies on effectiveness of learning objects in different learning environments. Another limitation is that most of the studies about the effectiveness of learning objects are made in undergraduate or graduate levels in online learning environments. Kay and Knaack (2008) stated that there were few studies about use of learning objects in primary and secondary schools, so they started to inquire the effectiveness of learning objects in primary and secondary level. Although there are few studies in primary and secondary level, researchers have been making research on the effectiveness of learning objects in primary and secondary level for the last five years (Andrade-Aréchiga, López & López-Morteo, 2012; Akpınar & Simsek, 2007; Baki & Çakıroğlu, 2010; Kay & Knaack, 2007b; Türel, 2008).

In their research, Kay and Knaack (2007a) claimed that formal research on the use of learning objects in secondary school science learning environments has not been done. So, they aimed to investigate the use of learning objects by secondary school students in biology, chemistry, and physics classrooms. A total of 19 teachers and 111 secondary school students were the samples of the study, and the data were collected by using a 5 point Likert scale and two open-ended questions. The results of the study showed that two thirds of the students stated they benefited from the learning objects. Learning objects enhanced their learning and motivation in the lesson. In addition, students mostly liked the motivating aspect, hands-on activities, and visual quality of the learning objects. Teachers verified that learning objects helped students to learn and stated that they would reuse them.

In his study, Çakıroğlu (2010) aimed to investigate the effects of using learning objects on students' cognitive and affective learning, teachers' and students' use of learning objects and the effects of learning objects on the school culture. He developed the learning objects for 9th grade mathematics classrooms. He designed a quasi-experimental study, and studied with three different groups. One of the experimental groups used the learning objects in the classroom activities implemented in the classroom, other experimental group used them as extra-curricular activities, and the control group was lectured with traditional instruction methods. After 11 weeks treatment and data collection with surveys, interviews, and observations, he founded that achievement scores of students used the learning objects in the classroom activities were significantly higher than control group students' scores. However, other experimental group students' achievement scores were not significantly higher than control group students. He

concluded that teachers had significant role in integrating the learning objects in the classroom environment, and they could be used in different instructional activities in order to facilitate students' learning.

As an effort to close the gap between knowledge and meaning in the classroom environment, Kong and Kwok (2005) developed a cognitive tool for meeting the diverse needs of learners for comprehending new procedural knowledge on adding/subtracting fractions. In the study, they used pre-test–post-test control group quasi-experimental design. They worked with 48 fourth grades of two primary schools. Experimental group students studied the subject for 20 hours using the cognitive tools, and the control group received no treatment. They found that the experimental group performed significantly better than the control group in achievement test.

In a different study, The University of Wisconsin-Milwaukee in collaboration with Instructional Communications System developed 351 basic-level video-based American Sign Language learning objects for deaf community continuing higher education. Learning objects were developed for a continuing education course, traditional face-to-face setting, and for independent learning. Participants' feedback presented that learning objects can be valuable instructional aids and educational enhancements (Lehman & Conceicao, 2007).

In a study, reporting the results of learning objects' usage in three different learning environments, the effectiveness of learning objects based learning environments were compared with learning environments with traditional methods (Nurmi and Jaakkola, 2006). Learning objects were developed for mathematics, Finnish language grammar and science classrooms. The participants of three studies were fourth and fifth grade students in Finnish primary school. Educational effectiveness of learning conditions was measured by using the pre-test – post-test experimental design. Results of study 1 in which the learning objects' effectiveness were searched for mathematics lesson yielded that experimental group students' achievement gain scores were not significantly greater than control group students' gain scores. In study 2 – Finnish language grammar – it was noted that there was not a significant difference between experimental and control group students. Third study's results were contradictory to the previous studies. The results of the third study revealed that the students studying in learning environments where both SLO and laboratory activities were used jointly developed significantly more than students exposed to traditional teaching method in which they used laboratory equipment and exercises. At the end of the studies, they argue that learning objects do not guarantee high achievement and learning. It is the carefully designed learning environments and arrangements which encourage students' engagement and enhance students' learning.

In their study, Akpinar and Simsek (2007) asked pre-service science education teachers (experimental group) and newly graduated instructional designers (control group) to design and develop learning objects by using a learning content management system (LCMS). They examined, evaluated and compared the learning objects developed by two groups in terms of number of assets, text density on each learning objects, number of instructional elements, number of screen orientations, and the quality of learning objects using the learning object review instrument (LORI). They also examined the effect of learning objects in learning environments. They found that the pre-service students used less number of assets, more amount of text, and less number of screen orientations in their learning objects than the instructional designers. The quality of learning objects' of both groups did not differ in terms of LORI criteria. Eight of the 40 learning objects (3 of them were developed by pre-service teachers, other five were developed by instructional designers) were selected in order to investigate the effectiveness of them in classroom. A pre- and a post-achievement test were administered to measure students' achievement. At the end of the experimentation, although seven of the learning objects increased students' achievement, one of them made a decrease in students' achievement.

In London Metropolitan University, Bradley and Boyle (2004) looked at the design, development and evaluation of learning objects in introductory programming course. In the project, one of the

student groups used text-based learning objects, and the other used flash-based learning objects. Students emphasized that learning objects were useful tools to facilitate their learning of course subjects, and majority of them stated that animations helped them to learn the concepts addressed. In addition, the effect of learning objects on retention and knowledge transfer was examined, and it was concluded that there was a great increase in all modules of the lesson.

In a recent study, Kay (2012) investigated the effect of Web-Based Learning Tools (WBLTs), also called as learning objects by Kay, in secondary school mathematics and science classrooms. He administered surveys and open-ended questions to 8 teachers and 333 students. He also analyzed student performance in terms of remembering, understanding, applying, and analyzing concepts. Students completed a pre-test and post-test based on the content of the courses implemented in class. At the end of treatment, students and teachers stated that the learning objects had positive effects on learning. He found that students' performance improved significantly when learning objects were used, with test scores improving from 28 to 53%.

Similarly, Türel and Gürol (2011) aimed to investigate the effects of learning objects-enriched learning environments on 7th grade students' academic achievements, retentions, attitudes toward and motivations in science education lesson. The participants of the study were 78 students at 7th grade in two public primary schools. Learning objects developed for the science lesson were placed into the Learning Management System, Moodle. Experimental group students were exposed to instruction with learning objects while the control group students were exposed to a traditional learning environment. They concluded that learning objects enriched instructional settings have positive effects on students' retention. They asserted that the reason for the difference in the retention test scores was the instructional approach in the learning environment. In addition, the experimental group students claimed that the teacher applied student-centered approach and let students to use learning objects actively and individually.

Nugent, Soh and Samal (2006) evaluated the effectiveness of learning objects in an undergraduate computer science lesson focusing on simple class and recursion. The learning objects were developed as animation and used multiple user input formats, such as drag-and-drop, multiple choice, and model construction. The students in the control group participated in a traditional computer science laboratory, and the experimental group students completed the Web-based learning objects in addition to computer science laboratory activities. Both groups took a 10-item post-test on simple class and recursion. Comparisons between students' learning showed no significant differences between experiment and control group students for both the simple class and recursion topics.

2.8.2. Effects of Learning Objects on Students' Attitudes

The concept of attitude has played an important role in the field of social psychology and several definitions on attitude have emerged. Attitude is described as "a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor" (Eagly & Chaiken, 1998, p.269). Attitudes have three components: (1) cognitive, (2) affective, and (3) behavioral (Reid, 2006). It is known that attitudes tend to be consistent and stable with time. Although deeply held attitudes are highly internalized and are resistant to modification, they are open to some change and development (Eagly & Chaiken, 1998). In the learning environment, students' attitude is the total of their cognitive, affective and behavioral tendency toward the lesson (Osborne, Simon & Collins, 2003). In addition, a number of studies have indicated significant relationships between achievement and attitudes (Reid, 2006; Yara, 2009).

A number of studies have tried to look at student attitudes toward lesson in technology enriched learning environments. For example, in their research, Andrade-Arechiga, Lopez, and Lopez-Morteo (2012) designed and developed a learning object to help students to overcome the learning difficulties in Calculus lesson. A total of 102 students attended to the study as experimental and control group. The control groups took the Calculus class with traditional instruction methods, and the experimental group students implemented the learning activities

with learning objects in classrooms equipped with internet enabled computers for each of them. Students were administered a survey regarding the design of the learning objects, their usage, perceived learning, and attitude towards lesson. Also, structured interviews with students were performed with 7 students. The results of the study showed that the students in the treatment group had significantly higher attitude scores than control group students.

Çakıroğlu (2008) investigated the effects of learning objects on students' attitudes toward mathematics lesson in 9th grade as well as on their academic achievement and on school culture. He reported that use of learning objects in the learning environments with different instructional approaches did not make a significant difference. The three group students' attitude scores were not significantly different.

As mentioned in the previous section, in their study Türel and Gürol (2011) comprehensively evaluated the effectiveness of learning objects in science courses in terms of students' achievements, retentions, attitudes, and motivations. They reported that although in the interviews students in the experimental group told they had high attitudes toward the science lesson, the quantitative results showed that there were no significant differences between experimental and control groups in terms of attitude scores.

In another study Shih, Chu, Hwang and Kinshuk (2011) developed learning objects for fifth grade students with mean age of 11 studying in context-aware ubiquitous learning environments. Learning objects were developed for 'Campus Plants and Ecology' unit in natural science course. 34 students participated in the study using pre and post-test experimental research design. They found that their approach significantly and effectively increased students' positive learning attitude. Interestingly, the results suggested that low-achievement students had greater improvement than high-achievement students. In addition, teachers participated in the study stated that they had positive attitude toward learning objects enhanced instruction.

Lopez-Morteo and Lopez (2007) developed an electronic collaborative learning environment based on Interactive Instructors of Recreational Mathematics (IIRM) which were interactive and recreation oriented learning objects in order to increase students' motivation toward mathematics. They asserted that the IIRM conceptual architecture included instructional support, flexible context, interactivity, the communication support, and the metadata. Learning objects were web pages containing text, images, video, interactive dynamic elements, or Java-embedded applications published on-line, in CD-ROM or in any other storage media. The experimentation was made with Mexican high school students. A total of 30 students attended to the study. Based on their evaluation, they asserted that use of IIRM model increased students' attitudes toward mathematics.

In order to investigate students' opinions on the use of learning objects in 4th grade social studies lesson, Yarar-Kaptan and Şeyihoğlu (2011) developed learning objects for 'I Get to Know Myself' unit in the social studies curriculum. After experimentation, they interviewed with 30 students. Students' positive attitudes included liking the lesson and enjoying it, changing opinions toward the lesson, being surprised or excited. Obviously, almost all of them stated they liked the lesson, and few of them expressed their attitude toward the lesson had changed. In addition to positive expressions, students' negative attitudes toward the lesson were difficulty or easiness of the learning activities in learning objects and being bored.

2.8.3. Engagement with Learning Objects and Students' Course Engagement

Engagement is a critical concept in assessing the students' use of learning objects. Early studies of engagement defined it in terms of interest, effort, motivation, and time on task. To Newman (1992, p.11) engagement stands for "active involvement, commitment, and concentrated attention, in contrast to superficial participation, apathy or lack of interest". A useful definition of engagement by Bangert-Drowns and Pyke (2001) is "the mobilization of cognitive, affective, and motivational strategies for interpretive transactions" (p.215). General agreement on engagement

states that engaged students are good learners, that engaged students more intensively and extensively involved in learning tasks, and that effective teaching stimulates student engagement (Handeslam et al., 2005; Bangert-Drowns and Pyke, 2002). Many of the studies on student engagement tell that it is a multidimensional construct that encompasses behavior, emotion, and cognition (Fredricks, et al., 2004). In addition, several authors have noted that engagement has a social interactional component (Handelsman et al., 2005).

The richness of interactive computer-based training systems stimulates the senses and thereby increases students' engagement (Chapman et al., 1999; Webster & Ho, 1997). Similar findings have been reported in the studies of student learning with computer supported learning environments (Liu et al., 2009: Jarvela et al., 2008). For example, Hug et al. (2005) stated that technology supported project based learning scaffolds students' engagement, and in their study Jarvela and her colleagues reported that when students work in computer-supported inquiry based learning environments, they are more engaged in learning activities and work harder on the given tasks. In educational multimedia learning environments, as Jacques et al. (1995) stated, learners are engaged when the multimedia hold the students' attention and they are attracted to learning environment for intrinsic rewards. Also, when engaging with multimedia learning environment students stated their feelings as curiosity, interest, confidence, and surprise.

The most common way of measuring student engagement with interactive computer based applications is students' self-reports. Other measurement techniques include direct observations of the users while interacting with the digital technologies, think aloud protocols, interview with the learners and teachers, and content analysis of computer notes and logs. Webster and Ho (1997) measured university students' engagement with the presentation software with a questionnaire with seven items containing intrinsic interest, attention, and curiosity. The questionnaire is also used to measure students' engagement with multimedia training software (Chapman et al., 1999) and to investigate users' experiences with technology (O'Brien et al., 2009). In order to obtain a comprehensive and rich understanding of student engagement, Jarvela and her colleagues (2008) used observations, interviews and content analysis of computer notes and experience-sampling-like methods. In addition, Kay and Knaack (2008) developed the Learning Object Evaluation Scale for Students (LOES-S) to examine middle and secondary school students' evaluation of learning objects in terms of perceived learning, learning objects' quality, and engagement. Also, they reported that engagement with the learning objects construct is correlated with the learning and quality construct.

In addition to the findings on student engagement with computer enriched learning environments such as multimedia and hypermedia learning environments, learning object systems are accepted as tools to enhance learning and student engagement. Ally et al. (2006) state that learning object repositories and learning objects have the potential to engage learners as active agents, and accessibility and learner engagement with learning objects are important concepts to learner contextualization and application of the information and in turn to facilitate students' learning processes. Learning objects systems can also be a medium for learners to construct knowledge through engagement in meaningful activity. In their studies on the effectiveness of learning objects in secondary schools, Kay and Knaack (2007a, 2008, and 2009) reported that student engagement with the learning objects was one of the most crucial factors which may affect the students' achievement. Also, in their study, teachers noted that using learning objects in several classroom environments engaged students and promoted successful learning.

In a different study, Andrea-Arechiga and her colleagues (2012) developed Learning Units (LU), a special type of learning objects specifically designed for the students who had learning difficulties in Calculus. They evaluated (LU) in terms of academic performance of students and motivational aspects of learning. The participants of the study were two experimental groups and two control groups taking the Calculus course. When students were asked to express their level of motivation in the Calculus class with the effects of the system, they were in the middle of the neutral and agreement categories. In addition, they observed that 26.9% of the students in the

groups using the system showed the highest level of motivation, whereas 55.4% are situated in the higher levels. They concluded that LU may help math educators to quickly engage their students in important mathematical processes.

In a different study, Lowe et al. (2010) examined the usability and effectiveness of learning objects in Australian and New Zealand primary and secondary schools. They questioned how students engaged with learning objects and in what ways the learning object engaged the learners in the lessons. They observed continuous motivation and attentive interaction with learning objects and in the learning process. Engaged students examined the environment, were active, received feedback and showed readiness for the next learning activity. They concluded that for student engagement in technology rich learning environments, simply providing enjoyable activities related to the curriculum is not enough. Appropriate challenges that provide continuous emotional and cognitive engagement and student input are keys for student engagement and learning.

In addition, Cameron and Bennett (2010) investigated primary school students' engagement with learning objects, and how learning objects enhanced students' learning. They conducted a qualitative case study in two classes at a public primary school. They made semi-structured focus group interviews with students and observed them in their learning environment where learning objects were used. In the learning environment where the teacher used a student-centered strategy, based on collaboration and peer-learning and provided minimal guidance, although the students were actively engaged, many of them failed to demonstrate understanding of the key concepts and only one of the students showed higher-order thinking skill. In contrast, in the learning environment where the teacher used a combination of direct teaching and modeling, the students were actively engaged with the learning objects, and all demonstrated an understanding of the basic concepts. They concluded that the potential of learning objects may be best achieved contextually when learning objects were integrated with the class' program of activities and when teacher provide maximum facilitation.

2.9. Summary

The concept of the learning objects has its roots in the Object-Oriented Programming (OOP) which is a paradigm from computer science (Wagner, 2002). Several terms have been used in the literature to name learning objects; as well different definitions have been created in order to explain the concept. The most common and well known definition of learning objects was made by LTSC (2001, p.5) as "any entity, digital or non-digital, which can be used, re-used or referenced during technology supported learning". Following this definition, some scholars made different definitions on learning objects (Cisco Systems, 2001; Cochrane, 2005; Kay & Knaack, 2005; L'Allier, 1997; McGreal, 2004). A common, good working definition of learning object is needed, and should be developed.

The characteristics of learning objects in the literature are reusability, granularity, interoperability, accessibility, adaptability, discoverability, durability, manageability, and generativity. There are millions of learning objects over the Internet. However, those resources do not necessarily make the object available to users. In order to enhance searching of learning objects, facilitate management and maintenance of learning objects, metadata usually defined as data about data are used. Much work has been done in order to standardize metadata. For example, DCM and LOM are well-known and mostly used metadata standards. Learning objects are stored in learning objects repositories in order to share and reuse digital objects, access to several learning materials, improve the quality of the learning experience, provide the different learning and teaching styles, minimize the costs of creating and accessing to resources, and provide the long-term sustainability of digital resources (Doctor & Ramachandran, 2007).

Beyond the technical characteristics of learning objects, there are studies examining the effects of using learning objects on learning and instruction in the learning environments. While some have been made in higher education level (Gadanidis et al., 2003; Haughey & Muirhead, 2005; Lim et

al., 2006), there is increased interest in using learning objects at K-12 level (Brush & Saye, 2001; Kay, 2012; Kay & Knaack, 2005; Lopez-Morteo & Lopez, 2007; Türel & Gürol, 2011). Studies on the effectiveness of learning objects in K-12 learning environments have focused on teaching of mathematics and science education. Also, they did not evaluate learning in a comprehensive manner. This study would contribute to the literature by investigating the use of learning objects in social studies lesson at K-12 level in a more comprehensive manner by examining the effects of using learning objects on students' achievement, attitude and engagement in the learning environment. Also, this study would introduce the actual users' namely the students' and teachers' opinions about using learning objects in the social studies lesson in their own words.

CHAPTER 3

METHODOLOGY

This chapter describes the research methods used for this study and the design and development phases of learning objects used during instruction process. Additionally, this chapter provides a description of the participants, data collection techniques, instruments for data collection, data analysis, validity and reliability of the study.

3.1. Purpose of the Study

The aim of this study was to compare students who used learning objects and those did not use in the instruction of social studies lesson in terms of their academic achievement, attitudes toward social studies lesson and their course engagement. In addition, this study aimed to investigate the social studies students' interaction and engagement with learning objects and to gain better understanding of their and teachers' evaluation of instruction with learning objects.

This research was guided with the following primary research question: *What is the effect of using learning objects on sixth grade students' academic achievement, attitudes toward and engagement in social studies lesson?*

The primary research question was guided with the following sub-questions:

1. How do students rate the learning objects in terms of
    a. their perceived learning,
    b. quality of the learning objects, and
    c. engagement with the learning objects?
2. Is there a significant difference between the achievement scores of students who use learning objects and who do not use the learning objects in social studies lessons?
3. Is there a significant difference between the students who use learning objects in the social studies lesson and those who do not use in terms of attitudes toward social studies lesson?
4. Is there a significant difference between course engagement scores of students who use learning objects and who do not use learning objects in social studies lessons?
5. Is there a relationship between the students' academic achievement and their course engagement?
6. Is there a relationship between the students' learning objects evaluation and their achievement?
7. What are the students' and the teachers' opinions about using learning object systems in the instruction of social studies?
8. How did the students and teachers use the learning objects in the learning environment?

3.2. Research Design

In this study, a mixed methods design which is defined as a "type of research design in which qualitative and quantitative approaches are used in types of questions, research methods, data collection, and analysis procedures and inferences (Tashakkori & Teddlie, 2003, p.711)" was used. Neither qualitative nor quantitative research methods solely are sufficient to comprehensively analyze the use of learning objects in social studies lessons. Mixed methods research design is "inclusive, pluralistic, and complementary, and it suggests that researchers take an eclectic approach to method selection and the thinking about and conduct of research" (Johnson & Onwuegbuzie, 2004, p.17). Also, effective use of this principle will be superior to mono-method studies.

This study adopted Creswell and Plano Clark's (2006) approach for the mixed methods design. *Embedded experimental model* was best suited for this study. An embedded-experimental design has the quantitative method as the predominant method which guides the research. This model has the qualitative data embedded in the experimental model. The qualitative method as the embedded method investigates a question different from the question pointed by the dominant method. Qualitative data can be collected before, during, and after the quantitative part of the study, and is used to describe a different aspect of the quantitative study, to examine the process of the intervention, or to follow up the experiences of the participant with certain characteristics (Cresswell & Plano Clark, 2006).

The visual model briefly describing the data collection techniques and procedures of this study is illustrated in Figure 4. In this study, as the comparison of students who used learning objects and those did not use in the instruction of social studies lesson in terms of their academic achievement, attitudes toward social studies lesson and their course engagement was the main research question, it was tested with one of the quantitative research methods, the experimental research model. Before the intervention, a pre-achievement test about the subject matter and pre-surveys on students' attitudes toward social studies lesson and course engagement were implemented. During the intervention, to analyze experimental group students' interaction and engagement with the learning objects, both qualitative and quantitative data collection methods were administered. The instruction process and the students in the treatment group were observed and LOES was administered to each student after each learning gain. After the intervention, a post-achievement test and post-surveys were administered to students. Quantitative data collected from both control and treatment group were analyzed. Also, data collected with the quantitative techniques helped the researcher to select the participants for the qualitative method used after the quantitative part of the study. After this dominant data collection method, in order to deeply investigate students' opinions on learning with, usability of, and interaction and engagement with the learning objects, and to understand the teacher's experiences with using learning objects system in the instruction process, interviews with the students and the teacher were conducted. Qualitative data collected with observation technique during intervention and interview technique after treatment were also analyzed. In the last phase, the findings are integrated and interpreted.

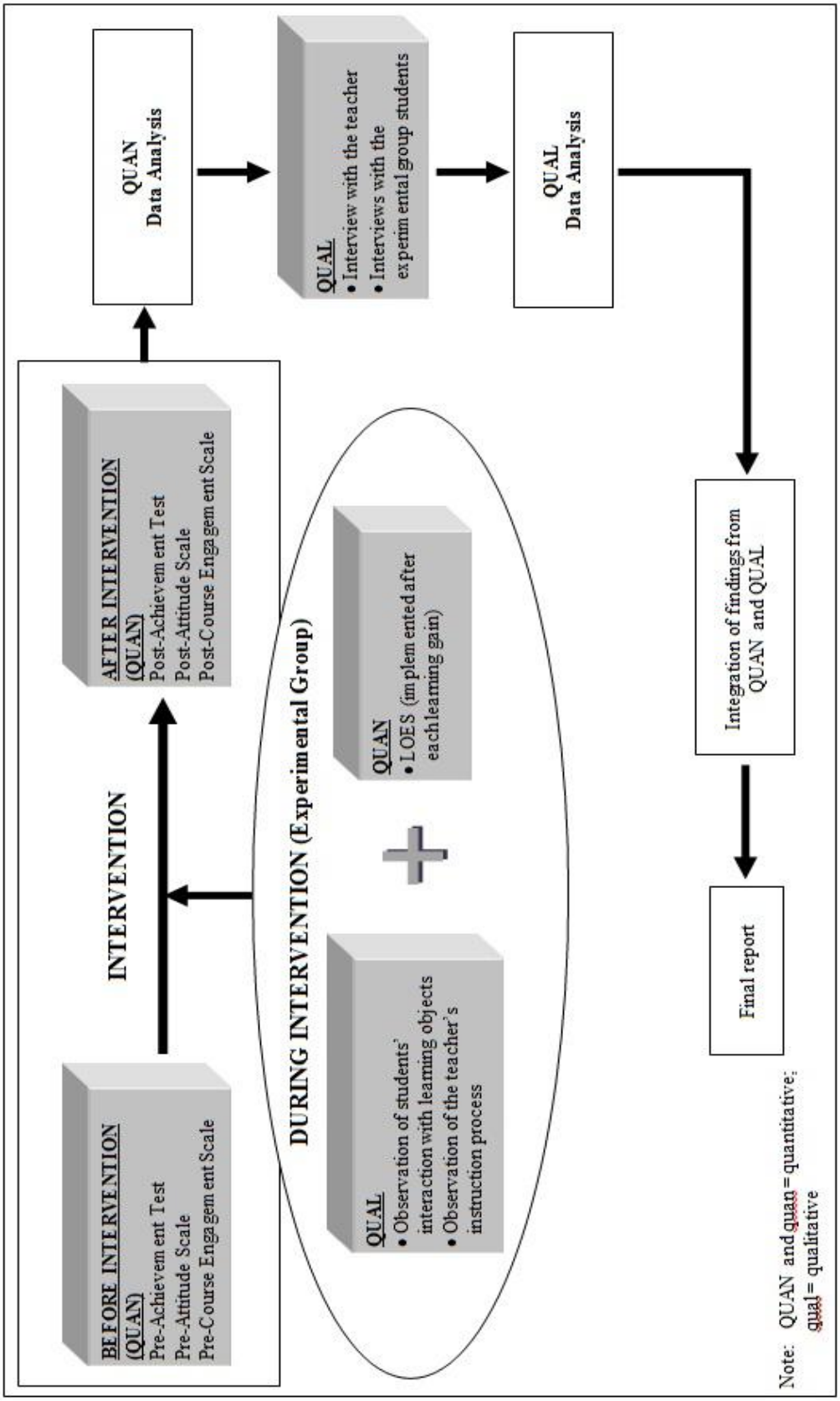


Figure 4. Visual Model for Mixed Methods Procedure (Embedded Experimental Model)

For the part of the study conducted with quantitative methods, as the students could not be randomly assigned to treatment and control groups individually, a quasi-experimental design, the matching-only pretest-posttest control group design, was employed. Two classes of students from the primary school at 6th grade were the experimental group, and the other two classes were assigned to the control group randomly. The dependent variables were the students' achievement scores, attitudes toward social studies lesson and their course engagement level.

Before the instruction was processed, the pre-achievement test, a pre-attitude and pre-engagement surveys were administered to both experimental and control group students. During treatment, students in the experimental group who were exposed to instruction with learning objects were observed, and they filled in the LOES at the end of using each combined learning object in order to investigate the students' evaluation of the learning objects in terms of perceived learning, engagement with learning objects and quality of learning objects. Experimental group students were administered totally 9 LOES. After the administration of post-test and surveys, 18 students in the treatment group and the social studies teacher were interviewed to take their opinions about social studies lesson enriched with learning objects. Each interview with students lasted for about 20 minutes. The interviews were made in the IT classroom and recorded with an audio recorder after permission was taken from students and the teacher. Data collected with qualitative and quantitative data collection tools were analyzed to find out answers to the research questions of the study. Table 4 shows the quantitative data collection process of this study.

Table 4. Quantitative Data Collection Process

Group	Before Treatment	During Treatment	After Treatment
Experimental (Instruction with Learning Objects)	• Social Studies Achievement Test • Attitude Towards Social Studies Scale • Student Course Engagement Scale	• Learning Object Evaluation Scale	• Social Studies Achievement Test • Attitude Towards Social Studies Scale • Student Course Engagement Scale
Control (Instruction without Learning Objects)	• Social Studies Achievement Test • Attitude Towards Social Studies Scale • Student Course Engagement Scale		• Social Studies Achievement Test • Attitude Towards Social Studies Scale • Student Course Engagement Scale

3.3. Participants

This study was conducted in a public primary school in Bolu. One of the social studies teachers in this school was voluntary to participate to the study, and he was assigned to participate to this study with required official permissions.

The participants of the study were 137 students at 6^{th} grade with a mean age of 11 in a public primary school where the teacher was in charge. They had computer literacy lessons at 4th and 5th grade. Also, before the study began the teacher and students stated that all of them had computers and Internet connection at their home. It was not possible to randomly assign the students individually to the treatment and control groups. Two classes were randomly assigned to experimental group, and other two classes were control groups. 66 of the students in B and C classes were in experimental group and 71 students in D and E classes were in control group. The participants of the study were shown in Table 5.

Table 5. Distribution of Participants to Experimental and Control Groups

Group	Class	Gender		Total
		Male	Female	
Experimental	B	17	16	67
	C	15	19	
Control	D	15	19	70
	E	19	17	
Total		66	71	137

The sampling method for the interview was the purposeful sampling. There are different categories of purposive sampling techniques such as extreme case sampling, homogeneous sampling, and maximal variation sampling. In this study, maximal variation sampling which is used to discover individuals who differ in some characteristics (Creswell, 2005) was used to represent students differ in the achievement gain scores and the LOES scores. So, as shown in Table 6, the students were categorized into a 3x3 matrix according to achievement gain scores on total LOES scores. Totally, 18 students were selected for the interview.

Table 6. 3x3 Matrix for Maximal Variation Sampling

Achievement / Total LOES Score	High		Average		Low	
	Female	Male	Female	Male	Female	Male
Low	1	1	1	1	1	1
Average	1	1	1	1	1	1
High	1	1	1	1	1	1

3.4. Procedures of Study

In spring semester of 2009-2010 academic year, the researcher met with two social studies teachers who were using computer technology in their classroom activities in two different public primary teachers in Bolu. The researcher told the aim study and planned procedures of the study to teachers, and they stated that they were voluntary to participate in the study. Also, the administrators were informed about study and permission was taken from them. In that semester, to begin to develop the learning objects, the units which the learning objects would be developed on, the achievements in the units and the type of instructional activities were determined by the teachers, the researcher and an academician in the social studies education program in elementary education department at Abant İzzet Baysal University.

Learning objects were piloted in the spring semester of 2010-2011 academic year in the same schools in order to evaluate visual design and usability of learning objects. Improvements were made on learning objects based on feedback from students, teachers and an expert in instructional technology field. The pilot study showed that the computers in one of the schools were too old and insufficient to run the learning objects. So, the planned study in that school was canceled.

Another pilot study was made in the fall semester of 2011-2012 academic year. In the beginning of the semester, the pilot of the course engagement scale was administered in two different public primary schools, and social studies achievement test was piloted in three different public primary schools in Bolu. Also, learning objects developed for the Silk Road and the Turks unit were implemented in four schools in order to pilot the LOES and get accustomed the experimental group students of the actual study to this new instructional approach for them. During pilot study, the researcher found that the Internet connection speed of the school where the actual study would be conducted was very low (2 MBits per second), and as the learning objects were on the

Internet environment, it was taking too much time to load the learning objects from the Internet to the computers. So, the researcher decided to store the learning objects in computers in the IT classroom.

Before the actual study started, pre-achievement test on the social studies topics, and pre-surveys on attitude towards social studies lesson and student course engagement were administered to both experimental and control group students. In the beginning of the actual study, in one class hour (40 minutes), a short orientation about how to use the learning objects was given to students.

Experimental group students used totally, 52 learning objects which were developed for two units (Table 7). They were combined to form 9 learning objects – one combined learning object is an aggregation of all learning objects developed for one learning gain. During experimentation, in experimental group, before each lesson began, the researcher loaded the learning objects to each computer in the IT classroom. The teacher has prepared lessons by using learning objects around course objectives and planned the course related to the objects. At the beginning of the lesson, in order to capture students' attention and to motivate them, the teacher asked questions about students' daily life and brought daily life materials such as newspaper and magazines which could be related the subject. The teacher introduced learning objects to students with brief notices on their usage and content and the learning activities in them. The first learning object of the aggregated learning object for the learning gain presented the goals of the lesson. The content of the lesson was presented to the students with learning objects. Depending on the content, some of them included just text and images, graphics or maps related with the content. The teacher wanted students to read them and examine the images and asked questions about the subject. Some learning objects included videos about daily life regarding the topics of the lesson. Students watched the videos and the teacher created a classroom discussion around the topics in the videos. Some learning objects included interactive learning activities such as games and interactive concept maps. The last learning object of an aggregated learning object was an exercise such as matching game and puzzle in order that students practice the newly acquired knowledge or skills. Because there were 16 computers in the IT classroom, two students used one computer and implemented the activities in the learning objects together. While the students were utilizing the learning objects, by circulating between students, he monitored the students, motivated them to pursue the learning activities and guided them to complete the activities in learning objects. In addition, during students' use of learning objects, he scaffolded students to implement the learning activity by giving feedback and giving hints. If students had difficulty in learning the subject by using the learning object, he used different instructional techniques such as lecturing and question and answer in order to help students to learn the subject. Sometimes he wanted students to use the learning objects simultaneously. Especially, the teacher sometimes required students to read the text, examine the images or watch the videos at the same time. Later, he created a classroom discussion around the text, image or video. After students' use of learning objects individually, he summarized the subject, gave information about the content, and utilized question and answer technique. It can be said that the students were mainly active in the learning environment.

In control group, the teacher did not utilize learning objects while instructing in the social studies lessons. The course was mainly teacher-directed in format, having lectures, question and answers, discussions, and solving standard questions, such as those at the end of the chapter in the course book. Student activity was mainly passive. In order to capture attention of students, the teacher asked questions about daily life or current news, brought daily life materials such as newspaper and magazine which could be related with the subject matter. Sometimes he told students the importance of the subject matter in terms of social life, economy or social studies. Later he presented the learning objectives of the lesson. Sometimes, depending on the subject, in order to enhance students' learning, the teacher associated new knowledge with prior knowledge. The teacher presented the content to the students by lecturing. Using digital presentations and reading the textbook had a prominent position in teaching procedure. Sometimes, he used maps and showed videos about the subject by using the computer and the projector in the social studies

classroom. If students had difficulty in understanding the subject, he utilized different instructional techniques. He guided the students by giving examples and non-examples, and provided visual images and metaphors. In order to help students to internalize new knowledge and to confirm correct understanding of the concepts, the teacher used question and answer or classroom discussion techniques. The teacher provided immediate feedback of students' performance in the question and answer and discussion techniques. At the end of the lesson, he asked students to write the important points of the subject, asked questions about the subject and made a summary of the subject of the lesson.

3.5. Design of Learning Objects

Totally 52 learning objects were developed, embedded or modified for this study. Learning objects were categorized and combined according to nine learning gains of the two units selected to be studied on. Number of learning objects for each learning gain of the two units in the 6th grade social studies lesson was presented in Table 7.

Table 7. Learning Gains of Two Lesson Units and Number of Learning Objects Developed for Each Learning Gain

Learning Gain	**Number of Learning Objects**
The student;	
Associating the sources of our country with economical activities, evaluates the importance of them in the economy of the country.	9
Advocates the importance and necessity of paying tax, in terms of national responsibility and its contribution to the budget of the country.	1
Discusses the effects of unconscious consumption of natural resource on human life.	4
Evaluates the role of qualified human resources on the economy of Turkey and makes research on the education, skills and personality characteristics of the profession he/she interests in.	1
Using the visual resources and data, makes inferences about the reasons for the distribution of the population and economy.	10
Evaluates the economic relationship of Turkey with other countries in terms of resources and needs.	8
Evaluates the economic, cultural, social and political relationship of Turkey with Turkish Republics, neighbor and other countries in terms of Ataturk's perception on national foreign policy.	9
Realizes the importance of solidarity and cooperation with other countries in case of natural disasters and environmental problems.	5
Evaluates the role of international cultural, art, fair and sports activities in the inter-community interaction.	5

If learning objects were not designed based on sound instructional design and performance improvement processes, they do not work. The instructional design strategies must have main role in design and use of learning objects (Wiley, 2001). Different organizations and authors have proposed several design models for learning object development. Wiley's Learning Object Design and Sequencing Theory, Cisco Systems' (1999) Rio-Rlo Model and Barritt and Alderman's (2004) Revised ADDIE Model are three examples for learning object design and development models. In this study, Barritt and Alderman' model focusing specifically on creating learning objects and use of learning objects in learning environments was adopted. This model is a modified version of ADDIE model for learning objects and emphasizes that teachers need to think how the learning objects should be reused in different learning contexts (Barritt & Alderman, 2004). The stages of this model are presented in Figure 5.

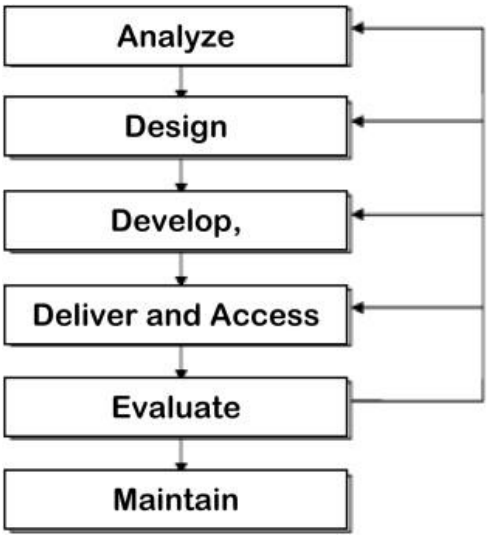


Figure 5. Learning Object Specific ADDIE Model

Analysis: In the analysis phase, the instructional units which the learning objects would be developed for were determined based on teacher's needs and suggestions. Firstly, the objectives of the two instructional units in the 6th grade social studies lesson were analyzed and decided that the learning objects could be used to enhance students' learning of social studies lesson. The target audiences of the intended learning objects were the 6th grade students who were 11 or 12 years old. All of them have computers and the Internet connections at their home and they had computer literacy course in their 4th and 5th grade in schooling. All the students had the required knowledge and basic skills in order to use the computer and the learning objects.

The learning object enriched social studies lesson would be implemented in the IT classroom of the school. There were 15 student computers and a teacher computer in the classroom. An interactive whiteboard, a laser printer and a scanner were connected to teacher computer, and all student computers could be controlled by the teacher computer with special software. All the computers had the required hardware and software in order to run the intended learning objects. There were more than 30 students in the classrooms, so two students had to use each computer. The Internet connection speed of the school where the application was made was 2 Mbits per second, and it was considered that while all the computers were running and connecting to the Internet, each computer's Internet connection would be too slow to use the learning objects in a learning management system or in a learning object repository. So, it was decided that the packaged learning objects would be stored in students' computers before each lesson begin.

In addition, the content of the instructional units were analyzed through textbooks, document analysis, and teachers' lecture notes. Firstly, the whole of the subject matter was taken and then was broken down into manageable chunks of information. After much consideration, it was decided that digital learning objects were suited for students of the social studies lesson and would meet the stated instructional goals. Also, it was recognized that the intended learning objects were only part of the larger learning environment. Students' use of learning objects would interact with other learning activities.

Design: Once identifying the required content, the learning objectives for the units determined by the Ministry of National Education (MoNE) were broken down into smallest objectives, so the granularity of the objectives were revealed. It was decided to design 54 learning objects at the beginning of the design stage. The learning strategies for each granuled objective were determined by the social studies teachers and an academician in social studies education department. As the learning strategies for each granule learning objective were not limited to receptive, directive, guided-discovery or exploratory learning, the learning objects did not have

the same teaching strategy. Learning activities to support the strategies were identified in collaboration with the teachers and the academician. After identifying the learning strategies and activities, the storyboarding of learning objects was designed and the delivery media was selected.

In order to develop the learning objects, animation software (Adobe Flash Professional CS5.5) were decided to be used. The software has the capability of creating animation and multimedia. It also supports the interactivity with special object-oriented programming language adopted in it. It was decided to be used to develop the learning objects because the products of the software are interoperable, and can run with most of the operating systems and the Internet browsers.

Later, the content (text, graphic, video, and so on) necessary to build the learning objects based on the needs of the teacher and the learning objectives were identified, prepared or collected from teachers' and academician's lecture notes, course textbooks, and the Internet. Videos and graphics required for learning objects were collected from the Internet, and it was decided to be make revisions on them. Also, learning object repositories such as MERLOT and Wisc-Online were searched in order to find appropriate learning objects. In addition, interactive activities or multimedia were searched over the Internet. Two learning objects collected from the repositories and from the Internet were modified in accordance with the needs of the course.

The interface and tools that provide interactivity with the learning objects were designed considering the characteristics of the students, and prototypes of learning objects were examined and evaluated by an expert in instructional design, two social studies teachers and five 6th grade students at a different primary school. After evaluating the usability of prototyped learning objects, the prototypes were revised according to the feedback from the teachers, students and the expert. Inadequate content was determined and it was enriched or completed, and problems with the visual quality of images and videos were refined.

Development: The development phase focused on the creation of the learning objects with the authoring tool, adding metadata to learning objects and their packaging with a content packaging editor. The content designed and collected in the design phase was created and combined with the authoring software. In addition, the interactivity was satisfied by writing the appropriate programming codes into the development environment. The intended learning objects were evaluated by the teachers, the academician, the researcher, and six students in different schools in the same age and grade with the targeted group. The evaluated learning objects were revised according to the feedback. In order that students could read the unreadable text easily, colors of text were edited in some learning objects, and typing errors were removed. The functional problems in the learning objects were solved. The visual quality of some images and videos was enhanced.

Totally, experimental group students utilized 52 learning objects during the experimentation of this study. For "Sources of Our Country" unit, 13 learning objects were designed and developed by the researcher, two social studies teachers, and an academician in social studies teaching department. In addition, a learning object found in AAAS's (The American Association for the Advancement of Science) Science Netlink web site and a learning object found in Sustain Ability International's Ollie's World web site were modified in order that students use them as an interactive learning material. For Our Country and the World unit, 37 learning objects were developed by the researcher and the others.

In order to satisfy visual consistency across the learning objects, 3 templates were developed. 35 learning objects were developed using one of the templates, 11 of them were developed one template, and the remaining 4 learning objects were developed by the other template. However, 2 modified learning objects had two distinctive interfaces. Figure 6 shows the screenshot of three different interfaces developed for learning objects and Figure 7 shows one of the modified learning objects.

Figure 6. A Screenshot of Developed Learning Objects

Figure 7. Screenshot of a Modified Learning Object

In order to organize, collect and package learning objects within IMS and SCORM standards, the Reusable E-learning Object Authoring and Development (RELOAD) Editor was used. This editor is a tool of a project under The Joint Information Systems Committee (JISC) Exchange for Learning Programme (X4L). The editor supports IMS Metadata, IEEE LOM, IMS Content Packaging 1.1.4, SCORM 1.2, and SCORM 2004 (RELOAD, 2009). The organization and the navigation structure of learning objects were edited (Figure 8), the metadata for each learning object were input (Figure 9), and packaged with this tool.

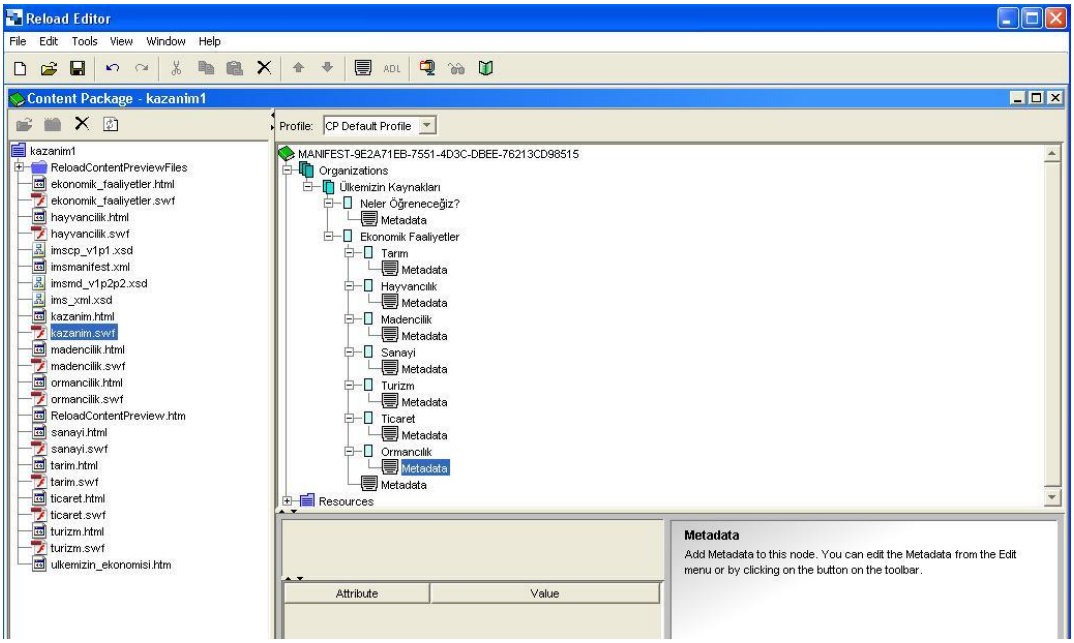


Figure 8. Screenshot of RELOAD Editor

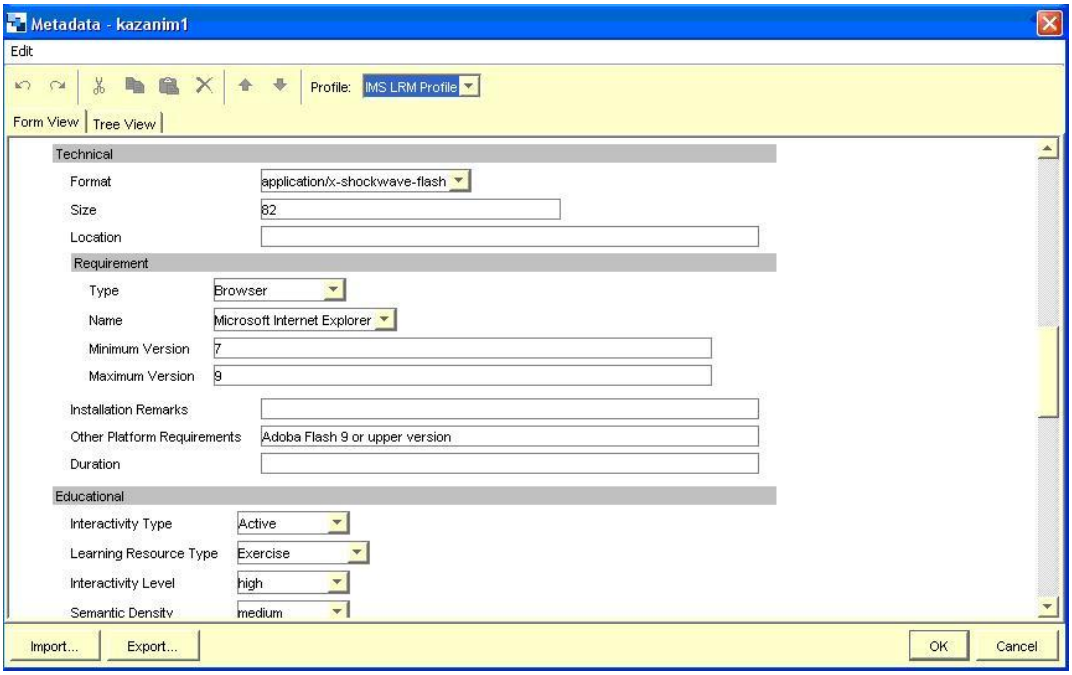


Figure 9. Screenshot of Metadata Editing

Implementation: Once the learning objects were developed, they were piloted with students in two social studies classrooms. The learning objects developed and packaged could not be loaded into an internet-based learning platform or a learning object repository because of the slow Internet connection of the computers in the IT classroom. Instead, the learning objects were stored into student computers and the teacher computer before each lesson had started. The students and the teacher used the learning objects in this pilot study. They were observed by the

researcher in order to find the deficiencies, faults, and the comments of students about the learning objects.

Evaluation: Formative evaluation was made during the analysis, design and development stages to ensure that the learning objects meet the instructional goals and learner needs. The feedback coming from the evaluation of learning objects by two social studies teachers, five students and the instructional design expert was about the usability, content and instructional activities in learning objects. Summative evaluation was conducted during this last stage of the design process in order to test the effectiveness of the learning objects. Social studies achievement test and learning objects evaluation scale were administered to the students, and students and social studies teacher were interviewed after the implementation of learning objects in the instruction process in order to evaluate the effectiveness of learning objects.

3.6. Data Collection Instruments

In this study both qualitative and quantitative methods were used. In this part, both quantitative and qualitative data collection instruments, their development process, and their validity and reliability issues were mentioned.

3.6.1. Quantitative Data Collection Instruments

To attain quantitativedata in order to answer the research questions, the following quantitative data collection instruments were used in this study.

Social Studies Achievement Test

A quantitative data collection instrument that was used in the study was the Social Studies Achievement Test (Appendix A). The purpose of the achievement test was to measure the achievement of students on the Sources of Our Country, and Our Country and the World units in the 6th grade social studies lesson curriculum. It was used as pre and post achievement test. The achievement test was developed by the social studies teacher, two academicians in Social Studies Teaching Department, an academician in Educational Measurement and Evaluation Department and the researcher. It consisted of 41 questions including 41 multiple-choice test items.

At the first step of the test construction process, the learning gains were get from the national 6th grade social studies education curriculum of Turkey and table of specification in relation to objectives were formed (Table 8). Six objectives were related to Sources of Our Country unit, and five objectives were related to Our Country and the World unit.

Secondly, initial forms of multiple choice items were constructed according to objectives of the two units by two social studies teachers and an academician in the social studies teaching department. Only multiple choice type items were used in the achievement test.

Expert opinions were taken from 3 social studies teachers in a different public primary school in Bolu, another academician in the social studies teaching department. Moreover, the clearness and readability of the items were also assessed by an academician in Turkish Language Teaching Department. According to the feedback from the teachers and the academicians, the items were revised. The revised version of the achievement test included 50 multiple-choice questions.

Table 8. Table of Specification

Unit	Code No.	Objective	Items
		The student;	
Resources of Our Country	O1	Associating the sources of our country with economical activities, evaluates the importance of them in the economy of the country.	1, 2, 3, 4, 5, 6, 7, 9, 10, 11, 12, 14
	O2	Considering the geographical characteristics of Turkey, designs investment and marketing plans.	8, 13, 15, 17
	O3	Advocates the importance and necessity of paying tax, in terms of national responsibility and its contribution to the budget of the country.	16, 19, 22
	O4	Discusses the effects of unconscious consumption of natural resource on human life.	18, 20, 21, 24
	O5	Evaluates the role of qualified human resources on the economy of Turkey.	23, 26, 27
	O6	Makes research on the education, skills and personality characteristics of the profession he/she interests in.	28, 31
Our Country and the World	O7	Using the visual resources and data, makes inferences about the reasons for the distribution of the population and economy.	25, 29, 30, 32, 33
	O8	Evaluates the economic relationship of Turkey with other countries in terms of resources and needs.	34, 35, 36, 37, 46
	O9	Evaluates the economic, cultural, social and political relationship of Turkey with Turkish Republics, neighbor and other countries in terms of Ataturk's perception on national foreign policy.	39, 40, 41, 50
	O10	Realizes the importance of solidarity and cooperation with other countries in case of natural disasters and environmental problems.	42, 43, 44
	O11	Evaluates the role of international cultural, art, fair and sports activities in the inter-community interaction.	45, 47, 48, 49

The achievement test was piloted with 288 students at 7th grade in three public primary schools in Bolu. The students were taught in the two units nearly 6 months ago. Data from the pilot implementation were analyzed to determine problematic items. The difficulty level, discrimination index of the items and the reliability of the achievement test were computed. Tekin (2008) states that the discrimination index value of an item should be more than .30. Items which have discrimination index value smaller than .30 were eliminated. In addition, items those have difficulty level between .40 and .60 were added to the test directly. However, items which have difficulty level .20 - .40 and .60 - .80 were discussed by the social studies teaching academicians, and the social studies teacher. Table 10 shows that the discrimination indices of the items in the achievement test varied from -.12 to .80. In addition, the difficulty of the items was in range between .16 and .76. Nine of the items (9, 16, 18, 19, 20, 23, 26, 38, and 41) were eliminated from the achievement test because of their low discrimination index values (Tekin, 2008). After the final revision, the achievement test included 41 multiple-choice questions (Table 9).

Table 9. Difficulty and Discrimination Indices of the Items in the Pilot Study

Item #	Difficulty	Discrimination Index	Item #	Difficulty	Discrimination Index
1	.57	.74	26	.24	.27
2	.65	.52	27	.47	.63
3	.70	.41	28	.38	.73
4	.44	.80	29	.54	.44
5	.51	.39	30	.76	.31
6	.39	.55	31	.32	.36
7	.35	.48	32	.48	.42
8	.51	.64	33	.42	.59
9	.50	.25	34	.50	.76
10	.62	.38	35	.36	.31
11	.50	.42	36	.48	.56
12	.38	.41	37	.64	.46
13	.47	.41	38	.23	-.06
14	.32	.53	39	.50	.60
15	.33	.47	40	.49	.80
16	.41	.19	41	.15	.09
17	.42	.41	42	.35	.41
18	.37	-.02	43	.61	.62
19	.22	.13	44	.50	.48
20	.24	-.12	45	.58	.67
21	.39	.45	46	.58	.49
22	.50	.44	47	.63	.37
23	.16	-.03	48	.72	.49
24	.41	.58	49	.48	.48
25	.59	.56	50	.48	.54

Table 10 shows that the Cronbach's alpha internal reliability coefficient of the test was .88. The difficulty index coefficient of the test is .47, and the computed discrimination index coefficient of the test was found .48. The results showed that the achievement test developed for the study was convenient to implement for the actual study.

Table 10. Result of Item Analysis in the Pilot Study

Statistics	Value
N of Items	50
N of Examinees	288
Mean	23.36
Variance	82.92
Std. Dev.	9.11
Skew	0.51
Kurtosis	-0.96
Alpha	0.88
SEM	3.14
Mean P	0.47
Mean Item-Tot.	0.38
Mean Biserial	0.48

Learning Object Evaluation Scale (LOES)

Another quantitative data collection instrument in order that students could evaluate the learning objects was Learning Object Evaluation Scale (LOES) (See Appendix B). This part mentions about the development of LOES.

Context and Participants
The participants of the LOES development part of the study were 388 students at four different public primary schools at their 6th grade in Bolu. Before the scale was administered to them, they used the learning objects of The Silk Road and Turks unit. After using the learning objects, a sample of 388 students were asked to rate the learning objects in reference to a 5-point Likert-type scale, with anchors ranging from 1 (strongly disagree) to 5 (strongly agree).

Procedures
There are some methodologies used by researchers to evaluate the students' use of learning objects. Bradley and Boyle (2004), Kay and Knaack (2005), and Krauss and Ally (2005) used qualitative techniques in the evaluation process. Quantitative efforts have been put by Bradley and Boyle (2004), Nesbit and Belfer (2004), Cochrane (2005) and others. A well-known instrument, Learning Object Review Instrument (LORI), was developed by Nesbit and Belfer (2004) to evaluate the learning objects that would be used in lessons in collaboration with experts, teachers, designers, and students.

The primary learning object evaluation methodologies use review instruments such as rubrics. One of the examples for those evaluation rubrics is Learning Object Evaluation Scale for Student (LOES-S) developed and improved by Kay and Knaack (2007). They developed the scale which was a student–based learning object evaluation tool and based on three key factors emphasized in 10 years of learning object research; perceived learning, quality or instructional design, and engagement or motivation with learning objects. The internal reliability estimates for the LOES-S constructs were 0.89 (Learning), 0.84 (Quality), and 0.78 (Engagement).

The LOES used in this study based on Kay and Knaack's (2007) LOES-S instrument mainly. In addition, the instrument was enriched with the items in Webster and Ho's (1997) study about audience engagement in multimedia presentations. The item pool included a total of 40 items. A five point Likert scale was used in order to express the level of agreement with the items included in the scale. The grading was as follows: "Strongly Agree (5), Agree (4), Neutral (3), Disagree (2) and Strongly Disagree (1)". The items in Kay and Knaack' (2007) and Webster and Ho's (1997) instruments were translated into Turkish by two academicians in the Department of Foreign Language Education at Abant Izzet Baysal University. Later, the translators discussed on the items in order to determine the final form of the scale. The language of the survey was also checked by an academician in Turkish Language Teaching Department so that the items can be understood easily and clearly by the students in the 6^{th} grade.

Before implementing LOES, in order to determine the face and content validity of the scale, instructional technology experts were asked their views on the items. For this purpose, the LOES form was analyzed with four experts in instructional technology field. Based on the feedback from the experts, 6 items were removed from the instrument, and 2 items were added in the instrument. The scale before the pilot application included 36 items in 3 different dimensions. There were 8 items in the perceived learning dimension, 15 items in usability dimension, and 13 items in the engagement dimension.

Item Analysis and Reliability
Established guidelines for scale development by DeVellis (2003) were followed in order to create the LOES form. There are three phases to an exploratory factor analysis: (a) select and measure the variables, (b) determine the number of factors, and (c) interpret the factors (Pohlmann, 2004).

Before the exploratory factor analysis, in order to determine how each item could contribute to the variance of the instrument and to validate the LOES items, item analysis was performed. The item analysis provides information about how well each individual item relates to the other items in the analysis. This was reflected by the item-remainder coefficient, item-total correlation, Cronbach's alpha if item deleted and t-test between upper and lower groups' mean scores calculated for each item (Tezbaşaran, 1997). The item-remainder coefficient is the correlation of

each item with the sum of the remaining items. They are used to delete items that do not correlate well with the rest of the items in the scale. Items having a value of .30 and higher item-total correlation and a value of .25 and higher item-remainder correlation are accepted to be sufficient (Field, 2009, p.678; Tavşancıl, 2010, p.34). For the LOES items, item-remainder correlations ranged from .074 to .690, and item-total correlations ranged from .179 to .722. Only item-total and item-remainder correlation coefficient of item 7 was not significant at .01 level. Item-total and item-remainder correlation of item 7 were .179 and .074 respectively. The values in the column labeled Cronbach's Alpha if Item is Deleted are the values of the overall alpha if that item isn't included in the calculation. Any items that result in substantially greater values of alpha than the overall alpha may need to be deleted from the scale to improve its reliability (Field, 2009). The Cronbach's alpha value of the items was computed as .949. Using this information, removing item 7 resulted in an increase in Cronbach's alpha from .949 to .955. Another application in item analysis is the comparison of upper 27% and lower 27% of groups' mean scores. If the t-value is significant for the item, it is selected for the scale, otherwise it is deleted (Tavşancıl, 2010). The difference between item-mean scores of these groups was examined using the independent samples t-test. The t-values for all items were significant at .01 level. As a result although the t-value for item 7 was significant, as the item-total correlation and item-remainder correlation was less than .30 and .25 respectively, and item 7 decreased the internal reliability of the scale form, it was removed from the scale. The item-total correlation, item-remainder correlation, alpha value if item deleted and t-value for the difference between the upper 27% and lower 27% for the LOES form before exploratory factor analysis were presented in Table 11.

Table 11. Item Analysis Results for LOES

Item No	Item-Total Correlation	Item-Remainder Correlation	Cronbach's Alpha if Item Deleted	t upper 27% - lower 27%
1	.666	.639	.947	9.514**
2	.534	.506	.948	4.435**
3	.708	.687	.947	7.740**
4	.651	.623	.947	10.062**
5	.640	.602	.947	10.596**
6	.686	.660	.947	10.939**
7	.179	.074	.955	2.823**
8	.696	.668	.947	8.531**
9	.634	.603	.947	8.370**
10	.646	.608	.947	9.106**
11	.527	.495	.948	7.333**
12	.601	.557	.948	9.640**
13	.633	.603	.947	7.701**
14	.681	.658	.947	8.511**
15	.634	.612	.948	7.862**
16	.627	.592	.947	8.905**
17	.684	.652	.947	12.044**
18	.635	.612	.948	8.166**
19	.599	.561	.948	8.195**
20	.722	.690	.947	10.716**
21	.621	.593	.947	7.413**
22	.554	.531	.948	5.317**
23	.639	.601	.947	8.858**
24	.595	.554	.948	8.427**
25	.666	.641	.947	7.609**
26	.648	.625	.948	6.925**
27	.675	.633	.947	12.631**
28	.656	.616	.947	9.925**

Table continued				
29	.614	.569	.948	10.804**
30	.658	.623	.947	9.966**
31	.665	.629	.947	10.408**
32	.620	.585	.948	7.695**
33	.670	.646	.947	7.344**
34	.657	.622	.947	10.401**
35	.563	.524	.948	7.535**
36	.660	.638	.947	8.000**

Exploratory Factor Analysis

In order to reveal the structure of the LOES, exploratory factor analysis (EFA) was executed. Factor analysis is used to find small number of new and conceptually meaningful factors by gathering certain number of interrelated variables and considering the relationship between them (Field, 2009). In this study, a principal component EFA was carried out in order to determine the factor structure of the LOES.

Firstly, it was attempted to discover whether the data obtained from 388 students was appropriate for exploratory factor analysis. Whether the size of the sample was appropriate for factor analysis and all variables were independent from one another, the Kaiser-Meyer-Olkin (KMO) value and Bartlett's Test of Sphericity (BTS) were taken into account respectively for that purpose (Field, 2009). The KMO values between 0.5 and 0.7 are average, values between 0.7 and 0.8 are good, values between 0.8 and 0.9 are great and values above 0.9 are excellent (Çokluk, Şekercioğlu & Büyüköztürk, 2010; Field, 2009). The KMO coefficient for LOES was calculated as .942. Since the KMO value was higher than .90, it could be said that the size of the sample was highly acceptable. As the BTS value was equal to 8563.798 and significant ($p < .05$) (Field, 2009), it was seen that the data were appropriate for the factor analysis (Table 12). Because the two assumptions were satisfied, exploratory factor analysis of LOES could be made.

Table 12. KMO and Bartlett's Test Results for LOES

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.942
Bartlett's Test of Sphericity	Approx. Chi-Square	8563.798
	df	595
	Sig.	.000

Secondly, the number of the factors in the scale was determined. The criteria for determining the number of factors to retain were eigenvalue greater than 1, the amount of common variance explained and the scree-test (Field, 2009). Principal components analysis revealed the presence of six components with eigenvalues exceeding 1, explaining 41.753%, 7.458%, 5.205%, 3.545%, 3.132% and 2.894% of the variance respectively, accounting for a total of 63.986% of the variance (Table 13).

Table 13. Total Variance Explained in Principal Component Analysis for LOES

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	14.614	41.753	41.753	14.614	41.753	41.753
2	2.610	7.458	49.211	2.610	7.458	49.211
3	1.822	5.205	54.416	1.822	5.205	54.416
4	1.241	3.545	57.960	1.241	3.545	57.960
5	1.096	3.132	61.092	1.096	3.132	61.092
6	1.013	2.894	63.986	1.013	2.894	63.986
7	.840	2.400	66.386			
8	.814	2.324	68.711			
9	.793	2.266	70.977			
10	.714	2.040	73.017			
11	.688	1.966	74.983			
12	.651	1.859	76.842			
13	.620	1.771	78.613			
14	.560	1.599	80.211			
15	.527	1.506	81.717			
16	.515	1.470	83.187			
17	.484	1.383	84.571			
18	.470	1.341	85.912			
19	.463	1.322	87.234			
20	.428	1.222	88.456			
21	.413	1.180	89.636			
22	.396	1.133	90.769			
23	.347	.992	91.761			
24	.336	.961	92.722			
25	.322	.919	93.641			
26	.283	.810	94.451			
27	.273	.779	95.229			
28	.251	.718	95.947			
29	.234	.669	96.616			
30	.229	.655	97.271			
31	.223	.638	97.909			
32	.207	.591	98.500			
33	.193	.552	99.052			
34	.172	.492	99.544			
35	.160	.456	100.000			

An inspection of the scree plot suggested a three-factor solution. The break in the trend line commencing at the fourth eigenvalue indicated that the major portion of variance was explained by the first three factors. When the eigenvalues, amount of common variance and the scree plot were examined, it was decided to extract three factors to continue to analysis (Figure 10).

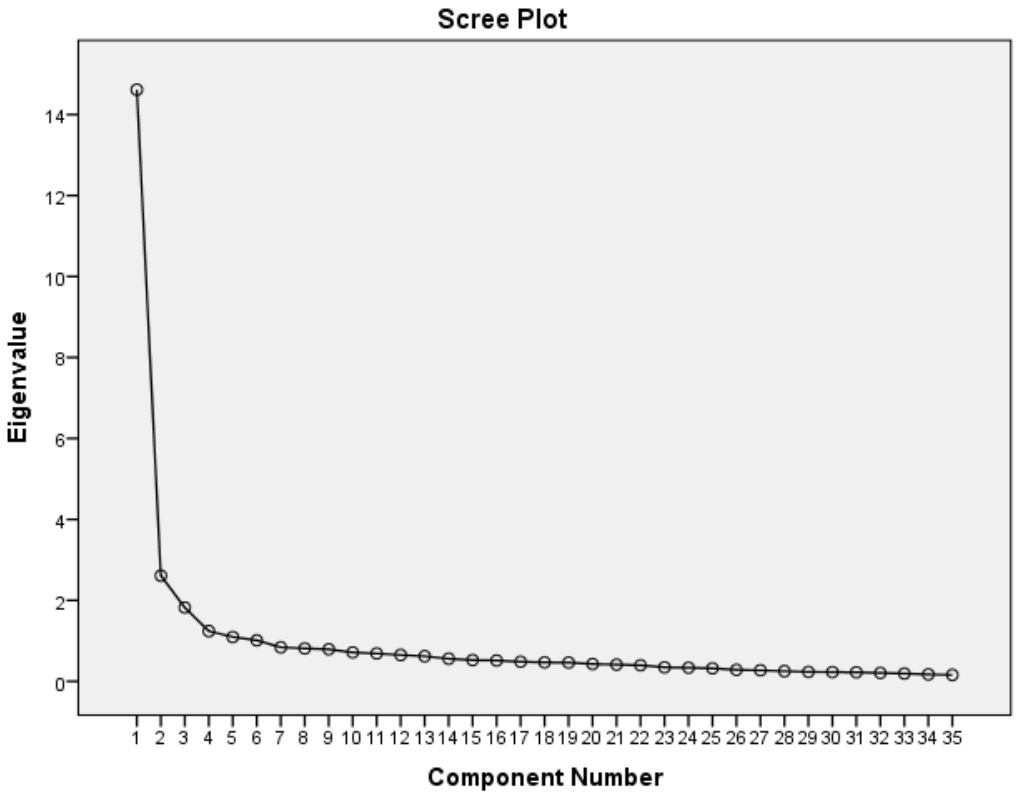


Figure 10. Scree Plot for LOES

In addition, Table 14 shows the component matrix before rotation. This matrix contained unrotated loadings of each of the items on the six components. It was requested that loadings less than 0.4 be suppressed in the output (Field, 2009). When the component matrix was analyzed it was observed that all of the 35 items had factor loadings more than .530, and mostly loaded into the first factor. This loading showed the reason for the first factor accounted for most of the variance (Field, 2009).

Table 14. The Component Matrix of LOES Before Rotation

Item No	Component					
	1	2	3	4	5	6
3	.741	.019	-.329	.139	.009	-.135
20	.733	-.223	.154	-.188	-.100	-.107
14	.733	-.287	-.154	-.002	.080	-.027
25	.719	-.273	-.148	.050	.105	-.104
6	.710	-.049	-.413	-.084	-.157	-.111
8	.710	.060	-.232	-.074	-.164	-.152
33	.698	.198	-.127	.096	.023	-.202
36	.696	-.135	-.028	.078	.180	-.010
1	.692	-.185	-.366	-.123	-.179	.153
15	.690	-.208	-.127	.214	.028	.045
17	.686	-.274	.146	-.328	-.174	.046
18	.664	-.174	-.030	.058	.188	-.009
4	.660	.031	-.283	-.193	-.222	-.114
13	.649	-.144	.248	.333	.254	.091

Table continued						
31	.645	.295	-.014	-.065	.354	-.012
26	.642	.300	-.110	.301	-.195	.155
34	.641	.353	.210	.073	-.235	-.320
27	.640	.271	.316	-.167	-.092	-.161
21	.639	-.374	.093	.168	.148	.143
10	.638	-.310	.225	-.114	-.138	.314
9	.638	-.331	.255	-.156	-.104	.117
16	.634	-.332	.214	-.205	-.085	.147
5	.634	-.002	-.194	-.323	-.041	-.085
30	.621	.433	.039	-.237	.375	-.035
19	.619	-.365	.090	.071	.224	-.003
23	.619	.401	.071	.137	-.127	.098
28	.619	.315	.028	-.271	.158	.104
12	.605	.140	.508	.053	-.121	-.311
32	.590	.409	.053	.157	-.222	.381
22	.588	-.325	-.053	.302	.064	-.074
24	.562	.391	-.022	.149	-.165	.432
29	.558	.410	.136	-.297	.366	.178
2	.546	.116	-.436	.111	.111	-.012
35	.543	.292	.067	.246	.010	-.166
11	.530	-.114	.481	.201	-.102	-.132

In the next phase, in the interpretation of the three factors, Varimax vertical axis rotation was used. Although the 12th, 14th, 15th, 25th and 33rd items meet the requirement for the value of factor loading of .40, they were eliminated from the scale during the Varimax rotation, since those items could not meet the requirement for the value of the differences of each item between the factor loadings of .10 (Çokluk et al., 2010).

After inappropriate items were suppressed, based on the results presented in Table 15, it was found that the common variance for each of the three factors was 20.041%, 19.546% and 14.594% respectively. The value of total variance between 40% and 60% is claimed to be sufficient for social science studies, and for any factor to be meaningful, at least 5% of the total variance explained should be attributable to that factor (Çokluk et al., 2010; Tavşancıl, 2010). Therefore, the total variance explained found as 54.181% in this study might be acceptable.

Table 15. Total Variance Explained After Rotation for LOES

Compo-nent	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	12.290	40.968	40.968	12.290	40.968	40.968	6.012	20.041	20.041
2	2.395	7.983	48.951	2.395	7.983	48.951	5.864	19.546	39.587
3	1.569	5.229	54.181	1.569	5.229	54.181	4.378	14.594	54.181
4	1.198	3.994	58.175						
5	1.075	3.583	61.758						
6	.904	3.015	64.773						
7	.808	2.693	67.466						
8	.779	2.596	70.061						
9	.746	2.487	72.548						
10	.647	2.155	74.703						
11	.615	2.051	76.755						

Table continued			
12	.594	1.979	78.734
13	.579	1.930	80.665
14	.513	1.711	82.375
15	.503	1.678	84.053
16	.479	1.597	85.651
17	.445	1.485	87.135
18	.435	1.449	88.584
19	.405	1.350	89.934
20	.387	1.291	91.225
21	.359	1.195	92.421
22	.343	1.145	93.565
23	.319	1.065	94.630
24	.273	.910	95.540
25	.260	.868	96.408
26	.252	.841	97.249
27	.235	.784	98.033
28	.225	.751	98.785
29	.187	.623	99.408
30	.178	.592	100.000

Table 16 shows the factor loads of items after Varimax vertical axis rotation. The scale consisted of 30 items in 3 factors named as usability, engagement and perceived learning. After Varimax rotation, the factor loadings of items ranged between .502 and .763. In the table below, the values in the column labeled Common Factor Load showed the proportion of common variance present in a variable and were all above .30, which was good (Field, 2009). The common factor loadings of items ranged from .386 to .717.

Table 16. Factor Loadings and Common Factor Loads of Each Item After Varimax Rotation for LOES

Item No	**Item**	**Component**			**Common Factor Load**
		Usability	**Engagement**	**Perceived Learning**	
9	Öğrenme nesnesini kolayca kullanabildim.	.742	.155	.178	.606
10	Öğrenme nesnesinin kullanımı basitti.	.718	.193	.174	.583
16	Görsel açıdan öğrenme nesnesini beğendim.	.709	.168	.181	.563
21	Öğrenme nesnesindeki yazılar rahatlıkla okunabiliyordu.	.695	.111	.284	.576
19	Öğrenme nesnesindeki butonlar (düğmeler) kolay anlaşılabiliyordu.	.671	.118	.243	.523
17	Öğrenme nesnesinin ekran tasarımı karmaşıktı. *	.659	.196	.319	.575
20	Öğrenme nesnesindeki görsellerin (resim, grafik, video vb.) kalitesi çok düşüktü. *	.659	.273	.305	.602
13	Öğrenme nesnesinin kullanımını öğrenmek kolaydı.	.631	.354	.079	.530
11	Öğrenme nesnesi içindeki konular açık bir şekilde sunulmuştu.	.607	.317	-.071	.474

Table continued

22	Öğrenme nesnesindeki bölümler arası geçiş kolaydı.	.538	.094	.370	.435
36	Öğrenme nesnesini kullanabilecek düzeyde bilgisayar becerisine sahibim.	.524	.321	.316	.477
18	Öğrenme nesnesindeki konular mantıklı bir sıraya göre hazırlanmış.	.513	.274	.336	.451
30	Dersteki etkinlikleri yapmak için öğrenme nesnesini dikkatlice inceledim.	.139	.715	.239	.587
29	Öğrenme nesnesi konuyu öğrenme isteğimi arttırdı.	.177	.710	.092	.545
32	Öğrenme nesnesini kullanarak ders işlemek eğlenceliydi.	.143	.689	.202	.536
23	Genel olarak öğrenme nesnesinde anlatılan konuyu sevdim.	.162	.684	.220	.543
34	Öğrenme nesnesi, dersteki etkinliklere ilgimi artırdı.	.251	.647	.198	.522
27	Öğrenme nesnesi dikkatimi konu üzerinde toplamamı sağladı.	.379	.642	.058	.558
24	Öğrenme nesnesini yeniden kullanmak isterim.	.114	.640	.246	.483
28	Öğrenme nesnesi konuya merakımı arttırdı.	.228	.622	.236	.494
31	Öğrenme nesnesi dersteki etkinliklerinin tamamını yapmama yardımcı oldu.	.222	.621	.281	.514
26	Öğrenme nesnesi eğlenceliydi.	.178	.582	.382	.517
35	Öğrenme nesnesi, anlatılan konu üzerinde derinlemesine düşünmemi sağladı.	.195	.560	.185	.386
6	Bu öğrenme nesnesi sayesinde yeni bilgiler öğrendim.	.272	.245	.763	.717
1	Öğrenme nesnesi ile çalışmak konuyu öğrenmeme yardımcı oldu.	.378	.145	.720	.683
3	Öğrenme nesnesindeki görseller (grafik, animasyon, video vb.) konuyu öğrenmeme yardımcı oldu.	.300	.347	.661	.648
4	Bu öğrenme nesnesini kullanarak konu ile ilgili soruları kolaylıkla cevaplayabilirim	.251	.290	.657	.579
2	Öğrenme nesnesini kullanarak konuyu daha kolay öğrendim.	.076	.287	.646	.505
8	Öğrenme nesnesi yardımı ile bu konuyu öğrenme nesnesi kullanılmayan konulardan daha iyi öğrendim.	.284	.369	.613	.592
5	Öğrenme nesnesini kullanmak konu ile ilgili etkinlikleri daha çabuk yapmamı sağladı.	.323	.305	.502	.449

* Negative items were reversed.

Lastly, Cronbach alpha coefficient of each factor and the correlations between the factors in the scale were calculated to determine the internal consistency of the scores obtained from the LOES. The Cronbach alpha coefficients over .70 are stated as adequate for an instrument to be used (Fraenkel & Wallen, 2006). All LOES factors showed reasonable reliability. The internal consistency reliability coefficients of perceived learning, usability and engagement were .88, .91 and .90 respectively. The correlations between the learning factor and the usability factors ($r = .68$, $p < .01$, $N = 388$) and engagement ($r = .68$, $p < .001$, $N = 388$) factors were significant, as was the correlation between the usability and engagement factors ($r = .61$, $p < .01$, $N = 388$).

Confirmatory Factor Analysis for LOES

To test whether the three-factor model obtained in EFA fit to the data (Sümer, 2000), confirmatory factor analysis was used. So the data set for 388 cases used in EFA was loaded in LISREL statistic program and a covariance matrix was prepared.

Path diagram and goodness of fit statistics were produced for the three-factor model with 30 items. The following path diagram with standardized solutions (Figure 11) illustrates the loadings of each item on respective factor the three-factor model, where learning was manifested by seven, usability was manifested by twelve and engagement was manifested by eleven observed variables. The maximum likelihood estimations appeared between .43 and .80 and all t-values were significant at $p < .05$. In addition, the error variances ranged from .36 to .82. Kline (2005) suggested that error variances should not exceed the value of .90. Moreover, three factors were allowed to correlate to each other. This showed that the factor loadings of each item on the related factor were at a reasonable size.

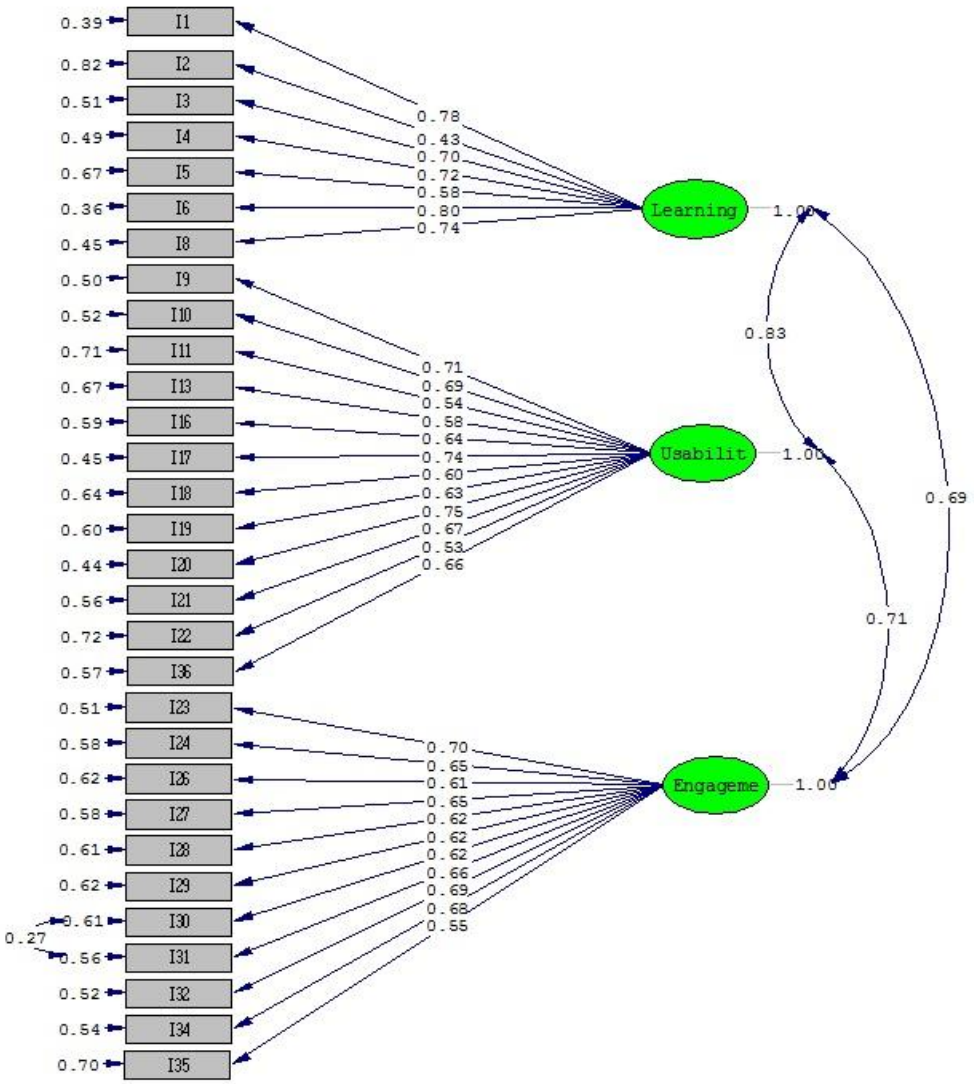


Figure 11. Path Analysis Diagram for LOES within CFA

As relying solely on chi-square (χ^2) as a fit statistic is problematic (Sümer, 2000; Tabachnick & Fidell, 2001), most frequently used statistics computed for the fit of data with the model are Normed Chi-Square Goodness of Fit, RMSEA (Root Mean Square Error of Approximation), SRMR (Standardized Root Mean Square Residuals), GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), CFI (Comparative Fit Index) and NFI (Non-Normed Fit Index) (Çokluk et al., 2010). In evaluating the results, the criteria generally accepted in the literature are used and the values are qualified as perfect or acceptable. Table 17 shows the accepted limits of the goodness of fit indexes adopted in this study and the goodness of fit estimates calculated with 30 items in three-factor model.

As the result of the confirmatory factor analysis conducted using the maximum likelihood method without any limitations, the worth of fit values was found to be χ^{2}/df = 2.742, RMSEA = .067, SRMR = .056, GFI = .87, AGFI = .85, CFI = .97, and NNFI = .97. According to these values, it can be said that GFI observable fit value was slightly lower than acceptable value, RMSEA, SRMR and AGFI fit values indicate an acceptable fit and the other observable fit values indicate a

perfect fit. In other words, this obtained model indicated that the factors were confirmed by the data.

Table 17. Criteria for Goodness of Fit Indexes and Calculated Values for Estimated Model of LOES

Goodness of fit statistics	Perfect	Acceptable	Estimated Model
χ^2/df	≤3	≤5	2.742
RMSEA	≤.05	≤.08	.067
SRMR	≤.05	≤.08	.056
GFI	≥.95	≥.90	.87
AGFI	≥.90	≥.85	.85
CFI	≥.95	≥.90	.97
NNFI	≥.95	≥.90	.97

Student Course Engagement Scale (SCES)

The other quantitative data collection instrument used in this study was Student Course Engagement Scale (SCES) (See Appendix C). This part tells the adaptation, validity and reliability of this scale.

Participants

The sample consisted of 217 primary education students in their 6th, 7th and 8th grades, and they were selected from two different public primary schools in Bolu. Among them were 73 were 6th grade, 75 were 7th grade, and 69 were 8th grade students. There were 113 female students (52.07%), 104 male students (47.92%).

Procedures

In order to reveal students' course engagement levels in social studies lesson, Student Course Engagement Scale (SCES) was used. This scale was first developed by Handelsman and his colleagues in 2005 and consisted of 23 items on students' course engagement. In their study, exploratory factor analysis revealed four dimensions of student engagement that were distinct and reliable: skills engagement (0.82), emotional engagement (0.82), participation/interaction engagement (0.79), and performance engagement (0.76).

In order to adapt the scale into Turkish, the researcher contacted with the owner of the scale, Prof. Mitchell M. Handelsman, and the required permission to adapt the scale was taken from him by e-mail. During the adaptation of the scale, the scale was translated into Turkish by three faculty members in the Department of English Language Teaching. Later, the translators discussed on the items in order to determine the final form of the scale. After that the translated items were checked by two faculty members of the Department of Turkish Language Teaching in terms of meaning and grammar.

The scale form before the pilot application included 23 items in 4 different dimensions. There were 9 items in skills engagement, 4 items in emotional engagement, 5 items in participation/interaction and 3 items in performance dimension.

Item Analysis and Reliability

There are three phases to an exploratory factor analysis: (a) select and measure the variables, (b) determine the number of factors, and (c) interpret the factors (Pohlmann, 2004). Item analysis was made by computing item-total correlation, item-remainder correlation, Cronbach's alpha if item deleted and t-value between upper 27% and lower 27% of the pilot study group. In order to determine the correlations between each item and the total score from the scale, item-total correlation coefficients were calculated. Item-remainder correlation was computed so that the

correlation of the item with the sum of the other items would be examined. Items having a value of .30 and higher item-total correlation value, and .25 and higher item-remainder correlation coefficient were accepted to be sufficient (Field, 2009, p.678; Tavşancıl, 2010, p.34). The item total correlation of all items ranged between .366 and .756. Moreover, item-remainder correlation of items ranged from .274 to .722. The analysis showed that all of the items had an item-total correlation of more than .30 and item-remainder correlation more than .25. The Cronbach's alpha value of all items was computed as .915, and Cronbach's alpha if item deleted test showed that none of the items decreased the internal reliability coefficient of the scale form. In addition, the independent samples t-test analyzed the differences between upper 27% and lower 27% students' mean scores. The t-values for all items were significant at .01 level. So, none of them were removed from the scale form according to the item analysis tests. Table 18 shows the item-total correlations, item-remainder correlations, alpha if item deleted and t value of the differences between upper 27% and lower 27% of the group of the items in the scale before the EFA.

Table 18. Item Analysis Results for SCES

Item No	Item-Total Correlation	Item-Remainder Correlation	Cronbach's Alpha if Item Deleted	t upper 27% - lower 27%
1	.603	.552	.910	7.215
2	.756	.722	.908	9.384
3	.592	.536	.911	7.826
4	.608	.577	.912	3.808
5	.692	.659	.909	6.285
6	.522	.479	.913	6.011
7	.531	.471	.914	7.977
8	.657	.604	.910	10.487
9	.606	.569	.912	5.267
10	.714	.683	.908	6.713
11	.582	.520	.911	9.950
12	.492	.427	.913	7.378
13	.650	.617	.911	4.788
14	.659	.629	.911	4.350
15	.572	.519	.911	7.196
16	.366	.274	.915	7.297
17	.699	.673	.910	4.701
18	.694	.653	.908	11.141
19	.598	.539	.910	10.046
20	.633	.592	.910	5.274
21	.643	.592	.910	10.563
22	.642	.588	.910	12.364
23	.645	.609	.911	5.893

Exploratory Factor Analysis

In order to reveal the structure of the SCES, exploratory factor analysis (EFA) was conducted. A principal component analysis was carried out in order to determine the factor structure of the SCES. Firstly, it was attempted to find out whether the data obtained from 217 students was appropriate for exploratory factor analysis. Whether the size of the sample was appropriate for factor analysis and all variables were independent from one another, the Kaiser-Meyer-Olkin (KMO) and Bartlett's Test of Sphericity (BTS) were considered respectively for that purpose. The KMO coefficient was calculated as .882. Since the calculated KMO value was higher than .80, the size of the sample was considered to be greatly acceptable (Çokluk et al., 2010). Also, as the BTS value was equal to 2506.753 and significant ($p < .05$) (Çokluk et al., 2010), it was seen that the data were appropriate for factor analysis (Table 19).

Table 19. KMO and Bartlett's Test Results for SCES

Kaiser-Meyer-Olkin Measure of Sampling Adequacy		.882
Bartlett's Test of Sphericity	Approx. Chi-Square	2506.753
	df	253
	Sig.	.000

Secondly, the number of the factors in the scale was determined. The criteria for determining the number of factors to retain were eigenvalue greater than 1, the amount of common variance explained exceeding 5% and the scree-test (Field, 2009). Principle component analysis extracted 4 factors with eigenvalues exceeding 1; each was explaining 39.239%, 10.491%, 7.344% and 5.033% of the variance respectively, and accounting for a total of 62.106% of the variance (Table 20).

Table 20. Total Variance Explained before Varimax rotation for SCES

Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	9.025	39.239	39.239	9.025	39.239	39.239
2	2.413	10.491	49.730	2.413	10.491	49.730
3	1.689	7.344	57.073	1.689	7.344	57.073
4	1.157	5.033	62.106	1.157	5.033	62.106
5	.941	4.091	66.196			
6	.809	3.517	69.714			
7	.789	3.431	73.145			
8	.733	3.188	76.333			
9	.652	2.834	79.166			
10	.601	2.613	81.779			
11	.536	2.331	84.110			
12	.503	2.187	86.298			
13	.456	1.981	88.279			
14	.441	1.918	90.197			
15	.388	1.687	91.884			
16	.369	1.606	93.490			
17	.331	1.440	94.930			
18	.265	1.152	96.081			
19	.246	1.071	97.152			
20	.212	.924	98.076			
21	.180	.781	98.857			
22	.150	.653	99.511			
23	.113	.489	100.000			

An examination of the scree plot suggested a three-factor solution. The break in the trend line commencing at the 4th eigenvalue indicated that the major portion of variance was explained by the first 3 factors. When the eigenvalues, amount of common variance and the scree plot were examined, it was decided to extract 3 factors to continue to analysis (Figure12).

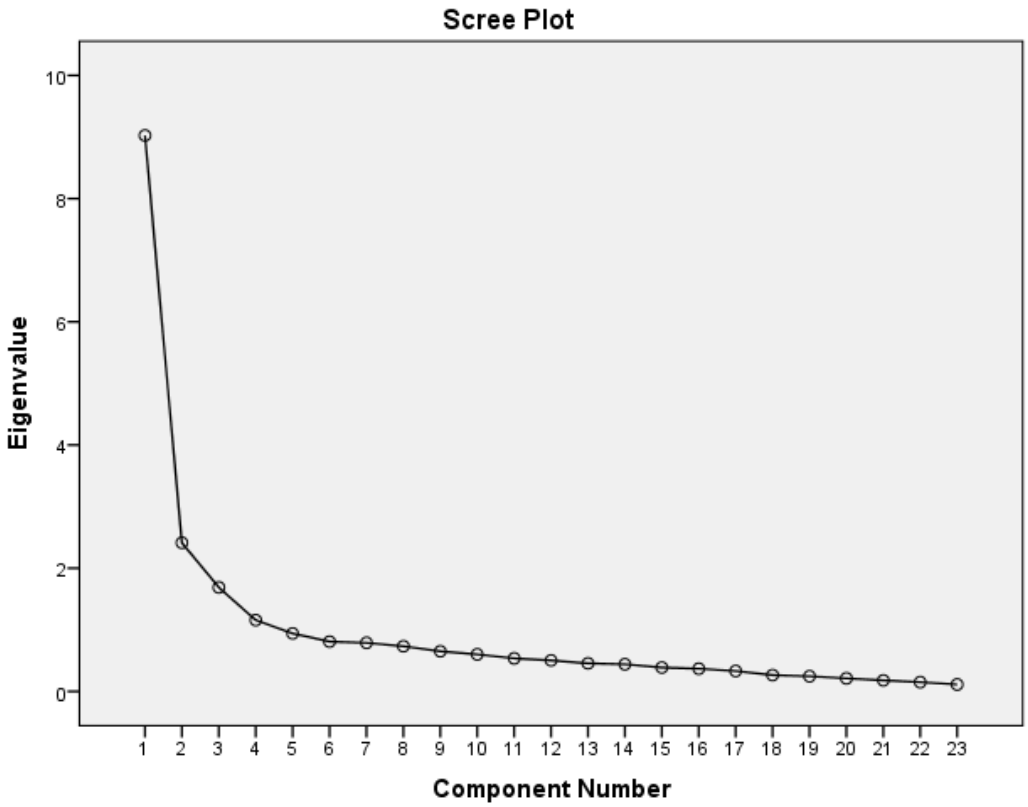


Figure 12. Scree Plot of SCES

In addition, Table 21 shows the component matrix before rotation. This matrix contained the loadings of each variable onto each factor. It was requested that loadings less than 0.4 be suppressed in the output (Büyüközürk, 2011). The analysis showed that all of the 23 items had factor loadings more than .497, and most of them were loaded in the first factor. This was why the first factor accounted for the most of the variance explained (Field, 2009).

Table 21. The Component Matrix of SCES before Varimax Rotation

Item No	Component			
	1	2	3	4
10	.832	-.189	.018	.017
17	.780	-.322	.088	.090
5	.753	-.295	.074	-.074
2	.742	.202	-.310	-.185
13	.729	-.394	.071	-.027
20	.701	-.326	-.064	.093
14	.683	-.349	-.037	-.030
18	.680	.311	-.253	-.124
4	.666	-.399	-.013	-.095
23	.640	-.376	.160	-.196
9	.608	-.422	-.069	.054
21	.604	.198	.408	-.324
22	.598	.367	.364	.158
1	.595	.252	-.256	.206
8	.583	.369	.364	-.128
15	.582	.241	-.360	-.280
19	.580	.418	-.213	-.332
11	.547	.244	.480	.274
3	.543	.345	-.488	.077
6	.470	-.035	-.298	.467
16	.309	.477	-.081	.066
7	.418	.379	.489	.000
12	.503	.178	.003	.595

In the next phase, Varimax vertical axis rotation was used. As 6th and 12th items could not meet the requirement for the value of the lower limit of the differences of each item between the factor load values (Çokluk et al., 2010), they were eliminated from the scale form during the Varimax rotation applied in accordance with the 23-item scale.

After inappropriate items were suppressed, based on the results presented in Table 22, it was found that the common variance for each of the three factors was 27.224%, 17.966% and 14.957% respectively. Therefore, the total variance explained found as 60.146 % for this scale could be acceptable (Çokluk et al., 2010; Tavşancıl, 2010).

Table 22. Total Variance Explained for SCES after Varimax Rotation

Compo-nent	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumula-tive %	Total	% of Variance	Cumula-tive %	Total	% of Variance	Cumula-tive %
1	8.60	40.95	40.95	8.60	40.95	40.95	5.72	27.22	27.22
2	2.39	11.38	52.33	2.39	11.38	52.33	3.78	17.97	45.19
3	1.64	7.81	60.14	1.64	7.81	60.15	3.14	14.96	60.15
4	.96	4.57	64.71						
5	.86	4.10	68.81						
6	.79	3.74	72.55						
7	.74	3.52	76.07						
8	.64	3.06	79.12						
9	.57	2.69	81.82						
10	.53	2.55	84.36						
11	.47	2.25	86.61						
12	.46	2.17	88.78						
13	.43	2.03	90.81						
14	.39	1.86	92.68						
15	.33	1.58	94.25						
16	.28	1.39	95.61						
17	.25	1.19	96.80						
18	.22	1.04	97.84						
19	.18	.86	98.70						
20	.16	.76	99.46						
21	.11	.54	100.00						

Table 23 shows the factor loads, common factor loadings of items after Varimax vertical axis rotation. The values in the column labeled Common Factor Load showed the proportion of common variance present in a variable and were all above .30, which was good (Field, 2009). The factor loadings of items ranged between .469 and .803, and the common factor loadings changed from .324 to .733.

Table 23. Factor Loadings and Common Factor Loads of SCES's Each Item after Varimax Rotation

Item No	Item	Factor Loadings			Common Factor Load
		Skills	Interaction and performance	Emotional	
13	Çaba sarfetmek	.803	.136	.171	.693
17	Ders okumalarını düzenli yapmak	.791	.180	.251	.721
4	Tüm ödevleri yapmak	.753	.147	.101	.599
5	Derslere her zaman gelmek	.747	.192	.253	.659
10	Ders aralarında ders notlarını gözden geçirip konuyu anladığımdan emin olmak	.737	.339	.275	.733
14	Düzenli olmak	.735	.206	.098	.592
20	Düzenli ders çalışmak	.733	.236	.097	.603
9	Derste iyi not tutmak	.731	.132	.005	.552
23	Dersi dikkatlice dinlemek	.730	.055	.205	.577
3	Konuyu anlamadığımda öğretmene sormak	.147	.781	.033	.633
2	Grup çalışmalarına aktif olarak katılmak	.395	.724	.172	.710
18	Derste eğlenmek	.277	.711	.238	.639
19	Arkadaşlarıma yardım etmek	.132	.708	.275	.594
15	Yüksek not almak	.250	.701	.084	.561
1	Sınıfta parmak kaldırmak	.254	.605	.192	.468
16	Sınavlarda başarılı olmak	-.105	.469	.303	.324
7	Ders aralarında dersle ilgilenmek	.050	.117	.746	.572
11	Ders konusunu gerçekten anlamak istemek	.239	.097	.726	.594
22	Dersin konularını gerçek hayatta uygulamak	.187	.260	.722	.624
8	Dersi kendim için ilginç hale getirebilecek yollar bulmak	.178	.289	.701	.607
21	Dersin konularını kendi yaşantımla ilişkilendirmek	.309	.193	.665	.575

Lastly, Cronbach alpha coefficient of each factor and the correlations between the factors in the scale were calculated to determine the internal consistency of the scores obtained from the SCES. The Cronbach alpha coefficients over .70 are stated as adequate for an instrument to be used (Fraenkel & Wallen, 2006). All SCES factors showed reasonable reliability. The internal consistency reliability coefficients of skill engagement, interaction and performance engagement and emotional engagement were .92, .83 and .83 respectively. The correlations between the skills engagement and the interaction and performance engagement factors ($r = .537$, $p < .01$, $N = 217$) and emotional engagement ($r = .541$, $p < .001$, $n = 217$) factors were significant, as was the correlation between the interaction and performance engagement and emotional engagement factors ($r = .545$, $p < .01$, $N = 217$).

Confirmatory Factor Analysis for SCES

To test whether the three-factor model obtained in EFA fit to the data (Sümer, 2000), confirmatory factor analysis was used. So the data set for 217 cases used in EFA was loaded in LISREL statistic program and a covariance matrix was prepared.

Path diagram and goodness of fit statistics were produced for the three-factor model with 21 items. The following path diagram with standardized solutions (Figure 13) illustrates the loadings of each item on respective factor the three-factor model, where skills engagement was manifested by 9, interaction and performance engagement was manifested by 7 and emotional engagement was manifested by 5 observed variables. The maximum likelihood estimations appeared between .37 and .79 and all t-values were significant at $p < .05$. In addition, the error variances ranged from .37 to .87. Kline (2005) suggested that error variances should not exceed the value of .90. Moreover, three factors were allowed to correlate to each other. This showed that the factor loadings of each item on the related factor were at a reasonable size.

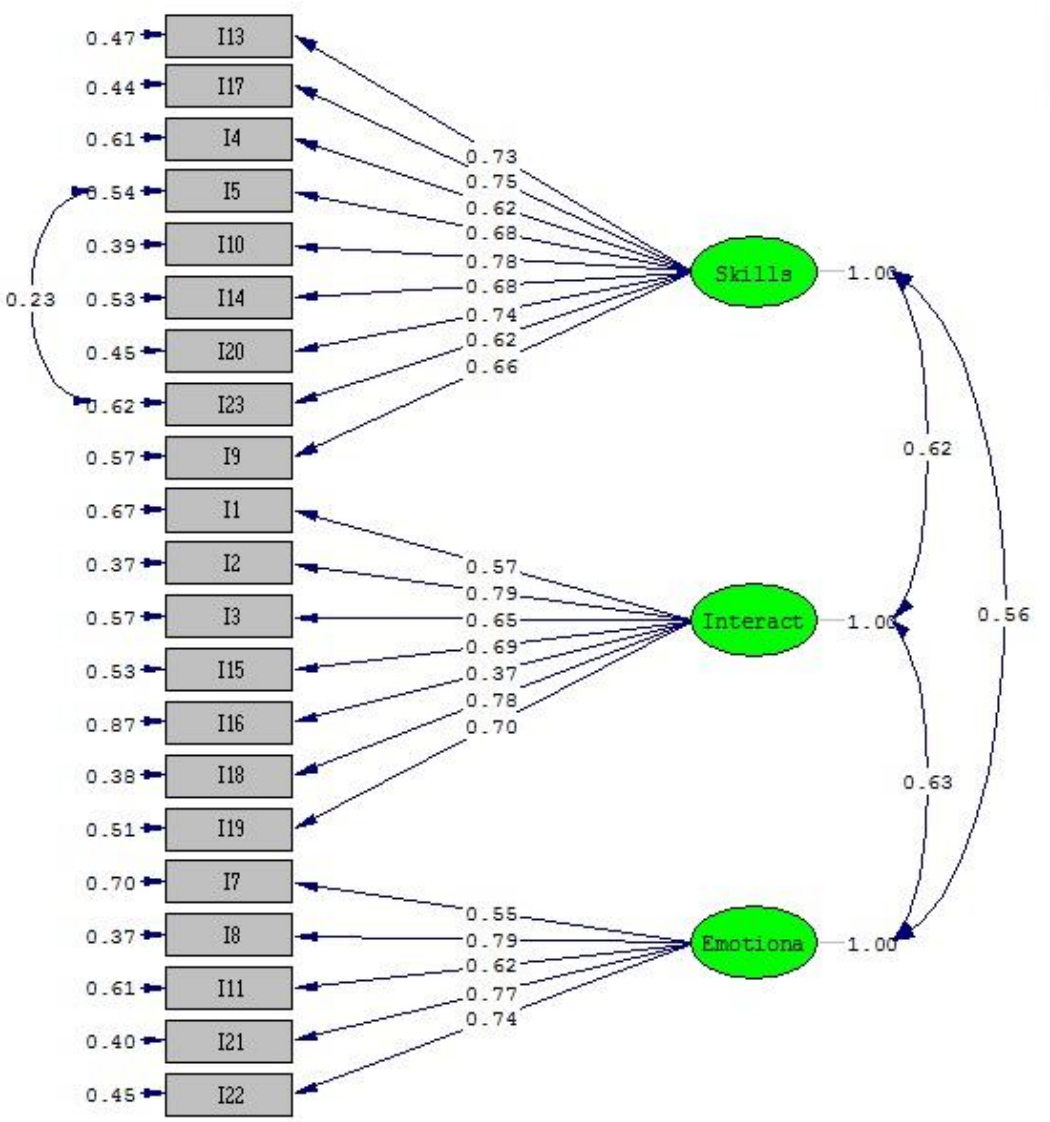


Figure 13. Path Analysis Diagram for SCES within CFA

Statistics used to compute the fit of data with the model were Normed Chi-Square Goodness of Fit, RMSEA (Root Mean Square Error of Approximation), SRMR (Standardized Root Mean Square Residuals), GFI (Goodness of Fit Index), AGFI (Adjusted Goodness of Fit Index), CFI (Comparative Fit Index) and NFI (Non-Normed Fit Index) (Çokluk et al., 2010). Table 24 shows

the accepted limits of the goodness of fit indexes adopted in this study and the goodness of fit estimates calculated with 30 items in three-factor model.

The testing of the hypothesized model yielded that $\chi^{2/}$df = 2.33, RMSEA = .076, SRMR = .063, GFI = .88, AGFI = .85, CFI = .95, and NNFI = .94. According to these values, it can be said that GFI observable fit value was slightly lower than acceptable fit value, RMSEA, SRMR, AGFI and NNFI fit values indicate an acceptable fit and the other observable fit values indicate a perfect fit. In other words, this obtained model indicated that the factors were confirmed by the data.

Table 24. Criteria for Goodness of Fit Indexes and Calculated Values for Estimated Model of SCES

Goodness of fit statistics	Perfect	Acceptable	Estimated Model
χ^2/df	≤3	≤5	2.33
RMSEA	≤.05	≤.08	.076
SRMR	≤.05	≤.08	.063
GFI	≥.95	≥.90	.88
AGFI	≥.90	≥.85	.85
CFI	≥.95	≥.90	.95
NNFI	≥.95	≥.90	.94

3.6.2. Qualitative Data Collection Instruments

The following instruments were used to obtain qualitative data for the study.

Interview Protocol

Interview technique in this study focused on experimental group students' and teacher's views on and experiences with the learning objects. In addition, qualitative data about the teachers' views on the use of learning objects employed in the learning environment and his views on teaching with learning objects were collected with the interview technique.

As Patton (1990, p.341) has remarked "we cannot observe feelings, thoughts, and intentions. We cannot observe behaviors that took place at some previous point in time…" So we have to ask questions to understand unobservable such as experiences, attitudes, thoughts, intentions, cognitive perceptions and effects.

Although interviews can be the primary on only data collection technique for qualitative studies, they can also be used with other data collection methods. It can be used in conjunction with observations to deeply investigate participants' perspectives on actions observed by the researcher. In addition they can be used within quantitative studies to gain better understanding of the phenomenon that is researched and to provide justification within the quantitative studies.

There are different types of interviews that are described by different scholars. Hatch (2002) classified interviews into three categories: informal, formal and standardized interviews. Informal interviews are unstructured interviews tend to resemble casual conversations and often used as a strategic part of observation studies. They do not involve any particular or sequence of questions. Formal interviews, sometimes called as "structured, semi-structured or in-depth" interviews include a series of questions designed to elicit specific answers form participants. The researcher has the flexibility of asking both pre-determined questions and additional questions to go deeply into the understanding of the answers of pre-determined questions. The standardized interview approach requires the researchers to interview with the informants with pre-determined questions that are asked in the same order and with the same words (Fraenkel & Wallen, 2005).

In this study, formal interview technique was implemented. With the formal interview technique, the subjectivity of the researcher is decreased, and the analysis and comparison of data are easier

than unstructured interviewing (Yildirim & Simsek, 2004). Data regarding the students' and the teacher's views on and experiences with using learning objects in the instruction of social studies lesson was collected with one-to-one formal interviews with the participants' own words and views. The interview questions and the protocol for students and teachers were prepared by the researcher and experts in instructional technology and social studies.

The aim of conducting interviews was to reveal students' and teacher's opinions about using learning objects in the instruction process in terms of perceived benefits on learning, attitude towards social studies lesson, engagement in the course and with learning objects, and usability of learning objects. In accordance with the aim of the study, the main themes of the interview questions were determined as learning and instruction, attitude towards social studies lesson, engagement with learning objects and in the course, and usability of learning objects and the IT classroom where the application was made. Semi-structured interview tool for students (Appendix E) and teacher (Appendix F) was developed for this study in order to allow the researcher to have a list of pre-determined questions but to provide him with flexibility to add or remove questions or change their orders (Merriam, 2009).

After reviewing literature, the initial interview protocol for students included 29 main questions and the teacher interview protocol consisted of 30 main questions. Alternative questions to and sub-questions of main questions were also prepared. After expert opinions were taken, some questions were revised in order to prevent misunderstanding by students and teacher, and some questions were eliminated. Final interview protocol for students and teacher had 22 and 24, without alternative or sub-questions, respectively.

Eighteen students were determined for the interviews according to 3x3 matrix based on students' learning objects evaluation and achievement scores. They were asked whether they were voluntary to participate in the interview. One of the students stated that she registered to the school in the spring semester and she did not know the instructional applications in the fall semester. So, she was eliminated from the interview and another student was selected instead of her. Interviews with students were made in the IT classroom at the end of the treatment in order to help them to remember the instructional setting and their experiences during experimentation. The interviews took 20 minutes averagely, and recorded with an audio recorded.

Observation Protocol

As what people do may differ from what they say they do (Johnson & Turner, 2003), and instead of relying on second-hand accounts, to look directly at and gather live data from naturally occurring situations in the social studies classroom, classroom observations were hold. In this study, the focus of observation was to reveal teachers and students' use of learning objects in the instruction process.

There are four different roles a researcher may take in a qualitative observation study. When a researcher takes on the role of a complete participant, he becomes the member of the group being observed, but does not reveal that he is a researcher. When the researcher performs the participant-as-observer role, he participates fully in the activities of the group being observed, and informs the observant that he is also a researcher and makes a research study. Having the observer-as-participant role, the researcher identifies himself as a researcher but does not participate to the activities of the observant other than superficially. Lastly, the researcher as the complete observer observes the group without participating to the activities of the group and does not inform that they are being observed. In this study, the researcher has the role of observer-as-participant. He identified himself as a researcher and told the students that they would be observed in the learning environment, and that the researcher would not participate into the classroom activities but may troubleshoot the technological problems in the IT classroom where the application was conducted.

An observation checklist (Appendix G) was prepared for this study. To standardize the information collected this instrument would be useful to make notes related to students' and teacher's behavior during instruction in IT classroom where the observation took place. Main points of interest included teacher's use of and integration of learning objects in the teaching process, students' engagement in learning and with learning objects, and students' learning and attitudes toward social studies lesson. Under the main categories, after reviewing literature and used observation protocols prepared to observe use of technology in education, items were developed. The initial protocol included 42 items. After expert review, the checklist had 35 items in a 5-point Likert scale ranging from never to always (Never – 1, Rarely – 2, Sometimes – 3, Usually – 4, Always – 5).

Totally 27 observations – 14 in class C and 13 in class E – were made during 8 weeks period. Nineteen class hours of instruction process in class C and E were observed in the IT classroom. Table 25 shows the observation date, observation time, and observed lessons' topics for each class.

Table 25. Information about Observations

Class	Observation Date	Observation Length	Objectives of the Observed Lesson
C	04.03.2012	1 lesson hour	Associating the sources of our country with economical activities, evaluates the importance of them in the economy of the country.
C	04.04.2012	2 lesson hours	Associating the sources of our country with economical activities, evaluates the importance of them in the economy of the country.
C	10.04.2012	1 lesson hour	Associating the sources of our country with economical activities, evaluates the importance of them in the economy of the country.
C	11.04.2012	1 lesson hour	Associating the sources of our country with economical activities, evaluates the importance of them in the economy of the country.
C	17.04.2012	1 lesson hour	Evaluating the role of qualified human resources on the economy of Turkey
C	18.04.2012	2 lesson hours	Advocating the importance and necessity of paying tax, in terms of national responsibility and its contribution to the budget of the country
C	02.05.2012	1 lesson hour	Discussing the effects of unconscious consumption of natural resource on human life
C	02.05.2012	1 lesson hour	Making research on the education, skills and personality characteristics of the profession he/she interests in
C	08.05.2012	1 lesson hour	Using the visual resources and data, making inferences about the reasons for the distribution of the population and economy
C	09.05.2012	2 lesson hours	Using the visual resources and data, making inferences about the reasons for the distribution of the population and economy
C	15.05.2012	1 lesson hour	Realizing the importance of solidarity and cooperation with other countries in case of natural disasters and environmental problems
C	16.05.2012	2 lesson hours	Evaluating the economic relationship of Turkey with other countries in terms of resources and needs

Table continued

C	22.05.2012	1 lesson hour	Evaluating the role of international cultural, art, fair and sports activities in the inter-community interaction
C	23.05.2012	2 lesson hours	Evaluating the economic, cultural, social and political relationship of Turkey with Turkish Republics, neighbor and other countries in terms of Ataturk's perception on national foreign policy
E	02.04.2012	2 lesson hours	Associating the sources of our country with economical activities, evaluates the importance of them in the economy of the country.
E	03.04.2012	1 lesson hour	Associating the sources of our country with economical activities, evaluates the importance of them in the economy of the country.
E	09.04.2012	2 lesson hours	Associating the sources of our country with economical activities, evaluates the importance of them in the economy of the country.
E	16.04.2012	2 lesson hours	Advocating the importance and necessity of paying tax, in terms of national responsibility and its contribution to the budget of the country
E	17.04.2012	1 lesson hour	Evaluating the role of qualified human resources on the economy of Turkey
E	30.04.2012	1 lesson hour	Discussing the effects of unconscious consumption of natural resource on human life
E	30.04.2012	1 lesson hour	Making research on the education, skills and personality characteristics of the profession he/she interests in
E	07.05.2012	2 lesson hours	Using the visual resources and data, making inferences about the reasons for the distribution of the population and economy
E	08.05.2012	1 lesson hour	Using the visual resources and data, making inferences about the reasons for the distribution of the population and economy
E	14.05.2012	2 lesson hours	Evaluating the economic relationship of Turkey with other countries in terms of resources and needs
E	15.05.2012	1 lesson hour	Realizing the importance of solidarity and cooperation with other countries in case of natural disasters and environmental problems
E	21.05.2012	2 lesson hours	Evaluating the economic, cultural, social and political relationship of Turkey with Turkish Republics, neighbor and other countries in terms of Ataturk's perception on national foreign policy
E	22.05.2012	1 lesson hour	Evaluating the role of international cultural, art, fair and sports activities in the inter-community interaction

In the fall semester, pilot study was implemented with the same student cohorts. In the beginning of the pilot study, the teacher introduced the researcher to the students. Researcher gave brief information about him and explained the aim of the study, the research process and told that they would be observed based on the criteria. In the actual study, during observations, researcher sat near the teacher computer and observed the students, the teacher and the instruction process. Researcher did not involve in the instruction process but only dealt with the breakdowns in technological devices in the IT classroom.

3.7. Analysis of Data

The total scores of each subject for pre and post achievement tests were calculated first. While calculating achievement scores, a score of 1 was given for every correct answer, and a score of 0 was given for an incorrect answer. Since there are 41 questions in the social studies achievement test and each question was 1 point of value, the highest score may be 41 in the achievement test.

The data collected through the achievement tests, attitude and engagement scales were analyzed through descriptive and inferential statistics by using the SPSS statistical package. The level of significance for the statistical analyses of the data in this study was set at .05. A two-way analysis of variance (ANOVA) would be applied to make 2x2 comparison between the experimental and control group students' scores in pre- and post-test and surveys. However, Kolmogorov-Smirnov test applied to test the normal distribution of data showed that the data for all tests were not distributed normally. So, the research questions investigating the difference between experimental and control group students' scores in achievement test, attitude and engagement scale were tested by examining the sub-questions in the main questions. The sub-questions and the applied statistical tests for them were provided in the Table 26. The 6th research question investigating the relationship between students' achievement and their course engagement, and the 7th research question examining the relationship students' evaluation of learning objects and their achievement were analyzed with Spearmen's correlation statistics.

Table 26. Sub-Questions and Statistical Tests to Analyze Them

Research question 2. Is there a significant difference between the achievement scores of students who use learning objects and who do not use the learning objects in social studies lessons?	
Sub-questions	**Applied Statistical Test**
• Is there a significant difference between experimental and control group students' pre-achievement test scores?	• Independent samples t-test
• Is there a significant difference between pre and post-achievement scores within each group?	• Paired samples t-test
• Is there a significant difference between experimental and control group students' post-achievement scores?	• Mann Whitney U-Test
Research Question 3. Is there a significant difference between the students who use learning objects in the social studies lesson and those who do not use in terms of attitudes toward social studies lesson?	
Sub-questions	**Applied Statistical Test**
• Is there a significant difference between experimental and control group students' pre-attitude scores?	• Independent samples t-test
• Is there a significant difference between pre and post-attitude scores within each group?	• Wilcoxon Signed Rank Test for Paired Samples
• Is there a significant difference between experimental and control group students' post-attitude?	• Mann Whitney U-Test
Research Question 4. Is there a significant difference between course engagement scores of students who use learning objects and who do not use learning objects in social studies lessons?	
Sub-questions	**Applied Statistical Test**
• Is there a significant difference between experimental and control group students' pre-engagement?	• Independent samples t-test
• Is there a significant difference between pre and post-engagement scores within each group?	• Wilcoxon Signed Rank Test for Paired Samples
• Is there a significant difference between experimental and control group students' post-engagement scores?	• Mann Whitney U-Test

The interview data were subjected to content analysis to describe teacher's and students' opinions. For this purpose, their responses were organized according to the main themes revealed for the main research questions. Then, they were interpreted. In addition, the data collected through observation were analyzed through descriptive statistics by using the SPSS statistical package.

3.8. Validity and Reliability Issues for Qualitative Part of the Study

3.8.1. Validity

Validity is an important key to effective research. Validity is thus a requirement for both quantitative and qualitative/naturalistic research. In qualitative research, validity might be addressed through the honesty, depth, richness and scope of the data achieved, the participants approached, the extent of triangulation and the disinterestedness or objectivity of the researcher (Cohen, Manion & Morrison, 2007). The validity of qualitative data of this study was handled under two headings; internal validity and external validity (generalization).

A study which has internal validity is one where the researcher accurately and richly describes the phenomenon in question. In order to satisfy the internal validity the following strategies were followed (Lincoln & Guba, 1985):

- *Triangulation of data*: interviews and observations were conducted, and tests and surveys were administered to students. The aim of interviews and observations was to explain and validate the results the quantitative data. Also, data coming from interviews were used to validate the results of the observations.
- *Peer debriefing*: the data collected with interviews were reviewed by an academician who had experience in qualitative research other than the researcher. The debriefer listened the recorded data and read the transcribed data. From the 18 interviews, the peer debriefer analyzed 5 (28%) randomly selected interviews. After analyses of data by the researcher and the peer debriefer separately, the coded data were compared. Although there were controversies between the researcher and the peer debriefer after the first analysis of interview data, all controversies had been resolved, and there were no new points to be discussed no longer. Another researcher from the instructional technology field attended to totally 6 observations (3 observations in class C and 3 observations in class E). The coded data coming from the independent observations on the observation protocols were compared and the controversies on the observation items were discussed.
- *Tactics to help ensure honesty in informants*: the purpose and the procedures of the study were told to the participants, and they were guaranteed that the data collected with observations and interviews would only be used for research and be safely stored.
- *Prolonged engagement in the field*: In the pilot study, the researcher was in the intended learning environment for more than two months, and before the actual study while the actual participants of the study were getting used to new instructional approach in the fall semester during more than one month, the researcher had visited the social studies classroom for two times in a week.

External validity in qualitative research means the generalization of qualitative results to a larger population, and is concerned with the extent to which the findings of one study can be applied to other situations (Merriam, 2009). The researcher provided a clear, detailed and in-depth description so that others can decide the extent to which findings from one piece of research are generalizable to another situation (Cohen et al., 2007).

Internal validity and external validity can be threatened by several factors. According to Fraenkel and Wallen (2005), some of the threats to the internal validity of research are subject characteristics, mortality, location, instrumentation, testing, history, maturation, attitude of subjects, regression, and implementation.

Although there are many other possible subject characteristics that might have affected the results of the study, participants of the two groups were selected to experimental and control group

randomly. Also, the students of both groups were in the same age, had the same computer literacy education background, socioeconomic background, computer access and Internet access.

The results of this study can be influenced by actionswhichhappen other than part of the experiment (history threat). In this study, the probable external actions had parallel effects on both experimental and control groups. Instructions in both groups were conducted by the same social studies teacher. Also, in the IT classroom where the instruction was implemented for experimental group, the researcher immediately solved the technical problems.

The maturation threat is a result of normal development and maturity between the time of the pre-test and the time of the post-test. As the time between the pre-test and the post-test was eight weeks, maturation was not considered to be a major threat to the internal validity of this study. Also, random assignment of experimental and control group prevented maturation threat.

To defeat the possible misinterpretations and enhance attainment of the data in the analysis of the interviews, the researcher developedan interview protocol which included the main themes. The researcher implemented face-to-face interviews by following the same protocol and by asking thesamequestions. Thus, the researcher overcome the instrumentation threat.

The mortality threat occurs when there is a dropout of one or more subjects in either group. None of the students in both experimental and control group left the groups during the study.

Regression threat occurs when subjects are selected on the basis of extreme scores (one far away from the mean) during a test (Fraenkel and Wallen, 2005). No regression threat was occured in this study because participants were not from the special education classrooms that can yield extreme scores.

The use of pre-test in experimental studies sometimes may create a "pre-test" effect which can influence the results of the study. Both experimental and control groups were exposed to the pre-test and pre-surveys. So the difference between groups cannot be attributed to testing. Also, students were not informed about the post-tests.

3.8.2. Reliability

Bogdan and Biklen (1998, p.36) state that "In qualitative studies, researchers are concerned with the accuracy and comprehensiveness of their data. Qualitative researchers tend to view reliability as a fit between what they record as data and what actually occurs in the setting under study". They add that two researchers who are studying a single setting may come up with very different findings but both sets of findings might be reliable.

In order to satisfy dependability of the qualitative part of the study, the followings were implemented:

- Detailed information about the purpose of the study, data collection, and decision-making process for the study was given to participants.
- Three types of data (interview, observation and survey) were collected from the participants of the study in order to satisfy triangulation.
- The properties of the qualitative part of the study were explained in the design of the study in a detailed way, the selection of participants was explained, and information about the participants was provided.

CHAPTER 4

RESULTS

This chapter is divided into two sections. In the first section, the result obtained from quantitative data analyses and in the second section, the results obtained from qualitative data analyses will be presented.

4.1. Quantitative Results

This section started with the test of the assumptions of parametric tests. Later the results of the research questions were presented.

4.1.1. Assumptions of Parametric Tests

The rationale behind hypothesis testing relies on having normally distributed data and so if this assumption is not met then parametric statistics tests cannot be applied (Field, 2009). One of the ways of determining whether the data are normally distributed is to apply the Kolmogorov-Smirnov test. If the test is non-significant ($p > .05$), the distribution of the sample is non-significantly different from a normal distribution. If the test is significant ($p < .05$), the distribution is significantly different from a normal distribution. It is a non-normal distribution. Table 27 shows the results of the Kolmogorov-Smirnov test applied on pre and post achievement test, attitude towards social studies lesson scores, and the course engagement in social studies lesson scores.

Table 27. Test of Normality with Kolmogorov-Smirnov Test

Test type	**Group**	**Kolmogorov-Smirnov**		
		Statistic	**df**	**Sig.**
Pre-achievement test	Experimental	.07	67	.20
	Control	.08	70	.20
Post-achievement test	Experimental	.11	67	**.03**
	Control	.08	70	.20
Pre-attitude survey	Experimental	.10	67	.17
	Control	.10	70	.19
Post-attitude survey	Experimental	.14	67	**.00**
	Control	.09	70	.20
Pre-engagement survey	Experimental	.08	67	.20
	Control	.10	70	.08
Post-engagement survey	Experimental	.12	67	**.01**
	Control	.09	70	.20

A two way analysis of variance (ANOVA) test would be applied whether students' scores on achievement tests, attitude towards social studies lesson scale and their engagement in the social studies lesson significantly differ according to their attendance to control or experimental group. However, two way ANOVA test assumes data for each group are normally distributed. Table 29 indicates that experimental group students' post-achievement scores, post-attitude scores, and post-engagement scores are significantly non-normally distributed. Although the others are significantly normal, two way ANOVA test cannot be implemented to investigate whether there are differences between control and experimental group students' scores in pre- and post-tests and surveys. The statistical techniques used to answer each research question and sub-question were shown in Table 26.

4.1.2. Results of Research Question 1

The first research question of the study was:

How did students rate the learning objects in terms of

a. their perceived learning,
b. quality of the learning objects, and
c. engagement with the learning objects?

In order to investigate experimental group students' views about the learning objects used in the study, learning object evaluation scale (LOES) was administered to students. The scale was administered for each of the combined learning object for each learning gain. Experimental group students filled out totally nine LOES. The descriptive statistics for each item, factors and the total was illustrated in Table 28. The means of the LOES items ranged from 4.25 to 4.57. It can be concluded that the experimental group students' perceived learning was very high (X=4.30), the students were highly satisfied (X=4.51) with the usability of the learning objects, and they highly engaged (X=4.38) with the learning objects.

Table 28. Descriptive Statistics for LOES Items

Items	N	Mean	Std. Deviation	Variance
Öğrenme nesnesi ile çalışmak konuyu öğrenmeme yardımcı oldu.	67	4.30	0.55	0.30
Öğrenme nesnesini kullanarak konuyu daha kolay öğrendim.	67	4.25	0.52	0.27
Öğrenme nesnesindeki görseller (grafik, animasyon, video vb.) konuyu öğrenmeme yardımcı oldu.	67	4.40	0.51	0.26
Bu öğrenme nesnesini kullanarak konu ile ilgili soruları kolaylıkla cevaplayabilirim	67	4.26	0.55	0.30
Öğrenme nesnesini kullanmak konu ile ilgili etkinlikleri daha çabuk yapmamı sağladı.	67	4.27	0.53	0.28
Bu öğrenme nesnesi sayesinde yeni bilgiler öğrendim.	67	4.35	0.53	0.29
Öğrenme nesnesi yardımı ile bu konuyu öğrenme nesnesi kullanılmayan konulardan daha iyi öğrendim.	67	4.28	0.53	0.28
Öğrenme nesnesini kullanabilecek düzeyde bilgisayar becerisine sahibim.	67	4.54	0.35	0.12
Öğrenme nesnesini kolayca kullanabildim.	67	4.52	0.35	0.12
Öğrenme nesnesinin kullanımı basitti.	67	4.53	0.34	0.12
Öğrenme nesnesi içindeki konular açık bir şekilde sunulmuştu.	67	4.49	0.39	0.15
Öğrenme nesnesinin kullanımını öğrenmek kolaydı.	67	4.48	0.41	0.17
Görsel açıdan öğrenme nesnesini beğendim.	67	4.50	0.40	0.16
Öğrenme nesnesinin ekran tasarımı karmaşıktı.	67	4.49	0.39	0.15
Öğrenme nesnesindeki konular mantıklı bir sıraya göre hazırlanmış.	67	4.50	0.42	0.18
Öğrenme nesnesindeki butonlar (bağlantılar) kolay anlaşılabiliyordu.	67	4.52	0.39	0.15
Öğrenme nesnesindeki görsellerin (resim, grafik, video vb.) kalitesi çok düşüktü.	67	4.46	0.40	0.16
Öğrenme nesnesindeki yazılar rahatlıkla okunabiliyordu.	67	4.50	0.42	0.17
Öğrenme nesnesindeki bölümler arası geçiş kolaydı.	67	4.57	0.37	0.14
Genel olarak öğrenme nesnesinde anlatılan konuyu sevdim.	67	4.42	0.49	0.24
Öğrenme nesnesini yeniden kullanmak isterim.	67	4.37	0.51	0.26
Öğrenme nesnesi eğlenceliydi.	67	4.41	0.51	0.26

Table continued				
Öğrenme nesnesi dikkatimi konu üzerinde toplamamı sağladı.	67	4.39	0.51	0.27
Öğrenme nesnesi konuya merakımı arttırdı.	67	4.37	0.53	0.28
Öğrenme nesnesi konuyu öğrenme isteğimi arttırdı.	67	4.37	0.52	0.27
Dersteki etkinlikleri yapmak için öğrenme nesnesini dikkatlice inceledim.	67	4.33	0.52	0.27
Öğrenme nesnesi dersteki etkinliklerinin tamamını yapmama yardımcı oldu.	67	4.39	0.52	0.27
Öğrenme nesnesini kullanarak ders işlemek eğlenceliydi.	67	4.40	0.51	0.26
Öğrenme nesnesi, dersteki etkinliklere ilgimi artırdı.	67	4.39	0.53	0.28
Öğrenme nesnesi, anlatılan konu üzerinde derinlemesine düşünmemi sağladı.	67	4.37	0.53	0.28
Learning	67	4.30	0.52	0.27
Usability	67	4.51	0.36	0.13
Engagement	67	4.38	0.49	0.24
Total	67	4.41	0.33	0.11

4.1.3. Results of Research Question 2

The second research question of the study was:

> Is there a significant difference between the achievement scores of students who use learning objects and who do not use learning objects in social studies lessons?

A two-way ANOVA test would be implemented in order to answer this research question. However, one of the assumptions of two-way ANOVA (normal distribution of data for all groups) was not satisfied. So the research question was divided into three sub-questions provided below:

1. Is there a significant difference between experimental and control group students' pre-achievement test scores?
2. Is there a significant difference between pre and post-achievement scores within each group?
3. Is there a significant difference between experimental and control group students' post-achievement scores?

As the data of each group were significantly normal, independent samples t-test was implemented in order to examine whether the experimental group students' pre achievement test scores was significantly higher than those of the control group. As shown in Table 29, mean scores of experimental group and control students on the pre-achievement test were 11.03 and 10.78 respectively. The t-test result showed that this difference in the mean score was statistically not significant at a significance level of .05 ($t(135)= .26$, $p> .05$). There was not a significant difference between experimental and control group students' mean scores in the pre-achievement test.

Table 29. The Results of Independent Samples t-test for Pre-Achievement Test Scores

Group	N	Mean	SD	df	t	p
Experimental	67	10.78	5.75	135	.26	.79
Control	70	11.03	5.47			

In order to examine whether there is a significant difference between pre and post-achievement test scores of both groups of students, as normality of differences between the two scores

assumption was satisfied (p>.05), paired-samples t-test was applied. Mean of experimental group students' post-achievement test scores (X=32.25) was significantly higher than the mean of their pre-achievement test scores (X=10.78) (t(66)=21.31, p<.05). In addition, mean of control group students' post-achievement test scores (X=28.29) was significantly higher than mean of their pre-achievement test scores (X=11.03) (t(69)=16.78, p<.05) (Table 30).

Table 30. The Results for Paired Samples t-test for Experimental and Control Groups' Achievement Test Scores

Achievement Test	**N**		**Mean**		**sd**		**df**		**t**		**p**	
	E.	**C.**	**E.**	**C.**	**E.**	**C.**	**E.**	**C.**	**E.**	**C.**	**E.**	**C.**
Pre-test	67	70	10.78	11.03	5.75	5.47	66	69	21.31	16.87	.00	.00
Post-test	67	70	32.25	28.29	6.27	5.81						

E. = Experimental group, C. = Control group

To test whether there is a significant difference between control and experimental group students' post-achievement test scores, as the data of students' post-achievement scores were not normally distributed, Mann Whitney U-Test was applied. The mean scores of experimental group and control students on the post-achievement test were 32.25 (sd=6.27) and 28.29 (sd=5.81) respectively. The Mann Whitney U-Test results indicated that experimental group students' post-achievement test scores was significantly higher than control group students' post-achievement test scores, U=1463.00, p<.05, at the end of the study (Table 31).

Table 31. Results for Mann Whitney U-test for Post-Achievement Test Scores

Group	**N**	**Mean Rank**	**Sum of Mean Ranks**	**U**	**p**
Experimental	67	82.16	5505.00	1463.00	0.00
Control	70	56.40	3948.00		

4.1.4. Results of Research Question 3

The third research question of the study was:

> Is there a significant difference between the students who use learning objects in the social studies lesson and those who do not use in terms of attitudes toward social studies lesson?

As one of the assumptions of two-way ANOVA (normal distribution of data for all groups) was not satisfied, the research question was divided into three sub-questions provided below:

1. Is there a significant difference between experimental and control group students' pre-attitude scores?
2. Is there a significant difference between pre and post-attitude scores within each group?
3. Is there a significant difference between experimental and control group students' post-attitude scores?

As the data both groups' pre-attitude scores were significantly normal (p<.05), independent samples t-test was implemented to investigate whether there was a significant difference between experimental and control group students' pre-attitude scores. As shown in Table 32, mean scores of experimental and control group students in pre-attitude survey were 92.25 and 92.87 respectively. The t-test result showed that this difference in the mean scores was statistically not significant at a significance level of .05 (t(135)= .21, p> .05). It can be said that there was not a significant difference between the mean of experimental and control group students' pre-attitude scores.

Table 32. Results for Independent Samples t-test for Pre-Attitude Scores

Group	N	Mean	SD	df	t	p
Experimental	67	92.25	17.53	135	-.21	.84
Control	70	92.87	17.10			

In order to examine whether there was a significant difference between pre and post-attitude scores of both groups of students, as normality of differences between the two scores assumption was not satisfied ($p<.05$), Wilcoxon Signed Rank Test for Paired Samples test was applied. Based on the negative ranks, although experimental group students' post-attitude scores was significantly higher than their pre-attitude scores ($z=5.92$, $p<.05$), control group students' post-attitude scores was not significantly higher than their pre-attitude scores ($z=.84$, $p>.05$) (Table 33).

Table 33. Wilcoxon Signed Rank Test for Paired Samples Results on Attitude Scores

Pretest - Posttest	N		Mean Rank		z*		p	
Group	E.	C	E.	C.	E.	C.	E.	C.
Negative	10	35	13.25	30.36	5.92	.84	0.00	.40
Positive	52	26	35.01	31.87				
Ties	5	9						

E.=experimental group, C.=control group, *Based on negative ranks

To test whether there was a significant difference between control and experimental group students' post-attitude scores, as the data of students' attitude scores in post-attitude survey were not normally distributed, Mann Whitney U-Test was applied. The mean of experimental and control group students' post-attitude scores were 92.76 (sd=22.61) and 84.46 (sd=18.26) respectively. The Mann Whitney U-Test results (Table 34) indicated that experimental group students' post-attitude scores were significantly higher than control group students' post-attitude scores ($U=1775.00$, $p<.05$).

Table 34. Mann Whitney U-Test Results for Post-Attitude Scores

Group	N	Mean Rank	Sum of Mean Ranks	U	p
Experimental	67	77.51	5193.00	1775.00	0.01
Control	70	60.86	4260.00		

4.1.5. Results of Research Question 4

The fourth research question of the study was:

> Is there a significant difference between course engagement scores of students who use learning objects and who do not use learning objects in social studies lessons?

As one of the assumptions of two-way ANOVA (normal distribution of data for all groups) was not satisfied, the research question was divided into three sub-questions provided below:

1. Is there a significant difference between experimental and control group students' pre-engagement scores?
2. Is there a significant difference between pre and post-engagement scores within each group?
3. Is there a significant difference between experimental and control group students' post-engagement scores?

As the data of each group were significantly normal, independent samples t-test was implemented in order to examine whether the experimental group students' mean scores in pre-engagement survey was significantly higher than those of the control group. As shown in Table 35, experimental and control group students' mean scores in pre-engagement survey were 64.63 and 67.20 respectively. The t-test result showed that this difference in the mean scores was not statistically significant at a significance level of .05 ($t(135)= .93$, $p>.05$) . There was not a significant difference between experimental and control group students' mean scores in the pre-engagement survey.

Table 35. Independent Samples t-test Results for Pre-Engagement Scores

Group	N	Mean	SD	df	t	p
Experimental	67	64.63	15.17	135	.93	.35
Control	70	67.20	17.13			

In order to examine whether there was a significant difference between pre and post-engagement scores of both groups of students, as normality of differences between the two scores assumption was not satisfied ($p<.05$), Wilcoxon Signed Rank Test for Paired Samples test was applied. Based on the negative ranks, experimental group students' post-engagement scores was significantly higher than their pre-engagement scores ($z=5.92$, $p<.05$). As well, control group students' post-engagement scores was significantly higher than their pre-engagement scores ($z=.84$, $p>.05$) (Table 36).

Table 36. Wilcoxon Signed Rank Test for Paired Samples Results for Engagement Scores

Pretest - Posttest	N		Mean Rank		z*		p	
Group	E.	C.	E.	C.	E.	C.	E.	C.
Negative	1	12	5.00	16.21	6.70	3.79	0.00	.00
Positive	59	34	30.93	26.07				
Ties	7	24						

E.=experimental group, C.=control group, *Based on negative ranks

To test whether there was a significant difference between experimental and control group students' post-engagement scores, as the data of students' course engagement scores in post-survey were not normally distributed, Mann Whitney U-Test was applied. The mean of experimental and control students' post-engagement scores 80.45 (sd.=17.76) and 70.56 (sd.=16.88) respectively. The Mann Whitney U-Test results (Table 37) indicated that experimental group students' post-engagement scores were significantly higher than those of control group students ($U=1598.50$, $p<.05$).

Table 37. Mann Whitney U-test Results for Post-Engagement Scores

Group	N	Mean Rank	Sum of Mean Ranks	U	p
Experimental	67	80.14	5369.50	1598.50	0.00
Control	70	58.34	4083.50		

4.1.6. Results of Research Question 5

The fifth research question of the study was:

> Is there a relationship between the students' academic achievement and their course engagement?

To test whether there is a significant correlation between students' achievement and their engagement in social studies lesson, as the data were significantly non-normal ($p<.05$), Spearman's correlation coefficient statistics was used. The Spearman's Rho correlation coefficient between the two variables was (.80), and the significance value of this coefficient was (.00). The significance value for this correlation coefficient was less than .05 (Table 38); therefore, it can be concluded that there was a significant relationship between students' achievement and their engagement in social studies lesson. The relationship was positive: as achievement increased, engagement also increased. Taking into consideration the coefficient of determination ($r^2=0.64$), it can be concluded that the engagement shared 64.0% of the variability in achievement.

Table 38. Spearman's Correlation Coefficient Statistics for Relationship between Achievement and Engagement Scores

			Achievement	**Engagement**
Spearman's rho	Achievement	Correlation Coefficient	1.00	.80
		Sig. (2-tailed)	.	.00
	Engagement	Correlation Coefficient	.80	1.00
		Sig. (2-tailed)	.00	.

4.1.7. Results of Research Question 6

The sixth research question of the study was:

> Is there a relationship between the students' evaluation of learning objects and their achievement?

To test whether there is a significant correlation between students' achievement and their perceived learning, usability evaluation of learning objects, and engagement with the learning objects, as the data were significantly non-normal, Spearman's correlation coefficient statistics was used. The correlation coefficients and the significance of the correlations were shown in the table below. The Spearman's Rho correlation coefficient between students' achievement and perceived learning, usability, and engagement with learning objects were .66, .29, and .59 respectively (Table 39). It can be concluded that the correlations between students' achievement and their perceived learning, usability, and engagement were significant ($p<.05$).

Table 39. Spearman's Correlation Coefficient Statistics for Relationship between Achievement and LOES Constructs' Scores

			Perceived Learning	**Usability**	**Engagement**
Spearman's rho	Achievement	Correlation Coefficient	.66	.29	.59
		Sig. (2-tailed)	0.00	0.02	0.00
		N	67	67	67

4.2. Students' and Teacher's Opinions about Using Learning Objects in the Instruction of Social Studies

The interview questions were aimed to gather in depth opinions of the students and teacher about their learning experience of social studies lesson with learning objects. The researcher conducted interviews with 18 students in the treatment group. The qualitative data collected through the interviews were analyzed with content analysis to investigate the opinions of students and teacher on the use of learning objects for *learning the social studies lesson*, for their *engagement* in the

course, for their *attitudes toward the lesson*, and the *usability of the learning objects*. The participants reported several positive and negative aspects of the treatment in the interviews.

4.2.1. Teacher's and Students' Opinions about Learning and Instruction

The interview questions regarding learning and instruction focused on the effects of using learning objects on students' learning and teacher's instruction process. Those questions revealed two sub-categories in the learning and instruction category – positive and negative opinions. The themes under the positive opinions sub-category were;

- increase in the learning and achievement in the social studies lesson,
- learning easier,
- retention of the subjects,
- concreteness of events and cases,
- individualization of learning,
- studying together,
- learning with activities, and
- guidance of teacher.

The negative opinions sub-category aroused from three themes were;

- unable to follow the lesson,
- not being individual, and
- decrease in the achievement.

14 of the 18 interviewed control group students stated that their *achievement in the social studies lesson increased* and *they learnt better* by using the learning objects in the learning process. Some of the students commented as following:

> A7: İlk dönem öğretmenimiz anlatıyordu ama iyi anlamıyordum... İkinci dönem resimler videolar falan beynimde kişileri, olayları falan daha iyi canlandırdı. Öyle olunca daha iyi öğrendim bence.
> A7: In the fall semester, our teacher told the lesson, but I didn't understand well enough... In the spring semester, pictures and videos visualized people and events better. So, I learnt better.

> B6: Mesela puanlarım daha yüksek oldu. Öğrenme nesneleri ile daha iyi pekişti bilgiler, kısa sürede çok bilgi öğreniyorsun ve beynine rahatça girebiliyor.
> B6: For example my grades were higher. Knowledge I learnt were reinforced better, you can learn lots of knowledge in a shorter time, and comprehend it better.

In parallel with students' opinions about learning objects' effects on their learning, the teacher said that:

> "Öğrenme nesnelerini kullandığım grupta yazılılarda olsun, ödevlerde olsun, performans, proje gibi konularda daha üst sonuçlar elde ettiğimi söyleyebilirim. En büyük ispatı o."
> "In the group in which I used the learning objects, I got better results from the students in exams, homework, performance homework and projects. It is the best evidence."

Six of the students commented that they *learnt easier* with the help of learning objects. One student (A1) said;

> "… daha kolay öğreniyoruz. İlk dönem öğretmen tahtada anlatıyordu. O zaman da anlıyorduk ama biraz zor oluyordu. İkinci dönem bilgisayarlar bizim önümüzde olduğu için biz de oradan okuyup takip ettiğimiz için, videoları oradan izlediğimiz için daha kolay öğrendik"
> "…we learn easier. In the fall semester, the teacher was lecturing by using the board. We understood at that time but it was a little difficult to understand. In the

spring semester, as we had the computers we were following the lesson while the content was read by other students, and we watched the videos on the computer. Thus we learnt easier."

Another student (B5) said;

"İkinci dönem konuları daha kolay öğrendim. Çünkü ilk dönem öğretmen tahtada projeksiyondan yansıtıp anlatıyordu ve geçiyordu. Bazen takip edemiyordum. Ama ikinci dönem bilgisayarlar önümüzde olduğu için oradan da takip edebildim. Hem resimler videolar falan da daha kolay öğrenmemi sağlıyordu. Normalde kitaplarda falan okuyunca resim veya video olmadığı için zor öğreniyordum. Ama bilgisayardaki resimler ve videolar daha açıklayıcı olduğu için daha kolay öğrendim"

"I learnt the subjects easier, because in the fall semester, the teacher was lecturing by using the projector to reflect on the board. Sometimes I couldn't follow. But in the second semester, as the computers were in front of us, I could follow. Also, pictures and videos helped me learn easier. Normally, when I read the book, as there are not realistic pictures and videos, I had difficulty to learn. But as the pictures and videos were more explanatory, I learnt easier."

Five of the students commented that learning objects helped them in *retention* of the subjects of the social studies lesson. For example a student (A11) explained that:

"Hem daha çok aklımda kaldı. İlk dönem dersten sonar hemen unutuyordum konuları ama bilgisayardaki şeyleri yapınca hemen unutmuyorum artık. Daha çok kalıyor aklımda."

" … I reminded the subjects more. In the fall semester, I could forget the subject in a short time after the lesson. However, as I made the activities in the computer, I didn't forget in a short time. It stays more in my mind."

Also, another student (B5) explained:

"… hem böyle daha kılda kalıcı oluyor. …. Bence daha çok aklımda kaldı."

"… by this way, it was more memorable. …. I think, it was kept in my mind more."

Seven of the students responded that the visuals such as pictures, graphics, animations and videos helped them to *visualize and concrete the abstract* events and cases. For example, student A7 stated:

"Resimlerin avantajı oldu... İkinci dönem gördüğümüz resimler, videolar daha açıklayıcı oldu, daha anlaşılır oldu.Kafamda canlandırabildim."

"Pictures were advantage for me to learn… However, the pictures and videos we saw in the computers in the spring semester were more illustrative, and the subjects were more understandable. I could visualize in my mind."

Another student (B10) expressed:

"Resimler kafamızda canlandırmaya, okuduğumuz şeyi kafamızda canlandırmaya avantaj sağladı.Videolar da daha fazla örnek anlamında, sosyal bilgiler dersinde hayatın birçok şeyini öğreniyoruz.Yapmamız gereken şeyleri örnekler görerek öğrenmemizi daha çok kolaylaştırıyor."

"Pictures helped us to visualize what we read in the books. Videos provided more examples and we learnt about real life. By showing examples, the videos facilitated our learning of what we had to learn."

In accordance with students' opinions about the visualization and concretization, the teacher voiced:

"… sosyal bilgiler dersi görselliğe önem verilen, çok fazla somut olayların görüldüğü öğrencilerin kendilerini dersin içinde bulduğu günlük hayatına uygulayabildiği bir ders... O yaş grubundaki çocuklar yazılardan değil resimlerden,

videolardan, çizgi filmlerden, etkinliklerden öğrenirler. Bunlarla zenginleştirilmiş bir sistem olduğu için çocuklar için çok faydalı olduğunu düşünüyorum."

"… social studies is a lesson which gives importance to visuals, the concrete events are encountered, the students are in and apply the lesson to their daily lives… Students in that age learn from images, videos, cartoon films, and activities. As the system is enriched with them, it is very beneficial."

10 of the interviewed students reported the use of learning objects in studying social studies lesson provided the *individualized learning*, and in turn, it helped them to learn the subject matters better and increase their achievement in the social studies lesson. For example student B3 commented that:

"Evde çalışırken istediğim zaman bakabildim, tekrarlar yaptım.Bazen videoları tekrar izledim. Anlamadığım yerleri istediğim zaman istediğim kadar tekrar tekrar izledim."

"While studying at home, I opened the system when I wanted, and I made repetition. Sometimes I watched the videos again and again. I watched the issues I had difficulty in understanding over and over again as I like."

In the Information Technology (IT) Classroom, one computer was used by two students in the social studies lesson. While six of the students stated that it was a disadvantage for them to learn the topic and to engage in the lesson, five of them stated that this situation lead them to *study together* to perform the instructional activities in the learning object. For example, student A11 said:

"… bence iki kişi bi bilgisayar kullanmalı. Çalışmaları yaparken bazen yanlış yapıyorum, arkadaşım yardımcı oluyor.Bilgisayardan bilmediğim bir şey olursa arkadaşıma soruyorum, o açıyor, o yardım ediyor bana."

"… I think two students should use one computer. Sometimes while making the activities, I made mistakes and my friend helped me or we made activity together. If there was a question I couldn't answer, I asked him, and he made the activity, he helped me."

One of the questions in the interview was about the characteristics of the learning objects which caused or facilitated students' learning. Five of the students emphasized the *learning activities within the learning* objects such as games and puzzles helped them to learn the subjects of the social studies lesson. For example, student A6 voiced:

"Oyunların, etkinliklerin içinde sorumluluk veriyordu. Tek başımıza yapıyorduk... En sonunda oyunlar vardı, bulmaca vardı, onları yapıyorduk ve öğreniyorduk."

"We were given some responsibilities through the activities and games. We were doing the activities by ourselves... At last there were games and puzzles. We made them and we learnt."

Another student (A11) stated:

"Alıştırmaları bilgisayardan yapıyoruz daha iyi olur, daha iyi öğreniriz, daha iyi anlarız."

"We made the exercises within the computer. It is better. We learn better, we understand better."

The achievement of use of technology in learning environments requires the guidance of the instructor. In the Information Technology (IT) Classroom, the social studies teacher encouraged and guided the students while learning objects were being used within the learning activities. Nine of the students emphasized the *guidance of the social studies teacher* in their learning of the subjects. For example, student A5 commented:

"Bize açtırıyordu, okutturuyordu, etkinlikle ilgili videoları izletiyordu.Ara sıra o da anlatıyordu.Öğrenme nesnelerinin nasıl kullanılacağından bahsetti, dikkatli olarak

orada ileri-geri var, çıkmak istiyorsanız oralara basın diyordu.Yapamadığımız bir etkinlik olduğu zaman yol gösterdi."

"He asked us to open the learning object and read the paragraphs in it. He wanted us to watch the videos. Also, sometimes he lectured. He told us how to use the learning objects. For example he said press next-previous buttons, and to finish, press that button. When there was an activity we couldn't make, he guided us, asked questions to complete the activity."

In addition, student B11 said:

"Bazı konularda örnekleri açıklıyordu.Etkinlikleri genelde kendimiz yapıyorduk ama bazı etkinlikleri yaparken yardımcı oluyordu mesela.Konuları bize okutturuyordu.Bazen onlarla ilgili sorular soruyordu."

"He clarified the examples in some subjects. Generally, we made the activities by ourselves but in some activities he helped us. He asked us to read the texts and he asked questions about them".

The teacher stated his role as:

"Yönlendirici olarak çocuklara, sorularla beyin jimnastiği yaptırıyordum.Onlar da sınıf içinde düşüncelerini fikirlerini paylaşıyorlardı.Ben sadece rehberlik yapıyordum.Yeri geldiğinde sorularla konuların zenginleşmesini daha olumlu yönde ilerlemesini sağlıyordum."

"Students were making mental gymnastics by questions with my guidance. They were sharing their ideas in the class. I was just guiding. When needed, I was enriching the subjects and positively directing the lesson with questions."

In the learning and instruction category, students stated 8 negative opinions about the use of learning objects in the social studies lesson. Those opinions were divided into 3 themes – *unable to follow the lesson, not being individual, and decrease in the achievement*.

Unsuitability of the IT classroom, the use of each computer by two students, and in turn noise in the learning environment caused students to be unable to follow the lesson. Five students commented that sometimes they *couldn't follow the lesson* in the IT classroom. For example, student A5 stated:

"Biri yan taraftakiyle oynuyor.Biri konuşuyor. O konuyu anlamaya çalışıyor, o yüzden uygun değil. Biraz gürültü oluyor, hemen konu dağılabiliyor.Birkaç kere ben de takip edemedim konuyu bu yüzden."

"One is playing with the other. One is talking. Other is trying to understand the subject. There occurs some noise. The lecture is disrupted immediately. For this reason, I couldn't follow the lesson several times."

The teacher added that:

"Şimdi fare elinde olan öğrenci etkin olayın içinde. Ama onun yanında pasif kalan öğrenciler ise daha uzak kalıyordu ve dersi atkip etmeme veya sıkılma durumları oluyordu.Onlar da sağ solla uğraşma, başka arkadaşlarıyla uğraşma, itişme kakışma gibi olumsuz yönde etkilerinin o olduğunu düşünüyorum.Yani etkin olarak bilgisayarın başındaki klavyenin başındaki farenin başındaki kesinlikle daha iyiydi ama kenarda kalanlar için pasif kaldıklarını düşünüyorum."

"The student who has the mouse is active and in. However, the students near the other were far away and there occurred not following the lesson or getting bored situations. There were negatives like students' hazing the others, jostling. In other words, the student using the computer, mouse or keyboard was more active, but I think the others were passive."

As each computer was used by two students in the IT classroom, the students couldn't use the computers individually. This situation caused the students not to implement the learning activities

individually and sometimes influenced their learning negatively. Two students complained about *not being individual* while using the learning objects in the social studies lesson. For example student B8 commented:

> "… arkadaşımızla birlikte yapıyoruz. Bazen anlaşmazlık olabiliyor.Kavgalar oluyor aramızda.Yapmak istediğimi yapamıyorum veya arkadaşım kendi istediğini yapamıyor."
> "We make with our friends. Sometimes there is conflict between us. Sometimes there is dispute. I cannot do what I want to do, or my friend cannot do what he wants to do."

Although 14 of the interviewed students stated that their achievement in the social studies lesson increased due to the application of learning objects in the lesson, one of the students emphasized her *achievement in the social studies lesson decreased* in the spring semester. She commented:

> "… ilk dönem notlarım daha yüksekti.İkinci dönem ilk döneme göre biraz düşük."
> "… my grades were higher in the fall semester. My grade in the spring semester is lower than in fall semester."

The teacher added that:

> "Bilgisayara ilgisi az olanlar da pasif kaldıkları için bilgisayar sınıfında bilgisayar yetmediği için pasif kalanların olumsuz etkilendiğini düşünüyorum."
> "I think that as the students who have less interest in computers were passive and there were less computers in the IT classroom, the passive were negatively affected."

4.2.2. Students' Attitudes toward Social Studies Lesson and Learning Objects

The students were asked questions in order to understand their attitudes toward social studies lesson implemented with the learning objects. Students' attitudes toward social studies lesson implemented with learning objects were divided into two sub-categories identified as *positive and negative attitudes*. Students' positive attitudes toward social studies lesson and learning objects were categorized as;

- fun of the social studies lesson with learning objects,
- increase in students' love of social studies lesson, and
- students' fun and love of learning objects.

Students' negative attitude toward social studies lesson and learning objects was categorized as;

- students' boring with some learning objects.

In the students' attitudes toward social studies lesson with learning objects category, the most frequently emphasized theme was the *fun of the social studies lessons* implemented with the learning objects. 13 of the 18 students found the social studies lesson with the learning objects were fun and enjoyable, and the lessons in the spring semester were more enjoyable than the lessons in the fall semester. For example student B11 said:

> "İkinci dönem daha eğlenceli geçti. ... ilk dönem biraz sıkıcı oluyordu benim için. Ama ikinci dönem bilgisayar başında oyunlarla, etkinliklerle, videolarla daha eğlenceli geçti.Zaten bilgisayar eğlenceli benim için. Hem eğlenmiş oldum hem de öğrenmiş oldum."
> "The lesson in the spring semester was more enjoyable. It was a little boring for me in fall semester. However, the lessons in the spring semester were more enjoyable in front of the computers with games, activities, and videos. Already computer is a fun for me. I enjoyed and learnt as well."

In addition student A8 stated:

> "2. dönem daha zevkli geçti bence. Bilgisayar başında ders işlemek eğlenceliydi.Oyunlar, etkinlikler, videolar falan eğlenceli yapıyordu dersi."

"I think the spring semester was more enjoyable than the fall semester. It was enjoyable to have lesson with the computer. The games, activities and the videos in the learning objects made the lesson more enjoyable."

Using the learning objects in the learning environment *increased students' love of the social studies lesson*. 14 of the 18 interviewed students stated that they loved the social studies lesson implemented with learning objects more when compared with the social studies lesson without the learning objects. As an example, student A2 stated:

"2. dönem dersi daha çok sevdim. Çünkü BT sınıfına gittiğimiz için daha az yazı yazdık ama ötekinde her dersin sonunda yazı yazıyorduk. Yazı yazmak biraz sıkıyordu beni. Normalde sosyal bilgiler dersini ilk üçte sayamazdım ama şu an ilk ikide bile sayabilirim."

"I loved the lesson more in the second semester. Because, as we went to the IT classroom, we wrote less. However, in the first semester, we wrote more in the social studies classroom. Writing is boring for me. Normally, social studies lesson was not in the first three. But now, it is in the first two for me."

The teacher verifies the students by saying:

"Tutumlarının olumlu olarak etkilediğini düşünüyorum.Mesela bazen BT sınıfına gidemediğimiz durum ortaya çıkmıştı.Bunu duyan çocukların ya keşke BT sınıfına gitsek diye serzenişte bulunduğunu biliyorum.Dolayısıyla çocukların istekle ve arzuyla BT sınıfında bu dersi işlemek istediklerini biliyorum.BT sınıfına gitmeyen diğer gruplarda ise çoğu öğrenci isteksiz kalıyor, dersten pek zevk almıyorlarmış gibi bir görüntüleri var. BT sınıfına giden sınıfın öğrencileri diğer sınıfın öğrencilerine göre daha istekliler, dersi daha çok seviyorlarmış gibi geliyor bana."

"I think their attitude was affected positively. For example once, we could not go to the IT classroom. The students who heard that reproached about to go there. So, I know that students desired to have the lesson in the IT classroom. Students in the other groups were reluctant and did not enjoy the lesson. The students going to the IT classroom were more eager, and like the lesson more. "

In addition to the more joy and love of the social studies lesson in the spring semester, students also *found the learning objects enjoyable and loved them*. 15 of the interviewed students emphasized that they loved the learning objects, and the learning activities in the learning objects such as games and puzzles were enjoyable. For example student A2 said:

"Eğlenceliydi, farklı etkinliklerdi... Bilgisayardaki etkinlikler çok farklıydı bence.Minerallerle, madenlerle ilgili, haritaların üzerinde nerede olduğunu bulmak, o çok güzeldi mesela."

"The activities in the learning objects were different and enjoyable… The activities in the computer were different, I think. For example, the activity about the mines and minerals, and placing them on the Turkey map was very fine."

In addition, student B3 commented that:

"Öğrenme nesnelerinin kendileri de çok hoşuma gitti mesela.İçindeki oyunlar, videolar, resimler falan eğlenceliydi yani.Eşleştirme etkinlikleri de güzeldi. Videolardan hani bu fiş alma ile ilgili olanı vardı, o çok komikti. Eğlenceliydiler yani."

"I liked the learning objects too. The games, videos, and pictures in them were enjoyable. The matching activities were also good. For example, the video about taking the sales slip was too funny. They were fun."

Experimental group students were also asked whether there were learning objects they didn't like or found boring. Only four of the students stated that *they found some learning objects boring*. However, there is/are not common learning object/s they found boring. For example student A4 said: "Uzun paragraflar oluyor. Onları okurken biraz kendimizi boşluyoruz.Konuşmaya

başlıyoruz.” - “There are long paragraphs to read. While reading them, we became slack. We start to talk.” Also, student B6 told that “Sıkıcı olan bir tane adam mesleğini seçme konusuyla ilgili bir video vardı, onu ben sıkıcı buldum.” - “There was a video in which a man talking about the occupation choice. It was boring”.

4.2.3. Students’ Engagement in Social Studies Lesson and With Learning Objects

The interview questions regarding students’ engagement focused on the students’ cognitive, behavioral, and emotional engagement in the social studies lesson implemented with learning objects. Those questions revealed two sub-categories in the students’ engagement in social studies lesson and with learning objects category – positive and negative opinions. The themes under the positive opinions sub-category were;

- increased participation in the lesson,
- increase in the interest to the social studies lesson,
- putting more effort,
- repeating,
- doing the homework, and
- challenging nature of the learning objects.

The negative opinions sub-category aroused from three themes;

- decrease in the participation,
- being unable to note taking, and
- distraction.

Using the learning objects as a new instructional approach in the social studies lesson *increased students’ participation* in the learning activities made in the lesson. 11 of the interviewed students stated that their participation to the learning activities in the classroom such as discussions, and paper-based or computer based activities increased in the spring semester. For example student A2 commented:

> “Ama bu yöntem farklı geldi ve derse katılma isteğim daha da çok arttı.Dersteki sorulara daha çok cevap verebiliyordum.”
> “However, this method was different and my desire to participate into the lesson increased more and more. I was answering the questions of the teacher more frequently”.

Another student (B5) stated:

> “İlk dönem o kadar rol almıyordum. Oturup dersi dinliyordum sadece.2. Dönem daha çok derse katılmaya başladım… daha etkin oldum derste.”
> “I didn’t have an active role in the first semester. I was just sitting and listening to the teacher. In the second semester, I started to attend to the activities more… I was more active during the lessons.”

In order to understand whether the students’ interest in the social studies lesson increased and which characteristics of the learning objects caused the increase or decrease in the interest in the social studies lesson, students were asked to compare the fall and spring semester in terms of interest in the social studies lesson. Seven of the interviewed students stated that their interest in the social studies lesson increased depending on the use of the learning objects during the learning of the subject matters. Especially, the existence of the videos about the real life made the lesson interesting for the students. A student (A2) stated:

> “İkisinde de derse ilgim vardı ama ikinci dönem biraz daha fazlaydı. İlk dönem pek ilginç gelmiyordu ders… Oradaki videolar dersi daha güncel daha anlamlı yaptı.Böylece derse ilgim de arttı.”
> “I was interested with the social studies lesson both in the first and the second semester, but this interest was more in the second semester. The lesson was not interesting in the first semester… Those videos made the social studies lesson more

meaningful, and increased my interest in the social studies lesson in the second semester."

Another student (A8) commented:

"İkinci dönem ilgim daha fazlaydı.İlk dönem çok ilgimi çekmiyordu konular falan.İkinci dönem bilgisayardaki programlar ilginç geldi bana.Oyunlar, videolar falan.İlk dönemden farklıydı yani.İlk dönem biraz sıkıcıydı ama ikinci dönem ki konular, bilgisayardaki programlar falan ilginç geldi."

"My interest was more in the second semester. The subjects in the first semester were not interesting for me. The programs in the computers in the second semester were interesting for me. Games, videos, and etc. It was different than the first semester. The lesson was boring for me in the first semester, but the subjects and programs in the computer made the lesson interesting."

To understand students' effort in the social studies lesson and the effect of the learning objects on students' effort, students were asked what they do to comprehensively understand the subject matters of the social studies lesson. Half of the interviewed students emphasized that they utilized the learning objects at their home to comprehend the topics. For example student A4 said:

"Ödevleri yaparken de o bilgisayardaki sizin yüklediğiniz siteye baktım.Oradaki o yazıları dikkatlice okudum, videoları dikkatlice izledim.Hatta birkaç kez izlediğim videolar olmuştu."

"While doing the homework, I investigated the web site you created for the lesson. I read the writings in the learning objects, and watched the videos again carefully. Moreover, I watched some videos again and again."

In addition, student B3 told:

"Eve gittiğimde internette siteye yeniden bağlandım.Oradaki etkinlikleri tekrarladım.Orada yapamadığım oyun olmuştu mesela, harita üzerinde madenleri yerleştirme, tarım ürünlerini yerleştirme, onları yaparken annemden yardım almıştım."

"When I went home, I connected to the website of the lesson. I repeated the activities there. There was an activity a little difficult for me, the matching of the mines and agricultural products on the map. My mother helped me while making this activity."

Repeating the learning activities and doing unfinished exercises are important factors which determine the engagement of the students in the course. The existence of the learning objects in the web environment provided students to repeat the learning activities, to play the games, and to watch the videos again. Eight of the interviewed students emphasized the importance of the repeatability of the learning activities in the learning objects. For example student B7 said that "Tekrar ettim, okudum onları. Videoları tekrar izledim.Resimlerle daha net anlamaya çalıştım." - "I repeated, and read them again. I watched the videos again. I tried to clearly understand with the pictures."

Doing the homework given by the social studies lesson with the help of the learning objects was another theme emerged with the interviewed students answers to the interview questions. Four of the students told that they benefited from the learning objects to do their homework in the social studies lesson. In order to clarify this statement, a student (B2) commented that "Yapıyorum ödevleri, mesela performans ödevlerini bilgisayardan bir de sizin hazırladığınız o siteden araştırarak yaptık. Daha çok araştırma yaptım." - "I do the homework. For example, I made the performance projects by searching in the Internet and using the website you created for the lesson."

The learning activities in the learning objects were found to be *challenging* by six of the interviewed students. Some of the activities in the learning objects were hard to implement and require students to think comprehensively. For example, student A10 stated:

> "Genelde çok zor değillerdi ama etkinlikler biraz zordu, bazıları ise kolaydı. Yaparken zorlandıklarım oldu yani. Zor olanlarda bazen çok düşünmek gerekiyordu. Öyle hemen cevap verilemiyordu, yapılamıyordu."
> "Generally, they were not so difficult but some activities were hard. Some of them were easy. There were activities which were difficult for me. Sometimes, I had to think much to do the difficult ones. I couldn't answer or do it immediately."

Although 11 of the interviewed students stated that their participation in the social studies lesson increased in the spring semester, six of the students told that there was *a decrease in their participation* to the social studies lesson when compared to their participation in the fall semester. For example, student A1 said that "İlk dönem daha fazla katılıyordum derse. BT sınıfında daha az parmak kaldırdım, daha az katıldım derse. Bilgisayar başında olunca arkadaşımla biraz fazla konuştuk galiba." - "I participated to the lesson more in the first semester. I raised my hand less in the IT classroom, and I participated less. Because we were in front of computer, I talked with my partner much." Another student (B2) complained about the settling in the IT classroom, and emphasized that the settling in the IT classroom prevented her to participate to the social studies lesson.

There were two other revealing themes in the negative opinions sub-category named as unable to note taking, and distraction. Only one of the students (B10) complained about the *inability to note taking*, and said that "BT sınıfında yazı yazamıyoruz, not alamıyoruz. Sınıfta daha iyi not tutabiliyoruz.Bence arada sınıfa da gidilmeli." - "We can't write and take notes in the IT classroom. We can take notes in the classroom better. Occasionally, we should go to the classroom." In addition, only one student (A1) stated that she sometimes *lost her attention* to the lesson in the IT classroom because of the noise in the environment.

4.2.4. Usability and Physical Conditions

The interview questions regarding usability focused on the students' views about usability of the learning objects and the physical conditions of the IT classroom where the instruction was implemented with learning objects. Those questions revealed two sub-categories in the usability category – positive and negative opinions. The themes under the positive opinions sub-category were;

- ease of use,
- colors,
- texts,
- images,
- videos, and
- clear expression.

The negative opinions sub-category aroused from five themes;

- unsuitability of the IT classroom,
- seating,
- problems with the computers,
- problems with the learning objects,
- lack of sound and animation with text, and
- colors.

To understand the students' views about the *ease of use of the learning objects* and the web site in which the learning objects were presented to them, they were asked about the ease of use of the learning objects. Students were happy with able to learn the use of the web site and the learning objects easily. 17 of the interviewed students stated that the learning objects and the web site for the learning objects were easily used by them. For example student A1 said:

> "Evet çok kolaydı.Zaten bilgisayar kullanmayı internete girmeyi biliyoruz. O sistem de internete girmek gibi bir şeydi. İnternetten bir farkı yoktu.İleri-geri düğmeleri falan.Kolayca öğrendim.Bir tek gizle-göster düğmesinin ilk başta ne olduğunu anlamamıştım ama onu da bir kere tıklayınca öğrendim."
> "Yes it was very easy. Already, we know using computers and surfing in the Internet. The system was like surfing on the Internet. It was not different than the Internet, such as forward and back buttons. I learnt it easily. Only, I didn't understand the hide-show button at the beginning, but when I first click on it, I learnt it."

Another student (B2) commented that "Çok kolaydı. Kullanıcıyı sürekli yönlendiren şeyler vardı. O yüzden kolay oldu. Yönlendiriyordu sürekli, gizle göster falan.Açıklamaları vardı." - "It was very easy to use. There were lots of things which guided the user. So, it was easy. It was always guiding. There were explanations."

The students were asked about the visual quality of the learning objects. Seven of the interviewed students emphasized that they liked the *use of colors in the learning objects*. For example, one student (A2) said that "Güzeldi, genellikle açık tonlar kullanıldığı için insanı çekiyordu, güzel renkler kullanılmıştı. Turuncu, mavi renkler kullanılmıştı. O renkler hoş gösteriyordu. Yazıların daha net ortaya çıkmasını sağlıyordu.Resimlerin daha net gözükmesini sağlıyordu." - "The colors were beautiful. Generally, as light colors were used, it was attractive for me. Vivid colors were used. Orange and blue were used. Those colors were showing the learning objects lovely, and caused the texts to be read clearly and seen the pictures better."

Verifying the students' comment, the teacher commented that:

> "Kesinlikle uygun renkler, güzel renkler seçilmiş.Bir karmaşıklık, çocuklarda bir göz yanılgısı yaratabilecek bir renk uyumsuzluğu yoktu.Renkler gayet iyi seçilmiş, arka plan mavi, yazılar beyaz, başlıklar yeşil mesela. O konuda öğrenciler tarafında da bir problem olduğunu sanmıyorum."
> "Absolutely convenient colors, they are well selected. There is not confusion, and color unconformity that may cause optical illusion. Colors were well selected, background was blue, text was white, and titles were green. I think there is not a problem for students regarding this point. "

When students and teacher were asked about the visual quality of the learning objects, 11 students mentioned that they found the texts in the learning objects to be easily readable by them. Teacher commented that "Yazılar gayet net okunuyordu. Büyüklükleri renkleri gayet iyiydi." – "Texts were easily read. Their size and colors were good." One of the ten students (A8) which stated that the texts were easily read commented that "Yazılar rahatlıkla okunuyordu. Büyüklükleri iyiydi, renkleri de iyiydi mesela. Arka plan mavi, yazılar beyaz. Kolay okunmasını sağlıyordu." - "The texts were easily readable. Their size and colors were appropriate. Background was blue, and the text was white. This provided the text to be read easily".

The visual quality of the images which is an issue that affects the usability of the learning objects was another revealed theme under the usability and physical conditions category. Teacher voiced that "Resimler gayet net görünüyordu, bulanık değildi. Görsel olarak çok iyiydi bence." – "Images were good looking, they were not fussy. Visually they were very good." 11 of the interviewed students emphasized that they liked the pictures in the learning objects in terms of visual quality. For example student B10 stated that "Resimler iyi görünüyordu. Büyüklükleri iyiydi.Karmaşık veya net olmayan bir resim yoktu diye hatırlıyorum." - "Pictures looked good. The sizes of them were good. There were not blurry images."

There were videos which presented examples about the complex topics and helped students to facilitate their learning. When students were asked the visual quality of the learning objects, six of the interviewed students mention about the visual quality of the videos in the learning objects.

The videos were found to be high quality in terms of both visuality and pedagogy by the interviewed students. For example, two of the students said that:

> A11: "Onların da görüntüleri iyiydi ama bazen sınıfta sesler net duyulmuyordu. Ama evde izlediğimde sesler çok iyi duyuluyordu.Ayrıca bence hepsi konuyla ilgiliydi.Konuları yazıları açıklıyordu.Konu ile ilgili bilgiler veriyordu.Konuları daha iyi anlamamızı sağlıyordu."
> A11: "Their visual quality was good, but sometimes the sound of the videos couldn't be easily heard. But the sound of the videos was heard well at home. In addition, all of them were related with the subject. They made the texts and subjects clear. They were giving information related with the subjects. It made us to understand the subject better."

> B11: "Genelde iyi görünüyordu. BT sınıfında bazen ses iyi çıkmıyordu ama evde sesi iyi duyuyordum... Çok açıklayıcıydı bence.Evde anneme ve babama da izlettim."
> B11: "Generally they look good and clear. In the IT classroom I couldn't hear the sound of videos easily, but at home the sound was good… I think it was explanatory. I showed it my mother and father."

The language used in the expression of the content determines the usability level of the learning objects. The findings from the students' answers indicated that the six of the interviwed students found the language used in the learning objects appropriate for them, and the learning objects were found to clearly express the issues in the social studies lesson. Student A10 said that "Bence öğrenme nesneleri içindeki konular tam bizim seviyemize göre anlatılmıştı. Öyle bilmediğimiz kelimeler falan yoktu.Anlaşılır bir şekilde yazılmıştı yazılar.Açıkça anlatılıyordu her şey.Karmaşık bir şekilde değildi yani." - "I think the subjects in the learning objects were told according to our level. There were not unknown words. All the things were expressed clearly and comprehensively. In other words, it was not sophisticated."

The themes under the negative opinions sub-category were *unsuitability of IT classroom, seating, problems with computers, problems with the learning objects, lack of sound or animation with text in the learning objects, and colors*. The most frequently mentioned negative opinions were in the problems with computers theme. 12 of the interviewed students had technological problems with computers in the IT classroom while the lesson was being implemented. The technological problems were solved by the researcher, but they may prevent the students to follow up the learning activities in the classroom. For example student A4 stated:

> "Bazen açılmadığı yerler oldu, orda biraz hoşumuza gitmiyor, orda bir kere donmuştu bilgisayarımız, o zaman biraz moralimiz bozulmuştu.Mesela video izlerken orada karardı, kırmızı kırmızı şeyler olmaya başladı.Öyle kaldı ama ses çıkıyordu."
> "Sometimes the computer was not opened. We didn't like it. Once the computer was locked, and we got angry. Once, while watching video, there were some red dots on the video. The video froze, but we could hear the sound of the video."

In addition, student B3 said:

> "Bilgisayar durduk yerde kendini kapattı. O yüzden yetişmekte zorlandım... Bilgisayarlar da biraz eski.Bazen kapanma sorunu oluyordu. Bir de bilgisayarlardan iyi ses çıkmıyordu. Evde videoların sesleri iyiydi ama burada izlediğimde bazen net duyulmuyordu."
> "The computer restarted with no reason. So I could follow difficultly then... Computers were old. The computers didn't have a good sound. The sound was good at my home computer, but I couldn't hear the videos' sound well here. "

The teacher also mentioned about the technological problems with the computers in the IT classroom by stating that:

"Sadece videoların ses kısmında yaşadık. O da hazırlanan öğrenme nesnelerinden değil, bilgisayar alt yapımızın, teknolojik donanımların yetersizliğinden kaynaklanıyordu. Kulaklıklar pek kaliteli kulaklıklar değildi, ses az geliyordu veya kullandığımız hoparlörlerden iyi ses çıkmıyordu. Ama evde videoları izlediğimde gayet iyi ses geliyordu. Bence sorun BT sınıfındaki hoparlörlerin veya kulaklıkların iyi olmamasından kaynaklı.Yoksa evde veya benim sosyal bilgiler sınıfımda iyiydi."
"We only had problems with the videos. This was not because of the learning objects but of the insufficiency of our schools' technological infrastructure and technological hardware. Headphones were not of high quality, or the speakers we used did not give good sound. However when I watch the videos at home, the sound was good. I think the problem was due to bad headphones or speakers. Otherwise, sound was good at home or social studies classroom."

Another mentioned problem in the usability and physical conditions of the IT classroom category was the *unsuitability of the IT classroom*. The IT classroom's area is 25 square meters, and there are 16 computers in it. More than 30 students had to be in it while the teaching was processed. As the classroom was crowded, there was noise, and the students sometimes argue between them. 10 of the interviewed students mentioned about the unsuitability of the IT classroom in order to implement the social studies lesson with learning objects. For example student A1 commented:

"Bazı arkadaşlarımız bilgisayarın köşesine oturdu.Çok fazla göremedi sınıf kalabalık olduğu için.Bence BT sınıfı değişsin, sınıf küçük kalıyor hem de herkese bir bilgisayar düşmeli, çok gürültü oluyor yoksa. Bence BT sınıfı bu şekilde ders işlemek için uygun değil. Çünkü sınıf küçük, rahatça oturamıyoruz. Ama herkese bir bilgisayar düşseydi belki bu kadar şımarmalar olmazdı, herkes kendisi yapardı. Birbirimizi rahatsız etmezdik, kavgalar çıkmazdı."
"Some of my friends were sitting at the corner of the computer desk. As the classroom was very crowded, they couldn't see the computers. I think the IT classroom has to be changed. The classroom is very small and each student should have one computer in the IT classroom. For this reason, there was much noise in the classroom. I think the IT classroom is not adequate to implement the lesson with this method. Because the classroom is small and we cannot sit comfortably. However, if each student had one computer, there wouldn't be pertness in the classroom environment, and everyone would make itself. We wouldn't disturb each other, and we wouldn't dispute between us."

Another student B3 stated:

"… BT sınıfı değişsin bence.Oradaki bilgisayarlar eski, sınıf kalabalık olduğu için havasız oluyor."
"… I think the IT classroom has to be changed. The computers in there were old. As the classroom was crowded, it was fuggy."

Seating in the IT classroom has been mentioned as one of the negative opinions which prevent students to participate to the lesson. As there are 16 computers in the IT classroom and more than 30 students in the lesson, two students had to use one computer during the instruction process. Although some of the students emphasized that the use of each computer by two students leaded them to study collaboratively to make the instructional activities, some of the students stated this as a negative opinion. This situation may cause conflict between two students which use the same computer. For example, student B5, who was one of the seven interviewed students stated that seating in the IT classroom was a problem for the instruction of social studies lesson, voiced that "Her kişiye 1 bilgisayar düşse uygun olur. İki kişi bir bilgisayarı kullanınca anlaşmazlıklar çıkabiliyor veya bilgisayarlarda problem olduğunda çok sıkışabiliyoruz. Bu şekilde olsa daha az problem olur." - "It is better that each student has one computer in the IT classroom. When two students use one computer, there may be conflict between us, or when there is a technological problem with the computer, there may be congestion. If each student has one computer, there will be fewer problems."

Teacher's opinions were parallel with students' opinions about the seating problem in the IT classroom. He expressed that:

> "Sınıf mevcudu ile kişi başına düşen bilgisayar sayısında bir orantısızlık oldu.Keşke her öğrenciye bir bilgisayar düşseydi, kesinlikle çok çok etkili olurdu.Çoğu zaman 2 kişiye bir bilgisayar hatta bazen 3 kişiye bir bilgisayar düştüğü için de kendini işin içinde bulan öğrenci daha etkili oluyor, diğerleri pasif kalıyor. "
>
> "There was inconvenience between the number of students and student per computer. I wish each student had one computer in the classroom. As 2 students had to use one computer, sometimes 3 students used one computer, the student who was in was more effective, the others were passive. "

The colors used in the learning objects were generally been liked by the interviewed students. However, six of the interviewed students made suggestions about the choice of colors for the learning objects. Student A5 told that "Arka plan hep mavi, sıkıcı. Biraz renkli olabilirdi.Farklı farklı olsa daha iyi olurdu.Renkleri hep mavi bu yüzden arkasını konuyla ilgili çiçekler, şekiller. Renkli olacak, arka tarafa da o konuyla ilgili bir resim olabilir" - "Background color was always blue. It was boring. It may be colorful. Use of different colors may be better. You may use different figures and flowers at the background. It should be colorful, or there may be pictures related with the subject." Another student (B2) said that "Renkler iyiydi ama maviydi sayfa. Üzerinde beyaz bazen zor okunuyordu.Videolar da bazen zor görünüyordu.Mesela renkleri çok açık bir tonla koyu bir ton olabilir." - "The colors were generally good but the background was always blue. White colored texts were sometimes read hardly, and the videos were seen hardly. For example you may use lighter and darker colors."

Another problem in the usability category mentioned by the interviewed students was the problems with the learning objects. The students were asked whether they had problems with the learning objects while implementing the activities in them, five of the students found some of the videos in the learning objects problematic. Because of the technological problems in some computers in the IT classroom, some of the videos were opened and watched hardly by the students. Student A5 stated that "Bazen videolar açılmadı. Bir tanesini izlemek istiyoruz, o açılmıyor.Videoların bazılarının sesleri çıkmıyordu." - "Sometimes the videos were not opened easily. We wanted to watch a video, but it wasn't opened. Sometimes we cannot hear the sound of the videos." Two of the students complained about the visual quality of the videos. For example student A7 commented that "Videoların bazıları net değildi, ne olduğu görünmüyordu. Bazılarında da ses çok iyi duyulmuyordu." - "Some of the visual were not visually high quality. We couldn't see clearly what it was in the video. The quality of sound was not good in some videos."

Students were also asked about their advisement about the usability of the learning objects. Only three of them suggested that the use of the sound or animation with text in the learning objects may make the learning objects more effective. For example student A1 told that "Fotoğraflar animasyon şeklinde olabilir mesela. O zaman daha açıklayıcı olabilir, daha eğlenceli olur. Bir de yazıları okurken sıkılabiliyor insan, yazının yanında bir de seslendirme olabilir belki." - "The pictures may be like animation. Then it may be more enjoyable and more explanatory. In addition, I may get bored while reading the text in the learning objects. There may be a sound which reads the text in the learning object."

Teacher was also asked about his advisement to enhance the usability of the learning objects and he advised that:

> "İçerik olarak çok fazla bir şey ekleneceğini sanmıyorum ama belki şu olabilir.Daha çok etkinliğe yer verilebilir.Bulmaca olsun, eşleştirme, doğru-yanlış, çoktan seçmeli testler de eklenebilir.Yoksa içerik olarak eklenebilecek bir eksiklik olduğunu düşünmüyorum.Sadece etkinlik bölümleri biraz daha zenginleştirilebilir.Etkinlik bölümlerini de matbu evrak olarak, kağıt olarak değerlendirmek için, bilgi

düzeylerini ölçmek için o şekilde yapıyorduk.Her konu sonuna belki bunlar eklenebilir.Daha zengin olur bence."
"I think there is nothing about to adding of the content in the learning objects. There might be more activities. Puzzles, matching exercises, true-false or multiple choice tests might be added. I do not think there is something to add to the content. Only the activity part might be improved. We were also using paper-based activities. More activities might be added to the end of the topics. I think it would be richer. "

4.3. Students' and Teacher's Use of Learning Objects

The aim of the observations was to reveal the students' and teacher's use of the learning objects in the learning and instruction process of social studies lesson. In addition, the results from the observation process would provide triangulation between the results of the quantitative data, interviews with students and teacher, and observations. Totally, 27 observations – 14 observations in 6C and 13 observations in 6E – were made by the researcher in the research process. After the collection of data, the means of each item for both classes were computed. As the reliability of the classroom observation protocol was not satisfied, only the descriptive statistics of the observation items were presented in Table 40. Observation form was consisted of two parts; teacher's and students' observation in the learning objects enriched learning environment.

The treatment was conducted in the IT classroom of the school. The school has one IT classroom. There were 15 computers for students and a computer for teacher. However, during the experimentation, teacher's computer was used by students. Moreover, as the number of computers per students was not equal to 1, two students had to use one computer during the study. There was a speaker, printer, scanner and a projector connected to the teacher computer. The layout of the classroom is presented in Figure 14. Student computers were connected to teacher computer, and they could be fully controlled by teacher computer by special software. All the computers had the Internet connection, and the connection speed of the school was 2 Mbits per second. So, it can be said that when all the computers were functioning and connecting to the Internet at the same time, each computer connected to the Internet with very low speed.

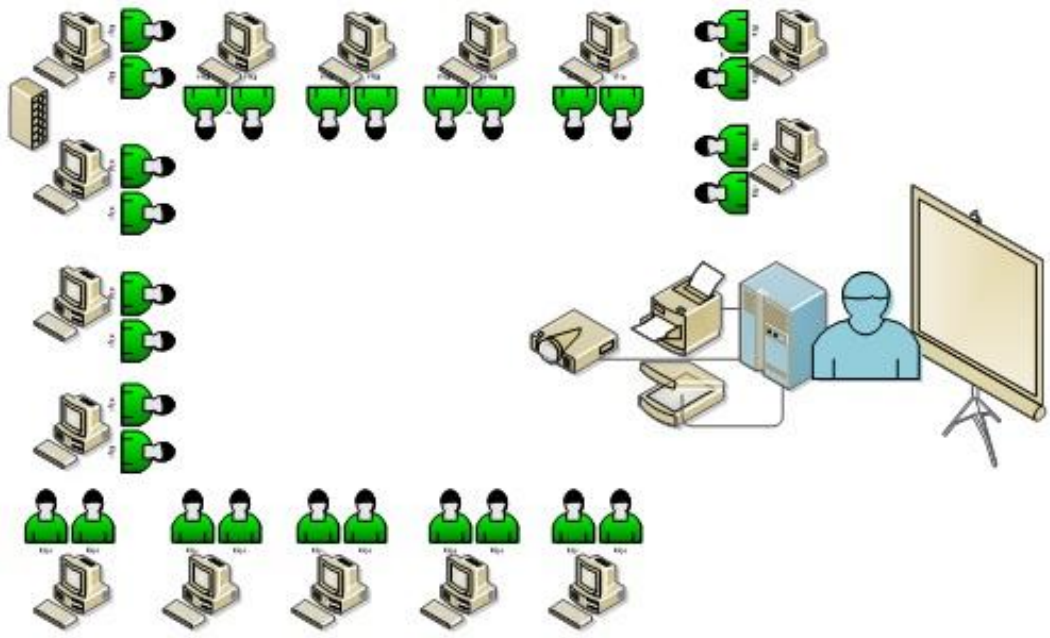


Figure 14. Layout of the IT Classroom

When the observation results related to teacher's behaviors in the learning environment were investigated, it was observed that the teacher has the required abilities to use the learning objects in his control (X=4.63). Observation results showed that the teacher successfully integrated the learning objects in the social studies lesson, and encouraged and guided the students in order to facilitate their learning. It can also be concluded that the teacher was happy with his role in the instruction process while using the learning objects in the lesson (X=4.37).

Students' observation items compatible with the dimensions of the quantitative part of the study were categorized as usability, engagement, learning and attitude towards social studies lesson and the learning objects. When the observation results related to students' behaviors in the learning environment were analyzed in terms of usability, it could be said that their ability to use of the computers and the learning objects during the intervention were satisfactory. The breakdowns in the computers bothered the students. The frequency of their complaint of the audiovisual quality of the videos in the learning objects was moderate, in other words students sometimes did not like the videos in terms of their audiovisual quality. It can be concluded that they occasionally disliked the visual quality of the learning objects (X=2.04). However, as the hardware of computers used by them in the IT classroom was not efficient, sometimes there were breakdowns in the computers for example computers restarted itself without reason, or the keyboard and the mouse of the computer stopped working. In case of a breakdown in the computers, the researcher fixed the problem or the students using that computer used another computer with other students. Students rarely complained of the technological problems with the computers (X=2.04) and not watching the videos because of interruption. In addition, it was rarely observed that the visual quality of the images and videos decreased when the window was enlarged, and the students annoyed with this problem.

In the engagement dimension of the observations, it can be concluded that all the items of that dimension were always observed. The students were ambitious to participate to the learning activities (X=4.59) and to the classroom discussions in the social studies lesson (X=4.48). Although the frequency of students' statement of the challenging of the learning objects was high (X=4.48), it was always observed that while making the activities in the learning objects, in order to take highest score in the activity or finish the activity to be the first, they competed with each other. Also it was observed that if they made a mistake or couldn't make an activity, they got help from their friends or the teacher.

Although at the beginning of the intervention, students had difficulty in following the teacher and implementing the activities in the learning objects concurrently, it was also frequently observed that they successfully did the two jobs synchronously in the actual study (X=4.01). Moreover, they made the learning activities in the classroom successfully – sometimes with the help of other friends and guidance of the teacher, and sometimes by using the textbook – even if they had difficulty in doing some activities. In the classroom discussions and in their answers to the teacher's questions, it was usually observed that students gave examples within the real life (X=4.11). Also, the teacher always used real life examples to explain the subjects of the social studies lesson.

In the attitudes toward social studies lesson, it was frequently observed that students were happy as the social studies lesson was done by using learning objects in the IT classroom (X=4.44). The lesson was enjoyable for the students and they rarely showed that they bored in the learning environment. Although the learning activities were challenging for students, it was occasionally observed that the students exhausted within the learning objects (X=2.11).

Table 40. Mean of the Observation Items

Items	***X***
The teacher used the learning object in his/her control	4.63
At the beginning of the lesson, the teacher explained how to use the LO in the lesson	4.19
The teacher guided the students while implementing the activities within the LO.	4.59
The teacher associated the LO with the subject matter	4.52
The teacher welcomed the students questions about the learning activity	4.44
The teacher encouraged the students to implement the learning activity with LO	4.48
The teacher implemented different instructional activities when the students did not understand the subject	4.48
The teacher asked questions to students about the activities in the LO	4.52
The teacher make instructional plan which integrate LO to the lesson	4.56
The teacher let students to work individually and freely	4.52
The teacher was happy with his role added by the learning environment	4.37
The teacher complained about atmosphere in the classroom	2.04
The students use the learning object in their control	4.37
The students complained of the colors used in the LOs	1.56
The students read the text in the LOs hardly	1.37
The students complained about the visual quality of images in the LOs	2.04
The students complained of the audiovisual quality of the videos	2.58
The students complained of the mistakes in the LOs	1.63
The students found the visuals irrelevant of the subject in the lesson	1.78
The students argued between themselves because of their want to use the computer by themselves	2.41
The students complain of the technological problems that prevent them from implementing the learning activities	2.04
The students participate to the learning activities enthusiastically	4.59
The students asked for help if they cannot implement the learning activity within the LO	3.44
The students use the LO to the end to perform the learning activities	4.44
The students raised their hands in the classroom discussion	4.48
The students commented that the learning activities were challenging	4.48
The students competed to perform the learning activity within the LO	4.41
The students can follow the teacher and use the LO synchronously	4.01
The students accomplished the instructional activities in the classroom	4.41
The students related the subjects in the lesson with real life	4.11
The students complained about the difficulty of understanding the concept/activity in the LO	1.81
The students stated that they liked the lesson	4.44
The students was bored in the lesson	2.11
The learning activity exhausted the students	2.11
The students have fun while implementing the learning activities with the LO	4.41

CHAPTER 5

CONCLUSIONS, DISCUSSION AND IMPLICATIONS

The purpose of this chapter is to discuss the findings of this study, draw conclusions, and offer some implications for educators and instructional designers and recommendations for future research. Also, the results of each research question were discussed and compared with the previous research studies.

5.1. Summary

This study examined the potentials and use of learning objects in sixth grade social studies lesson. The research questions aim to understand several major purposes: to investigate whether using learning objects in the social studies lesson affected students' achievement in the lesson, course engagement, attitudes toward the lesson, and to investigate students' views on the learning objects and the instruction process implemented with learning objects. This research study was designed as a mixed method case study. This mixed method design included quantitative analysis of the social studies achievement test, student course engagement scale, attitude towards social studies courses scale, learning object evaluation scale for students. In addition to quantitative analysis, the research design included qualitative student and teacher interviews, and observation of students and teacher in the learning environment.

5.2. Students' Evaluation of Learning Objects

Research question 1 asked the experimental group students to rate the learning objects used in the learning of social studies lesson in terms of perceived learning, usability of learning objects, and engagement with the learning objects. During the intervention, students used one learning object group – totally nine combined learning objects – for each learning gain for the two learning units in 6th grade social studies curriculum, and after using them, at the end of each learning gain, they rated each learning object. The students rated totally nine combined learning objects, and the total score of all learning objects were analyzed in terms of the mean and standard deviation of LOES items. It can be concluded that the experimental group students' perceived learning was very high (X=4.30), the students were highly satisfied (X=4.51) with the usability of the learning objects, and they highly engaged (X=4.38) with the learning objects.

The analysis of data coming from LOES showed that students believed that learning objects facilitated their learning of social studies lesson subjects. Also, students felt that using learning object in a lesson was more beneficial in terms of learning gain than not using it. In addition, in the interviews, 14 students commented that their achievement and learning increased in the learning objects enhanced learning environment. Moreover, the teacher believed that experimental group students' performance in the classroom and their learning had increased when compared with the fall semester, and experimental group students' performances were better than control group students'. The learning objects which were interactive, challenging in nature, and containing audiovisuals were identified as the most beneficial. Interactivity is considered to be beneficial to students' learning in computer aided instruction. Majority of research indicated that interactivity is key factor in knowledge construction and cognitive skills development (Evans & Gibbons, 2006; Mayer & Chandler, 2001; Schaffer & Hannafin, 1986). So, interactive nature of some learning objects might have positively affected students' perceived learning. Because of their potential to facilitate student engagement in instruction process, to force learners to increase their mental effort and to improve comprehensiveness (Schaffere & Hannafin, 1986), videos in the learning objects might be perceived as beneficial for students' learning by them. Also, it was observed that students in the experimental group finished the learning activities successfully and they rarely complained about the difficulty of the subjects of the lesson.

The findings of this study about students' perceived benefits of learning objects on their learning are consistent with the findings in the literature. Türel and Gürol (2011) investigated the positive and negative effects of learning objects in the science classroom within the students' perspective and concluded that according to teachers and students, learning objects were important materials which had positive effects on students' learning. In addition, Shih et al. (2011) inquired the feasibility of learning objects based context aware u-learning with students' and teachers' opinions, and revealed that learning objects were capable of enhancing students' motivation and learning effectiveness. Moreover, Baki and Çakıroğlu (2010) questioned the effectiveness of learning objects in high school mathematics classroom from students' and teachers' viewpoint. At the end of the study, students evaluated the learning objects as highly sufficient in terms of learning value and value added by learning objects.

The findings coming from the LOES showed that the learning objects had high usability degree for students. They could easily use the learning objects, the audiovisual quality of learning objects were high, and the visuals in the learning objects were explanatory enough to help them to learn the subjects. Interview results verified the results of the LOES in terms of usability of learning objects. Students expressed that although some of the videos in learning objects were blurred and the voice of videos were not heard easily in the IT classroom (n=5), they were easy to use (n=17), the visual design of them were good and not confusing (n=13), the messages in them clearly presented (n=6), and visuals and audio were related with the subject matter (n=6).

Visual design is an important factor that leads to create interest and is a doorway to use (Çakıroğlu & Akkan, 2011; Hawthorn, 2000). The learning objects' interfaces were designed by the researcher considering the target group students. In the learning objects less complex interfaces, bright colors, large, intuitive buttons and icons, and characters were used. As the students found the interface and presentation of knowledge in the learning objects generally useful and attractive, they might have engaged in the learning objects.

In addition to high perceived learning and usability rating, the learning objects highly engaged the students in the learning activities in them (X=4.38). Students were ambitious to use the learning objects and to make the learning activities in them. Students found the learning object enjoyable and liked them. In addition, six of the interviewed students stated that learning activities in the learning objects had sufficient challenging in order that students engage with the learning objects. They were ambitious to end the activities in learning objects, and sometimes get help from each other and the teacher when they get difficulty in making the activities (n=4). The results coming from the observations were parallel with the results of LOES' engagement construct and interviews with students. It was observed that students stated that most of the learning objects were challenging, they used learning objects to the end to make the activities in learning objects, and they had fun while implementing the activities in leaning objects. The results of this study on students' engagement with learning objects supported the findings of studies investigating the engagement of students with learning objects. In Cameron and Bennett's (2010) study, primary school students highly engaged with The Le@arning Federation's learning objects. The observed students usually worked collaboratively and demonstrated high level of reasoning behind their choices in order to solve problems posed by learning objects. Kay and Knaack (2007, 2008a, 2008b, 2009, 2012) made some series of research investigating the effectiveness of learning objects in several learning settings and reported that students had moderately high positive feelings about engagement features of learning objects. In addition, students found learning objects interesting and fun, liked the learning objects, and expressed that learning objects approach was more effective than other instructional methods.

The introduction of new technologies into learning environment may cause novelty effect for students and teachers. In the case of novelty effect, students were expected to be highly motivated and excited when the learning objects first introduced to the social studies lesson, and expected that their motivation decrease over time (Solvber, 2003). Engagement of students with learning objects might be attributed to novelty of using learning objects for instruction. Although, all

students in the experimental group had computers and the Internet connection at their home, and they had computer literacy course in their 4th and 5th grades, use of computer technology was a new instructional approach for them. So, they might engage with the learning objects during the experimentation.

The challenging nature of activities in the learning objects used in this study might be another reason for students' high engagement with learning objects. Six of the interviewed students found that the activities in the learning objects neither too difficult nor too easy to implement. If the level of difficulty offered by the learning objects was higher or lower than students' level, then they might rapidly disengage from learning objects (Lowe et al., 2010). Also learning objects might have exploited the entertainment potential of games and students might have fun of using the learning objects (Schibeci et al., 2008). So, students' fun of the activities in the learning objects might provide high engagement of students (Lowe et al., 2010).

Teacher's guidance and encouragement in the experimental group might have positively affected students' engagement with learning objects. Teaching with learning objects was a new instructional process for the social studies teacher. Integrating learning objects to the instruction process influenced teacher's role in the learning environment. While the instruction in the control group was mainly teacher-directed in format, in the experimental group students were mainly active and the teacher was more active in guiding and supporting the students while they were implementing the activities within learning objects. As nine of the students and teacher stated in interviews, he let them to study individually, gave them responsibility to make the learning activities and directed or guided them during the study. So, the teacher might have created more intrinsic and extrinsic motivation compared with the control group, and experimental group students might be engaged more with learning objects by seriously approaching them (Lowe et al., 2010).

5.3. Students' Learning in the Social Studies Lesson

The second research question asked whether there was a significant difference between the achievement scores of students who use learning objects and who do not use the learning objects in social studies lessons. Before the study was implemented, there was not a significant difference between pre-achievement test scores of experimental and control group. After the treatment, the quantitative results of the study indicated that both groups' post-achievement test results were significantly higher than their pre-achievement test results. In addition, the finding indicated that the post-achievement scores of the experimental group students were significantly higher than control group students' post-achievement scores.

In order to deeply investigate and better understand whether learning objects had positive effects on students' learning, data regarding students' learning from LOES, interviews with students, and observations were also analyzed. Analysis of the learning construct in LOES indicated that use of learning objects facilitated students learning in the social studies lesson (X=4.30). Studying with the learning objects helped them to learn the subjects (X=4.30) and they learnt the subjects in the social studies lesson easier (X=4.25). This finding coincided with the findings from the interview in which 14 students stated that they learnt better with learning objects, and their achievement increased in the spring semester in which the learning objects were used in the instruction process when compared with the fall semester in which the learning objects were not used. In addition, the teacher confirmed the interviewed students by asserting that experimental group students were more successful when compared with their performance in the fall semester and the control group.

Some of the studies have investigated the effectiveness of learning objects in several learning environments. Similar to findings of some research, the learning objects may be effective tools that can enhance students learning and increase students' academic achievement. In their research, Akpınar and Şimsek (2007) in which they investigated the effectiveness of learning objects developed by senior instructional design students on elementary and secondary school

students' achievement, they concluded that in the half of the research implemented with their students' learning objects, the learning objects significantly improved students' learning in the units the learning objects were used. In his study, Türel (2008) stated that the learning environment enriched with learning objects had positive effects on students' academic achievement, and learning objects facilitated the retention of knowledge. As a result, the finding of this study is parallel with the findings of similar studies (Akpınar & Şimşek, 2007; Jaakkola and Nurmi, 2004; Kay & Knaack, 2007; Lim, Lee & Richards, 2006; Sedig & Lieng, 2006; Türel, 2008).

Although experimental group students' higher scores might be due to the use of learning objects in the learning environment, there may be some conditions that could not be controlled during the study, such as students' repetition of subjects at home, their use of exercise books, use of the Internet to make research, or getting help from their parents. In the interviews, experimental group students stated that they repeated the learning activities at their home, revisited the web site containing the learning objects over and over, used textbooks or exercise books to study lesson or do homework, and used the Internet to make research about the lesson or do homework. In addition, when they did not understand the topic in the lesson, they asked their parents or friends outside of the classroom. Their interaction with the environment might have affected their learning positively. As all variables cannot be controlled in experimental studies in educational research (Fraenkel & Wallen, 2006), those extraneous variables might have influenced students' achievement positively.

Learning environment has a novelty effect on the students if they take the technology enhanced course for the first time (Chellman & Duchastel, 2000). The significant difference between the experimental and control group students' post-achievement test scores can be accounted for the novelty effect of the new instructional approach for them. The students who participated in this study had not taken a course in which the learning objects used before.

This study investigated the relationship between the LOES scores of the learning objects and the students' learning through the learning objects through correlation studies. It was found that there was a positive and significant correlation between students' achievement and their evaluation of learning objects. Students' high rating of learning objects might have been considered as one of the reasons for experimental group students' higher achievement. In contrast to this result Akpınar (2008) found that the difference between pre- and post-test scores did not correlate significantly with the teachers' or the students' ratings of the learning objects in terms of LORI scores. He asserted that in his study students used learning objects in a self-directed exploratory environment, with little input or interaction from the supervising teachers. The difference between his study and this study was the teacher's guiding of students while they were using learning objects. Teacher changing role and guidance might be a reason for students' higher achievement in the course and satisfaction with learning objects.

As mentioned in the previous section, interactivity in educational software is a crucial factor enhances students' learning. The interactive games and learning activities in the learning objects might have increased students' achievement in this study.

Lowe et al. (2003) emphasize that appropriate challenges that provide sustained emotional and cognitive interest and student input are keys for student engagement and learning. The level of challenge provided in the learning objects might have matched the student's skill level.

Research shows that the quality of learners' engagement with educational software may significantly influence their learning (Bangert-Drowns & Pyke, 2001; Bangert-Drowns & Pyke, 2002). Both quantitative and qualitative results of this study showed that the students in the experimental group highly engaged with the learning objects. In LOES, students showed that they engaged with the learning objects (X=4.38), and in interviews they stated that they used the learning objects enthusiastically, they had fun while using them, used them to the end, and raced

with each other to complete the activities in the learning objects. So, experimental group students' engagement with the learning objects might have influenced their achievement in the social studies lesson.

In addition, students' engagement in the learning environment might have increased experimental group students' achievement. Students' engagement in the learning environment has been regarded as a crucial element in classroom learning (Bangert-Drowns & Pyke, 2002; Fredricks et al., 2004). One of the results of this study which showed that there was a positive and significant relationship between students' achievement and their course engagement was in line with the literature. While there was a significant increase in experimental group students' engagement and their engagement scores were significantly higher than control group students' scores, it can be concluded that the higher increase in experimental group students' achievement might be due to their higher engagement in the social studies lesson.

In control group, the teacher presented visuals such as concept maps, images, maps or videos through the projector. However, students were not able to investigate the visuals individually. In contrast, students in the experimental group had the opportunity to examine the visuals individually. Visual representation of knowledge, helping learners to visualize knowledge, and its application facilitates many aspects of learning, such as encoding, comprehension and application of knowledge (Alessi & Trollip, 2001). In LOES, experimental group students concluded that the visuals such as graphics, images, and videos in the learning objects enhanced their learning in the social studies lesson (X=4.40). In compatible with this quantitative result, in the interviews, seven students emphasized that the visuals in the learning objects helped them to concrete the abstract concepts and cases, and gave real life examples. The visuals also helped them to learn the many aspects of the subjects. So, it can be said that the visuals might have improved experimental group students' learning better than control group students. The findings of this study are consistent with empirical evidence in the literature that audio and visual representations has a more beneficial effect on learning social studies learning (Boster, Meyer, Roberto, Inge & Strom, 2006; Hammond & Lee, 2010; Hofer & Swan, 2005; van Hover, Swan & Berson, 2004).

Another issue to consider is guidance of students by teacher. Guidance is important in instruction because novice learners cannot learn everything from a single exposure. Guiding the learner in a technology assisted learning environment is of great importance in achieving the aims of instruction enriched with technology. One of the reasons for the significant difference between the experimental and control group may be the much instructional guidance of the teacher to the experimental group students. While in the control group the instruction was mainly teacher-directed in format and the teacher motivated and encouraged students to actively engage in the classroom discussions, in the experimental group, the same teacher was more active in guiding the students, encouraging them to make the activities in the learning objects and to participate in the discussions in the classroom. As nine of the interviewed students told, the teacher helped the experimental group students in making the instructional activities in learning objects. Also, he guided them while using the learning objects and while they were making the activities in the learning objects, and encouraged them to participate in the classroom discussion. Moreover, the teacher defined his role in the classroom enriched with learning objects as leader and guider of students. In addition, in accordance with the interview results, the observation results supported the teacher's statements. It can be said that the teacher was a guide and a facilitator in the experimental class, so this may bring the significant difference between the student groups.

In summary, it can be concluded that social studies lessons enhanced with learning objects have a positive effect on students' academic achievement for students if their achievement scores are interpreted as success in acquiring the knowledge in the course content. It can be said that rather than the novelty effect of learning objects, students' high engagement with learning objects, visual representations of knowledge by learning objects, students' positive opinions about learning objects, and interactive nature of learning objects might have influenced students' learning positively.

5.4. Students' Attitudes toward the Social Studies Lesson

The third research question asked whether there was a significant difference between the students who used learning objects in the social studies lesson and those who did not use in terms of attitudes toward social studies lesson. Before the study, the results of the analysis of pre-survey on students' attitudes toward social studies lesson showed that experimental group students' pre-attitude scores was not significantly different than control group students' scores. After the application, the experimental group students' attitude scores increased significantly. However, the control group students' scores did not differ significantly than their pre-attitude scores. In addition, experimental group students' post-attitude scores were significantly higher than control group students' scores.

Studies that have been implemented about the influences of learning objects enriched instruction on students' attitudes indicated that it makes positive changes in students' attitudes toward lessons. For example, in his study, Türel (2008) investigates effects of using learning objects on students' attitudes toward science lesson. He found that although the attitude scores of control group students decreased slightly, experimental group students' attitude scores in the science lesson improved. In parallel to the results of this study, Kay and Knaack (2008) stated that students had positive attitudes toward the social studies, mathematics, and science lessons after using learning objects in the instruction process. Also, the findings of this study about the attitudes of students toward the lesson are parallel with the results of the study of Lopez-Morteo & Lopez (2007) in which they investigated the feelings of students on mathematics lesson implemented with Interactive Instructors of Recreational Mathematics which were educational software components, specializing in mathematical concepts.

The interviews with the students supported the quantitative results on students' attitudes toward the lesson. In the interviews, 15 students commented that they liked the lessons with learning objects more than the lessons without learning objects. In addition, it was observed that students did not get bored during the lesson, and had fun while implementing the learning activities in the IT classroom. The lessons were also more enjoyable when compared with the lessons in the fall semester. It can be said that, as 15 students mentioned in the interviews, the attributes of the learning objects which made the lesson more enjoyable and made the students liked the lesson more were the games, interactive learning activities, and videos in them.

Apparently, perceived benefits of taking learning objects enriched course, and the actual value associated with the interactive features of learning objects assisted instruction may have helped to shape students' attitudes towards social studies lesson. If students feel that they are responsible for their own learning and they are active in the learning environment, they may have positive attitudes toward the delivery medium and the lesson (Hoffman, 2002). In their interviews, the students commented that they had more responsibilities, and they were more active in the social studies lesson in the spring semester when compared with the lesson in the fall semester.

Attitudes toward learning objects enhanced instruction are considered to influence not only the acceptance of them, but also future attitudes toward the lesson. According to the interview results, 15 students liked the learning objects and the learning activities in them. Using the learning objects, the students played enjoyable games, made different instructional activities, and watched several videos related with real life. The development of positive attitudes might be related to the easy involvement of the students in learning activities in the learning objects (Manual, 2001; Matuga, 2001). It can be said that positive attitudes of students toward the learning objects used in the lessons might have positively affected their attitudes toward the social studies lesson.

This result can be understood as successful because the students' attitudes toward the lesson did change the students' attitudes positively. So, it can be concluded that the learning objects enhanced instruction might have positively affected the students' attitudes toward the social studies lesson.

5.5. Students' Engagement in the Social Studies Lesson

The fourth research question asked whether there was a significant difference between course engagement scores of students who use learning objects and who do not use learning objects in social studies lessons. Before the study, control group students' engagement in the social studies lesson was not significantly different than the experimental group students'. The quantitative results of the study indicated that there was a significant difference between the pre-engagement and the post-engagement scores in the course engagement scale of solely experimental group students at the end of the study. In addition, post-engagement scores of experimental group students were significantly higher than control group students' post-engagement scores. The qualitative findings of the study supported the findings of the quantitative part of the study regarding the students' engagement in the social studies lesson. 15 students stated that their participation in the lesson in the spring semester was higher than their participation in the fall semester.

The results of this study regarding the *students' engagement* in the course are parallel with some studies in the literature. In their study, Salas and Ellis (2006) emphasized that students were better prepared for workshops and were more engaged in class discussions when they used the learning objects at their own pace. Learning Units, a special type of learning objects specifically designed for the students who had difficulties in learning Calculus, helped math educators to quickly engage their students in important mathematical processes (Andrade-Arechiga, Lopez & Lopez-Morteo, 2012). Türel (2008) also reported that using learning objects in the science classroom increased students' motivation to learn. The results of this study regarding students' engagement with learning objects are contradictory to Kay and Knaack's study (2008). Kay and Knaack (2008) reported that although majority of teachers felt that students were engaged in the learning objects, and commented that their students enjoyed while using the learning objects, students rated their engagement with the learning objects as neutral. In addition, in one of their previous studies (2007), in which the learning objects developed for the secondary school mathematics were evaluated by the students, they reported that students' engagement with the learning objects were not high. For them the result for neutral engagement of students might be due to the design of learning objects because learning objects might have not been suited for each student's learning style and teachers might have tested learning objects with a few representative students.

The learning activities and the games in the learning objects might be sufficiently challenging to engage students. The level of challenge might have matched the student's skill level. The tasks prepared by the teacher and academician in social studies teaching department were neither too hard for the students to give up easily, nor were too easy for the students to become bored. The results of this study supported Lowe et al.'s study (2010) in which they examined the usability and effectiveness of learning objects in Australian and New Zealand schools and reported that although students had high engagement level at the beginning of the study, they rapidly disengaged from some learning objects as they did not offer appropriate challenge. They proposed that learning objects should have difficulty, and students should have manageable effort to overcome this difficulty.

Research indicates that engagement is increased when students feel a sense of control over their own learning (Alderman, 2008). One way of enhancing engagement is to give students decision making opportunities, starting early stages of a course (Bates & Poole, 2003). Although, in some learning activities the teacher controlled the students' learning, generally the role of the teacher in the learning objects enriched learning environment was to encourage and guide the students in this study. Students had the opportunity to implement the learning activities in the learning objects at their own pace and in their own control. Also, it was frequently observed that the teacher let the students to work individually and freely. Experimental group students' individual use of learning objects at their own control and own pace might have increased their engagement in the lesson.

One effective way to students' course engagement requires individualized learning that is tailored to students' needs and daily live. This strategy is mainly based on the finding that students are more likely to engage in material in which they perceive it to be meeting their needs and corresponding to their daily lives (Alderman, 2008). From interviews with students it could be understood that the learning activities implemented within the learning objects evoked the cases or events the students may encounter in their daily lives, in the news, or in their social relationships. Several authentic activities, real life videos and real life images were provided to experimental group students as well as the control group. In contrast to control group students' watching or analysis of digital or nondigital audio-visuals in the blackboard, experimental group students were provided the same digital images at their own computers, and they had the opportunity to repeat the video or analyze the images individually. Also, it was frequently observed that students connected the issues of the social studies lesson with their daily lives and the news or TV programs such as films or TV series. In addition, in both groups, the teacher asked students to watch the news on TV and find the news related with the subjects, and to bring news on newspapers to the classroom to make connection between the issues of the social studies lesson and the real life. The integration of learning objects containing videos, images or activities about daily life, teacher's connection of students' daily life with the content of the social studies lesson might have been regarded as one of the reasons for experimental group students' higher course engagement.

Engagement with the learning material influences the engagement of the learner in the learning environment. Students' interaction with the learning objects might have increased their engagement in the classroom environment. In this study, the students highly engaged with the learning activities in the learning objects. Data from the engagement construct in the LOES indicated that students liked the learning objects and the learning activities in them (X=4.42), examined them in order to make the activities (X=4.33), and learning objects increased their participation to the classroom discussion (X=4.39), and positively influenced curiosity in the subjects (X=4.37). In addition, 15 students liked the learning objects, and 11 of them enthusiastically made the activities in them. Moreover, it was observed that students used learning objects to the end, and competed to implement the activities in learning objects. Findings of this study regarding students' engagement with learning objects were consistent with some studies in literature. For example, Freebody (2005) after studying with several learning objects in different subject areas reported that the participants of his study had increased motivation in the lessons through engagement with learning objects as well as increase in learning and achievement.

In their study, Cameron and Bennett (2010) observed that most students working in collaboration showed high engagement with the learning objects during the study. Also, they participated to the discussions in the classroom, listened to the instructor, and were able to make real-life connections. Although the learning objects in this study were first developed for individual learning, as there was not one computer per student, two students had to use each computer and had to study together during the research. As stated in the interviews, sometimes they made the activities in the learning objects together, and helped each other. This situation might have advanced students' course engagement.

One of the criteria Haughey & Muirhead (2005) looked at for assessing the learning objects was that "The technology helps learners to engage effectively with the concept/skill/idea." According to the results on the effects of learning objects on students' engagement, in summary, it can be concluded that learning objects may be effective tools which may positively influence students' course engagement in the social studies lesson. Students might have actively engaged with learning objects by receiving immediate feedback on learning experiences from unique information sources. When students are engaged in learning environments enriched with learning objects, they construct their own knowledge, with the teacher as the facilitator of the process. So, learning objects should be designed in ways that are useful and attractive for the students to engage in them.

5.6. Implications for Practice

This investigation was undertaken to compare 6th grade students who used learning objects and who did not use them in the instruction process in terms of their academic achievement, attitudes toward social studies lesson, and engagement in the course. The results of this study have some implications for educators and instructional designers considering the incorporation of learning objects into their learning environments. A number of considerations may be considered as they apply to future use and design of learning objects.

The results of this study shows that learning objects might be effective tools to facilitate 6th grade student's achievement, attitudes toward social studies lesson and engagement in the social studies lesson. So, implementation of learning objects in social studies lesson by teachers should be encouraged.

During the experimentation, the social studies teacher guided and encouraged students while they were using learning objects. Students stated that they were satisfied with the teacher's role in the classroom. In order to sustain students' motivation and engagement in instructional processes enriched with learning objects, the teacher should have an active role such as guiding them, encouraging them, connecting daily life with content, clarifying the contents, enabling the learners to make sense of the content and activities. The potential of learning objects can be achieved when the teacher scaffolds students' interaction with the content and instructional activities.

The adaptation of learning objects in the instruction of social studies lesson changed the teacher's instructional process and role in the learning environment. The use of learning objects in the classroom might not solely increase students' achievement, attitude and engagement. It might be the integration of learning objects into the instructional strategies employed to enhance students' cognitive or affective learning. So, while instructors were selecting learning objects to use in the learning environment, they should consider their instructional strategies and then embed learning objects. Or, instructional designers should develop their learning objects by taking into account the instructional strategies of instructors and the instructional context. The ways they are designed and implemented, and the learning environments created around them will determine their pedagogical value (Nurmi & Jaakkola, 2006).

In this study, learning objects were designed and developed in cooperation with social studies teacher involved in the study. As the teacher was at the core of the instructional design of learning objects by stating the goals and needs of instruction and revising the learning objects, he adopted the learning objects enthusiastically. Also, placing the teacher as one of the actual users of the learning objects facilitated the instructional design process. Also, learning objects can be readily generated and accessed per specific goals of teachers and students. They should be developed through iterative design by getting feedback from the target group.

Social studies is a subject that depends on the use of a number of resources such as text-based materials, visuals or audio. Audio-visual materials are very useful in teaching social studies (Okobia, 2011). One of the results of this study showed that learning objects including audio and visual may enhance students' learning and increase their attention. Instructional designers may integrate audio-visuals into learning objects in order to enhance learning and instruction process, and to encourage and motivate the students in the lesson.

The use of learning objects containing several instructional activities helped the instructor to conduct different types of activities in the lesson and increased students' interest. So, number of learning objects which include games, puzzles, races, and different interactive activities may be increased in order to increase students' interest and motivation in the classroom.

Although there were videos, images and graphs in the learning objects, they also included text, and some of the texts were long. Some of the students stated that it was boring to read the long

text. Instead of reading long paragraphs, to continue their motivation and engagement, instructional designer may use audio as option or develop animations with short texts about the content.

The IT classroom where the experimentation was done was not suitable in order to make such an instruction. Each student did not have a computer in the classroom, and the computers' hardware was not sufficient to apply the learning objects unproblematically. Also, the Internet connection speed of computers was low. In order to accomplish the potentials of learning objects, the deficiencies in the technological dimensions should be overcome.

During the intervention, in the experimental group, two students had to use one computer. In the interviews, some of the students complained of unavailability of using computers individually in the learning environment. For this reason, some students were unable to follow the lesson. In order that students could use the instructional materials individually, the IT classroom should be redesigned and equipped in consideration with the number of students in the classroom or needs of the instructional strategies of the teacher.

One of the reasons behind the learning objects approach is to reduce the cost of development of technology based education by subsequent reuse in a wide range of different contexts. By sharing, reusing learning objects or combining them with other such entities to build larger chunks of instruction for the same or different contexts, instructional designers may reduce the cost of developing new instructional materials, and teachers may reduce the time they spend to create or search for learning materials.

5.7. Recommendations for Further Research

This study is one of the comprehensive studies in the field of learning objects. The study provides a statistically significant result about the use of learning objects as a support for traditional classroom instruction, and also provides a model from which other studies may be replicated.

The experience gained from this study has suggested a number of recommendations for further study in the area of learning objects. The following recommendations are made for further study.

This study aimed to compare 6th grade students who used learning objects and did not use in the instruction of social studies lesson in terms of their academic achievement, attitudes toward social studies lesson, and engagement in the course. One study is not adequate to make a decision about the use of learning objects in learning environments. So, additional research is needed to replicate the results of the study, in order to verify the results of this study.

It would be interesting to conduct to determine the effects of learning objects with a larger sample size from different schools to get more accurate results and to search for a generalization.

The data collected with quantitative methods for this study were not normally distributed. As two-way ANOVA test could not be conducted to make a 2x2 comparison between experimental and control group students in terms of pre and post-test, the probability of making statistical error increased and the impact of learning objects on achievement could not be examined. In order to minimize the probability error, a study would be conducted with larger samples and collected data would be normally distributed. So, more accurate results may be obtained from larger samples for the literature, and impact of learning objects on students' achievement with other variables can be evaluated.

Learning objects developed for this study were used in the learning environment within one teacher's instructional approach. It would be interesting to use learning objects within several teachers' instructional approaches in order to investigate the effects of learning objects in different learning environments with different teachers' instructional approach, and to compare the results for different environments.

Because achievement tests were administered immediately following lecture and learning objects enriched instruction, long term knowledge retention could not be determined. The concept of retention is almost always an integral part of learning and refers to the process whereby long-term memory preserves learning in such a way that it can locate, identify, and retrieve it accurately for use at a later time (Driscoll, 2005). The level of retention of knowledge depends on the type of instructional method. Instructional methods that allow students to participate actively in the learning process have a significant impact on long-term retention. So, it would be valuable to determine the effect of learning objects enriched instruction on learners' knowledge retention.

When a new technology is firstly introduced to the learning environment, students' performances improve in response to increased interest in the new technology. If experimental group students' achievements, attitudes toward social studies lesson and course engagement are due to novelty effect, their scores tend to decrease over time (Clark & Sugrue, 1995). So, longitudinal studies with the same topics and the same student groups in their 7th and 8th grades can be conducted in order to investigate the long time effect of learning objects.

Another research topic for consideration would be a case study of teachers' use of learning objects in the classroom. Literature about use of learning objects in the classroom shows that it is the pedagogical setting which makes learning objects approach successful. So, it would make great contribution to the literature to reveal how teachers use learning objects in the instructional process and to deeply investigate the characteristics of the learning environments where the learning objects are used successfully.

This study has some limitations. Students could not use the computers in the IT classroom individually while implementing the learning activities. Two or sometimes three students used one computer. This study can be redesigned accordingly, covering the same subject area and for the same grade level after overcoming this limitation. Such an investigation regarding the learning objects use in learning environments could provide valuable information for the literature.

Another limitation of this study depends on the slow Internet connection speed of the computers in the IT classroom. Because of this, a learning object repository where the students log in and their logs are kept could not be generated and used for this study. It would be interesting to deeply investigate how students used the learning objects by collecting the students' data in the learning objects repository log system.

REFERENCES

ADL (Advanced Distributed Learning) (2001).*Sharable Content Object Reference Model (SCORM)*.Retrieved from: http://www.adlnet.gov/capabilities/scorm/scorm-version-1-2

ADL (2009).*SCORM 2004 4th Edition Version 1.0*. Retrieved from: http://www.adlnet.gov/Technologies/scorm/SCORMSDocuments/2004%204th%20Edition/Overview.aspx.

Akpınar, Y. (2008). Validation of a learning object review instrument: Relationship between ratings of learning objects and actual learning outcomes. *Interdisciplinary Journal of E-Learning and Learning Objects*. 4, 291-302.

Akpınar, Y. & Şimşek, H. (2007). Pre-service teachers' learning object development: A case study in K-12 setting. *Interdisciplinary Journal of Knowledge and Learning Objects.* 3, 197-217.

Alderman, M.K. (2008).*Motivation for achievement: possibilities for teaching and learning*. New York, NY: Routledge.

Ally M., Cleveland-Innes, M., Boskic, N., Larwill, S. (2006). Learners' use of learning objects. *Journal Of Distance Education Revue De L'éducation À Distance.* Fall/Automne, 2006.21(2).44-57.

Altun, A. (2009). Kavram öğretiminde içerik geliştirme aracının tasarlanması ve etkiliğinin değerlendirilmesi.Retrieved from: http://www.ontolab.hacettepe.edu.tr/wp-content/Publications/proje_AA.pdf

Andrade-Aréchiga, M., López, G. & López-Morteo, G. (2012) Assessing effectiveness of learning units under the teaching unit model in an undergraduate mathematics course. *Computers & Education* 59 (2), 594-606.

Andrade-Aréchiga, M., López, G. & López-Morteo, G. (2012).Assessing effectiveness of learning units under the teaching unit model in an undergraduate mathematics course.*Computers & Education*, 59 (2), 594-606.

Baki, A. & Çakıroğlu, Ü. (2010). Learning objects in high school mathematics classrooms: implementation and evaluation, *Computers & Education*, 55 (4), 1459-1469.

Balatsoukas, P., Morris, A., & O'Brien, A. (2008).Learning objects update: Review and critical approach to content aggregation. *Educational Technology & Society*, 11 (2), 119-130.

Bangert-Drowns, R. L. and Pyke, C. (2001) A taxonomy of student engagement with educational software: An exploration of literate thinking with electronic text. *Journal of Educational Computing Research*, 24 (3), 213-234.

Bangert-Drowns, R.L. & Pyke, C. (2002). Teacher ratings of student engagement with educational software: An exploratory study. *Educational Technology Research and Development*, 50 (2), pp. 23–38.

Bannan-Ritland, B., Dabbagh, N. & Murphy, K. (2001) Learning object systems as constructivist learning environments: Related assumptions, theories and applications.In D. Wiley (Ed.) *The Instructional Use of Learning Objects* (pp. 61-97). Retrieved from: http://reusability.org/read/chapters/wiley.doc (last accessed 1 July 2008).

Barritt, C. & Alderman Jr., F. L. (2004).*Creating a Reusable Learning Objects Strategy: Leveraging Information and Learning in a Knowledge Economy.* San Francisco, CA: Wiley Books.

Bates, A.W. & Poole, G. (2003).*Effective teaching with technology in higher education*. San Francisco, CA: Jossey-Bass.

Bennett, K. & McGee, P. (2005): Transformative power of the learning object debate, *Open Learning: The Journal of Open, Distance and e-Learning*, 20:1, 15-30

Bogdan, R. and Biklen, S. K. (1998) Q*ualitative research for education*. Boston: Allyn and Bacon.

Bradley C. & Boyle T. (2004).The design, development and use of multimedia learning objects.*Journal of Educational Multimedia and Hypermedia, Special Edition on Learning Objects*, 13 (4), 371-389.

Buzzetto-More, N.A. & Pinhey, K. (2006).Guidelines and standards for the development of fully online learning objects.*Interdisciplinary Journal of Knowledge and Learning Objects,* 2006 (2), 96-104.

Büyüköztürk, Ş. (2011).*Sosyal bilimler için veri analizi el kitabi istatistik, araştırma deseni SPSS uygulamaları ve yorum*. Ankara, Pegem Yayıncılık.

Cameron, T., & Bennett, S. (2010). Learning objects in practice: The integration of reusable learning objects in primary education. *British Journal of Educational Technology*, 41, 897–908.

Clark, R., & Sugrue, B. (1995).Research on instructional media, 1978-1988. In G. J. Anglin (Ed.), *Instructional technology: Past, present, and future (2nd edition)*. Englewood: Libraries Unlimited, Inc. (pp. 348-364).

Cebeci, Z. (2003). Öğrenim nesnelerine giriş, *Elektronik Sosyal Bilimler Dergisi*. 6, 1-6.

Chapman, P., Selvarajah, S. & Webster, J. (1999).Engagement in Multimedia Training Systems.In *Proceedings of the Thirty-Second Annual Hawaii International Conference on System Sciences*.

Cisco Systems. (1999). Reusable information object strategy.Retrieved from: http://www.cisco.com/warp/public/779/ibs/solutions/learning/whitepapers/el_cisco_rio.pdf

Cisco Systems (2003). Reusable learning object strategy: Designing and developing learning objects for multiple learning approaches. Retrieved from: http://www.e-novalia.com/materiales/RLOW__07_03.pdf

Clyde, L. A. (2004). Digital learning objects. *Teacher Librarian*, 31 (4), 55-57.

Cochrane, T. (2005). Interactive quicktime: Developing and evaluating multimedia learning objects to enhance both face-to-face and distance e-learning environments. *Interdisciplinary Journal of Knowledge and Learning Objects*, 1, 33-54.

Cohen, L., Manion, L & Morrison, K. (2007) *Research methods in education*.(6th ed). London: RoutledgeFalmer.

Collis, B.A. and Strijker, A. (2003) Re-usable learning objects in context.*International Journal on E-learning*, 2 (4). pp. 5-16.

Creswell, J. W. (1999). Mixed method research: Introduction and application.In T. Cijek (Ed.), *Handbook of educational policy* (pp. 455–472). San Diego, CA: Academic Press.

Creswell, J. W. (2005). *Educational research: Planning, conducting, and evaluating quantitative and qualitative approaches to research. 2nd ed*. Upper Saddle River, NJ: Merrill/Pearson Education.

Creswell, J. W., & Plano Clark, V. L. (2006).*Designing and Conducting Mixed Methods Research*. Thousand Oaks, CA: Sage.

Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technology in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal*, 38(4), 813-834.

Çokluk, Ö., Şekercioğlu, G. & Büyüköztürk, Ş. (2010). *Sosyal bilimler için çok değişkenli istatistik.* Ankara, Pegem Yayıncılık.

Demir, S. B. & Akengin, H. (2010). Sosyal bilgiler dersine yönelik bir tutum ölçeğinin geliştirilmesi: Geçerlik ve güvenirlik çalışması. *E-International Journal of Educational Research*, 1(1), 26-40.

DeVellis, R. F. (2003). *Scale Development Theory and Applications (2nd ed.).* Thousand Oaks: Sage.

Doctor, G. & Ramachandran, S. (2007). Learning object repositories: An emerging knowledge management tool for sharing and reusing learning resources. *The ICFAI Journal of Knowledge Management*, 2.

Dong, A., & Agogino, M. A. (2001). Design principles for the information architecture of a SMET educational digital library. *Communications of the ACM,* 314 – 321.

Driscoll, M.P. (2005). *Psychology of learning for instruction*. (3rd ed.). Boston: Pearson Education, Inc.

Eagly, A. H., & Chaiken, S. (1998). Attitude structure and function.In D.T. Gilbert, Susan T. Fiske, and G. Lindzey (Eds.).*Handbook of Social Psychology,*269–322. New York: McGraw-Hill.

Eduworks & O.K.I. Leadership (2002). OKI white paper: What is the open knowledge initiative? Retrieved from: http://web.mit.edu/oki/product/whtpapers/whatis.html

Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration.*Educational Technology Research and Development,* 47(4), 47-61.

Fraenkel, J.R., & Wallen, N.E. (2006).*How to design and evaluate research in education*. NY: McGraw-Hill.

Fredericks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research*, 74, 59 – 109.

Friesen N. (2001). What are educational objects? *Interactive Learning Environments*, 9(3).

Friesen N. (2004). Three objections to learning objects and e-learning standards.*In* McGreal, R. (Ed.).*Online Education Using Learning Objects.* London: Routledge.

Gadanidis, G., Gadanidis, J., & Schindler, K. (2003).Factors mediating the use of online applets in the lesson planning of pre-service mathematics teachers.*Journal of Computers in Mathematics and Science Teaching*, 22(4), 323-344.

Gibbons, A., Nelson, J., & Richards, R. (2002).The nature and origin of instructional objects.*In D. Wiley (Ed.), The instructional use of learning objects (pp. 25–58).* Bloomington, IN: Agency for Instructional Technology.

Hamel, C. J., & Ryan-Jones, D. (2002) Designing instruction with learning objects. *International Journal of Educational Technology*, 3(1). Available at: http://education.illinois.edu/ijet/v3n1/hamel/index.html

Handelsman, M. M., Briggs, W. L., Sullivan, N., & Towler, A. (2005).A measure of college student course engagement.*The Journal of Educational Research*, 98, 184-191.

Hatala, M. and Nesbit, J. 2001.An evolutionary approach to building a learning object repository.*Proceedings of the 4th IASTED International Conference on Computers and Advanced Technology in Education (CATE 2001).* Calgary: ACTA Press

Hatch, J. A. (2002).*Doing qualitative research in education settings*. Albany: SUNY Press.

Haughey, M. & Muirhead, B. (2005).Evaluating learning objects for schools.*E-Journal of Instructional Science and Technology*, 8(1).Available at: http://www.usq.edu.au/electpub/e-jist/docs/vol8_no1/fullpapers/eval_learnobjects_school.htm.

Haughey, M. and Muirhead, B. (2005).The pedagogical and multimedia designs of learning objects for schools.*Australasian Journal of Educational Technology*, 21(4), 470-490. Available at http://www.ascilite.org.au/ajet/ajet21/haughey.html

Heafner, T. (2004).Using technology to motivate students to learn social studies.*Contemporary Issues in Technology and Teacher Education*, 4(1). Available at: http://www.citejournal.org/vol4/iss1/socialstudies/article1.cfm

Hillman, D. (2001). Using Dublin Core, DCMI recommendation. Retrieved from http://dublincore.org/documents/usageguide/

Hodgins, H. W. (2002). The future of learning objects. *Proceedings of the 2002 eTEE Conference 11-16 August 2002 (pp. 76-82).* Davos, Switzerland. Retrieved September 29, 2007, from http://www.coe.gatech.edu/eTEE/pdfs/Hodgins.pdf

Hodgson, K. (1998). *Metadata: Foundations, Potential and Applications*, School of Library and Information Studies, University of Alberta.Retrieved from http://web.archive.org/web/20020814115740re_/www.slis.ualberta.ca/538/khodgson/metadata.htm.

Howe, K. R. (1988). Against the quantitative-qualitative incompatibility thesis or dogmas die hard. *Educational Researcher*, 17, 10-16.

Hug, B., Krajcik, J., & Marx, R. (2005). Using innovative learning technologies to promote learning and engagement in an urban science classroom.*Urban Education*, 40(4), 446-472.

IEEE.(2006). IEEE LTSC (Institute of Electrical and Electronics Engineers, Inc., Learning Technology Standards Committee).Retrieved from: http://ieeeltsc.org/ (last accessed: 01.05.2006)

Ilomaki, L., Lakkala, M. & Paavola, S. (2006). Case studies of learning objects used in school settings. *Learning, Media, and Technology*, 31 (3), 249-267.

IMS (2006). IMS Meta-data Best Practice Guide for IEE 1484.12.1-2002 Standard for Learning Object Metadata Version 1.3 Final Specification. Retrieved from: http://www.imsproject.org/metadata/

Jacques, R., Preece, J., & Carey, T. (1995).Engagement as a design concept for multimedia.*Canadian Journal of Educational Communication*, 24(1), 49-59.

Jarvela, S., Veermans, M., & Leinonen, P. (2008).Investigating student engagement in computer-supported inquiry: A process-oriented analysis.*Social Psychology in Education*, 11, 299-322.

Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14-26.

Johnson, B. & Turner, L.A. (2003).Data collection strategies in mixed methods research.In A. Tashakkori & C. Teddlie (Eds.) *Handbook of mixed methods in social & behavioral research* (pp. 297-320). Thousand Oaks, CA: Sage Publications.

Jonassen, D. & Churchill, D. (2004). Is There a Learning Orientation in Learning Objects? *International Journal on E-Learning*, 3(2), 32-41. Norfolk, VA: AACE.

Karaman, S. (2005).*Öğrenme nesnelerine dayalı bir içerik geliştirme sisteminin hazırlanması ve öğretmen adaylarının nesne yaklaşımı ile içerik geliştirme profillerinin belirlenmesi*.(Unpublished doctoral dissertation).Atatürk University, Graduate School of Social Sciences, Erzurum.

Kay, R. H. (2012) Exploring the use of web-based learning tools in secondary school classrooms. *Interactive Learning Environments*, 20 (1), 1-17.

Kay, R. H. & Knaack, L. (2009).Analyzing the effectiveness of learning objects for secondary school science classrooms.*Journal of Educational Multimedia and Hypermedia*, 18(2).

Kay R. H., Knaack L. (2005). Developing learning objects for secondary school students: A multi-component model. *Interdisciplinary Journal of Knowledge and Learning Objects.*Volume 1, 2005.

Kay, R. H., & Knaack, L. (2007a). A systematic evaluation of learning objects for secondary school students. *Journal of Educational Technology Systems*, 35 (4), 411-448.

Kay, R. H., & Knaack, L. (2007b). Evaluating the use of learning objects for secondary school science.*Journal of Computers in Mathematics and Science Teaching*, 26(4), 261-289.

Kay, R. H., & Knaack, L. (2008).Investigating the use of learning objects in secondary school mathematics.*Interdisciplinary Journal of E-Learning and Learning Objects*, 4, 269-289.

Kline, R. B. (2005). *Principles and practice of structural equation modeling (2nd ed.)*. New York: Guilford Press.

Kong, S. C., & Kwok, L. F. (2005). A cognitive tool for teaching the addition/subtraction of common fractions: A model of affordances. *Computers and Education,* 45(2), 245-265.

Krauss, F., & Ally, M. (2005).A study of the design and evaluation of a learning object and implications for content development.*Interdisciplinary Journal of Knowledge and Learning Objects*, 1, 1-22. Available at: http://ijklo.org/Volume1/v1p001-022Krauss.pdf

L'Allier, J.J. (1997). Frame of reference: NETg's map to the products, their structure and core beliefs. NetG.Retrieved from: http://www.netg.com/research/whitepapers/frameref.asp

Leacock, T. L., & Nesbit, J. C. (2007).A framework for evaluating the quality of multimedia learning resources.*Educational Technology & Society*, 10 (2), 44-59.

Lehman, R.M. & Conceiçao, S.C.O. (2007). American sign language learning objects for instruction: A higher education perspective. In P. Northrup (Ed.) *Learning Objects for Instruction: Design and Evaluation* (pp. 95-103). Hershey, PA: IGI Global.

Lim, C. P., & Khine, M. S. (2006). Managing teachers' barriers to ICT integration in Singapore schools.*Journal of Technology and Teacher Education*, 14(1), 97-125.

Lim, P.C., Lee, L. S & Richards, C. (2006). Developing interactive objects for a computing module, *International Journal on E-learning*, 5 (2) , 215- 221.

Lincoln, Y. S., & Guba, E. G. (1985).*Naturalistic inquiry*. Beverly Hills, CA: Sage Publications.

Liu, X., Magjuka, R. J., Bonk, C. J., & Lee, S. (2007). Does sense of community matter? An examination of participants' perceptions of building learning communities in online courses.*The Quarterly Review of Distance Education*, 8(1), 9-24.

LOM (2000).LOM working draft v4.1.Retrieved from: http://ltsc.ieee.org/doc/wg12/LOMv4.1.htm.

Longmire, W. (2001). A primer on learning objects.Retrieved from http://www.astd.org/LC/2000/0300_longmire.h

Lopez-Morteo, G., & Lopez, G. (2007). Computer support for learning mathematics: A learning environment based on recreational learning objects. *Computers & Education*, 48(4), 618-641.

Lowe, K., Lee, L., Schibeci, R., Cummings, R., Phillips, R., & Lake, D. (2010).Learning objects and engagement of students in Australian and New Zealand schools.*British Journal of Educational Technology*, 41 (2), 227-241.

MacDonald, C. J., Stodel, E., Thompson, T. L., Muirhead, B., Hinton, C., Carson, B., et al. (2005). Addressing the eLearning contradiction: A collaborative approach for developing a conceptual framework learning object.*Interdisciplinary Journal of Knowledge and Learning Objects*, 1, 79-98. Available at: http://ijklo.org/Volume1/v1p079-098McDonald.pdf

Marks, H. M. (2000). Student engagement in instructional activity: Patterns in the elementary, middle, and high school years. *American Educational Research Journal,* 37, 153 – 184.

McCormick, R. & Li, N. (2006). An evaluation of European learning objects in use. *Learning, Media, & Technology*, 31 (3), 213-231.

McGee, P. & Katz, H. (2005).A learning object life cycle.In G. Richards (Ed.), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2005* (pp. 1405-1410). Chesapeake, VA: AACE.

McGreal, R. (2004). Learning objects: A practical definition. *The International Journal of Instructional Technology and Distance Learning*, 1(9).Available at: http://www.itdl.org/Journal/Sep_04/ article02.htm

McGreal, R., & Roberts, T. (2001). A primer on metadata for learning objects: Fostering an interoperable environment. *E-learning*, 2(10), 26-29.

Merriam, S.B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco: John Wiley and Sons.

Merrill, D. (1983). Component display theory. In C. M. Reigeluth (Ed.), *Instructional Design Theories and Models: An Overview of their Current States.* Hillsdale, NJ: Lawrence Erlbaum.

Merrill, M. D. (1999). Instructional transaction theory (ITT): instructional design based on knowledge objects. In C. M. Reigeluth (Ed.), *Instructional Design Theories and Models: A New Paradigm of Instructional Theory.*Mahwah, NJ: Lawrence Erlbaum Associates.

Merrill, M. D., & Thompson, B. M. (1999). The IDXelerator: Learning-centered instructional design. In J. v. d. Akker, R. M. Branch, K. Gustafson, N. Nienke & T. Plomp (Eds.), *Design Approaches and Tools in Education and Training (pp. 265-277).* Dordrecht, Netherlands: Kluwer Academic. Available at: http://mdavidmerrill.com/Papers/ElectronicTextBook.PDF

Morris, E. (2005). Object oriented learning objects. *Australasian Journal of Educational Technology*, 21(1), 40-59.

Mwanza, D & Engeström, Y. (2005) Managing content in e-learning environments. *British Journal of Educational Technology*, 36 (3), 453-463.
Najjar, J., Duval, E., Ternier, S. & Neven, F. (2003). Towards interoperable learning object repositories: the ARIADNE experience. In Pedro Isaias and Nitya Karmahav (Eds.), *Proceedings of the IADIS International Conference WWW/Internet, Algarve, Portugal, 5-8 November 2003, (pp. 219-226)*. Lisbon: IADIS. Available at: http://www.iadis.net/dl/final_uploads/200302L028.pdf
Namuth, D., Fritz, S., King, J. Boren, A. (2005). Principles of sustainable learning object libraries. *Interdisciplinary Journal of Knowledge and Learning* Objects, 1, 181-196. Available at http://ijklo.org/Volume1/v1p181-196Namuth.pdf.
Nesbit, J. C., & Belfer, K. (2004). Collaborative evaluation of learning objects. In R. McGreal (Ed.), *Online education using learning objects* (pp. 138-153). London: Routledge/Falmer.
Nesbit, J. C., Belfer, K., & Vargo, J. (2002). A convergent participation model for evaluation of learning objects. *Canadian Journal of Learning and Technology*, 28(3), 105–120.
Newman, F. (1992).*Student engagement and achievement in American secondary schools*. New York: Teachers College Press.
Nugent, G. C., Soh, L., & Samal, A. (2006).Design, development and validation of learning objects.*Journal of Educational Technology Systems*, 34 (3), 271-281.
Nurmi, S., & Jaakkola, T. (2006). Effectiveness of learning objects in various instructional settings. *Learning, Media and Technology*, 31(3), 233-247.
O'Brian, H.,Toms, E., Kelloway, K. & Kelley, E. (2010). The development and evaluation of a survey to measure user engagement.*Journal of the American Society for Information Science and Technology*, 61 (1), 50-69.
Osborne, J., Simon, S., & Collins, S. (2003). Attitudes towards science: a review of the literature and its implications. *International Journal of Science Education*, 25, 1049-1079.
Paquette, G., & Rosca, I. (2002). Organic aggregation of knowledge object in educational systems. *Canadian Journal of Learning and Technology*, 28 (3).Available at: http://www.cjlt.ca/index.php/cjlt/article/view/111/104
Parrish, P.E. (2004). The trouble with learning objects. *Educational Technology, Research & Development*, 52(1), 49-67.
Paulsson, F. & Naeve, A. (2006). Virtual workspace environment (VWE): a taxonomy and service oriented architecture framework for modularized virtual learning environments – applying the learning object concept of the VLE. *International Journal on E-Learning*, 5(1), 45-57.
Pohlmann, J. T. (2004). Use and Interpretation of factor analysis in The Journal of Educational Research: 1992-2002. *The Journal of Educational Research*, 98(1), 14-23
Polsani, P.R. (2003). Use and abuse of reusable learning objects.*Journal of Digital Information*, 3 (4).Available at: http://journals.tdl.org/jodi/article/viewArticle/89/88
Porter, D., Curry, J., Muirhead, W., & Galan, N. (2002).A report on learning object repositories: Review and recommendations for a pan-Canadian approach to repository implementation in Canada. Ottawa, ON: CANARIE and Industry Canada.Retrieved from: http://www.colombiaaprende.edu.co/html/mediateca/1607/articles-172726_archivo.pdf
Reid, N. (2006). Thoughts on attitude measurement.*Research in Science & Technological Education*, 24, (1), 3-27.
Reigeluth, C. M. & Nelson, L. M. (1997).A new paradigm of ISD?In R. C. Branch & B. B. Minor (Eds.), *Educational media and technology yearbook* (Vol. 22, pp. 24-35). Englewood, CO: Libraries Unlimited.
RELOAD, (2009). *Reusable eLearning Object Authoring & Delivery Project*.Retrieved from: http://www.reload.ac.uk/
Richards, G. & Hatala, M. (2005).Linking learning object repositories.*International Journal of Learning Technology*, 1 (4), 399 – 410.

Salas, K. & Ellis, L. (2006). The development and implementation of learning objects in a higher education setting. *Interdisciplinary Journal of Knowledge and Learning Objects*, 2, 1-22. Available at: http://ijklo.org/Volume2/v2p001-022deSalas.pdf

Schatz, S. C. (2005). Unique metadata schemas: A model for user-centric design of a performance support system. *Educational Technology Research & Development*, 53(4), 69-84.

Schoepp, K. (2005). Barriers to technology integration in a technology-rich environment. *Learning and Teaching in Higher Education: Gulf Perspectives*, 2 (1). Available at: http://www.zu.ac.ae/lthe/vol2no1/lthe02_05.html

Sedig, K ve Liang, H., 2006. Interactivity of visual mathematical representations: Factors affecting learning and cognitive processes. *Journal of Interactive Learning Research*, 17 (2), 179–212.

Shih, J. L., Chu, H. C., Hwang, G. J., & Kinshuk. (2010). An investigation of attitudes of students and teachers about participating in a context-aware ubiquitous learning activity. *British Journal of Educational Technology*, doi:10.1111/j.1467-8535.2009.01020.x.

Silveira, İ. F., Araujo Jr., C.F., Amaral, H., Oliveira, İ.C.A., Schimiguel, J., Ledón, M.F.P., Ferreira, M.A.G.V. (2007).Granularity and reusability of learning objects. In: Alex Koohang, Keith Harman. (Eds.). *Learning Objects and Instructional Design.Learning Objects and Instructional Design.* CA: USA, Informing Science Press, 139-170.

Smith S.R. (2004). Guidelines for authors of learning objects. NMC: The New Media Consortium. Retrieved from http://www.nmc.org/guidelines/NMC%20LO%20Guidelines.pdf

Sosteric, M., & Hesemeier, S. (2002,). When is a learning object not an object: A first step towards a theory of learning objects.*International Review of Research in Open and Distance Learning*, 3 (2). Available at: http://www.irrodl.org/content/v3.2/index.html

Sümer, N. (2000). Yapısal eşitlik modelleri: temel kavramlar ve örnek uygulamalar. *Türk Psikoloji Yazıları*, 3(6):74-79.

Tabachnick, B.G. & Fidell, L.S. (2001).*Using multivariate statistics (4th Edition)*. New York: Allyn & Bacon.

Tashakkori, A. & Teddlie, C. (2003).*Handbook of Mixed Methods in Social & Behavioral Research.* Thousand Oaks: Sage.

Tashakkori, A., & Teddlie, C. (1998).*Mixed methodology: Combining qualitative and quantitative approaches. Applied Social Research Methods Series (Vol. 46).* Thousand Oaks, CA: Sage.

Tavşancıl, E. (2010). *Tutumların ölçülmesi ve SPSS ile veri analizi*. (4. Baskı). Ankara: Nobel Yayın Dağıtım.

Tekin, H. (2008). *Eğitimde ölçme ve değerlendirme*. Ankara: Yargı Yayınevi.

Tezbaşaran, A.A. (1997). *Likert tipi ölçek geliştirme kılavuzu*. Ankara: Türk Psikologlar Derneği.

Tozman, R. (2004). Another new paradigm for instructional design. Available at http://www.learningcircuits.org/2004/nov2004/tozman.htm

Türel, Y. K. (2008). *Öğrenme nesneleri ile zenginleştirilmiş öğretim ortamlarının öğrenci başarıları tutumları ve motivasyonları üzerine etkisi*.(Unpublished doctoral dissertation).Fırat University, Institute of Social Sciences, Elazığ.

Türel, Y.K. & Gürol, M. (2011). A comprehensive evaluation of learning objects enriched instructional environments in science classes. *Contemporary Educational Technology,* 2(4), 264-281.

Tzikopoulos, A., Manouselis, N., Vuorikari, R. (2007). An overview of learning objects repositories. In P. Northrup (Ed.) *Learning Objects for Instruction* (pp. 29-55). Hershey, PA: IGI Global.

Vercoustre A.M., & McLean A. (2005).Reusing educational material for teaching and learning: current approaches and directions.*International Journal on E-Learning*, 4 (1), 57-68.

Verbert, K. & Duval, E. (2004). Towards a global architecture for learning objects: a comparative analysis of learning object content models. *Proceedings of the ED-MEDIA 2004 World Conference on Educational Multimedia, Hypermedia and Telecommunications*, pp.

202–209. Available at: http://www.cs.kuleuven.ac.be/~hmdb/publications/publicationDetails.php?id=41315.
Vuorikari, R., Manouselis, N. & Duval, E. (2006). Using metadata for storing, sharing and reusing evaluations for social recommendations: the case of learning resources.In Go, D.H. & Foo, S. (Eds.) *Social Information Retrieval Systems: Emerging Technologies and Applications for Searching the Web Effectively*. Hershey, PA: Idea Group Publishing.
Wagner, E. (June 2002). The new frontier of learning object design.*The eLearning Developer's Journal Online Version*. Available at: http://www.elearningguild.com/pdf/2/061802dst-h.pdf
Webster, J., & Ho, H. (1997).Audience engagement in multimedia presentations.*The DATA BASE for Advances in Information Systems*, 28(2), 63-77.
White, M. (2005). Metadata-not just for librarians anymore.*E-Content*, 28(5), 31.
Wiley D.A. (2001) Connecting learning objects to instructional design theory: a definition, a metaphor, and a taxonomy. In D.A. Wiley (ed.)*The Instructional Use of Learning Objects: Online Version.*Retrieved from: http:// reusability.org/read/chapters/wiley.doc
Yara, P.O. (2009). Relationship between teachers' attitude and students' academic achievement in Mathematics in some selected senior secondary schools in Southwestern Nigeria, *European Journal of Social Sciences* –11(3), 364-368.
Yarar-Kaptan, S. & Şeyihoğlu A. (2011). İlköğretim öğrencilerinin öğrenme nesnelerine yönelik düşünceleri: sosyal bilgiler dersi örneği, *Eğitim Bilimleri Araştırmaları Dergisi Uluslar Arası e-dergi*, 1 (2), 119-132.
Yıldırım, A., Simsek, H. (2005). *Sosyal bilimlerde nitel araştırma yöntemleri*. Seçkin Yayıncılık, Ankara.
Zhang, J. & Jastram, I. (2006).A study of the metadata creation behavior of different user groups on the internet.*Information Processing and Management.*42.4:1099-1122.

APPENDICES

APPENDIX A

SOCIAL STUDIES ACHIEVEMENT TEST

1.Haydar: Baba! Böyle çok yorucu oluyor, bir traktör alsak?
Çelebi Amca: Ben de istemez miyim traktör almayı oğlum? Çevrene bir bak! Arazi çok engebeli ve eğimli. Burada traktör kullanılamaz.
Yukarıda bir çiftçi Çelebi Amca ile oğlu Haydar arasında geçen olay anlatılmaktadır. Bu konuşma dikkate alındığında, bu ailenin aşağıdaki tarım ürünlerinden hangisinin yetiştiği alanda tarım yaptığı söylenebilir?
A) Arpa **B) Çay** C) Buğday D) Pamuk

2. Ülkemizin bütün bölgelerinde ekilebilen buğday olgunlaşma ve hasat döneminde yağış zarar verir. Buğdayın özellikleri göz önüne alındığında aşağıda verilen illerden hangisinde yetiştirilmesi <u>beklenemez?</u>
A) Rize B) Konya C) Ankara D) Şanlıurfa

3. Aşağıdaki hayvancılık faaliyetlerinden hangisinin yapıldığı bölgede, doğal bitki türüne bağlılık <u>yanlış</u> eşleştirilmiştir?
A) Bozkır → Koyun B) Çayır → Sığır
C) Dut Ağacı → Keçi D) Çiçekli bitkiler ve çam ormanları →Arıcılık

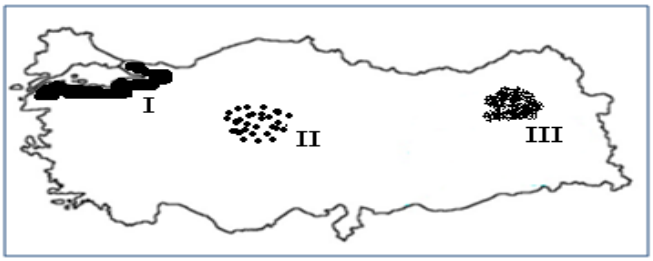
4.Aşağıda ülkemizdeki bazı fabrikalar ve bulundukları yerler verilmiştir.

- Rize → Çay işletmeleri
- Edirne, Tekirdağ → Ayçiçeği yağı üretimi
- Giresun →Kağıt üretimi

Yukarıdaki fabrikaların kuruluş yeri seçiminde aşağıdakilerden hangisi etkili olmuştur?
A) Sermayenin yeterli olması B) Enerji ihtiyacının kolaylıkla karşılanması
C) Ulaşım şartlarının elverişli olması D) **Hammaddeye yakınlık**

5. Ülkemizde yer alan makarna ve bisküvi fabrikalarının İç Anadolu Bölgesi'nin genellikle güney kesimlerinde toplandığı görülmektedir. Bu duruma, aşağıdakilerden hangisi kanıt olarak gösterilebilir?
A) Nüfus yoğunluğunun fazla olması B) **Buğday üretiminin çok yaygın olması**
C) Sanayi faaliyetlerinin gelişmiş olması D) Ulaşım sistemlerinin gelişmiş olması

6.



Yukarıda Türkiye haritası üzerinde işaretlenmiş alanlarda hangi türde hayvancılık yapılmaktadır?

I	II	III
A) Küçükbaş	Büyükbaş	Kümes
B) Büyükbaş	Küçükbaş	Kümes
C) Kümes	Büyükbaş	Küçükbaş
D) Kümes	**Küçükbaş**	**Büyükbaş**

7. "… Yirmi dokuz farklı maden çeşidine sahip ülkemiz maden yatakları bakımından dünyada ilk on içerisinde bulunmaktadır. Ayrıca uzay sanayi, bilgisayar ve otomotiv sanayinde kullanılmaya başlanan gelecek yüzyılın madeni "bor" rezervi en çok ülkemizde bulunmaktadır."
Yukarıda öğretmenin anlattıklarına göre aşağıdakilerden hangisine <u>ulaşılamaz?</u>
A) Ülkemizde dünyada bulunan her çeşit maden çıkarılır.
B) Ülkemiz maden yatakları bakımından oldukça zengindir.
C) Bor madeninin değişik alanlarda kullanılma özelliği vardır.
D) Geleceğin en önemli madeni olan bor madeninde ülkemiz dünyada ilk sırada yer alır.

8. Ülkemizde en önemli demir çelik fabrikalarından iki tanesi Karabük ve Ereğli'de bulunmaktadır. Bu şehirlerde demir madeni yatakları bulunmamasına rağmen, fabrikaların buraya kurulmasının nedeni aşağıdakilerden hangisidir?
A) Enerjinin kaynaklarının yeterli olması B) Demir çelik tüketiminin fazla olması
C) Ulaşım olanaklarının elverişli olması D) Taş kömürü yataklarının bulunması

9. Aşağıda bazı turistik yerler ve bulundukları kentler eşleştirilmiştir. Yapılan eşleştirmelerden hangisi <u>yanlıştır?</u>
A) Sümela Manastır → Trabzon B) Pamukkale Travertenleri → Denizli
C) Peribacaları → Konya **C)** Manavgat Şelalesi → Antalya

10. Ülkemizdeki ormanların % 79'u kıyı bölgelerinde, % 21 'i ise iç bölgelerde yer alır. Bu durum, aşağıdakilerden hangisine bağlanabilir?
A) Kıyı kesimlerindeki yağış miktarının iç kesimlere göre fazla olmasına
B) Kıyı bölgelerinde kışların ılık geçmesine
C) İç bölgelerde küçükbaş hayvancılığın gelişmesine
D) Kıyı bölgelerindeki nüfusun iç bölgelerdekinden az olmasına

11.Aşağıdakilerden hangisi, ormanların yok edilmesiyle ortaya çıkardığı sonuçlardan biridir?
A) Yabani hayvan türlerinin çoğalması
B) Ormanlardan elde edilen ürünlerin artması
C) Küçükbaş hayvancılık faaliyetlerinin artması
D) Erozyon ve toprak kaymalarının artması

12. "Herkes kamu giderlerini karşılamak üzere mali gücüne göre vergi ödemekle yükümlüdür." **Anayasamızın bu maddesine göre hangi yargıya <u>ulaşamayız?</u>**

A) Vergi ödemek önemli bir vatandaşlık görevidir.
B) Vergi devlet hizmetlerinin yürütülmesi için gereklidir.
C) Vergisini ödemeyen suç işlemiş olur.
D) Herkes aynı miktarda vergi ödemelidir.

13. Yeraltından çıkan sıcak su ve buhardan elde edilen ve yenilenebilir bir enerji kaynağı olan, başta Denizli-Sarayköy'de çıkarılan enerji kaynağımız hangisidir?

A) Jeotermal enerji B) Güneş enerjisi C) Rüzgar D) Taş kömürü

14. Güneydoğu Anadolu Projesi (GAP),ülkemizin güneydoğusunda yer alan illeri kapsayan büyük bir projedir. Proje kapsamında Fırat ve Dicle nehirleri üzerinde çok sayıda baraj ve hidroelektrik santrallerinin yapımı, 1,7 milyon hektar alanın sulu tarıma kavuşturulması planlanmaktadır. Bunun sonucunda bölgede, enerjide ve tarım alanlarında üretim artışı amaçlanmaktadır.

Metne göre GAP'ın temel hedefi aşağıdakilerden hangisidir?

A) Bölgede ulaşım faaliyetlerinin gelişmesini sağlamak
B) Bölgenin haberleşme altyapısını geliştirmek
C) Bölgede enerji ve tarımsal üretimi arttırmak
D) Fırat ve Dicle nehirlerinin taşkın yapmasını engellemek

15."Bir un fabrikası açmak istiyorum. İşleyebileceğimiz hammadde buğday olacağından, buğday yetiştirilebilen Ankara'da fabrikamı açacağım. Hammaddeye yakınlığın yanı sıra ulaşımı rahat olduğundan üretilen unun Ankara'dan yurt içi pazarlara kara veya demiryolu ile ulaştırılması kolay ve masrafsız olacaktır."

Metne göre aşağıdakilerden hangisine <u>ulaşılamaz</u>?

A) Yatırımcı kuracağı iş alanının demir veya karayollarına bağlantısını araştırmıştır.
B) Yatırımcı, fabrikasını kurarken hammaddeye yakın olmaya önem vermektedir.
C) Yatırımcının fabrikasını kurduğu yerden diğer bölgelere ulaşım rahat olmalıdır.
D) Yatırımcı için önemli olan herhangi bir ilde un fabrikası kurmaktır.

16. Yenilenemeyen enerji kaynakları bitki ve hayvan ölülerinin toprağın altında milyonlarca yıl çürümesi ile oluşan fosil yakıtlardır. Örneğin, kömür ve petrol gibi…Ancak günümüzde fosil yakıtlara alternatif yakıtlar aranmaktadır.

Fosil yakıtlara alternatif aranmasının <u>temel</u> nedeni aşağıdakilerden hangisidir?

A) Fosil yakıtların pahalı olması
B) Havayı kirletmesi ve rezervlerin tükenecek olması
C) Ülkemizde fosil yakıtların az bulunması
D) Fosil yakıtların yeterli enerjiyi sağlayamaması

17. Aşağıdakilerden hangisi devletin vergi toplayarak kaynak yarattığı temel hizmetlerden biri <u>değildir?</u>

A) Vatandaşların iş yeri açma belgesi verilmesi
B) Yol, köprü, baraj yapılması
C) Sağlık hizmetlerinin yerine getirilmesi
D)Güvenlik hizmetlerinin yerine getirilmesi

18. Aşağıda verilen enerji kaynaklarından hangisi doğaya <u>en az</u> zarar verir?

A)Kömür **B) Jeotermal**
C) Doğal gaz D) Petrol

19. Aşağıdakilerden hangisi nitelikli bir insanın ülkesine sağladığı faydalardan biri değildir?
A) Ülke ekonomisine katkıda bulunur
B) Zaman ve paradan tasarruf sağlar
C) Çevresindeki insanları zarara uğratır
D) Geliştirdiği fikirlerle topluma örnek olur

20. "İşini profesyonelce yapan ve üretime katkı sağlayan insandır" diyen bir kişi aşağıdaki insan tiplerinden hangisinin tanımını yapmıştır?
A) Nitelikli B) Seviyeli C) Sevimli D) Olgun

21. Bir mesleği seçerken dikkat etmemiz gereken en önemli ilke nedir?
A) Yaşımıza uygun olmalıdır
B) Maaşı iyi olmalıdır
C) Ailemizin istediği meslek olmalıdır
D) İlgi istek ve yeteneklerimize uygun olmalıdır

22. Şeyma'nın yaşadığı ülkede nüfus yoğunluğu oldukça fazladır. Bu durumda Şeyma'nın yaşadığı ülkeyle ilgili olarak aşağıdakilerden hangisi söylenemez?
A) Sanayi ve Ticaret faaliyetleri gelişmiştir.
B) Olumsuz iklim ve tabiat şartları hakimdir.
C) Yer şekilleri bakımından engebesi ve yükseltisi az olan bir yerdedir.
D) Verimli tarım toprakları nüfus yoğunluğunda etkili olmuştur.

23. Dünyada nüfusun dağılışına baktığımızda Asya'nın güneyi ve güneydoğusu, Güney ve Batı Avrupa kıyıları, ABD'nin doğu ve batı kıyıları, Mısır'da Nil nehrinin çevresi kalabalık nüfuslu bölgelerdir.
Bu bölgelerde nüfusun kalabalık olmasına yol açan etkenler arasında aşağıdakilerden hangisi bulunmaz?
A) Sanayi, ulaşım ve turizm bakımından gelişmiş olması
B) Tarım alanlarının verimli olması
C) Yeterli su kaynaklarının bulunması
D) Sık ormanların bulunması

24.Özgür: Ben istemesem de babam istediği için, çok para kazanmamı sağlayacak meslekleri seçeceğim.
Hande: Ben, kişisel özelliklerime uygun bir meslek seçeceğim.
Salih: Ben, yeteneklerime göre bir meslek seçeceğim.
Mine: Ben, meraklarım ve ilgilerim doğrultusunda bir meslek seçeceğim.
Yukarıdaki 6. sınıf öğrencilerinden hangisinin meslek seçiminde göz önüne aldığı unsur doğru değildir?
A) Özgür'ün B) Hande'nin C) Salih'in D) Mine'nin

25. Aşağıda verilen yerlerden hangisinde karşısındaki ekonomik faaliyetin geliştiği söylenemez?
A)Geniş ve verimli ovalar – tarım
B)Ormanlık alanlar – kağıt sanayi
C)Yüksek ve dağlık yerler – tekstil sanayi
D)Deniz kıyıları – balıkçılık

26.

Dünya'daki nüfusun dağılışını gösteren harita incelendiğinde, nüfusun kıyı kesimlerinde yoğunlaşmasının <u>en önemli</u> nedeni aşağıdakilerden hangisidir?

A) İklim koşullarının elverişli olması

B) Doğal afetlerin az görülmesi

C) Bitki örtüsünün gür olması

D) Zengin yer altı kaynaklarının bulunması

27.

Sektörler	Gelişmiş Ülkeler	Türkiye
Tarım	%10	%22,2
Sanayi	%30	%18,8
Hizmet	%60	%59

Yukarıdaki tabloda Türkiye ile gelişmiş ülkelerin nüfusunun sektörlere göre dağılımı verilmiştir. Tablodaki bilgilere göre aşağıdakilerden hangisi söylenebilir?

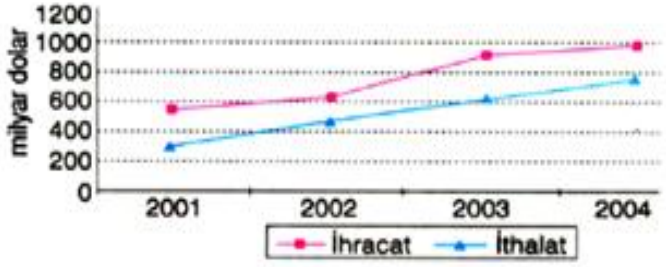
A) Gelişmiş ülkelerde, toplamda en az çalışan nüfus tarım sektöründedir.

B)Gelişmiş ülkelerde nüfus en çok sanayi sektöründe çalışmaktadır.

C)Türkiye de hizmet sektöründe çalışan nüfus, gelişmiş ülkelerden fazladır.

D)Gelişmiş ülkelerdeki tarımsal üretim Türkiye'den fazladır.

28. Aşağıdaki grafikte Türk Cumhuriyetleri ile 2001 -2004 yılları arasındaki ihracat ve ithalat oranlarımız verilmiştir.



Buna göre;

I. İhracat oranı, ithalat oranından fazladır.

II. En fazla İhracat Azerbaycan'a yapılmaktadır.

III. Her sene ihracat ve ithalatımız artmıştır

yargılarından hangisi yada hangilerine ulaşılabilir?

A) I ve II B) II ve III **C)I ve III** D) I. II ve III

29. Ticaretimizle ilgili genel verilere bakıldığında aldıklarımızın sattıklarımızdan çok olduğu görülmektedir. Bu aşağıdaki sonuçlardan hangisine sebep olur?
A) Ülkemiz ticari açıdan zenginleşir.
B) Firmalar günden güne kar ederler.
C) Dostlarımızın sayısı artar.
D) Dış ticaret açığı meydana gelir.

30. ''Komşuları ile ve bütün devletlerle iyi geçinmek, Türkiye siyasetinin esasıdır.''
Mustafa Kemal Atatürk'ün bu sözü onun hangi kişilik özelliğinin bir kanıtıdır?
A) İdealistliği B) İleri görüşlülüğü **C) Barışçılığı** D) Kararlılığı

31. Bakü-Tiflis-Ceyhan petrol boru hattının Türkiye'den geçmesi, ülkemize hangi alanda yarar sağlamaktadır?
A) Ticaret B) Turizm C) Hayvancılık D) Tarım

32.

Anadolu Türkçesi	**Türkmen Türkçesi**
Akıl yasta değil baştadır	Akıl yaşta bolmaz, başda bolar
İki karpuz bir koltukta olmaz	Bir elde iki garpiz tutdurmaz

Türkmen Türkçesi ile Anadolu Türkçesinde ortak olan atasözlerinden yola çıkılarak aşağıdaki yargılardan hangisine <u>ulaşılamaz</u>?
A) Ortak dil Türkçenin farklı şiveleri vardır.
B) Anlatımdaki kültürel varlığımız korunmuştur.
C) Türkmenistan Asya'da kurulmuş bir Türk devletidir.
D) Dildeki ortaklık, düşüncedeki ortaklığın bir sonucudur.

33. Aşağıdaki sorunlardan hangisinin çözümünde ülkeler arasındaki iş birliğine <u>daha fazla</u> gereksinim duyulur?
A) Gecekondulaşma B) Küresel ısınma
C) Trafik sıkışıklığı **D) Toprak kayması**

34. 17 Ağustos 1999 Gölcük depreminde Yunanistan, Japonya, Fransa, İran ve Kore gibi ülkeler ülkemize çeşitli yardımlarda bulunmuşlardır. Bu ülkelerin Türkiye ye yardım etmelerinin amacı aşağıdakilerden hangisidir?
A) Türkiye'nin yardım isteği
B) İnsanların yardımlaşma ve işbirliği duygusu
C) Birleşmiş Milletlerin yardım çağrısı
D) Bu ülkelerin zengin olması

35. Çevre sorunları, doğal afetler gibi büyük boyutludur. Sadece meydana geldiği alanı etkilememektedir. Çevre sorunları için aşağıdaki çalışmalardan öncelikle hangisinin yapılması gerekir?
A) Ülkeler arası ticari ilişkiler geliştirilmelidir.
B)Yardım kuruluşları artırılmalıdır.
C)Haberleşme ağı geliştirilmelidir.
D) Ülkeler arası iş birliği geliştirilmelidir.

36. Ülkemiz, zaman zaman uluslararası büyük spor organizasyonlarına ev sahipliği yapmaktadır. Bunlardan biri olan Üniversite oyunları, 2005 yılı Ağustos ayında İzmir'de yapılmıştır.
Bu dev organizasyonun aşağıdakilerden hangisine katkı yaptığı <u>söylenemez?</u>
A) Üniversiteler arası teknik desteğin artmasına B) Hoşgörü ortamının gelişmesine
C) Ülkelerarası ilişkilere D) Türkiye'nin reklamının yapılmasına

37. Aşağıdakilerden hangisi iç ticarete örnek değildir?
A) Bursa'da üretilen otomobilin Samsun'da satılması
B) Denizli'de yetiştirilen üzümlerin İzmir limanından Rusya'ya satılması.
C) Trabzonlu balıkçıların, Karadeniz'de tuttukları balıkları Ankara balık pazarında satması.
D) Antalya'da yetiştirilen domateslerin İstanbul pazarlarında satılması.

38. Aşağıda, Türkiye'de yapılan bir organizasyonun sağladığı yararlar verilmiştir.
- Türkiye kendisini tanıtma olanağı bulmuştur
- Türkiye hakkındaki olumsuz ön yargılar ortadan kalkmıştır
- Değişik ülke insanları birbiriyle tanışıp arkadaşlık kurmuştur

Buna göre, söz konusu organizasyon aşağıdakilerden hangisi <u>olamaz?</u>
A) 23 Nisan Ulusal Egemenlik ve Çocuk Bayramı
B) İstanbul Park pistinde düzenlenen Formula 1 yarışması
C) Millî Eğitim Bakanlığı'nın ilköğretim okulları arasında düzenlediği bilgi yarışması
D) 2005 yılında İzmir'de düzenlenen uluslararası üniversite oyunları

39. Uluslararası alanda yapılan organizasyonların faydaları olarak hangisini <u>gösteremeyiz</u>?
A) Yapılan etkinlikler ülkeleri birbirine yaklaştırır
B) Ülkelerarası dostluğun ve iletişimin gelişmesini sağlar
C) Ülkelerarası ticaretin gelişmesine etki eder
D) Ülkelerarası rekabetin artmasını sağlar

40. Ülkemizde 2005 yılından ben Formula 1 yarışları düzenlenmekledir. Bu yarışların ülkemizde düzenlenmesi sonucunda;
I. Ülkemizin tanıtımında önemli bir rol oynamıştır.
II. Uluslararası büyük etkinliklerin ülkemizde yapılabileceğini göstermiştir.
III. Formula 1 yarışı İçin ülkemize gelen turistler ülkemize ekonomik katkı sağlamıştır.

yargılarından hangilerine ulaşılabilir?
A) I ve II B) I ve III C) II ve III **D) I, II ve III**

41. Aşağıdakilerden hangisi dünya toplumları arasında ilişkilerin gelişmesine katkıda <u>bulunmaz?</u>
A) Deprem felaketleri B)Spor etkinlikleri
C) Savaşlar D)Fuar organizasyonları

APPENDIX B

LEARNING OBJECT EVALUATION SCALE

	Kesinlikle Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Kesinlikle Katılıyorum
1. Öğrenme nesnesi ile çalışmak konuyu öğrenmeme yardımcı oldu.	O	O	O	O	O
2. Öğrenme nesnesini kullanarak konuyu daha kolay öğrendim.	O	O	O	O	O
3. Öğrenme nesnesindeki görseller (grafik, animasyon, video vb.) konuyu öğrenmeme yardımcı oldu.	O	O	O	O	O
4. Bu öğrenme nesnesini kullanarak konu ile ilgili soruları kolaylıkla cevaplayabilirim	O	O	O	O	O
5. Öğrenme nesnesini kullanmak konu ile ilgili etkinlikleri daha çabuk yapmamı sağladı.	O	O	O	O	O
6. Bu öğrenme nesnesi sayesinde yeni bilgiler öğrendim.	O	O	O	O	O
7. Öğrenme nesnesi yardımı ile bu konuyu öğrenme nesnesi kullanılmayan konulardan daha iyi öğrendim.	O	O	O	O	O
8. Öğrenme nesnesini kullanabilecek düzeyde bilgisayar becerisine sahibim.	O	O	O	O	O
9. Öğrenme nesnesini kolayca kullanabildim.	O	O	O	O	O
10. Öğrenme nesnesinin kullanımı basitti.	O	O	O	O	O
11. Öğrenme nesnesi içindeki konular açık bir şekilde sunulmuştu.	O	O	O	O	O
12. Öğrenme nesnesinin kullanımını öğrenmek kolaydı.	O	O	O	O	O
13. Görsel açıdan öğrenme nesnesini beğendim.	O	O	O	O	O
14. Öğrenme nesnesinin ekran tasarımı karmaşıktı.	O	O	O	O	O
15. Öğrenme nesnesindeki konular mantıklı bir sıraya göre hazırlanmış.	O	O	O	O	O
16. Öğrenme nesnesindeki butonlar (bağlantılar) kolay anlaşılabiliyordu.	O	O	O	O	O
17. Öğrenme nesnesindeki görsellerin (resim, grafik, video vb.) kalitesi çok düşüktü.	O	O	O	O	O
18. Öğrenme nesnesindeki yazılar rahatlıkla okunabiliyordu.	O	O	O	O	O
19. Öğrenme nesnesindeki bölümler arası geçiş kolaydı.	O	O	O	O	O
20. Genel olarak öğrenme nesnesinde anlatılan konuyu sevdim.	O	O	O	O	O
21. Öğrenme nesnesini yeniden kullanmak isterim.	O	O	O	O	O
22. Öğrenme nesnesi eğlenceliydi.	O	O	O	O	O
23. Öğrenme nesnesi dikkatimi konu üzerinde toplamamı sağladı.	O	O	O	O	O
24. Öğrenme nesnesi konuya merakımı arttırdı.	O	O	O	O	O
25. Öğrenme nesnesi konuyu öğrenme isteğimi arttırdı.	O	O	O	O	O
26. Dersteki etkinlikleri yapmak için öğrenme nesnesini dikkatlice inceledim.	O	O	O	O	O
27. Öğrenme nesnesi dersteki etkinliklerinin tamamını yapmama yardımcı oldu.	O	O	O	O	O
28. Öğrenme nesnesini kullanarak ders işlemek eğlenceliydi.	O	O	O	O	O
29. Öğrenme nesnesi, dersteki etkinliklere ilgimi artırdı.	O	O	O	O	O
30. Öğrenme nesnesi, anlatılan konu üzerinde derinlemesine düşünmemi sağladı.	O	O	O	O	O

Başka sebeplerden dolayı öğrenme nesnesini etkili bir şekilde kullanamadıysanız lütfen belirtin.

APPENDIX C

STUDENT COURSE ENGAGEMENT SCALE

Aşağıdaki davranış, düşünce ve duygulardan hangileri BU DÖNEM SOSYAL BİLGİLER DERSİNDEKİ sizi tanımlıyor. Lütfen her ifadeyi aşağıda verilen derecelendirmeye göre değerlendirin:

5 = Çok Belirgin özelliğimdir
4 = Özelliğimdir
3 = Özelliğim sayılabilir
2 = Özelliğim sayılamaz
1 = Beni hiç yansıtmıyor

	Beni hiç yansıtmıyor	**Özelliğim sayılamaz**	**Özelliğim sayılabilir**	**Özelliğimdir**	**Çok Belirgin özelliğimdir**
1. Sınıfta parmak kaldırmak	1	2	3	4	5
2. Grup çalışmalarına aktif olarak katılmak	1	2	3	4	5
3. Konuyu anlamadığımda öğretmene sormak	1	2	3	4	5
4. Tüm ödevleri yapmak	1	2	3	4	5
5. Derslere her zaman gelmek	1	2	3	4	5
6. Ders aralarında dersle ilgilenmek	1	2	3	4	5
7. Dersi kendim için ilginç hale getirebilecek yollar bulmak	1	2	3	4	5
8. Derste iyi not tutmak	1	2	3	4	5
9. Ders aralarında ders notlarını gözden geçirip konuyu anladığımdan emin olmak	1	2	3	4	5
10. Ders konusunu gerçekten anlamak istemek	1	2	3	4	5
11. Çaba sarfetmek	1	2	3	4	5
12. Düzenli olmak	1	2	3	4	5
13. Yüksek not almak	1	2	3	4	5
14. Sınavlarda başarılı olmak	1	2	3	4	5
15. Ders okumalarını düzenli yapmak	1	2	3	4	5
16. Derste eğlenmek	1	2	3	4	5
17. Arkadaşlarıma yardım etmek	1	2	3	4	5
18. Düzenli ders çalışmak	1	2	3	4	5
19. Dersin konularını kendi yaşantımla ilişkilendirmek	1	2	3	4	5
20. Dersin konularını gerçek hayatta uygulamak	1	2	3	4	5
21. Dersi dikkatlice dinlemek	1	2	3	4	5

APPENDIX D

ATTITUDE TOWARDS SOCIAL STUDIES LESSON SCALE

	Kesinlikle Katılmıyorum	**Katılmıyorum**	**Kararsızım**	**Katılıyorum**	**Kesinlikle Katılıyorum**
1. Sosyal Bilgiler dersinde zilin nasıl çaldığını anlamıyorum.	O	O	O	O	O
2. Sosyal Bilgiler dersinden nefret ediyorum.	O	O	O	O	O
3. Sosyal Bilgiler dersi yerine başka bir derse girmeyi tercih ederim.	O	O	O	O	O
4. Mecbur olmasam Sosyal Bilgiler dersine girmem.	O	O	O	O	O
5. Keşke her ders Sosyal Bilgiler olsa…	O	O	O	O	O
6. Bence Sosyal Bilgiler dersine ayrılan sürenin azaltılması gerekir.	O	O	O	O	O
7. Ah Ah keşke Soysa Bilgiler olmasa...	O	O	O	O	O
8. Sosyal Bilgiler dersinin konuları bana çok eğlenceli geliyor.	O	O	O	O	O
9. Sosyal Bilgiler dersinde yeni konuları öğrenmek bana heyecan veriyor.	O	O	O	O	O
10.Sosyal Bilgiler dersi bende güzel duygular uyandırıyor.	O	O	O	O	O
11.Sosyal Bilgiler dersini iple çekiyorum.	O	O	O	O	O
12.Sosyal Bilgiler sevdiğim dersler arasındadır.	O	O	O	O	O
13.Mümkün olsa boş derslerimde Sosyal Bilgiler dersine girmek isterim.	O	O	O	O	O
14.Tarihi hikâyeleri dinlemek bana zevk verir.	O	O	O	O	O
15.Boş zamanlarımda Sosyal Bilgiler dersiyle ilgili kitapları okurum.	O	O	O	O	O
16.Sosyal Bilgiler öğretmenimiz beni Soysal Bilgiler dersinden soğuttu.	O	O	O	O	O
17.Sosyal Bilgiler öğretmeni yüzünden Soysal Bilgiler kelimesini bile duymak istemiyorum.	O	O	O	O	O
18.Sosyal Bilgiler öğretmeninden nefret ediyorum.	O	O	O	O	O
19.Sosyal Bilgiler dersinde asla başarılı olamam.	O	O	O	O	O
20.Sosyal Bilgiler öğretmenim bana Sosyal Bilgiler dersini sevdirdi.	O	O	O	O	O
21.Sosyal Bilgiler dersine çalışmam gerektiği zaman kendimi yorgun hissediyorum.	O	O	O	O	O
22.Hata yapmaktan korktuğum için Sosyal Bilgiler dersinde konuşmam.	O	O	O	O	O
23.Sosyal Bilgiler dersine asla iyi bir not alamam.	O	O	O	O	O
24.Sosyal Bilgiler dersi olmasaydı, okulu daha çok severdim.	O	O	O	O	O
25.Sosyal Bilgiler dersi zaman kaybıdır.	O	O	O	O	O
26.Sosyal Bilgiler dersinde canım çok sıkılıyor.	O	O	O	O	O

APPENDIX E

INTERVIEW QUESTIONS FOR STUDENTS

- Daha önce öğrenme nesneleri kullanarak bir ders işlediniz mi?
    - O dersten bahseder misin biraz? Hoşuna gitmiş miydi?
        - Neleri beğenmiştin?
        - Nelerden hoşlanmamıştın?
- Bu dönem sosyal bilgiler dersini öğrenme nesnelerini kullanarak işlediniz. Bu yöntemle sosyal bilgiler dersini işlemek hoşuna gitti mi?
    - Bu yöntemle ders işlerken hoşuna giden veya sana ilginç gelen şeyler nelerdi?
    - Bu yöntemle ders işlerken hoşuna gitmeyen şeyler nelerdi?
        - Neden?
- Bu yöntem diğer derslerde de kullanılabilir mi?
    - Hangi derste örneğin?
    - O derse getireceği avantajlar neler olabilir sence?
- Sosyal bilgiler dersi hep öğrenme nesneleri kullanılarak mı işlenmeli? Neden, biraz açıklayabilir misin?
- Sence öğrenme nesnesi olmadan sosyal bilgiler dersi daha mı iyi işlenir? Neden, biraz açıklayabilir misin?
- Öğrenme nesneleri kullanarak işlenen sosyal bilgiler dersi ile öğrenme nesneleri kullanmadan işlenen ilk dönemki sosyal bilgiler dersini karşılaştırırsak;
    - Sosyal bilgiler dersinden ilk dönem mi daha çok hoşlandın, ikinci dönem mi daha çok hoşlandın? Neden, açıklayabilir misin?
    - İlk dönemki sosyal bilgiler dersleri mi daha zevkli geçti, ikinci dönemki sosyal bilgiler dersler mi daha zevkli geçti? Neden, açıklayabilir misin?
    - Birinci ve ikinci dönem sosyal bilgiler dersini karşılaştırdığında hangisinde derse karşı ilgin veya katılımın (sorulan sorulara cevap vermek, sınıftaki tartışmalara katılmak, öğretmene soru sormak, ödevleri zamanında yapmak gibi) fazlaydı? Neden, açıklayabilir misin?
    - Birinci ve ikinci dönem sosyal bilgiler derslerini karşılaştırdığında hangi dönem daha iyi öğrendiğini düşünüyorsun? Neden, açıklayabilir misin?
- Sosyal bilgiler dersinde öğrenme nesnelerinin kullanımı, konuları öğrenmeni nasıl etkiledi mi?
    - Olumlu yönde mi etkiledi, olumsuz yönde mi etkiledi? Neden, açıklayabilir misin?
    - Öğrenme nesnelerinin hangi özellikleri senin konuyu öğrenmeni etkiledi?
        - Evde internete bağlanarak konuları yeniden ve istediğim kadar işleme olanağı,
        - Videoları yeniden ve istediğim kadar izleyebilme olanağı,
        - Videolarla somut örnekleri görebilme olanağı,
        - Sistem anında yanıt verebiliyor, hatalarımı hemen görebiliyorum.
- Öğrenme nesnelerini kullanarak BT sınıfında ders işlerken derse katılımın nasıldı?
    - Derse katılmak için neler yaptın?
    - 10 üzerinden kendine kaç puan verirsin?
    - Öğrenme nesnelerinin senin derse katılımına etkisi oldu mu düşünüyor musun? Neden, açıklayabilir misin?
- Öğrenme nesneleri içindeki etkinlikler eğlenceli miydi / sıkıcı mıydı? Neden açıklayabilir misin?
    - Eğlenceli olanlara bir örnek verir misin?
    - Sıkıcı olanlara bir örnek verir misin?
- Öğrenme nesnelerinde sunulan konuları veya içerikleri anlamakta zorlandın mı? Neden açıklayabilir misin?

    - Kolay olan konulara örnek verebilir misin?
    - Zor olan konulara örnek verebilir misin?
        - Peki, zor olan konuları öğrenmek için neler yaptın, açıklayabilir misin?
- Öğrenme nesneleri içerisinde sunulan etkinlikleri (oyunları oynamak) yaparken zorluk çektin mi? Açıklayabilir misin?
    - Etkinlikleri doğru olarak yapamadığın oldu mu? Hangileri, örnek verebilir misin?
        - Etkinlikleri doğru yapabilmek için hangi yollara başvurdun (neler yaptın)? Kimlerden destek aldın?
- Öğrenme nesnelerinde sunulan konuları öğrenmeye gerçekten istekli miydin? Neden açıklayabilir misin?
    - Öğrenmek için neler yaptın?
- Öğrenme nesnelerinin sunulduğu sistemi öğrenmek kolay mıydı? Neden açıklayabilir misin?
- Sistemi tüm etkinlikler süresince kullanmak kolay mıydı? Neden açıklayabilir misin?
- Sistem içinde bir konudan başka bir konuya rahatça geçiş yapabildin mi?
    - Sistem içinde dolaşırken hiç hataya rastladın mı? Neler açıklayabilir misin?
- Sistemi kullanırken yaşadığın zorluklar varsa anlatır mısın?
- Öğrenme nesneleri içerisinde sunulan içeriğin (resim, animasyon, video, metin, ses) sunumu hakkında neler söyleyebilirsin?
    - Yeterince ayrıntılı mıydı?
        - Çok detaylı olmuş veya çok yüzeysel olmuş diyebileceğin örnekler var mı? Açıklayabilir misin?
    - Sunulan içerikler anlaşılabilir miydi?
    - Sunulan resim, animasyon, video, metin veya oyunları anlatılan konuyla ilgili buldun mu?
    - Tasarım (renkler, yazılar, resimler, grafikler, videolar, sesler, butonlar ve linkler) açısından öğrenme nesnelerinin kalitesini nasıl değerlendirirsin? Beğendiğin yönler nelerdi?
    - Beğenmediğin yönler nelerdi?
- Öğrenme nesnelerinin tasarımını iyileştirmek için neler önerirsin?
- Uygulamalar boyunca hiç teknik problemle karşılaştın mı? Açıklayabilir misin?
    - Problemi nasıl çözdün?
    - Yaşadığın bu problem o an için senin derse katılımını veya konuyu anlamanı olumsuz yönde etkiledi mi? Nasıl?
- BT sınıfı öğrenme nesneleri kullanarak sosyal bilgiler dersini işlemek için uygun mu?
    - Hangi açılardan uygundu?
    - Hangi açılardan uygun değildi?
    - İki veya üç kişinin bir bilgisayarı kullanması sence problem oluyor muydu? Ne gibi problemler oluyor?
    - Çok gürültü oluyor muydu? Arkadaşların birbirlerini dinliyorlar mıydı?
    - Bu problemleri gidermek için ne yapılabilir?
    - Tek kişi bir bilgisayar kullansa nasıl olur peki? Daha iyi öğrenir miydin? Bu problemler çözebilir mi?
- BT sınıfında öğrenme nesneleri ile sosyal bilgiler dersini işlerken öğretmen neler yapıyordu (dersi nasıl işliyordu)?
    - Öğrenme nesnelerini nasıl kullanmanız gerektiğini anlatıyor muydu? Neler yapmanızı istiyordu?
    - Etkinlikleri yaparken size yardımcı oluyor muydu?
- BT sınıfında öğrenme nesneleri ile dersi işlerken öğretmen aynı şekilde mi ders işlesin? Neden açıklayabilir misin?
    - Neyin veya nelerin kesinlikle aynı kalmasını isterdin? Neden?
    - Neyi veya neleri kesinlikle değiştirmesini isterdin? Neden

APPENDIX F

INTERVIEW QUESTIONS FOR TEACHERS

- Sizce sosyal bilgiler dersi öğrenme nesnelerinin uygulanması için uygun bir ders mi?
    - Neden?
- Sosyal bilgiler dersinin yapısını, öğrencilerin düzeyini, özelliklerini, okulun teknolojik yeterliklerini ele aldığınızda öğrenme nesnelerini kullanarak ders işlemek uygun muydu?
    - Neden?
- Sosyal bilgiler dersinde öğrenme nesnelerinin kullanımı hakkında
    - Olumlu olarak neler söyleyebilirsiniz?
    - Olumsuz olarak neler söyleyebilirsiniz?
- Öğrenme nesneleri ile öğretim deneyiminizi dikkate aldığınızda en çok beğendiğiniz yönler neler oldu? Neden?
- Öğrenme nesneleri ile öğretim deneyiminizi dikkate aldığınızda beğenmediğiniz yönler neler oldu? Neden?
- Daha önceki sosyal bilgiler dersinde bilgisayar kullanıyor muydunuz?
    - Evet, ise ne tür etkinlikler yapıyordunuz? Ne tür uygulamalar kullanıyordunuz? Örnek verebilir misiniz?
    - Hayır, ise neden?
- Öğrenme nesneleri ile öğretim yaklaşımı sizin öğretim etkinliklerinizi nasıl etkiledi? Daha önceki etkinliklerden farkı neydi?
- Öğrenme nesnelerini sınıf içinde nasıl kullandınız? Ne tür etkinliklerde kullandınız?
- Öğrenme nesneleri ders etkinliklerinin gerçekleştirilmesinde size yardımcı oldu mu (sizin için öğretim sürecini kolaylaştırdı mı?)? Nasıl? Örnek verebilir misiniz?
- Bundan sonra da öğrenme nesnelerini kullanmak ister misiniz?
    - Hayır, ise neden?
    - Evet ise,
        - Nelerin aynı kalmasını istersiniz?
        - Nelerin mutlaka değişmesi gerekir?
- Öğrenme nesneleri ile sosyal bilgiler derslerini işlemek sizin genel olarak öğretim anlayışınızı etkiledi mi?
    - Evet ise nasıl bir değişim oldu?
- Dersinizde öğrenme nesnelerini kullanmak öğrencilerin öğrenmelerine katkıda bulundu mu? Nasıl?
    - Başarılı öğrencilerin öğrenmelerini nasıl etkiledi?
    - Başarısı düşük olan öğrencilerin öğrenmelerini nasıl etkiledi?
- Öğrenme nesnelerini kullanmak öğrencilerin derse **katılımlarını** nasıl etkiledi? Örnek verebilir misiniz?
- Sizce, sosyal bilgiler dersinde öğrenme nesneleri kullanmak öğrencilerin sosyal bilgiler dersine yönelik **tutumlarını** nasıl etkiledi?
- Öğrencilerin sosyal bilgiler dersinde öğrenme nesnesi kullanımına yönelik **tepkileri** nasıldı? Gözlemleriniz nelerdir? Örnekler verebilir misiniz?
    - Memnuniyet
    - Eğlence vb.
- Öğrenciler öğrenme nesnelerini kullanırken nasıl bir etkileşim içindeydiler?
    - Öğrenci – öğrenci etkileşimi nasıldı?
    - Öğrenci – öğretmen etkileşimi nasıldı?
    - Öğrenci – sistem etkileşimi nasıldı?
- Öğrenme nesnelerinin tasarımı aşamasında sizin de katkınız oldu. Tasarım ve geliştirme aşamasındaki katkılarınızdan biraz bahseder misiniz?

    - Tasarım ve geliştirme aşamasında neler yaptınız? Size düşen görevler neler oldu?
    - Geliştirilen öğrenme nesneleri sizin ihtiyaçlarınızı karşılayabildi mi?
    - Şu bölümü şöyle olsaydı veya böyle olmasaydı dediğiniz bölümler/durumlar oldu mu? Açıklayabilir misiniz?
    - Deerste kullandığınız öğrenme nesnelerini iyileştirebilmek için neler önerirsiniz?
- Öğrenme nesnelerinde sunulan içeriğin kalitesini nasıl değerlendiriyorsunuz?
- Öğrenme nesnelerinin görsel tasarımı ile ilgili
    - Neler hoşunuza gitti?
    - Neler hoşunuza gitmedi? Neden?
- Öğrenme nesnelerinde kullanılan renkler, resimler, grafikler ve videoların görsel kalitesi hakkındaki görüşleriniz nelerdir?
- Öğrenme nesnelerinde sunulan etkinlikler ve içeriklerin ayrıntı düzeyi hakkındaki görüşleriniz nelerdir?
- Öğrenme nesneleri sistemini sorunsuz bir şekilde kullanabildiniz mi?
    - Sorunlarla karşılaştıysanız, bu sorunlar nelerdi, açıklayabilir misiniz?
    - Bu sorunlar öğrenme/öğretme etkinliklerini nasıl etkiledi?
    - Bu sorunları çözmek için nasıl bir yol izlediniz?
- Kullanılan öğrenme nesnelerinin kalitesini artırmak için neler önerebilir siniz?
    - İçerik yönünden,
    - görsel tasarım yönünden ve
    - kullanım kolaylığı yönünden.
- Sosyal bilgiler dersinde öğrenme nesnelerini uygulamak için kullandığınız BT sınıfı, öğrenme nesneleriyle öğretim yapmak için uygun mu?
    - Hangi yönlerden uygun?
    - Hangi yönlerden uygun değil?
- Başka eklemek istedikleriniz var mı?

APPENDIX F

CLASSROOM OBSERVATION PROTOCOL

Class: _____ Date:_____
Subject Matter : _____
Course Objective :_____
Observation Start Time : _____ Observation Stop Time: _____
Number of Students: _____ Number of Computers Working: _____

	Never				**Always**	**N.A**
Teacher's Role						
The teacher used the learning object in his/her control	1	2	3	4	5	
At the beginning of the lesson, the teacher explained how to use the LO in the lesson	1	2	3	4	5	
The teacher guided the students while implementing the activities within the LO.	1	2	3	4	5	
The teacher associated the LO with the subject matter	1	2	3	4	5	
The teacher welcomed the students questions about the learning activity	1	2	3	4	5	
The teacher encouraged the students to implement the learning activity with LO	1	2	3	4	5	
The teacher implemented different instructional activities when the students did not understand the subject	1	2	3	4	5	
The teacher asked questions to students about the activities in the LO	1	2	3	4	5	
The teacher make instructional plan which integrate LO to the lesson	1	2	3	4	5	
The teacher let students to work individually and freely	1	2	3	4	5	
The teacher was happy with his/her role added by the learning environment	1	2	3	4	5	
The teacher complained about atmosphere in the classroom	1	2	3	4	5	
Students' Role						
The students use the learning object in their control	1	2	3	4	5	
The students complained of the colors used in the LOs	1	2	3	4	5	
The students read the text in the LOs hardly	1	2	3	4	5	
The students complained about the visual quality of images in the LOs	1	2	3	4	5	
The students complained of the audiovisual quality of the videos	1	2	3	4	5	
The students complained of the mistakes in the LOs	1	2	3	4	5	
The students found the visuals irrelevant of the subject in the lesson	1	2	3	4	5	
The students argued between themselves because of their want to use the computer by themselves	1	2	3	4	5	
The students complain of the technical problems that prevent them from implementing the learning activities	1	2	3	4	5	
The students participate to the learning activities enthusiastically	1	2	3	4	5	

The students asked for help if they cannot implement the learning activity within the LO	1	2	3	4	5	
The students use the LO to the end to perform the learning activities	1	2	3	4	5	
The students raised their hands in the classroom discussion	1	2	3	4	5	
The students commented that the learning activities were challenging	1	2	3	4	5	
The students competed to perform the learning activity within the LO	1	2	3	4	5	
The students can follow the teacher and use the LO synchronously	1	2	3	4	5	
The students accomplished the instructional activities in the classroom	1	2	3	4	5	
The students related the subjects in the lesson with real life	1	2	3	4	5	
Students complained about the difficulty of understanding the concept/activity in the LO	1	2	3	4	5	
The students stated that they liked the lesson	1	2	3	4	5	
The students was bored in the lesson	1	2	3	4	5	
The learning activity exhausted the students	1	2	3	4	5	
The students have fun while implementing the learning activities with the LO	1	2	3	4	5	

CURRICULUM VITAE

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Education

Degree	Institution	Year of Graduation
MS	Abant İzzet Baysal University, Educational Administration and Supervision	2005
BS	Boğaziçi University, Computer Education and Educational Technology	2003
High	Bolu Atatürk High School	1998
Schools	Bolu İzzet Baysal Anatolian High School	1997

Work Experience

Year	Place	Enrollment
2003 - …	Abant İzzet Baysal University	Research Assistant
2003 – 2003	Ministry of National Education	Computer Education Teacher

Foreign Languages

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Publications

1. Tekinarslan, E. & Gürer, M.D. (2011). Abant İzzet Baysal Üniversitesi BÖTE öğrencilerinin bilgi paylaşımı ve web yayın araçları olarak ağ günlükleri hakkındaki görüşleri. *Kastamonu Eğitim Dergisi*, 19 (3), 887-902.
2. Tekinarslan, E. & Gürer, M.D. (2011). Problematic Internet use among Turkish university students: A multidimensional investigation based on demographics and Internet activities. *International Journal of Human Sciences*, 8 (1).
3. Tekinarslan, E. & Gürer, M.D. (2010). Opinions of faculty of education students about Facebook. *13th International Conference ICT in the Education of the Balkan Countries*. Varna, June 17-19, 2010.
4. Tekinarslan, E. & Gürer, M.D. (2010). BÖTE öğrencilerinin bloglar hakkındaki görüşleri. *10th International Educational Technology Conference*, İstanbul, Turkey.
5. Tekinarslan, E.& Gürer, M.D. (2009). Eğitim fakültesi 1. sınıf öğrencilerinin bilgisayar öz-yeterlik algılarındaki değişimleri. *9th International Educational Technology Conference*, Ankara, 2009.
6. Tekinarslan, E.& Gürer, M.D. (2009). Problemli internet kullanımı: eğitim fakültesi öğrencileri üzerine çok yönlü bir inceleme. *9th International Educational Technology Conference*, Ankara, 2009.
7. Akbaba-Altun, S. & Gürer, M. D. (2008). School administrators' perceptions of their roles regarding information technology classrooms. *Eğitim Araştırmaları-Eurasian Journal of Educational Research*, 33, 35-54.
8. Tekinarslan, E. & Gürer, M.D. (2007). Beliefs of Academicians within a Faculty of Education about the Factors Affecting Use of Technology in Teaching Environments. *Abant İzzet Baysal Üniversitesi Eğitim Fakültesi Dergisi*, 7(2), 85-92.
9. Altun, A., Gülbahar, Y, Madran, O., Gürer, M.D. (2006). Design and development of a content management system for e-learnıng: ENIYISI, *2nd International Open and Distance Learning (IODL Symposium*, Eskişehir, 2006.

10. Gürer, M.D., Bakar, A., Kurşun, E. (2006). Modeling technology use in teacher training programs: a case of a faculty of education, *2nd International Open and Distance Learning (IODL)Symposium*, Eskişehir, 2006.
11. Akbaba-Altun, S. & Gürer, M.D. (2006). İlköğretim okulu yöneticilerinin bilgi teknolojisi sınıflarına yönelik rollerinin farkındalık düzeyleri: Ordu ili örneği, *XV. Ulusal Eğitim Bilimleri Kongresi*, Muğla, 2006.
12. Altun, A. & Gürer, M.D. (2005). Tekli okur-yazarlıktan çoklu okuryazarlıklara doğru: Medya okur-yazarlığı. *Ed. (Altun, A., ve Olkun, S.) Güncel Gelişmeler Işığında İlköğretim: Matematik, Fen, Teknoloji, Yönetim* (ss. 177-190). Ankara: Anı Yayıncılık.
13. Tekinarslan, E., Gürer, M.D., Ağca, R.K. (2005). Harmanlanmış Öğrenme Ortamları. *V. International Educational Technologies Conference*, Sakarya, September 2005.