

EXAMINING EFFECTS OF A TECHNOLOGY-ENHANCED
EXTRACURRICULUM ON SPECIAL EDUCATION STUDENTS WITH
INTELLECTUAL DISABILITY

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

SİBEL DOĞAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
COMPUTER EDUCATION AND INSTRUCTIONAL TECHNOLOGY

JANUARY 2015

Approval of the thesis:

**EXAMINING EFFECTS OF A TECHNOLOGY-ENHANCED
EXTRACURRICULUM ON SPECIAL EDUCATION STUDENTS WITH
INTELLECTUAL DISABILITY**

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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

EXAMINING EFFECTS OF A TECHNOLOGY-ENHANCED EXTRACURRICULUM ON SPECIAL EDUCATION STUDENTS WITH INTELLECTUAL DISABILITY

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January 2015, 157 Pages

This study aims to find out how a technology-enhanced extra curriculum affects students with intellectual disability in terms of cognitive and physical development; along with teachers' perceptions. The participants of the study were 58 students with intellectual disability, who were attending "Ankara Sait Ulusoy Özel Eğitim ve Uygulama Merkezi." These 58 special education students were invited to Computer Education and Instructional Technology (CEIT) Department in Middle East Technical University (METU) for three semesters. In line with the technology enhanced extra-curriculum, students participated in various activities, such as recording a short video, playing concept games on touch table. Various data collection techniques were utilized in the study. The researcher conducted interviews after study was over and observations throughout the activities. Moreover, a demographic questionnaire was administered to teachers. Finally, a document analysis of the drawings of students with intellectual disability was conducted with teachers. Findings from the data analysis showed that technology-enhanced extracurricular activities affected participants in a positive way in terms cognitive and physical development. However, such activities should be regular and

continuous in nature, for students to get the most benefit from them. Moreover, materials and games should be chosen appropriately for students' levels considering their disabilities. In addition to these, it was shown that teachers' perception is positive towards using technology. Finally, teachers explained that technology based extra-curricular activities should be used for supportive purposes in special education not as the core curriculum or instruction.

Keywords: Special education, technology-enhanced extracurriculum, formative research, multiple case study, and children with intellectual disability.

ÖZ

TEKNOLOJİ İLE ZENGİNLEŞTİRİLMİŞ DERS DIŞI FAALİYETLERİN ZİHİNSEL ENGELLİ ÖĞRENCİLER ÜZERİNDEKİ ETKİLERİNİN İNCELENMESİ

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Yüksek Lisans, Bilgisayar ve Öğretim Teknolojileri Eğitimi Bölümü

Tez Yöneticisi: Dr. Gökür Kaplan Akıllı

January 2015, 157 Sayfa

Bu çalışmanın amacı teknolojiyle zenginleştirilmiş ders dışı faaliyetlerin zihinsel engelli çocuklar üzerindeki bilişsel ve fiziksel etkilerinin incelenmesi ve öğretmenlerin özel eğitimde teknoloji kullanımına yönelik algılarının belirlenmesidir. Bu sebeple “Ankara Sait Ulusoy Özel Eğitim ve Uygulama Merkezi”nden 58 zihinsel engelli öğrenci toplam üç dönem boyunca Orta Dođu Teknik Üniversitesi (ODTÜ) Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE) bölümüne davet edilmiştir. Planlanan, teknoloji ile zenginleştirilmiş müfredat dışı faaliyetler çerçevesinde, zihinsel engelli öğrenciler çizim tableti üzerinde çizim yapmak, kısa videolar çekmek gibi farklı etkinliklere katılmışlardır. Çalışmada farklı veri toplama teknikleri kullanılmıştır. Araştırmacı, aileler, öğretmenler ve gönüllü öğrencilerle görüşme yapmasının yanı sıra, yapılan etkinlikler boyunca gözlem de yapmıştır. Ayrıca, öğretmenlere demografik bir anket uygulanmıştır. Son olarak, engelli çocukların çizimleri, öğretmenleriyle birlikte, bir belge analizine tabi tutulmuştur. Veri analizi sonucunda elde edilen bulgular, teknolojiyle zenginleştirilmiş ders dışı faaliyetlerin, katılımcıların bilişsel ve fiziksel gelişimlerini

olumlu yönde etkilediğini göstermiştir. Öğrencilerin bu tarz etkinliklerden en çok faydayı elde edebilmesi için bu tür etkinliklerin düzenli ve sürekli olması gerekmektedir. Ayrıca, bu tür etkinliklerde kullanılacak materyal ve oyunların, zihinsel engelli öğrencilerin engelleri dikkate alınarak, seviyelerine uygun seçilmesi gerekmektedir. Bunlara ek olarak, çalışmaya katılan öğretmenlerin teknoloji kullanımına yönelik algılarının olumlu olduğu gösterilmiştir. Son olarak, öğretmenler teknolojiyle zenginleştirilmiş ders dışı etkinliklerin, müfredatın ana bir parçası olmasından ziyade; özel eğitimi destekleyici amaçlarla kullanılması gerektiğini belirtmişlerdir.

Anahtar Kelimeler: Özel eğitim, Teknolojiyle zenginleştirilmiş ders dışı müfredat, biçimlendirici araştırma, çoklu örnek olay, zihinsel engelli.

To My Husband, My Mom and Sister

ACKNOWLEDGEMENTS

First of all, I would like to thank my supervisor Dr. Göknur Kaplan Akilli for her support, guidance, advice and comments during my study.

I also would like to thank the members of my thesis committee Assist. Prof. Dr. Necdet Karasu, Prof. Dr. Kürşat Çağiltay, Assoc. Prof. Dr. Ömer Delialioğlu, Dr. Hasan Karaaslan, for their support, comments and advice.

I would like to thank Sonay Caner for working with me and keeping me motivated all the time.

I also would like to thank my colleagues Ömer Faruk İslim and Berkan Çelik for their help in coding part. Without their help, I wouldn't have finished the coding. Also, I would like to thank Okan Arslan, Deniz Selin Uzunosmanoğlu, Ozan Raşit Yürüm and Mehmet Dönmez for their support and advices during my thesis.

I would like to thank “TÜBİTAK” for supporting project SOBAG 111K394, which provides technical infrastructure for my thesis.

I also would like to thank Bünyamin Dinç manager of “Sait Ulusoy Özel Eğitim ve Uygulama Merkezi” and teachers for their support, gentility and helpfulness during study.

I might have forgotten to mention others who directly or indirectly involved in this study. Thank you very much ...

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LIST OF ABBREVIATIONS

METU: Middle East Technical University

CEIT: Computer Education and Instructional Technology

VASRC (GİSAM): Visual & Auditory Systems Research Center

TEL LABORATORY: Technology Enhanced Learning Research and Applications
Laboratory

ICT: Information and Communication Technologies

IT: Information Technologies

CHAPTER 1

INTRODUCTION

This chapter presents the background of the study, statement of the problem based on this background, purpose of the study along with the pursued research questions, significance of the study, the definitions used in the current study and the organization of the study.

1.1 Background of the Study

Technological enhancements have been affecting many areas and daily lives of people. It has been changing the way of living, and even learning. Change and development in the area of technology has changed the structure and function of educational institutions, process of education and learning environments as well. What is more, these changes and technological developments bring a different point of view to understand education (Tor & Erden, 2004).

With these enhancements, learning environments start to be enriched by using technological devices such as Computers, Smart Boards and Tablet PCs and subsequently interactive materials that are produced and run on these devices. These equipment and materials possess structures, which are a wide varying spectrum from simple to complex. Using such materials and equipment make teaching processes more fluent and remarkable (Semerci, 2006). Semerci (2006) further argued that if learning is defined as making sense of stimulus, which people get via their sense organs, then learning would be more permanent when learning environments address multiple senses.

Technology use may be one of the ways to provide multiple sensory environments. Technology provides variety of technological devices such as computer, laptops, tablet PCs and software to create materials. Using technology may affect students in various aspects such as their cognitive, physical, and social development. In addition to this, Martin (2004) stated that accessing technology might supply meaningful learning experiences by enhancing higher order thinking skills and problem solving skills. He also argued that if technology is integrated appropriately and successfully into learning environments, then it will have the potential to provide benefits for all students.

Besides normal education, special education students can also get benefit from technology use by providing them with opportunities for socializing and learning, which were previously denied to them by their physical or mental impairments (Girgin, Kurt, & Odabasi, 2011). Providing various materials for learning process is important for making knowledge more permanent for an effective learning. Permanence of learning is an important issue in education. However, it is crucial in special education, which consists of children with various disabilities and unique needs. In special education, children have distracted attention, and their memory is not strong enough. Moreover, these children have difficulty in transferring knowledge from short term memory to long term memory (MoNE, 2013). Thus, in the classrooms consisting of special children, who have different developmental characteristics; various equipment and materials should be provided to meet the varying needs of these children. Using different materials and means, which are prepared for addressing these various needs of the different students, enrich learning environments (Avcioğlu, 2012).

Integrating technology into current special education system may help teachers to provide students with enriched learning environments. In other words, technology integration into education may lessen the teachers' workload. Teachers are expected to teach children and find materials by considering students' unique characteristics both in normal education and in special education. As Netherton and Deal (2006) explained; one of teachers' major responsibilities is to provide children, regardless of

their disabilities, with successful learning experiences and assistive technology which can help teachers to reach this goal by giving their students an opportunity for a brilliant future. Hence, technology use may provide teachers with more materials to choose from and with tools for creating their own unique materials.

To sum up, technology has been changing many fields, especially the field of education. It affects learning environments and the structure of education in a positive way by providing different learning materials and equipment, which in turn enriches variety in learning environments. Providing alternative ways may touch more students in terms of understanding and achievement. Especially special children need alternative ways for learning because of their disabilities. These students' lives need to be touched upon from different perspectives. Furthermore, beside the education system and children, technology integration may also have an effect on teachers and their workload.

1.2 Statement of the Problem

Technology and technological devices such as computers, tablet PCs are commonly used in many areas for many purposes. Education is the one of the most popular areas that integrates technology. Reforms that are conducted in the area of education show that technology is necessary for all educational levels and it increases the quality of education. For example, in Turkey, FATİH project has got started. According to the Official Website of FATİH Project (2012), selected pilot schools have been provided with the necessary infrastructure for supporting the use of the Internet and smart boards. Moreover, tablet PCs were distributed to students and teachers within the pilot schools as well. It has been planned to expand it to every school all over the country within the upcoming years. There are many studies that have been conducted and argued about the positive effects of using and integrating technology into education even at the kindergarten level. Although, there are studies about technology integration into special education (Lin, Chen, Wu & Yeh, 2008; Chang, Chen, & Huang, 2011; Kim, 2002), more studies should be conducted for

meeting unique and different needs of special children and lack of material variety (Avcıoğlu, 2012). Students with different disabilities might be considered as subject to special education (Öztürk, 2011) and these students need private and individualized care and instruction. As a result of this, there should be different supportive ways to use, while teaching these students. However, providing alternative ways for disabled children is problematic in special education due to the lack of material diversity. Therefore, utilizing technology might be a good choice to close this gap. Thus, this current research was conducted as an attempt to examine the effects of a technology-enhanced extracurriculum on students' cognitive and physical development and on teachers' opinions, attitudes and workload.

1.3 Purpose of the study

The current study aims to make a humble addition to the contemporary knowledge base and a contribution to the limited literature about the aforementioned issue. More precisely, the purpose of the current study is to find out the effects of a technology-enhanced extracurriculum on students with intellectual disability, regarding their cognitive and physical development; along with teachers' opinions about such an extracurriculum.

1.4 Research Questions

In pursuit of the research problem and in accordance with the purpose of the study, the following research questions led the current study:

- 1) How technology-enhanced extracurriculum activities affect students with intellectual disability?
 - a) What are the effects of such activities on intellectually disabled students' cognitive development?
 - b) What are the effects of such activities on intellectually disabled students' students' physical development?

- 2) What are teachers' opinions about technology-enhanced extracurriculum?
 - a) What do teachers think about technology use in special education?
- 3) How activities in a technology-enhanced extracurriculum can be improved?

1.5 Significance of the Study

Special education is a wider area including diversity in terms of students and their disabilities. While teaching special children, students have to be considered individually. Teaching procedures have to be planned specifically according to needs of the children in each class. For students, within the traditional education system, the traditional way of teaching is generally direct instruction; where teacher explains the subject to the students in the classroom. On the contrary, in special education this is both not possible and suitable, since students in a class are very distinct from each other with distinct characteristics and varying disabilities. These children should be provided with alternative ways to choose from which works best for them. Thus, different techniques, which meet students' needs, should be included to support and overcome their disabilities. However, finding alternative ways and materials is problematic in special education. As Ray and Atwill (2008) explained, providing alternative ways or learning opportunities for students with disabilities has always been a challenge. Integrating technology into special education can meet the needs of diversity. However, effects of technology on students' cognitive and physical developments should be determined to get benefit.

What is more, Parikh (2002) argued that intent of special education is meeting those unique needs of students with disabilities. Furthermore, in special education, variety in the learning settings should be provided to students, since a typical school environment is not enough for them. Activities utilized in the learning processes should be varied for providing permanent and better learning. Parikh (2002) also explained that extracurricular activities have positive impacts on children and they enjoy being involved in these extra activities. Additionally, he also supported the idea that there should be different types of support for students with different

disabilities to increase their capabilities. He further emphasized that in special education; there should be devices, which are called as assistive technology. Although assistive technology are basically comprised of specific devices for specific impairments, Parikh (2002) stressed that computing technology is one type of assistive technology that can be used for all children with different disabilities.

Moreover, trying to teach abstract terms or concepts to children is not easy due to lack of materials. Children with disabilities may have more difficulty in learning abstract terms. This is one of the obstacles before their learning and improvement of it. This problem may be fixed by providing alternative learning ways and materials. Technological devices, software and materials that are specifically produced for these children may be used as an alternative way to reach the ultimate goal of permanent or better learning. In addition to this, technology provides many advantages in the process of configuring individualized learning environments for special education (Uzun, Gülen, Uzun, Çakır, Çağıltay, Karasu & Kaplan Akıllı, 2013). Technology use in special education may be one of the effective ways because it can provide educational variety. There are many devices and software, which can be redesigned for these children regarding their disabilities. In literature, there are many studies, which were conducted for supporting the idea of integrating technology into current education system even at the kindergarten level. Researchers claimed that technology integration has positive effects such as increasing students' success, cognitive development, language development and problem solving skills (McCarrick & Li, 2007; Li & Atkins, 2004).

Although, there are studies about integrating technology into special education and effects of technology, more studies should be conducted. The conducted studies were supporting the idea of participating to an extracurriculum in special education for providing special children with various environments to help them being more social (Hansen, 2007). Moreover, Lewis (1997) also argued that using technology in special education improves delivery of instruction, improve students' attitude and also increase students learning. In addition, computer technologies can provide a broader range of activities for different needs of these students. Furthermore, adaptive

technology can be used for severe disabled students to become more active learners in learning environments to perform as well as their normal peers (Hasselbring, 2000). In addition to these, some studies argued that using technology in special education develops students' reading comprehension skills (Stetter & Huges, 2011), math skills (Bouck, Basette, Taper-Doughty, Flanagan & Szwed, 2009), literacy skills (Lin et. al., 2008). However, more studies needed because of diversity of disabilities and characteristic of students and lack of material variety in special education. Furthermore, some studies implied usability aspects of application of information and communication technologies (ICT) into special education as future works (Williams, Jamali, & Nicholas, 2006). Starcic and Bagon (2014) argued that ICT-supported education for disabled people has not arisen enough interest, because it is a tough issue in terms of accessing research findings and enhancements in this field.

To sum up, in special education, education should be specific for each child and used materials should be chosen according to needs of children. In other words, it is needed to have different materials to cover lesson and provide children with alternative ways to improve their knowledge. Technology integration into special education is necessary because using technology may help to increase and maintain students' motivation and attention. Moreover, it meets material problems for children with different disabilities and new materials can be created easily by considering current needs. Lastly, technology use also impacts teachers in a positive way by decreasing their workload. All in all, there is an apparent need for a study, which is about determining the effects of using technological devices on children with disabilities in special education along with teachers' opinions.

1.6 Definition of Terms

This part aims to present definition of terms, which were used in the current study. Definitions were given by considering their operational functions within the study. How terms used in the study. In other words, definitions given below are operational definitions of terms reflecting how they are utilized or considered within the study.

Technology

Technology is a term covering devices, software, tools and many other things even a colored pen helps people to conduct, create, and understand actions, procedures what they tried to do.

Assistive Technology

Assistive technologies consist of hardware, software and devices helping people with disabilities and special needs to deal with the challenges of communication and learning (Sharma & Madhumita, 2012).

Special Education

Special education is an education type which is prepared and arranged for specific needs for people who have disabilities.

Special Children

Children who have disability or disabilities need to be educated privately.

Children with Intellectual Disability

Children with intellectual disability can be defined as children who have inadequacies in terms of mental actions.

Extra-Curricular Activity

It is a program which consist of activities or specific activity which is planned for supporting lessons and students' learning and meets students' needs. Content of program can be design for specific needs of students or learning environment.

Cognitive Development

By means of cognitive development, it is emphasized that using previously learned knowledge in the new situation or games to complete levels. Making decisions independently and understand result is one of the examples of cognitive development.

Physical Development

By means of cognitive development, it is emphasized that increasing students' body movements by keeping them active and complete activities.

1.7 Organization of Study

In the current study, there are 5 main chapters, which are introduction, literature review, methodology, results, and, discussion and conclusion. In the first chapter, background of the study, problem statement, purpose of the study, significance of the study and definitions, which were used in the study, explained in detail. Information was given about studies conducted previously and the problem itself, i.e., why this study was conducted.

In the second chapter, which is literature review, the current literature was reviewed and relevant studies are filtered down and synthesized under four main headings: technology, technology integration into education, special education and technology usage to provide information about technology and effects of technology in both normal and special education. Furthermore, why teacher attitude is important while integration technology were tried be explained with the related studies.

Methodology is third chapter, which reveals research questions, design of the study, justification for the selection of the method, implementation process, data collection procedures and data analysis procedures in detail, to introduce and explain the selected method; participants; instruments used for data collection; and procedures used for analysis of the data.

In the fourth chapter, which is titled as “Results,” findings of the conducted study were given. Results were explained in line with the research questions supported by demographic information and tables; and by weaving the findings from one demographic questionnaire, observations, three interview sets, and analysis of collected documents.

Finally, in the last chapter, namely, discussion and conclusion, findings from the study are discussed and interpreted in accordance with the literature in the light of the main purpose and research questions driving the study along with the implementations of the findings and further research possibilities.

CHAPTER 2

LITERATURE REVIEW

2.1 Education and Technology Integration

In traditional educational model, role of teacher is to be in the center of all actions. S/he has to cover subjects, make students to reinforce their knowledge and assess their knowledge by applying quizzes or making exams. The only source in traditional educational model is teachers besides books. However, when it comes to today's opportunities, we see that even this traditional educational model has changed in the light of technological advances. With enhancements, teachers are not in the center anymore; their role has been changed to being a guide or facilitator. Moreover, they are expected to adapt and learn how to use technological devices (Bacanak, Orhan, & Köse, 2003). With the increasing use of devices such as laptops, tablet PCs, smart phones and the Internet, students improve their knowledge by searching, discovering and creating their own learning. Moreover, many schools have computer laboratories with Internet connection and information technologies as course. As a result of these, technology has not only an important role in many parts of the daily life and changes the way of living, but also started to transform education as an integral part of life, as well.

Technology usage makes people's life easier and it should be integrated into education system (Bacanak et. al., 2003). Torgesen and Young (1983) explained that there is a link between technology, and learning and technology has an important role on learning of people (Adam, Rigoni, & Tatnall, 1997). Also, technology provides people with combination of knowledge, processes and creativity that provides people with designing, creating and understanding tools, products and the system supporting them as well (Wright, 1996). Moreover, Akgün, Özden, Çinici,

Aslan and Berber, (2014) explained that integrating computer into an education system has two important roles; using it as a tool while presenting the subject and making learning process easier. In this regard, “FATİH” project has been initiated to integrate technology into the current education system in Turkey. Within this project, tablet PCs for 5-12 grade students and smart boards for all schools were distributed. Moreover, necessary technical infrastructures were provided for such schools. Tablet PCs which were given to students, had previously installed e-books to support their lessons (Sarışık, 2013). This project was applied as a pilot study in some of big cities and it is planned to implement it countrywide.

Integration of technology into current education system may arise some questions such as whether using technology in education may be harmful for students or not. The answer was given by Wang and Hoot (2006) who claimed that ‘whether technology is appropriate for young children or not’ is not a question anymore, since using computer contributes children’s cognitive development by improving creative thinking abilities, problem solving skills and language skills (Mohammad & Mohammad, 2002) as well as increasing learning of the students (Mahini, Forushan, & Haghani, 2012). Moreover, Couse and Chen (2010) argue that using tablet PCs improves children’s ability to enhance their problem solving skills; convey their ideas and cognitive development. In addition to these, research made by Couse and Chen (2010) showed that the interest of children towards tablet PCs was very high. For example, 20% of the pictures that children draw on tablet PCs were better than the pictures that they normally draw on paper. Also, Parikh (2002) explained that computer assisted instruction can help improvements in students’ academic success.

Besides these positive effects, technology integrated education system is needed because all of the children may not learn in a same way. There should be different ways or alternatives while proceeding teaching. In other words, educational materials or way of teaching should be varied to meet needs of children. Providing alternative ways can increase learning and understanding among children.

Although, technology integration into education affects students' achievements and personal development positively, technological devices such as computer, and tablet PCs should be used for supportive purposes in classrooms for getting higher benefit. Keengwe and Onchwari (2009) also supported the idea that in technology integrated education devices should support the learning situation rather than being at its center. Getting benefit from devices such as computer, tablet PCs depends not only on teacher attitude but also on the software used. Aktaş-Arnas (2005) emphasized that software selection, and teacher's attitudes and competencies are the most important factors in such cases. Beside the mentioned positive impacts of technology in education, using technology in an appropriate way is crucial. How technology is integrated in learning environments also influences the effects of technology. As Akkoyunlu (1995) stated; correct and effective usage of computer in learning environments enrich the teaching-learning process.

Using technology in both formal and special education has positive effects on children. Some of these positive effects are the improvement in cognitive development, social and language skills, and creative thinking skills (Vernadakis, Avgerinos, Tsitskari, & Zachopoulou, 2005). Moreover, Parikh (2002) explained that technology use increase students' academic success.

However, beside these positive effects, there are also some negative aspects of technology on students' academic performances (Chou, 2001). For instance, Spitzer (2014) expressed that using Information Technologies (IT) in learning process prevents learning to be in- depth or coded. IT distracts students' attention. Furthermore, Wang, Hsu, Reeves, and Coster, (2014) argued that integration of technology into K-12 affects students' higher-order cognitive skills insufficiently because usage of technology is oftentimes based on teacher-centered approach.

To sum up, technology and technological devices such as computer, tablet PCs, etc. are being used widely in many fields including education. Integration of technology into education has advantages on students' cognitive development, creative thinking skills and problem solving skills. Moreover, integrating technology into education

provides alternative ways to teach children. However, technology should not be in the center of the education system. It should be used as an aid for supportive purposes.

2.2 Special Education and Technology Use

In Turkey, as in all over the world, there are many people called as “Disabled”. 15 % of people all over the world have different disabilities (WHO, 2015). According to Turkish Statistical Institute (2002) 12.29% of Turkey is disabled. Moreover, 58% of that percentage is orthopedically, visually, auditory, verbally and intellectually disabled. Disability can be defined as a condition that comes from birth or occurs later in life. In this situation, people lose their physical, mental, physiological and social abilities in varying extents. They also have difficulty in meeting their daily needs and needs of protection, rehabilitation, care and consulting services (Öztürk, 2011). Moreover, it is explained that most common types of disability are orthopedic, visual, auditory, speech-related, mental, and continual illnesses. Each of disabilities has their own characteristics and features. Therefore, people who have such disabilities need to be educated according to their needs. Moreover, for providing equality of opportunity in education, it is necessary that giving chance of affording and accessing materials in special education.

In the current study, students with one of these disabilities, namely, intellectual disability have been chosen as the target group. Intellectual disability can be defined as an inadequacy in mental functions, cognitive, social and practical adaptive skills and it occurs before 18 years old (American Association, 2000). Some indications of this disability type are slow body progress and distracted attention. Moreover, these special children have difficulty in transferring what they have learned. Their memory is not strong, so they easily forget what they learned. In addition to these, people with intellectual disability have trouble in their social relationships (MoNE, 2013). By considering these problems, children who have disabilities need special treatment and should be educated individually.

Sharma and Madhumita (2012) explained the scope of special education as a field that “deals with the education of the disabled who may have different disabilities” (p.1). Researchers defined these disabilities as visual, auditory, physical and health impairment; intellectual disability; emotional disturbance; speech impairment; learning disability or multiple disabilities. Furthermore, MoNE (2013), states that special education addresses individuals who needed to be educated in private by providing them with enhanced education programs and methods, and environments appropriate for their disabilities. The initial aim of special education is to provide disabled children with an opportunity to attend and profit from education just like people without disabilities (Vaughn & Linan-Thompson, 2003). Moreover, special education needs changes according to the learning of the person affected. In another words, there are people who have more than one form of difficulties; so it is necessary to provide environments to learners to meet their needs (Brodin, 2010). In addition to these, the areas of needs defined by Morris (2001) as “communication and sensory and/or physical interaction, cognition and learning, behavior and finally emotional and social development” (p.91). Technology use provides efficient and productive processes while configuring learning environments for special education students’ needs and eliminations of such inadequacies (Hetzroni & Tannous, 2004). Using same methods or same materials may not be enough for disabled students for meeting their needs in special education. There should be more alternative ways to teach subjects students with more than one disability. Haksız (2014) explained that by using technology and technological devices, appropriate materials may be produced for each disability type, so disabled students may have chance to benefit from alternative ways which fit to their needs. Computer supported instructional technologies can be used for supporting different skills and needs (King-Sears & Evmenova, 2007; Sze, 2008). An environment that is enriched by different materials should be provided to increase better learning. These alternative materials or methods may be provided with technology integration. In other words, technology supported education may be the one of the alternative ways needed. Since technology can provide multi stimuli environments which presents knowledge both in visual and auditory ways.

Drigas and Ioannidou (2013) emphasized: “The successful integration of (ICT) into learning environments has the potential to benefit all students as well as students with special educational needs” (p.41). For example, using technology enhanced learning environments for students with intellectual disability teaching is supportive for improving learning outcomes (Wehmeyer, Palmer, & Davies, 2011). By integrating technology into special education students’ cognitive skills such reading comprehension skills (Stetter & Huges, 2011; Kim, 2002) can be supported. Furthermore, there are many studies showed that computer supported learning is effective on students’ math skills (Bouck et. al., 2009), literacy skills (Lin et. al., 2008; Coyne, Pisha, Dalton, et. al., 2012), reading comprehension (Chen et. al., 2009). In addition to these, learning environments enriched with Kinect technology help students to learn daily life skills and transferring them to real life (Chang et. al, 2011 ; Uzun et al., 2013). As further, conducted studies revealed that studies on special children’s literacy and reading comprehension indicated that special children prefers computer supported education over traditional method (Williams, Wright, Callaghan et. al., 2002) and get benefit more from computer supported education (Kim, 2002).

Technology provides many advantages in the process of configuring individualized learning environments for special education (Uzun, et. al.,2013). Furthermore, using devices and different materials provides variety in learning environments. In addition to learning materials, physically interactive games can be designed for special students. Uzun et al., (2013) found out in their study that Kinect technology provides students in special education with visual support, entertained environment. Moreover, using devices like tablet PCs in learning environment gives students chance of make practice or learn in different places not only in the classroom.

There are many studies providing evidence for positive effects of technology integration into education even at the kindergarten level (Bacanak et al., 2003) and more conducted for special education (Chen et. al., 2009; Stetter & Huges, 2011; Kim, 2002). Although, there are studies indicating the positive effects of integrating technology into special education, ICT-supported learning for disabled people is a

tough issue for studying (Starcic & Bagon, 2014). More studies should be conducted by considering unique and different needs of special children and special education. Avcıoğlu (2012) revealed that teachers' equipment and material variety for teaching students with intellectual disability was not enough. By using technological devices and software, materials can be designed considering different disabilities and problems of students. Moreover, a study which is conducted by MEB (2007) showed that most of the disabled students have problems for using mouse and keyboard. Devices and activities which do not need keyboard and mouse should be provided for students who do not have this usage skill. In other words, for generalizing technology usage in special education, technological solution who do not need to use keyboard and mouse should be provided for integrating technology into special education.

As a result, disability is a condition that affects people cognitive, physical, psychological and social terms. It has different types, which are orthopedic, visual, auditory, speaking, mental, and continual illness. Disabled people or special children might have one or more disabilities simultaneously and these children should be educated individually. There are many schools offering special education to special children. While educating these children used materials should be designed to meet their needs. In special education, there is a gap in terms of finding appropriate materials while covering subjects. Technology may be a way to fill this gap. By using technology, technological devices and software, materials that stimulate students from different aspects can be designed easily.

2.3 Technology Integration and Special Education Teachers

Although current studies showed that integrating technology has positive effects on students' cognitive, physical and language development, some factors should be taken into consideration in technology usage. These factors are teacher attitude and competency toward technology usage, and needs of teachers. Aktaş-Arnas (2005) explained teacher's attitude and competency are the most important factors in the stage of technology use in education. Moreover, Hew and Brush (2007) also argued that teacher attitude toward technology is one of the important issues while integrating technology.

For teacher attitude and competency, increasing significance of computers makes teachers use technology in classroom practices (Yüksel & Kavanoz, 2011). Teachers are the most important helpers for children to access technology by facilitating their learning process and providing them with timely feedback (Mahini et. al., 2012). According to Ozan and Ulaş (2010) teachers are guides who show the way for students to reach the knowledge. A teacher should know about the technologies that they will face with. Moreover, Samancıoğlu and Summak (2014) explained that teachers' competency of using computer affects their usage of technology in classrooms. If teacher has positive attitude or competency to use technology in lessons, it affects students' attitude and success as well. Although, it is important to have technological devices and materials in a classroom, they are nothing but just 'devices' unless teacher utilizes them for or integrates them into the learning environment. In addition to attitude, to use technology a teacher should have competency. Hutinger, Bell, Daytner, and Johanson (2006) explained that teachers should know not only how to use technology but also learn how to apply the technology into the learning environment. Teachers should learn or they have to be trained about technology that they will encounter. Teachers are the one who use and expand technology in educational settings, they should be educated about existing technologies. For that reason, educating teachers is crucial (Sze, 2008; Morrison, 2007). However, in Turkey, educators training about information and communication

technologies (ICT) are not enough (MEB, 2007). Furthermore, studies showed that educators do not get training and support for existing technologies (Artan & Uyanık-Balat, 2003).

Besides possible positive effects on students' learning, using technology in special education may have some positive impacts on teachers as well. Güleç-Aslan, Özbey, Sola-Özgüç, and Cihan (2012) argued in their study that teachers have some other responsibilities such as paper and administrative works besides their teaching role. Also, they have problem in finding needed materials for teaching activity. These increase teachers' workload. Providing alternative tools and materials can decrease the workload of special education teachers. As a result, decreased workload, it may increase their motivation and efficiency in classroom. (Güleç-Aslan et. al., 2012). Moreover, Ribeiro and Moreira (2010) explained that Information and Communication Technologies (ICT) provides important tools for teachers and students' in terms of overcoming barriers and promoting acquisition of skills. Furthermore, using multi-stimuli environments in special education have affirmative effects on interaction between intellectually disabled students and teachers. Such environments decrease the students' needs and teachers' workload (Tjus, Heiman & Nelson, 2011).

In conclusion, because technology is an important part of our lives and education, some factors should be taken into consideration to increase success of students. Teachers are supposed to use technology well in their lessons besides being subject experts in the information era. Using technology willingly and being competent about it, will affect students' attitude toward use of technology, technological devices and materials. Teachers are in the center of technology integration. For that reason, teachers should be trained about technology to make them more competent and to increase their awareness. More, integrating technology can provide material variety and decrease workload.

2.4 Mobile Learning and Special Education

With enhancements in the technology has increased the importance of mobile devices and mobile learning as well. Mobile learning can be defined as “any educational provision where the sole or dominant technologies are handheld or palmtop devices” (Traxler, 2005, p.261). Walker (2006) explained mobile learning as “mediated learning through mobile technology” (p.9). Walker (2006) argued that mobile learning include many devices such as PDAs, Tablet PCs and even Laptops but not desktop. However, mobile learning is not just about device. It is also about learning across contexts.

Mobile learning provides variety in terms of accessing variety of devices and services, whenever and wherever needed (van't Hooft, Swan, Cook, & Lin, 2007). As Walker (2006) claimed that mobile learning provides mobile technologies or multimedia for learning. According to Dual Coding Theory, using multimedia consisting of verbal information and imagery develops information process or learning (Paivio, 1991). Brington (2001) explained that using multimedia motivates learners and considers students' different learning styles.

Considering students' differentiations in learning is an important issue for education, especially for special education. In special education, there are different disabilities and appropriate environments needed to meet unique needs of disabled people (Brodin, 2010). Parikh (2002) argued that intent of special education is meeting those unique needs of students with disabilities. Using different materials and means, which are prepared for addressing these various needs of the different students, enrich learning environments (Avcioğlu, 2012). By using mobile devices such as laptop, and tablet PCs may make teaching process more fluent and remarkable (Semerci, 2006). Moreover, with mobile learning, multi stimuli or multimedia environments can be created. As Semerci (2006) argued that if learning is defined as making sense of stimulus, which people get via their sense organs, then learning would be more permanent when learning environments address multiple senses.

To sum up, mobile learning is about learning with mobile technologies. Through mobile devices and multimedia, students' motivation can be increased by considering their differentiations' in terms of learning styles. In special education, there are different disability types. Each disability has different unique needs to be meet. Via mobile learning, especially mobile devices and multimedia, learning environments can be enriched by addressing various needs of the different students.

2.5 Summary

Education is one of the most important and popular field that use and integrate technology and technological devices. There are studies defending that integrating technology into education even at the kindergarten level increases students' cognitive, physical, language development, problem solving skill and higher order skills. Technology use in education may provide alternative ways to teach or learn. Alternative ways or materials should be provided because all children do not learn in a same way. Like children, everyone has different intelligence types and they should be educated by providing alternative ways, which meet their needs.

Meeting unique needs of students is also an important issue in special education too. In special education, children have diversity in terms of their disabilities and characteristics. Children who have different disabilities needed to be educated in special or individually. Using technology in special education may be a way for material variety providing multi-stimuli learning environments. Providing these, is necessary both students and the teachers.

Teachers have different responsibilities besides their roles. Supporting them in terms of material variety can decrease their workload and increase their motivation. This also affects students learning and success in the classroom. Integrating technology in a learning environment is not enough. Teachers are people who will use and integrate technology into learning because of that they should be educated about what they will face. Educating teachers also important for overcoming teachers' negative

attitude because teachers' attitude and competency is an important issue that should be taken into consideration while integrating technology in learning environment.

As for technology use in education; teachers' attitude, competency and needs are important factors that should be taken into consideration. When teachers know how to use and integrate technology, teacher's self-confidence and competency increases. It also affects success and learning of students in a classroom.

CHAPTER 3

METHODOLOGY

Throughout the third chapter, detailed information about the design of the study will be covered: research questions driving the study, overall design of the study, along with the justification of the selected method, the course of the implementation process, data collection instruments and procedures, data analysis, and reliability and validity issues that contributes to the quality of the research will be explained in detail.

3.1 Research Questions

The purpose of the current study is to find out the effects of a technology-enhanced extracurriculum on students with intellectual disability, regarding their cognitive and physical development; along with teachers' opinions about such an extracurriculum. In accordance with this purpose, answers to the following research questions are being pursued:

- 1) How technology-enhanced extracurriculum activities affect students with intellectual disability?
 - a) What are the effects of such activities on intellectually disabled students' cognitive development?
 - b) What are the effects of such activities on intellectually disabled students' students' physical development?
- 2) What are teachers' opinions about technology-enhanced extracurriculum?
 - a) What do teachers think about technology use in special education?
- 3) How activities in a technology-enhanced extracurriculum can be improved?

3.2 Design of the Study

The current study is a part of ÖZTEK Project. ÖZTEK is stand for “Özel Eğitim Öğrencilerine Yönelik Teknoloji ile Zenginleştirilmiş Öğrenme Ortamları Kullanarak Temel ve Bilişsel Kavramların Öğretimi ve Etkililiğinin Araştırılması” (<http://oztek.metu.edu.tr>). The aim of ÖZTEK Project is to investigate effectiveness of learning environments that are enhanced via innovative technologies that are specifically designed for children who have intellectual disabilities and to produce materials via innovative technologies, to be used supportively for their education.

Reigeluth and Frick (1999) defined formative research as a type of research which helps researcher to develop a new theory or a design. They further argued that design of formative research is parallel with Yin's (2009) holistic single case design. Yin (2009) provides two options to choose from for a single holistic case, where one can use either one unique case embedded within one context or multiple cases within multiple contexts. The current study is an example for the latter, i.e. it is designed as a formative research that comprises post facto-multiple cases within multiple contexts. The current study consists of steps which are selecting cases, applying cases, collecting data, analyzing data and interpreting the findings.

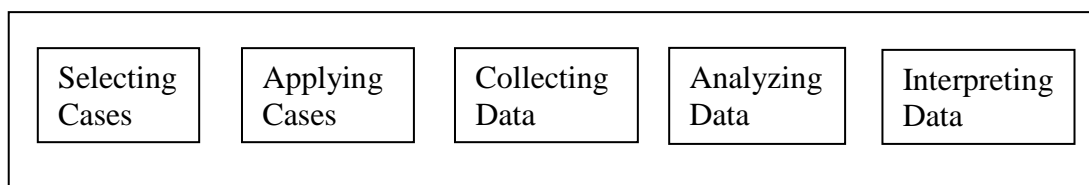


Figure 3.1 Steps of Overall Design of the Study

While creating cases, students of “Sait Ulusoy Eğitim ve Uygulama Okulu” were chosen as participants for the study. Fifty-eight intellectually disabled students were invited to Department of Computer Education and Instructional Technology (CEIT) at the Middle East Technical University (METU) for three different semesters and they faced with three contextually different cases. The cases had diversity in terms of student numbers; time to attend activities and activities selected. In first semester, 16

students attend activities for four weeks as two groups of eight students. Each group attended activities, which were visiting museum, recording short video, drawing pictures on drawing tablets, playing simple concept games on touch table, playing physically interactive games on X-box and Nintendo Wii during four weeks. In the second case, five groups of six students attended to the activities for ten weeks. Each group attended to visiting museum, recording short video, drawing pictures on drawing tablets, and playing simple concept games on touch table, tablet PCs, X-box and Nintendo Wii activities during two weeks. In the last case, 42 students attended drawing pictures on drawing tablets, recording short video, playing simple concept games on touch table and tablet PCs, playing physically interactive games on X-box and Nintendo Wii for four weeks and dance activity in “Türk Halk Bilim Topluluğu (THBT)” for three weeks.

Table 3.1 Overall Design of the Study

Research Method	Formative Research Post-Facto Multiple Case Study
Participants	Students with intellectual disability (n=58) Teachers (n=8) Volunteer students (n=15) Parents (n=2)
Data Collection Instruments	Interviews- Semi structured with teachers, volunteers and parents Observation –Direct Demographic Questionnaire- (Baltacı-Göktalay, 2010) Document Analysis
Data Analysis	Interviews- Iterative Open Coding Demographic Questionnaire (1=strongly disagree, 2=disagree, 3=undecided,4=agree, 5=strongly agree) Descriptive Results Document Analysis (Drawing of students were examined with two special education teachers)

For data collection, as Reigeluth and Frick (1999) mentioned, interviews, observation and documents were used as the main instruments for gathering data. In addition to interviews, observations and documents, a demographic questionnaire was administered to examine teachers’ attitude towards technology usage and technology acceptance.

Thus, in the current study, three sets of interviews were conducted with volunteer students, teachers and parents, respectively. Moreover, observations conducted by the researcher during activities and demographic questionnaire was administered to teachers. Interviews were conducted after activities were completed. They were recorded by using a voice recorder and later were transcribed word by word by using Microsoft Word. The researcher wrote observation notes after the completion of each week's activity and assembled them separately for each activity at the end of the semester. She also conducted the document analysis with the teachers of students with intellectual disability at the end of activities.

As for data analysis; firstly, interviews were transcribed word by word. Then, each interview was coded by using open coding. At the end, coding tables were created for volunteer, teacher and parent interviews (see APPENDIX J, APPENDIX K, APPENDIX L, respectively). Observation notes were regrouped for each case and activity type. Demographic questionnaires were examined to figure out some demographic information about teachers and their attitudes towards technology usage and acceptance.

To sum up, formative research with multiple case studies was selected as the research method. In the study, there were three different cases that 86 students attended. To collect data, interviews with teacher, volunteer and parents; observations; document analysis and demographic questionnaire for teachers were implemented.

3.3 Justification for the Selection of the Methodology

The current study is designed as a formative research which comprises post facto-multiple cases. Formative research can be defined as a kind of developmental research or action research. The aim of this research is to improve or enhance theory for designing instructional processes (Reigeluth & Frick, 1999).

The reasons and rationale behind choosing this method for the current study will be explained in detail within this section. The most important reason is the researcher's aim to create a new design by using the investigated problem. Formative research has this intent in its nature. Yin (1994) explained that the researchers could choose either a single or multiple case designs to make a theory. As a result of this, it is an appropriate selection for the current study.

The other reason that formative research has been chosen as the utilized method for the study is the characteristics of research questions consisting of "how" and "what." Reigeluth and Frick (1999) argued that formative research design is the same as the design of holistic single case study, which is put forth by Yin (2009). Single case study is appropriate to ask how or why questions (Yin, 1984). Since the research questions are formulated with "how" and "what," to investigate the research problem stated as how the activities in a technology-enhanced extracurriculum affect intellectually disabled students' cognitive and physical development, this method selection is appropriate. Moreover, in the current research, multiple case design was preferred instead of single case design to strengthen the findings of the study. In multiple case designs, data are collected and analyzed from more than one case (Merriam, 1998), which enables researcher to report more robust results by presenting evidence from multiple cases, which converges to the same finding. Furthermore, Tellis (1997b) argued that multiple case design must follow replication instead of sampling logic because using replication make findings of research more powerful. In the current study, there are three cases, to examine the effects of the technology-enhanced curriculum on students with intellectual disability. Applying

more than one case or selecting multiple case design, helped researcher to observe the effects of the designed program with different students within different contexts.

In summary, formative research with a multiple case design was chosen as the method for the current study. There are some reasons for choosing that method type. Intent of creating a new technology-enhanced curriculum was the first reason. The other reason was the type of research questions. Research questions given above consist of “How” and “What” questions. The need to implement the same case more than once was related with the target group and to fulfill the intention of getting more clear and robust results from the study.

3.4 Implementation Process

For the purpose of examining effects of a technology-enhanced extracurriculum on the cognitive and physical development of students with intellectual disability, 58 students from “Ankara Sait Ulusoy Özel Eğitim ve Uygulama Merkezi” invited to CEIT department at METU to attend the designed extracurricular activities. The participants were students with intellectual disability from different ages and grade levels. In the first semester, 16 students in two groups of eight attended activities for four weeks per each group, whereas, in the second semester, 30 students in five groups of six for two weeks per each group. Finally, in the last semester 42 students attended the activities. Moreover, there were also students from “Necmi Erşahin İlkokulu” were attending activities as partners. In these three semesters, contextually different cases were applied. There were differences among number of students; time spent for the activities and the duration of the curriculum implementation; and activities included in each case. Activities are divided into four main parts, which were visiting museum, CEIT laboratory activities, TEL Lab activities and recording short video activity. The following sections present detailed information on the context for these activities.

3.4.1 Activities

The components of the technology-enhanced extracurriculum were put together for students with intellectual disability under the supervision of a special education expert. Moreover, activities were designed by considering special education current curriculum. Each activity in the curricula was serving a specific component, i.e. cognitive, physical, and social goals (see Table 3.2).

Table 3.2 Information about Components of the Program

Components	Activities
Cognitive	Drawing Pictures on Drawing Tablets
	Playing Concept Games on Touch Table
	Playing Concept Games on Tablet PCs
Physical	Playing Physically Interactive Games on X Box
	Playing Physically Interactive Games on Nintendo Wii
Social	Recording Short Video
	Visiting Museum
	THBT Dance Activity

Moreover, these activities were classified into four main groups, namely, visiting museum, CEIT laboratory activities, Technology Enhanced Laboratory (TEL Lab) activities, and recording short video activity. Table 3.3 presents these activities along with the brief descriptions of the activities.

Table 3.3 Information about Activities

Activity Name	Brief Definition
Visiting Museum	Visiting METU Museums. There were three different parts in the museum activity. These parts are science and technology museum, history museum and car museum. In science and technology museum, students attended “Planetarium” activity and watch video about planets. Moreover, students tried to do some simple science experiments.
CEIT Laboratory Activities	Drawing simple pictures, which are familiar for students, was stick on the drawing tablet. Students tried to draw picture by using drawing tablet and pen on Microsoft Paint. Playing simple concept games about defining colors, shapes and animals on touch table and tablet PCs.
TEL Laboratory Activities	Playing physically active games on X Box Playing physically active games in Nintendo Wii
Video Recording Activity	Recording short videos

Visiting Museum

Visiting Museum activity comprised of three visits to different museums. These are technology and science museum, car museum and history museum. Students visited these three museums one by one. Firstly, in history museum, some old tools and devices such as an old refrigerator were showed. After that, car museum was visited. There are many types of old cars exhibited in METU museum. Students were allowed to get inside the cars to examine them and take photos with them. This was a good experience especially for male participants. Car museum made them feel excited and happy. Finally, in technology and science museum, students try to conduct some science experiments. In science museum, students had a chance to conduct simple experiments such as seeing how their heart beats, when they put their hand into a machine. Moreover, students had a chance to see their bodies in different mirror types like convex mirror, concave mirror, etc...

In addition to these experiences, students joined the Planetarium activity, which was conducted in METU Science and Technology Museum. In that activity, students

visited “Gezegen Evi,” which was a seven-meter tent. It had air conditioning, a sound system and a Digitalium projection machine. In that activity, visitors watched a thirty-minute video called “Astronaut” about planets. The shape of the tent and used devices projected movie to the top of tent and it seemed like gazing at actual sky. It was a different experience for not only students with intellectual disability but also their teachers and it really attracted the attention of students.

CEIT Laboratory Activities

There were three types of activities in Computer Education and Instructional Technology (CEIT) Laboratory. The first one was drawing pictures by using drawing tablets. During the activity, students tried to use a pen to draw attached pictures on each drawing tablet. The attached pictures were cartoon characters such as PEPEE, CAILOU that were familiar to and easily recognizable by the students with intellectual disability. In this activity, participants were supposed to copy the attached pictures with the help and directions of either volunteers or teachers who were informing them about what was going on and what they were doing. While trying to draw pictures, children used Microsoft Paint and Drawing tablets. Figure 2 provides a picture from the activity.



Figure 3.2 Screen Shut from Drawing Activity

The other activity planned was playing concept games on touch table and tablet PCs. These games were developed by utilizing Flash and were playable both on touch table and Tablet PCs. There were different types of games prepared for different purposes, such as defining colors and shapes; identifying face parts; recognizing animals and their voices. The games prepared for these children were designed to help them to recognize and reinforce simple concepts they learned in their school. The scope of the games did not include the whole curriculum, but they provided exemplary games for the selected topics. Figure 3 provides a picture from the activity.



Figure 3.3 Picture from Touch Table Game

While playing games on touch table and tablet PCs, participants did not have to possess any complex skills or abilities to use the devices, since they were supposed to learn and execute simple operations such as tapping on the animals, dragging and dropping shapes into appropriate places, etc. Moreover, while playing games, students had a chance to learn and apply what they have learned before. For instance, for the animal concept game, they first heard animal voices and then practiced which voice belonged to which animal. After each interaction in the game, students got either a positive feedback such as a smiling face, clapping, etc. or a neutral feedback according to their answers. Furthermore, for the games played on the touch table, each child had a chance to play not only alone but also with their friends, since the

touch table had a big screen and multi-touch support, more than one child was able to engage in the games at the same time. This triggered increased interaction and collaboration among the children enabling them to help each other and to communicate with each other easily.

Technology Enhanced Laboratory (TEL LAB) Activities

In TEL lab, children were allowed to use two devices, namely, X Box and Nintendo Wii. Both X Box and Nintendo Wii are the devices that enable players to see their body movements reflected via an avatar in the game, which in turn provides immediate immersion, to make players actually feel like they are in the game. As Zeng and Zhang (2012) argued, X Box has advance depth sensors, color camera, and four-microphone array providing full-body 3D motion capture. Besides these, it has face recognition and voice recognition as well. The most frequently played games in X Box and Wii were “River Rush” and “Tennis,” respectively. These games forced players to be physically active and give them complete control of the game. Moreover, participants can be involved in the game as one player or two players. If they do not want to play alone, the setting could be adjusted for two players. Figure 4 provides a picture from the activity.



Figure 3.4 Picture from Game “River Rush” Played on X Box

In the X Box game called “River Rush”, participants have to collect coins that were spread around a river and direct the boat to the places that the coins were located. To direct the boat, participants were supposed to turn their bodies to right, left and even up in accordance with where the coins were located in the river. For example, if coins were in the sky they have to jump up to grab them. During the game, students had to make certain decisions such as choosing which path to follow decide and act by themselves. They also had to be aware of the game environment and speed up their movements, when necessary, to be successful or finish the game. Figure 5 provides a screenshot from the game.



Figure 3.5 Game Children Played on X Box.

As for the Wii game called “Tennis,” students have to serve and hit the balls to collect points. To do this, participants have to move their arms and also their bodies. In addition to this, subjects need to think about their next movement to send the coming ball back correctly to score points in the game. Figure 6 provides a screenshot from the game.



Figure 3.6 Game Children Played on Nintendo Wii

Activity for Recording a Short Video

For video recording during the planned activities, two locations were used. One of them was Visual & Auditory Systems Research Center (VASRC) in Middle East Technical University (METU), where there were professional devices, systems and people who use and teach how to use video cameras on a voluntary basis as well as producing videos within the university. For the first semester of the program, students were invited to VASRC to record videos. Participants were asked to record a two-minute video of a friend was supposed to tell something about oneself, sing a song, etc. Participants were involved in this activity both as cameramen and players. In other words, participants shot the videos themselves and took part in their friends' videos. In addition to the activity, their videos were shot, while they were pretending flying like a bird by VASRC personal. VASRC edited these videos and presented them at the end of the semester as a gift for the children. Besides VASRC, participants who participated in the second and third semesters were allowed to experience using both cameras and video cameras in the CEIT laboratory, so that they had a chance to use video cameras just like the participants who have experienced the designed activity in VASRC in the first semester.

3.4.2 Cases

This section presents in-depth information about the three cases, in which the data were collected. These are the nuances between the cases such as the locations for the activities, number of students who attended activities and time schedules and duration of the activities for each case (see Table 3.4).

Table 3.4 Information about Activities, Groups and Student Numbers

Case	Date	#Week for Each Group	Activities	Number of Students in Groups
#1	12 March 2012-14 May 2012	4 weeks	Visiting Museum Drawing pictures by using drawing tablets Playing concept games on Touch Table Playing concept games on Tablet PCs Playing physically interactive games on X Box 360 Playing physically interactive games on Nintendo Wii Recording Short Video	8
#2	7 October 2013-25 November 2013	2 weeks	Visiting Museum Drawing pictures by using drawing tablets Playing concept games on Touch Table Playing concept games on Tablet PCs Playing physically interactive games on X Box 360 Playing physically interactive games on Nintendo Wii Recording Short Video	6
#3	10 March 2014-5 May 2014	1 week	Drawing pictures by using drawing tablets Playing concept games on Touch Table Playing concept games on Tablet PCs Physically interactive games on X Box and Playing physically interactive games on X Box 360 Playing physically interactive games on Nintendo Wii Recording Short Video THBT Dance Activity	6

As a part of the ÖZTEK Project, all three cases utilized a technology-enhanced extracurriculum including various activities and materials specifically designed for students with intellectual disability under the supervision and consultancy of a special education expert. The implemented curricula were designed and re-designed by the researcher in consideration with her observations and delimitations of time and location of the activities.

Case 1

For the first case, 16 students with intellectual disability from “Ankara Sait Ulusoy Özel Eğitim ve Uygulama Merkezi” came to METU-CEIT department to attend the activities as two separate groups of eight at different times. The planned activity took a total of eight weeks and each group had four weeks. Participants spent two hours in each week from 10:00 to 12:00 starting from 12 March 2012 to 14 May 2012. Moreover, teachers of students with intellectual disability accompanied them. There was also volunteer junior and senior CEIT students assigned to each child. These volunteers were undergraduate students enrolled in CEIT department and some of these students take part in the activities for fulfillment of the “Community Service” course’s credits. The duties of volunteers were to help the accompanying teachers and to monitor and facilitate the students with intellectual disability, while they were using devices and playing games to complete activities.

In the first week, students with intellectual disability visited the METU car, science and technology and history museums. In the science and technology museum, students attended “Planetarium” activity and watched a half-hour video about planets. Furthermore, students tried to conduct some simple science experiments. In the second week, participants were involved in an activity in VASRC, where they had a chance to record videos and to become actors. In other words, participants shot the videos themselves and took part in their friends’ videos as well. In the third week, students with intellectual disability and their teachers were invited to the CEIT Department. Students drew pictures by using drawing tablets and pens, and played simple concept games on touch table. The aim of concept games was to reinforce

some simple concepts like colors, shapes, and animals. In the last week, participants used TEL laboratory to play some physically interactive games on Nintendo Wii and X Box. Students used both their bodies and minds actively. Played games required skills like thinking and acting at the same time. Table 3.5 presents the scheduled activities along with the locations and their brief descriptions for the current case. This plan was implemented for both groups, who attended the activities separately and subsequently.

Table 3.5 Applied Curriculum and Details about Activities in Case1

Name of Activity	Description of Activity	Time	# Children
Visiting Museum	METU car museum and science and technology museum and history museum was visited. Experiments were tried to be made by students. Moreover, children got inside "Gezegen Evi (Planetarium)". Children watched video named "Astronaut" about planets and life.	1 week	8
Recording Short Video	In GISAM, a place in METU, videos were taken. Children were involved in the activity both performer and cameramen.	1 week	8
Drawing Pictures by Using Drawing Tablets	Drawing tablets were connected to computers for each child. Picture of "PEPE" was stuck on these drawing tablets and they tried to draw pepe by drawing over picture.	1 week	8
Playing Simple Concept Games on Touch Table	On touch table children played simple concept games like colors, shapes, animals.		
Playing Physically Interactive Games on Nintendo Wii and X Box	In METU CEIT technology enhance lab, students had an opportunity to play physically interactive games on Wii and X box.	1 week	8

Case 2

For the second case, 30 students with intellectual disability from “Ankara Sait Ulusoy Özel Eğitim ve Uygulama Merkezi” came to METU-CEIT department to attend the activities as five separate groups of six at different times. The planned activity took a total of ten weeks and each group had two weeks to complete the activities. Participants spent two hours in each week starting from 7 October 2013 and 25 November 2013. Moreover, teachers of students with intellectual disability accompanied them. Similar to the first case, there was also volunteer junior and senior CEIT students to monitor and facilitate the students with intellectual disability, while they were using devices and playing games to complete activities.

In the first week, students with intellectual disability visited the METU car, science and technology and history museums. In the science and technology museum, students tried to conduct some simple science experiments as well as attending “Planetarium” activity and watching a half-hour video about planets.

In the second week, participants played simple concept games on touch table and tablet PCs, drew pictures on drawing tablets in CEIT laboratory, and played physically interactive games on Wii and X Box in TEL lab. Furthermore, some short videos were recorded in the CEIT seminar room. These videos were two-minute long videos where students with intellectual disability were both the cameramen behind the camera and actors in front of the camera, where they had a chance to record videos and to become actors. Students attended these activities in turns. For instance, while two groups were in the seminar room recording the video, the other groups were in the TEL Lab to play games on Nintendo Wii and X Box. All in all, five groups of students came to METU for two-week long activities and all attended to the same activities. Table 3.6 presents the scheduled activities along with the locations and their brief descriptions for the current case. This plan was implemented for both groups, who attended the activities separately and subsequently.

Table 3.6 Applied Curriculum and Details about Activities in Case2

Name of Activity	Description of Activity	Time	# Children
Visiting Museum	METU car museum and science and technology museum and history museum was visited. Students try to conduct experiments. Moreover, children got inside "Gezegen Evi (Planetarium)."Children watched video named "Astronaut" that was about planets and life.	1 week	6
Recording Short Video	In CEIT Laboratory, students shot videos. Children were both performers and players in the videos but also cameraman.		
Drawing Pictures by Using Drawing Tablets	Drawing tablets were connected to computers for each child. Picture of "PEPEE" was stuck on these drawing tablets and they tried to draw Pepe by drawing over picture.	1 week	6
Playing Concept Games on Touch Table Tablet PCs	On touch table children played simple concept games like colors, shapes, and animals.		
Playing Physically Interactive Games on Nintendo Wii and X X-Box	In METU CEIT TEL lab, students had an opportunity to play physically interactive games on Wii and X Box.		

Case 3

For the last case, a total of six students with intellectual disability and three students from “Necmi Erşahin İlkokulu” attended to the activities. Participants spent two hours for each activity, which took place between 10 March 2014 and 5 May 2014 with a total of seven weeks. Moreover, teachers of students with intellectual disability accompanied them. Similar to the previous cases, there was also volunteer junior and senior CEIT students to monitor and facilitate the students with intellectual disability, while they were using devices and playing games to complete activities.

According to the planned schedule (see Table 3.7), four weeks spent at the CEIT Lab and TEL Lab. During this time, students were allowed to draw pictures on drawing tablets, play simple concept games such as recognizing human face parts, recognizing colors and shapes and animals’ voices on touch table and tablets. Moreover, some physical games were played on X Box and Nintendo Wii. In these games, students direct the game characters by using their bodies and have to be physically active to play the game. In addition to this, students recorded two-minute videos by using video cameras in the CEIT Lab, where they had a chance to record videos and to become actors. In other words, participants shot the videos themselves and took part in their friends’ videos as well.

Besides, in the remaining last three weeks, students attended to a dance activity in “Türk Halk Bilim Topluluğu (THBT),” where a trainer from THBT community gave dance lessons to the students. In this activity, students with intellectual disability were paired with the students from the “Necmi Erşahin İlkokulu” and prepared a show under their trainer’s supervision. Even though the dance activity was one of the planned activities in the extracurriculum, the researcher did not collect any data from this activity since it was a social activity with no technology enhancement. The aim was to provide students with a different activity and environment.

Table 3.7 Applied Curriculum and Details about Activities in Case3

Name of Activity	Description of Activity	Time	# Children
Drawing Pictures by Using Drawing Tablets	Drawing tablets were connected to computers for each child. Picture of “PEPEE” was stuck on these drawing tablets and they tried to draw Pepe by drawing over picture.		
Playing Concept Games on Touch Table and Tablet PCs	On Touchable table and tablet PCs children played simple concept games like colors, shapes, recognizing animal voices and human body parts.	4 weeks	6
Playing Physically Interactive Games on Nintendo Wii and X Box	In METU CEIT TEL lab, students had an opportunity to play simple games on Wii and X Box.		
Recording Short Video	A chance was given to students to experience recording two-minute videos in CEIT laboratory.		
THBT Dance Activity	"Türk Halk Bilim Topluluğu" is community that dance activities were conducted. A trainer from community will teach a specific simple dance to students.	3 weeks	6

3.4.3 Participants

Students with Intellectual Disability:

The main participants of the study were special education students of “Sait Ulusoy Eğitim ve Uygulama Okulu,” who had intermediate to high intellectual disability. More precisely, 75% percent of the students were intermediately and 25% of students were highly intellectually disabled. There were eight grades in “Sait Ulusoy Eğitim ve Uygulama Okulu,” at which the number of students varies from two to 12 with changing age ranges (see Table 3.8). These differences among the grades are due to the attending students’ intellectual disability level.

Table 3.8 Information about Students with Intellectual Disability

Grade Level	Student Numbers in Grades	Age Range
1 th Grade	2	6-7
2 nd Grade	6	7-9
3 rd Grade	12	8-12
4 th Grade	12	9-13
5 th Grade	6	11-14
6 th Grade	6	11-13
7 th Grade	6	12-18
8 th Grade	8	14-17

Students get basic education such as reading/writing, learning colors, shapes, and numbers. In the current study, 58 students with intellectual disability attended to the planned curriculum in three different semesters. In first semester, two eight-person groups came to METU and attended to the activities for four weeks. In the second semester, five six-person groups attended to the activities for two weeks and in the third semester, six students with intellectual disability and students from “Ankara Necmi Erşahin İlkokulu” attended to the activities in pairs as partners. Although “Sait Ulusoy Eğitim ve Uygulama Okulu” has a total of 58 students, to total number of participants across the cases add up to 88, since some of the students attended to the designed activities for more than once during the three semesters.

Moreover, there were three more groups who participated to the study beside the students with intellectual disability. The researcher conducted interviews with these three groups, namely, volunteers, teachers and parents of the students with intellectual disability.

Volunteers:

Volunteers of the study were comprised of undergraduate students, namely juniors and seniors at the Department of CEIT, who were enrolled in “CEIT 386 Community Service” course, where they conduct volunteer work for community service. Beside these students, there were also some other undergraduate students volunteered due to their own personal interest in the conducted study. In each case, there was one volunteer student for each student with intellectual disability to help them complete the activities.

Similar to the children with intellectual disability, some of the volunteers took part in the study more than once. The researcher conducted interviews with 15 of these volunteers for the current study to gather their point of view, since they had a chance to easily observe the whole process and provide rich information on what students did during the activities, whether they liked/enjoyed the activities or not, etc.

Teachers:

Teachers of students with intellectual disability also participated into the study. Teachers came to METU with their students and they were with their students during the activities to help, observe and follow their performances on activities. Since they know their students individually, teachers helped both children and volunteers to conduct activities in an easy way. For this reason, they were a valuable data source for the study that might provide rich information.

Hence, the researcher conducted interviews with all eight of the teachers beside the administered demographic questionnaire. Half of the teachers ($n=4$) were female and the other half was male. What is more, teachers had different backgrounds besides being a special education teacher (see Table 3.9).

Table 3.9 Branch Distribution of Teachers

Job Title	n	%
Special Education Teacher	5	62.5
Counselor	2	25
Physical Education Teacher	1	12.5

Five of the eight teachers were special education teachers, whereas two of them were counselors and one of them was physical education teacher originally.

As for the experiences of the teachers on the job, five of them had 11 or more years of experience (see Table 3.10).

Table 3.10 Job Experiences of Teachers

Experience	n	%
1-5 years	1	12.5
6-10 years	2	25
>11 years	5	62.5

3.4.4 Data Collection Procedure

For collecting data, four techniques which are interview, observation, demographic questionnaire and document analysis were used. Data collection procedure started with the date of students' arrival at METU on 12 March 2012. During extra-curricular activities, researcher made observations about "what students' reactions was when they face with activities", "Whether students were voluntary or not during the activities", "how they feel while conducting activities", and "general thoughts about activities in terms of easiness and appropriateness for special children". While making observation, researcher was with the students. The observation was conducted in each week when students participated to the activities. Observation was held in four different places. These places were METU museums, CEIT laboratory, CEIT TEL lab and video recording places VASCR and CEIT Seminar Room.

Museums were quiet, the students and teachers were the only participants there and they were highly interested in what they want. In Planetarium part, the tent was dark and students were observed through the noise released to understand whether they were engaged in the activity or not. In CEIT laboratory, environment was a little noisy because there were students, their teachers, volunteers and sometimes parents in the same room. It was not easy to observe all children because the activities were conducted in more than one place within the location. Afterwards the observations each week, the researcher made some notes about each activity and wrote down her observations and interpretations, where she compiled these notes to write a general view of the semester.

Interviews were made with volunteer students of CEIT, teachers & parents of students with intellectual disability. Researcher herself conducted interviews after the activities were finished. Volunteer interviews were conducted in researcher's office in Department of CEIT. The place was quiet and no one disturbed the interviews. There were 12 questions about activities in the interview (See Appendix B). In these questions, the aim was to gather general information about activities, how many children that volunteers took care of during program, participants' reaction during activities, in which activity students feel better and complete opinions of volunteers about activities and their suggestions for making program better.

While conducting interviews with teachers, the researcher went to "Ankara Sait Ulusoy Özel Eğitim ve Uygulama Merkezi". Researcher made an appointment with teachers considering their program. Interviews were conducted in two days with eight teachers in the teachers' room at the school. Moreover, teachers helped the researcher to gain access to parents by helping her to make an appointment and meet with the parents. Two parents involved in the interviews as participants and these interviews also conducted at the school, in the teachers' room.

In addition to the interviews, the researcher also administered a demographic questionnaire to teachers, to gather information about teachers' attitude towards technology. Moreover, a document analysis was conducted with the teachers. The

pictures that the students with intellectual disability drew during the activities were collected after each week and examined with two teachers regarding students' performance.

3.4.5 Data Collection Instruments

Using variety of evidence strengthens a case study (Yin, 1984). Reigeluth and Frick (1999) also mentioned about three techniques that are used to collect data in formative research. These techniques are observation, interview and document analysis. Moreover, researchers also defined interview as the tool that provides the most useful data.

These instruments, which were mentioned above, help collecting more detailed information from participants. With interviews, the aim was to see the situation from different perspectives of volunteers, teachers, and parents. Observations provided a chance to see what was going on during activities. Document analysis gave the chance to examine products of the activities and whether used tool affected students' work or not. With demographic questionnaire, it was aimed to get information about teachers' technology acceptance.

The interviews and demographic questionnaire was prepared by the researcher. It was examined by two experts and redesigned according to feedbacks that experts gave. This process is conducted to ensure reliability and validity of the instruments. After the feedbacks, the questions were rechecked to make sure that there were no yes/no, leading and multiple questions in the interviews. There were only probes. Moreover, participants were voluntary to fill the questionnaire.

Interview

In the study, interviews were conducted with volunteers, teachers and parents of students with intellectual disability. For this purpose, literature was scanned and interview questions were prepared by considering research questions. Interview

questions were different for volunteers, teachers and parents. Furthermore, they were prepared in Turkish to gather data from volunteers, parents and teachers.

After the interview questions were prepared, they were examined by two experts, who were from the CEIT department at METU, and redesigned according to feedbacks that experts gave. All three interviews were designed as “semi-structured”. There were no multiple, leading and Yes/No questions in the prepared interviews. In volunteers’ interview, there were 12 questions (see APPENDIX B). With these questions; the aim was to learn about volunteers’ experiences and observations during the activities. Thus, information about the program, activities that they attended and their roles in the activities were asked. Moreover, volunteers were supposed to answer questions about participants’ reactions and interactions with activities, tools used and people around them. In addition to these; their feelings, thoughts and experiences about study were asked. After preparing the interview, a pilot study was conducted with one of volunteers to be sure about understandability and clarity of the questions. After the pilot interview, some questions were rearranged and restated in order to make them clearer and to increase understandability. Once again, feedbacks were got from experts and interview was finalized. Interviews were conducted by arranging appointments with volunteers at researcher’s office in the CEIT department. While recording interviews a voice recorder was used. Furthermore, records were transcribed word by word by using Microsoft Office Word program.

In second term, while preparing teachers’ interview questions, literature was scanned for finding similar studies, although the research in this area is limited. Nine questions were prepared (see APPENDIX C) and rechecked with two experts from the CEIT department. For conducting interviews, “Ankara Sait Ulusoy Özel Eğitim ve Uygulama Merkezi” was visited for making arrangements for the interview times with teachers. Before conducting the interviews, a pilot study was done with one of the teachers after the dance activity in THBT. Interview was made in a room within the community building. There was no disturbance during interview. The pilot study showed that there were some similar questions and they should be eliminated. After

finalizing the interview questions, researcher started to conduct the interviews. As location, the teachers' room in "Sait Ulusoy Özel Eğitim ve Uygulama Merkezi," was used. The room was quite roomy and appropriate to make an interview. A voice recorder was used to save interviews. While transcribing interviews Microsoft Office Word was used. In addition to interview, a demographic questionnaire was administered to teachers to see their attitudes towards technology. There were 18 questions in the questionnaire for these purposes, beside the questions for getting information about teachers' sex, age, whether they use computer, laptop, smart phone to access Internet (see APPENDIX D).

In the last term, interviews were conducted with the parents of children. Teachers helped researcher to gain access to parents and conduct interviews with them about their thoughts on the activities their children attended (see APPENDIX E). Two parents were involved in the study. Parent interviews were done in the school's teachers' room. A voice recorder was used to save interviews. While transcribing interviews Microsoft Office Word was used. To see whether the questions were clear to the parents, there should be a pilot study. However, there was no such study because of the number of parents who attended the activities at METU was limited. Only two parents could be involved in the study.

For volunteers the whole interviews took 107.23 minutes in total and seven minutes average for each person. As for interviews with the teachers, the interviews took 55.2 minutes in total and 6.9 minutes average for each teacher. Finally, interviews with parents took 9.16 minutes in total and 4.6 minutes for each parent. Table 3.11 provides the details about the interviews.

Table 3.11 Detailed Information about Interviewers

Groups	# of Participant	Total Time	Average Time
Volunteer Students	15	107.23	7.15
Teachers	8	55.2	6.9
Parents	2	9.16	4.58
Total	25	171.60	18.22

All in all, interviews took a total of 171.60 minutes with 6.86 minutes average for each interviewee. The digital recordings of the interviews were transferred into researcher's computer and backed up in an external disk for storage. Throughout the transcription process, all data were transcribed word by word to avoid any data loss. For example, researcher transcribed all information even the sentences where participants lost their focus or left incomplete. Researcher also checked each interview word by word twice to prevent data loss.

Observation

Observation was conducted during the activities. Researcher was actively involved in the technology-enhanced extracurriculum, so that observing children's reaction toward the activities was easy. During the observation process, researcher observed children and worked with them acting like the volunteers. However, it was not easy to observe all children at once, since the activities were conducted in two or more places within the activity location at the same time. Researcher was visiting these places one by one.

Moreover, throughout the observations, researcher did not use any paper to take notes. Instead, after each week, when the activities were over, researcher specifically took some notes for each activity. In observation notes, researcher wrote down students' reactions to the activity and devices, the obstacles or problems that they faced with during the activity their performances during the activity, whether they attended to the activity willingly, and whether they completed the activity or not. At the end of the each semester, weekly observation notes were compiled and the researcher prepared a review report about each activity within each case.

Document Analysis

For document analysis, pictures that students drew in the activities were collected and saved in a hard disk by volunteers after the completion of each drawing activity. These pictures were examined with teachers of students with intellectual disability,

after the curriculum was completed. Since the students wrote their names on the pictures, teachers were able to evaluate pictures by considering students individually. In the process of evaluation, teachers considered the time that students attended to the activity and their characteristics. There were two teachers who know every child attended to the program individually. These two teachers examined pictures respectively and discussed performance of the students. Researcher recorded teachers' comments about drawing performances of the students by using voice recorder. Figure 7 displays two examples that students produced during the drawing activity by using drawing tablets.

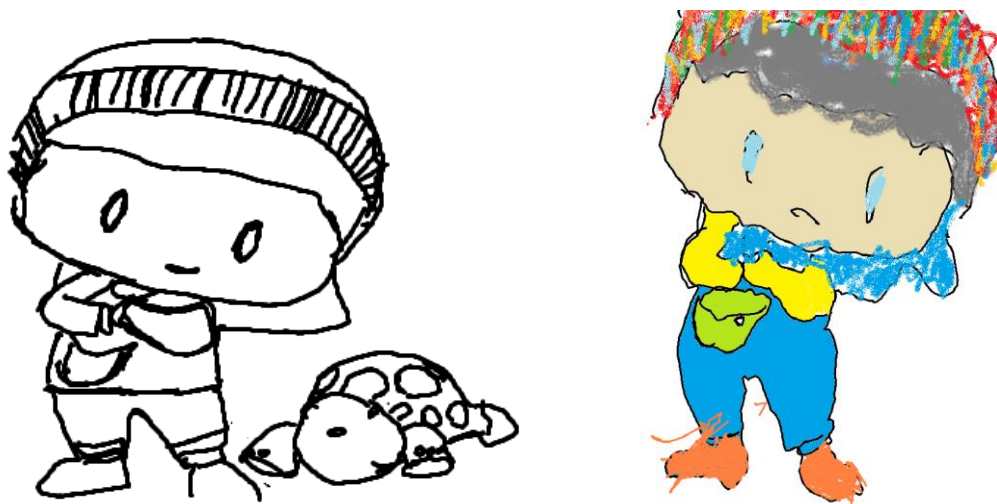


Figure 3.7 Some Examples from Drawing Activity

Demographic Questionnaire

A demographic questionnaire was prepared for gathering information about teachers and their thoughts about technology usage in their daily life and in the classrooms (see APPENDIX D). In the demographic questionnaire, there were questions about teachers' sex, major, which technological devices such as desktop computer, laptop, smart phone and tablet PCs they use, whether they use Internet or not and finally, what their purposes of using Internet were. Moreover, the aim also was to see whether special education teachers use technology in their daily life, whether they

want to use or were afraid of using technology in their lessons, For these purposes, a Turkish scale which is prepared by Baltaci-Goktalay and Ozdilek (2010) was examined and some of the questions were selected to be used in the study. The necessary correspondence for permission to use the scale can be found in APPENDIX I. Besides the questions about the demographics of the teachers, such as sex, age, major, etc., there were three multiple-choice questions about which devices they use and purpose of Internet usage if they access to Internet. In addition to this, there were 18 Likert scale questions about teachers' opinions of technology and technology usage in their lessons. For these questions 5-point Likert type is used, where 5 was the highest positive and 1 was the lowest negative (5= strongly agree, 4=agree, 3=undecided, 2=disagree, 1=strongly disagree).

3.4.6 Data Analysis

For data analysis, the researcher tried to analyze all four sources of data in relation to the each other. All analyses were conducted after the data collection was complete. Since the literature about the issues that the researcher pursues was scarce, she tried to find out themes and categories from the transcribed interviews, observations and documents. The data analysis procedures for each data source are described below.

Interviews

After the transcription of the interviews was finished, researcher started the coding process. Since there were three different participant groups, namely, volunteers, teachers and parents. They were given separate codes for anonymity (see Table 3.12).

Table 3.12 Codes for Participants

Participants	Code for Participants	Number of Participants
Teachers	T1... T8	8
Volunteers	V1...V15	15
Parents	P1 and P2	2

Coding was conducted at three iterations or stages. At the first stage, researcher herself coded the three interview sets separately. Two experts, a faculty member in the department and a PhD student examined the codes that the researcher derived from the transcriptions. The aim was to select the right keywords to code the data and not missing any part that might be important. At the second stage or iteration, researcher made some corrections by considering feedbacks from experts. Moreover, researcher created an Excel Book consisting of codes and relevant quotations of the participants. Figure 8 displays a screenshot from the Excel Book including different sheets for the main themes.

Participant	Analysis	Code	Opinions
T1	Cognitive development	Reinforcer	Tabi ki yani en azından benim öğrencimin biri renk bilmiyordu ama dün fark ettim ki renkleri söylüyor bilgisayar kullandıklarında baktım renkleri öğrenmiş en azından kırmızıyı tanıyor ve sarıyı tanıyor.
T3	Cognitive development	Develop eye-hand coordination	Ya şu var el göz koordinasyonunu bir kere geliştirir.
T4	Cognitive development	Reinforcer	Evet, pekiştirici olarak kullanılabilir çünkü ilgilerini çeker. Değişik renkte, modelde, şekilde bu tarz.
	Cognitive development	Improve long term memory	Özellikle bizim çocuklarda dikkat eksikliği ve mesela uzun dönemli bellek çok kısa kullanamıyorlar o hemen aktarıyor. Tekrar tekrar kullanma imkânımız var o da çok etkili.
T5	Cognitive development	Reinforcer	Tabi ki hem de çok da hoşlarına gider.
T6	Cognitive development	Develop eye-hand coordination	Balon patlatma oyunu vardı işte daha doğrusu kırmızıya dokun vs işte orda algı el göz koordinasyonu f
T7	Cognitive development	Reinforcer	Dediğim gibi yani hem görsel hem fiziksel aktiviteye dayandığı için ve sessel aktiviteye dayandığı için hatırlama ihtimalleri daha yüksek olur.
T8	Cognitive development	Reinforcer	Pekiştirme aracı olarak çok rahatlıkla kullanabiliriz.
V1	Cognitive development	Reinforcer	Bu dokunmatik ekran gibi ekranlarda geliştirilen uygulamalarla aslında o çocuklar okullarda öğrendi renkler. Normalde renkleri biliyorlarmış öğrenmişler dokunmatik ekranda uygulamada da bunlar aras
V3	Cognitive development	Learning simple concepts	bilişsel olarak beklide şeyi öğrettik biz onlar bu üçgen dörtgen hani o geometrik şekilleri renkleri öğr ama yani bu mesela üçgen deyip işte bu ikisini birleştirince AA bu başka bir şey hani o farkı kavrayıp başka bir ş mi dikdörtgen mi deyip 2 tane seçim yapınca direkt kareyi seçebilmisti yani sonra tekrar birleştirdiğinde aaa ba yapabilişti
V4	Cognitive development	Decision Making	Aynı şekilde flash oyunlarında sürekli aynı sesi duyup tekrar uygulamaları gerekiyordu. Hani bir inek se düşünüyordular bayağı bilişsel olarak.
V6	Cognitive development	Develop eye-hand coordination	Onun için koordinasyon filan yaptılar. Ne bileyim Pepe çizimleri. Hani direk ona bakıp elini ona göre o
V7	Cognitive development	Learning simple concepts	... temel kavramları öğreniyorlar renkleri falan. O şeydeki mesela yeşil kırmızı balonlar vardı. Bazı çocuk falan diye böyle ayırt etmeden tikiyorlardı ama sonradan alıştılar mesela. Sadece hani kırmızıları tiki etmeleri gerektiğini anladılar.
V8	Cognitive development	Increase Multi-tasking process	... dokunmatik masa çünkü görüp dokunuyorsun bilişsel olarak hani.
V9	Cognitive development	Learning basic concepts	... hani bir sefer gösterdikten sonra böyle öğrenciler vardı ki kendi başlarına yapabiliyorlar yani hani. Da organ nedir dediğimizde doğru cevaplar aldığımız öğrenciler de oldu.
V10	Cognitive development	Learning basic concepts	... bilişsel olarak mesela ne bileyim azlık çokluk ile ilgili bir şey olduğunda hani onu ayırt edebiliyorl
			... hep aynı oyunu 1 den fazla kez oynadı. Oynanan oyunda gidilebilir yol u uygulanabilir seçenek 1 de

Figure 3.8 Screen Shut of Coding Table

After creating the Excel file, researcher asked her thesis advisor and one other PhD student to examine codes and quotations. At the end of this process, some of the codes were renamed and regrouped. At third iteration, researcher finished the needed

corrections and codebook was finalized to get approval of thesis advisor (see APPENDIX J, APPENDIX K and APPENDIX L for the codebooks derived from the interviews with the volunteers, teachers, and parents, respectively).

Observation

Researcher conducted the observations herself. After all cases were over, the researcher examined the case reports and she synthesized the common points within the three case reports, similar to the approach she followed for the analysis of the interviews

Document Analysis

Document analysis was conducted after the implementation of the technology-enhanced extracurriculum was over. Pictures that students drew were saved in a hard disk and these pictures were shown to two teachers from “Ankara Sait Ulusoy Özel Eğitim ve Uygulama Okulu.” These teachers, and the researcher examined pictures the pictures one by one, while discussing the performances of students in regards to their intellectual disability level. Teachers were asked to compare students’ works on drawing tablet with the pictures they drew on paper to explore the effectiveness of the technology use in this particular instance. Researcher asked questions such as “In which condition, do you think their performances are better? Why?” “Can you discuss their performances for both?” etc. While asking these questions and getting feedback or information from teachers, a voice recorder was used to record what teachers stated about performances of students. After the transcription of these recordings, the researcher analyzed these transcriptions with a similar approach she followed for the analysis of the interviews and observations.

Demographic Questionnaire

For the analysis of the demographic questionnaire, the researcher basically calculated the frequencies of the options for each question, and the points obtained for “strongly

disagree and disagree” and “strongly agree and agree” were summed. After these combined scores were obtained, they were compared and the one with the greatest ratio was specified. Then these results were interpreted and reported. The complete analysis of the demographic questionnaire is given in the next chapter (see Table 4.5).

3.5 Researcher Role

In the current study, the researcher was at insider status. Researcher planned the technology-enhanced extracurriculum and chose materials and games for the activities under the supervision of a special education expert. Moreover, researcher took place actively in the activities. She attended to the activities actively and worked like volunteer students. The purpose was to observe students and activities closely and being part of process as much as possible but without any biases. For this purpose, the researcher listed her assumptions for the study and kept them at bay throughout the course of the study.

3.6 Assumptions of the Study

- Teachers of students with intellectual disability were informed about how to use devices and playing games before and during activities by volunteer students. The given information was to enough for them to enjoy activities.
- Technology enhanced extra-curriculum may affect students with intellectual disability positively in terms of cognitive and physical development.
- Physically Interactive games played on X Box 360 with Kinect and Nintendo Wii may have possibility to increase students’ physical actions and enforce them to think and act at the same time.
- Concept games played on touch table and tablet PCs give students chance to work with alone or group. Moreover, concept games may provide opportunity students to enforce what they learn. Because there is a problem to find

material for teaching subject in special education, providing these alternatives will increase success.

- Using technologies like X Box, touch table, tablet PCs as supportive in special education and may increase students' motivation by letting them control their movements and learning.
- Using drawing tablets to draw picture may improve students' eye hand coordination.
- At the end of the study, administered questionnaire filled out carefully and accurately.
- Interviewees participated to the interviews voluntarily and they provided honest answers and accurate information that they believe to be true about the activities and the effects of the activities on students with intellectual disability.

3.7 Limitations of the Study

- The participants of the study was comprised of students of "Sait Ulusoy Özel Eğitim ve Uygulama Okulu" in Ankara.
- The study also limited with students who have either high or intermediate intellectual disability.
- The physical environment in which the activities took place was not big enough for students to complete the activities.
- The activities were limited with the games that were chosen for the curriculum.
- Using drawing tablets was difficult for some students because they had trouble with looking at the screen for what they draw and looking tablets at the same time. Student lost their focus. A tablet pc and pen may be preferred instead of drawing tablets.
- The game types should be diverse. Students got bored when they played same game more than once. Moreover, played games should be chosen for each

grade level may be for each student's needs specifically. Because the students are so different even in the same grade level.

- Technology enhanced extra-curriculum activities are planned for all levels of students who take special education. It should be planned for each grade level.
- Given time for each activity should be more and regular to get more reliable results. Getting familiar with devices takes more time for some of students.
- While making observations researcher could not observe all students at the same time, because different activities were taking in different places.

3.8 Delimitations of the Study

- Because the study was conducted with students with intellectual disability, teachers and their schools, the cases in the current research had been shaped according to their availabilities. For example, number of students in cases and time schedules for cases, were redesigned considering students' and their teachers' schedules. The number of students in the first case was higher than other cases because school management want to incorporate all students into the program applied.
- Different disability levels at the same grade level was a delimitation. For instance, where some students in a class were achieving success in all activities; the others did not give any reaction to their environments let alone completing the activities.
- Illnesses of students with intellectual disability were a limitation for the study because some of them got sick easily and having trouble to continue the whole program.

3.9 Quality of the Research

Validity and reliability are important issues in a research in terms of ethics. Merriam (1998) explained that "validity and reliability are concerns that can be approached

through careful attention to a study's conceptualization and the way in which the data were collected, analyzed, and interpreted and the way in which the findings are presented" (p.200). Moreover, Reigeluth and Frick (1999) explained the importance of construct validity (or, internal validity or credibility), and external validity to increase the quality of a research. Yin (1994) explained three methods to increase validity or credibility. These methods are using multiple source of evidence, establishment of chain of evidence and the review of the key informant. Moreover, to enhance quality of a research, results should be supported by using different means. Mathison (1988) also explained that researcher is expected to use different methods, and data sources; to triangulate and to improve the validity of the study.

Triangulation as a strategy improving validity of findings in a research (Huberman & Miles, 1994; Johansson, 2003). Tellis (1997a) argued that "the need for triangulation arises from the ethical need to confirm the validity of the processes" (p.2). Mathison (1988) defined four types of triangulation, which are data, investigator, theory and methodological triangulation. In the current research, data triangulation was used. Data triangulation consists of using several data sources. In the study, interviews, observations, document analysis and demographic questionnaire were used to collect data. Moreover, interviews were conducted with different groups such as teachers, volunteers and parents as the source of data. Thus using different data sources enhanced the findings of the current research. Moreover, taking expert opinions during the data coding also contributes to the validity of the research findings. Tellis (1997a) further explained that case studies are designed for highlighting details from different point of views, different participants, by using multiple data sources. In the study, there was more than one case. Using multiple cases in a research is a strategy for enhancing the external validity and generalizability of the research findings (Merriam, 1998).

As for reliability, it is a term related with the consistency of results from different sources in a research. Reliability is defined as "the consistency of scores or answers from one administration of an instrument to another, and from one set of items to another" (Fraenkel, Wallen, and Hyun, 2012), p. 154). In addition to this, Merriam

(1998) explained reliability as replicability of research findings. In the current research, the three cases were used to increase the reliability of the study.

However, Trochim (2006) argued that validity and reliability terms are generally used in quantitative research rather than qualitative research (Seale, 1999; Lincoln & Guba, 1985), since the terms “truth” or “falsity” are not meaningful concerns for observation. Lincoln and Guba (1985) further articulated the terms “credibility, transferability, dependability and confirmability”. Creswell (1988) expressed that these terms used for indicating the quality of the research. For the credibility, all documents collected from activities, interview records and questionnaires filled by the participants were saved in a hard drive and they were not shared with anyone during and after the study was over. As for transferability, research processes, procedures and the context along with the research questions, design of the study and cases were explained in detail.

Dependability is an issue related with reliability. Merriam (1998) explained reliability as replicability of research findings. This issue was overcome by conducting three cases. These were different contextually. The researcher had the chance to make observations for three times for each three cases. Moreover, pilot studies were conducted before interview to make questions clearer for participants’ better understanding. Moreover, while coding interviews, transcriptions were read and reviewed over and over. Created codes were examined by the thesis advisor and other two PhD students to confirm the accuracy and representability of the derived codes, themes and subthemes.

To sum up, validity and reliability are important terms in a research to enhance the quality of results. There are certain techniques and means to increase validity and reliability in a research by using several data sources for triangulation, and using multiple case for replicability are only two of these techniques that were utilized in the current study.

CHAPTER 4

RESULTS

This formative research multiple case study consisted of interviews made with volunteers, teachers and parents, observation, demographic questionnaire and a document analysis. Students with intellectual disability, teachers, volunteers and students' parents were involved in the study as participants' to collect data. 58 students were observed during three different semesters, eight teachers, 15 volunteers and two parents were attended the interviews. Moreover, a demographic questionnaire was filled by eight teachers. The interviews were made and transcribed to figure out themes. The current study centered upon the following research questions:

- 1) How technology-enhanced extracurriculum activities affect students with intellectual disability?
 - a) What are the effects of such activities on intellectually disabled students' cognitive development?
 - b) What are the effects of such activities on intellectually disabled students' students' physical development?
- 2) What are teachers' opinions about technology-enhanced extracurriculum?
 - a) What do teachers think about technology use in special education?
- 3) How activities in a technology-enhanced extracurriculum can be improved?

4.1 Research Question and Related Interview Questions

For each research of the study, there were questions in the interviews. In the table 4.1, interview questions related with research questions were shown. For three research questions, there were different questions in different interviews so different aspects were combined by asking same question to different groups.

Table 4.1 Research Questions and Related Interview Questions

Research Questions	Related Interview Questions
How technology-enhanced extracurriculum activities effect on students with intellectual disability?	(Teacher Interview) - Dokunmatik masa ve tablet bilgisayarlar üzerinde oynanan oyunların çocukların bilişsel gelişimlerine etkisi hakkında ne düşünüyorsunuz? -Pekiştirme aracı olarak kullanılabilirler mi? Neden?
a) How this extracurriculum affect intellectually disabled students' cognitive development? b) How this extracurriculum affect intellectually disabled students' physical development?	(Volunteer Interview) -Genel olarak etkinliklerin çocukların fiziksel ve bilişsel gelişimleri üzerindeki etkileri hakkındaki fikirleriniz nelerdir? Sizce nedeni ya da nedenleri nelerdir?
What are teachers' opinions about technology-enhanced extracurriculum?	(Teacher Interview) -Eğitimde teknolojinin yeri ile ilgili düşünceleriniz neler? Teknolojinin eğitimdeki rolü ne olmalıdır? -Özel eğitimde teknoloji kullanımını ile ilgili neler düşünüyorsunuz / nasıl hissediyorsunuz? -Eksiklikler -Okulunuzda ya da özel eğitim müfredatı içerisinde teknoloji tabanlı bir ekstra program olması öğrencilerin eğitim- öğretim sürecini nasıl etkiler? Neden? Motivasyon Performans Bilişsel Gelişim Fiziksel Gelişim Dikkat Akran Etkileşimi
a) What about technology use in special education?	
How activities in a technology-enhanced extracurriculum can be enriched for getting higher benefits?	(Teacher Interview) - Öğrencilerinizin katıldığı ders dışı aktiviteye başka neler eklenebilir ya da nasıl revizeler yapılabilir? (Volunteer Interview) -Sizce etkinlikler nasıl revize edilebilir? Ya da yeni etkinlik olarak ne eklenebilir?

In coding part, short symbols were used for defining participants. In table 3.12, three different symbols were explained. V1-V15 were used for defining volunteer students, T1-T8 were used for teachers and finally P1 and P2 were used for defining parents. In further part of result chapter, each research question and related findings were presented in detail. Table 4.2 presents main codes for each research question.

Table 4.2 Main Codes Related with Research Questions

Research Question 1	A) Cognitive Development B) Physical Development
Research Question 2	A) Interview Results 1) Cognitive Development 2) Suggestions for Integrating Technology 3) Others 4) Teachers Attitude 5) Barriers B) Demographic Questionnaire Results 1) Internet Usage of Teacher 2) Technology Acceptance of Teacher
Research Question 3	A) Components of the Program B) Revisions 1) Game Variety 2) Limitations 3) Sustainability 4) Suggestions for Game Design and The Program

In the section below, each research question were examined in detail. According to table 4.2 each main codes and sub themes were given with quotations of participants.

4.1.1 Research Question 1:

How activities in a technology-enhanced extracurriculum effect children with intellectual disability in terms of cognitive and physically development?

To investigate cognitive and physical effects of technology-enhanced program, there were two main titles below. These titles were cognitive development and physical development.

A) Cognitive Development

In order to investigate effects of technology-enhanced extracurriculum on students with intellectual disability cognitive development, interviews were conducted with volunteer students and teachers of disabled children.

According to results, some terms occurred as an effect of cognitive development. These terms are, Use as a reinforcement, develop eye-hand coordination, improve long term memory, learning simple concepts, develop decision making mechanism and finally increase multi-tasking process. Let examine these terms in detail.

Table 4.3 Subthemes Related with Cognitive Development

Using as Reinforcement
Learning Simple Concepts
Develop Eye-Hand Coordination
Support Cognitive Development
Develop Multi-Tasking Process
Develop Decision Making Mechanism
Better Understanding
Improve Long Term Memory
Provide Reuse
Learning in Shorter Time
Pushing Think and Adapt
Providing Multi-Stimuli Environment

Teachers and volunteer students (n=7) expressed that using technology in special education reinforces learning of students with intellectual disability. Some of the teachers and volunteer students stated their thoughts. One of the teachers expressed: “Of course, yesterday I realized that one of my students, who did not know colors, was telling colors. In games or while using computer, he learned colors, at least he knows red and yellow.” [T1]

“Tabi ki yani en azından benim öğrencimin biri renk bilmiyordu ama dün fark ettim ki renkleri söylüyor. Hani oyun içerisinde ya da bilgisayarı kullandıklarında baktım renkleri öğrenmiş en azından kırmızıyı tanıyor ve sarıyı tanıyor.” [T1]

Another teacher stated:

“Like I said, because we used technology as reinforcement, it supports cognitive development. However, it should be used after learning subject for support cognitive development.” [T3]

“Dediğim gibi yani hani şeyi teknolojiyi pekiştireç olarak kullandığımız için bilişsel gelişimi destekler ama öğrendiği konudan sonra yapılan etkinlikte bilişsel gelişimi destekler.” [T3]

One another teacher stated:

“In touch screens, children can reinforce what they learn in schools with materials produced on that screens. For example colors. Children have already known colors, they have learned it. I believed that they can learn distinguishing colors by playing with touch screen materials.” [V1]

“Bu dokunmatik ekran gibi ekranlarda geliştirilen uygulamalarla aslında o çocuklar okullarda öğrendiklerini pekiştirebilirler mesela renkler. Normalde renkleri biliyorlarmış öğrenmişler dokunmatik ekranda uygulamada da bunlar arasındaki mesela farkı oynayarak pekiştirebileceklerine inanıyorum.” [V1]

One of the volunteer stated:

“We can use technology as reinforcement tool easily.” [T8]

“[Teknolojiyi] Pekiştirme aracı olarak çok rahatlıkla kullanabiliriz.” [T8]

Learning Simple Concepts

Result of interviews showed that technology enhanced extra-curriculum helped students with intellectual disability to learn simple concepts. Participants (n=6) explained about their opinions. One of the participants expressed:

“We may taught students with intellectual disability that what is triangle and square. We taught them these geometric shapes and colors. It may be cognitive. We asked is

it square or rectangle? And provided 2 choices. They could choose square directly and called it “square”. They could do that alone. [V3]

“Bilişsel olarak belki de şeyi öğrettik biz onlar [zihinsel engelli öğrenciler] bu üçgen dörtgen hani o geometrik şekilleri renkleri öğretmiştik. Belki o anlamda bilişsel olabilir ama yani bu mesela üçgen deyip işte bu ikisini birleştirdince AA bu başka bir şey hani o farkı kavrayıp başka bir şekil olabileceğini düşünmüştük. Kare kare mi dikdörtgen mi deyip 2 tane seçim yapınca direkt kareyi seçebilmişti yani sonra tekrar birleştirdiğinde aaa bak bu kare dedi. Hani tek başına yapabilişti” [V3]

One of the volunteers commented:

“They learn basic concepts like colors. In the game, there were green and red balloons. At the beginning, some of the children were clicking without distinguishing green or red but they got used to it. They understood that clicking on reds and need to distinguish colors” [V7]

“Temel kavramları öğreniyorlar renkleri falan. O şeydeki [oyunda] mesela yeşil kırmızı balonlar vardı. Bazı çocuklar ilk başladığında yeşil, kırmızı falan diye böyle ayırt etmeden tıklıyorlardı ama sonradan alıştılar mesela. Sadece hani kırmızılar tıklamaları gerektiğini renkleri ayırt etmeleri gerektiğini anladılar.” [V7]

Another volunteer explained:

“It was interesting for me that one of the students who could not distinguish colors know colors directly after activity.” [V15]

“[Öğrencilerden biri] hani renkleri ayırt edemiyordu ama o etkinliği yaptıktan sonra hani onun bilmesi direkt hani yapması çok ilgimi çekmişti” [V15]

In addition to interview results, observation which was done by researcher during activities also revealed that students with intellectual disability learned simple concepts by playing games on touch table and tablet PCs. For example, students started to differentiate colors after playing games.

Develop Eye-Hand Coordination

Developing eye hand coordination is another cognitive effect of technology enhanced curriculum explained by participants (n=3). One of the participants stated:

“Program develops eye-hand coordination.” [T3]

“Ya şu var [program] el göz koordinasyonunu bir kere geliştirir.” [T3]

Another teacher commented:

“There was balloon game. Children were touching red balloons etc. In there, eye-hand coordination was quite successful. ” [T6]

“Balon patlatma oyunu vardı işte daha doğrusu kırmızıya dokun vs. işte orda algı el göz koordinasyonu falan gayet başarılıydı.” [T6]

Support Cognitive Development

In the current study, participants (n=2) explained that technology enhanced program have positive impact on enhancement of cognitive development. One of the participant stated it by saying:

“Program is really effective in terms of cognitive development and physical development because children seeing, touching and doing themselves.” [T4]

“[Program] Bilişsel ve fiziksel gelişim anlamında gerçekten etkili oluyor çünkü çocuk görüyor, kendi dokunuyor, yapıyor.” [T4]

Another participant explained:

“Like I said, because we used technology as reinforcement, it supports cognitive development. However, it should be used after learning subject for support cognitive development.”

“Dediğim gibi yani hani şeyi teknolojiyi pekiştireç olarak kullandığımız için bilişsel gelişimi destekler ama öğrendiği konudan sonra yapılan etkinlikte bilişsel gelişimi destekler.” [T3]

Develop Decision Making Mechanism

When interview results were examined participants (n=2) of the study stated decision making as a cognitive effect of technology enhanced extra-curriculum. One of the volunteer explained this effect by saying:

“In flash based games, students were hearing the same voice and after that they chose the animal belongs to voice. For example, there is a cow voice coming through and they think which animal this is as cognitively.” [V4]

“Aynı şekilde flash oyunlarında sürekli aynı sesi duyup tekrar uygulamaları gerekiyordu. Hani bir inek sesi geliyor arkasından hangi hayvandı diye düşünüyorlardı bayağı bilişsel olarak.” [V4]

Another volunteer stated:

“Students played same game more than once. In the game, there were different ways or applicable choices. For example, you can jump for picking money above, if you do not you can go over the water for picking Money below. Students made a different move in each time. For example, one of the students played first, did not get the Money on cloud. At second time, while playing student tried to jump for getting Money.” Whether student was successful or not, it depends on their jump moment. However, they tried it and made an effort for that. In that situation, decision making mechanism can be seen.” [V11]

“[Öğrenciler] Hep aynı oyunu 1 den fazla kez oynadılar. Oynanan oyunda gidilebilir yol uygulanabilir seçenek 1 den fazla atlarsın işte yukarıdaki paraları toplarsın atlamazsın suyun üzerindeki aşağıdaki paraları toplarsın bunların her seferinde çocuk farklı bir harekette bulundu. Yani mesela ilk oynadığında bulutun üzerindeki alamadığı durumda 2. Kez oynarken orada zıplamaya çalıştı başarılı oldu veya olmadı. Bu birazda zamanına zıplama anına bağlı olarak değişiyor ama bunu denedi onu almak için uğraştı yani bi şeyi bu konuda bir karar verme mekanizması görülebilir yani.” [V11]

Observation notes that researcher took revealed that both playing concept games and physically active games develop students’ decision making mechanism. These games need students’ controlling. In other word, students control games with their

decisions. For example, in physically active games on X Box, students determined the path that they go and the movement needed.

Better Understanding

One of the participants a teacher explained that technology enhanced program provide better understanding for children. Teacher argued it by saying:

“Of course, yesterday I realized that one of my students, who did not know colors, was telling colors. In games or while using computer, he learned colors, at least he knows red and yellow.” [T1]

“Tabi ki yani en azından benim öğrencimin biri renk bilmiyordu ama dün fark ettim ki renkleri söylüyor. Hani oyun içerisinde ya da bilgisayarı kullandıklarında baktım renkleri öğrenmiş en azından kırmızıyı tanıyor ve sarıyı tanıyor.” [T1]

Develop Multi-Tasking Process

Participants (n=2) argued that technology enhanced program develop multi-tasking process of students with intellectual disability. One of the volunteer student stated:

“In terms of cognitive development touch screen are important because in you perceived with your eyes directly. You made a process. After that you give an output with your movement. I think it is important. ” [V8]

“Bilişsel gelişim açısından bence tablet daha şey dokunmatik ekran önemli çünkü orada direkt gözle algılıyorsun. Bir işlem yapıyorsun. Daha sonra işlemin cevabı olarak hareketinle bir çıktı veriyorsun. Bence çok önemli.”[V8]

The other volunteer student explained:

“For example, in the game, children use their hands or listen sound and playing game at the same time. Children learn doing things at the same time. ” [V10]

“[Çocuk] mesela elini kullanıyor falan böyle ya da aynı zamanda hem sesi dinleyecek hem yapacak aynı zamanda. Bir şeyleri eş zamanlı yapmayı falan kazanmış oluyor” [V10]

Researcher notes indicated that playing activities in the technology enhanced curriculum develops students’ multi-tasking processes. For example, in physically

interactive games such as River Rush, students think, decide and give response with their movements. They were supposed to think and response at the same time or quickly to maintain game or not fail.

Improve Long Term Memory

In the study, one of the participants explained that using technology enhanced extra-curriculum improves long term memory of students with intellectual disability. The participant stated:

“Our children have lack of attention and long term memory problem. They cannot use their long term memory, it is too short. They can transfer knowledge to short term memory because they see it. There is a reuse opportunity of materials, it is so effective.” [T4]

“Özellikle bizim çocuklarda dikkat eksikliği ve mesela uzun dönemli bellek çok kısa kullanamıyorlar onu. Kısa dönemli belleğe gördüğü için hemen aktarıyor. Tekrar tekrar kullanma imkânımız var [materyalleri] o da çok etkili.” [T4]

Provide Reuse

One of the participants stated that materials in program provides reuse. Interviewee explained it by saying:

“Our children have lack of attention and long term memory problem. They cannot use their long term memory, it is too short. They can transfer knowledge to short term memory because they see it. There is a reuse opportunity of materials, it is so effective.” [T4]

“Özellikle bizim çocuklarda dikkat eksikliği ve mesela uzun dönemli bellek çok kısa kullanamıyorlar onu. Kısa dönemli belleğe gördüğü için hemen aktarıyor. Tekrar tekrar kullanma imkânımız var o da çok etkili.” [T4]

According to observation notes taken, activities in technology enhanced curriculum can be repeatable how many times students or teacher want. Students with intellectual disability or teachers can reuse them whenever they want.

Learning in Shorter Time

One of the teachers explained that applied program decrease the time for teaching process. Teacher stated:

“Technology enhanced extra-curriculum affects learning process positively. I mean we have chance to teach in a shorter time” [T7]

“[Teknoloji tabanlı ekstra müfredat]Süreci tabi ki olumlu yönde etkiler. Yani daha kısa sürede öğretme şansımız olur.” [T7]

Pushing Students Think and Adapt

According to results of interviews, one of the teachers claimed that activities push students to think and adapt situation. Teacher stated:

“Students are physically active and learning during activities. They faced with situations presenting cognitive contradiction to solve. This pushes students to think and adapt. They have to force themselves to do this.” [T8]

“[Aktiviteler esnasında]Hareketli hem de öğreniyor [Öğrenciler]. Bir de şöyle bir şey var her yeni durum çözmesi gereken bir bilişsel bir çelişki ortaya koyuyor. Çocuğu zorladığı için çocuk düşünmek, adapte olmak, en azından kendini zorlamak zorunda kalıyor” [T8]

Observation notes showed that activities in technology enhanced extra-curriculum, makes students with intellectual disability think and active more. Especially in physically active games, if students want to play games, they have to push themselves to pass next level or solve current situation by deciding and moving their bodies to the right side. For example, in River Rush a game on X Box, there are ways such as jumping, moving their body left and right to get moneys all over the river. If students want to continue to play, they have to push themselves to think and act.

Providing Multi-Stimuli Environment

One of the subjects explained that technology enhanced program provides multi-stimuli environments. Interviewee claimed:

“Like I said, because the activities consist of visual, physical and audio stimulus, chance of students remembering what they learn increases. ” [T7]

“Dediğim gibi yani [aktiviteler]hem görsel hem fiziksel aktiviteye dayandığı için ve sessel aktiviteye dayandığı için yani öğrencilerin öğrendiklerini hatırlama ihtimalleri daha yüksek olur.” [T7]

Researcher observation notes also indicated that activities in technology enhanced extra-curriculum provides multi-stimuli environment. In games, there more than one stimuli at a time. For example, in concept games, students see visual about concepts, they hear music and instruction related with them and they can involve by touching or clicking to the game. If they did not understand instruction they see animation or see visuals. Using multi-stimuli keep students attention on materials.

B) Physical Development

In order to investigate effects of technology-enhanced extracurriculum on intellectually disabled students’ physical development, interviews were conducted with volunteer students and teachers of disabled children.

According to results, some terms occurred as an effect of physical development. These terms are, making students physically more active, supporting physical development, providing physically active environment, developing muscles and controlling physical movements. Let examine these terms in detail.

Table 4.4 Subthemes Related with Physical Development

Making Students Physically More Active
Support Physical Development
Provide Physically Active Environment
Develop Muscles
Controlling Physical Movements

Making Students Physically More Active

After interview results were examined, it is revealed that some of the participants (n=7) thought that activities in technology enhanced curriculum make students physically more active. A participant argued that by saying:

“I think, the program creates physical impact on students because most of them moving slowly. There were students who could not move much. I think, they will be physically more active.” [V1]

”[Öğrencilerde] Onlarda bence fiziksel etkiyi yaratır çünkü çoğu hani daha böyle pasif hareket ediyor. Çok fazla hareket edemeyen çocuklar vardı. Onlarında daha fazla hareketli olabileceklerini düşünüyorum.” [V1]

One of the participant stated:

“When playing X-Box games, students jumped a lot and they were moving. I think that this situation develops them physically.”

“X-Box oyunlarını oynarken çok zıpladılar ve hareketlilerdi bu hani harekette olmaları hani fiziksel olarak geliştirici olduğunu düşünüyorum.” [V4]

Another participant explained:

“While they were playing, they forgot about everything like their environment. They were just focusing game. Their movement ability was developing.” [V5]

“Ama oyun oynarken her şeyi unutuyorlardı yani çevrelerini unutup sadece oyuna odaklanıyorlardı. Hani hareket yetenekleri geliyordu.” [V5]

One another volunteer claimed:

“Definitely, it is a point that I believe providing big benefits. Especially in physical aspect, disabled students cannot jump, twist and turn or movements according to eye-foot coordination. For example, like they did in THBT dance activity. For doing these movements, they forced themselves physically and they got serious progress in physical aspect.” [V11]

“Kesinlikle yani büyük bi faydası olduğuna inandığım bir nokta. Fiziksel açıdan özellikle çünkü şimdi bazıları bu engelli arkadaşlarımız yani şimdi mesela bazıları zıplayamıyor, sağa sola eğilimler de bulunamıyorlar veya işte el ve ayak koordinasyonuna uygun hareketler. İşte THBT de yaptıkları gibi bu tür şeyleri yapamıyorlar. Şimdi bunları yapmak için şey

kendilerini zorluyorlar fiziksel bu etkinliđi yapmak için ve bunları şey ciddi anlamda ilerleme kaydettirmiştir yani fiziksel açıdan özellikle” [V11]

Researcher observation also showed that students with intellectual disability liked games especially physically active games such as River Rush. Students played even more than once. When students came to METU to attend activities, they could not seem to play physically active games because they had difficulty in moving. However, in physically active games students' performances were quite good. Games made them physically more active.

Support Physical Development

In the current study, one of the participants a teacher explained that activities in technology enhance curriculum supports intellectually disabled students' physical development. Teacher said:

“It is really effective in terms of physical and cognitive development because children seeing, touching themselves and doing.” [T4]

“Bilişsel ve fiziksel gelişim anlamında gerçekten etkili oluyor çünkü çocuk görüyor, kendi dokunuyor, yapıyor.” [T4]

Provide Physically Active Environment

One of the teachers, claimed that applied technology enhanced curriculum provides with disabled students physically active environment. Participant emphasized it by saying:

“I missed movement. Activities were not the type that sit and think. There was no environment that students were stable and sitting on a table and learn. ” [T8]

“Hareket hareketi atladım. Evet, [Aktiviteler] sadece oturarak düşünerek yapılan bir şey değil. Çünkü hem hareket açısından da çocuklar stabil yani bir masada oturarak bir şey öğrenmesine sebep olacak bir ortam yok orada.” [T8]

Observation notes taken by researcher herself indicated that physically interactive games such as River Rush and Tennis provided environment making students physically more active. Game devices which are X Box and Nintendo Wii, students

played and control games by using their bodies and this makes them physically active by providing physically active game environments.

Develop Muscles

One of the volunteers explained that playing physically interactive games on X-Box helps students' muscles develop. Volunteer student explained it by saying:

“For example, you are playing a game on the Kinect. You are jumping, boxing, playing tennis but you use real muscles. As a result, you use that muscles and it develops by using it. Accordingly, your body develops in terms of physically while having fun.” [V8]

“Hani Kinect te mesela bir oyun oynuyorsun zıplyyorsun boks yapıyorsun tenis oynuyorsun falan ama gerçekten o kaslarını kullanıyorsun. Sonuçta kullanıyorsun o kasları ve hani kullandıkça da gelişiyor dolayısıyla eğlenirken vücudun gelişiyor fiziksel açıdan.” [V8]

Controlling Physical Movements

One of the participants explained that students with intellectual disability could control their movements during activities. Volunteer stated:

“I saw that most of the students could able to control their movements physically.” [V12]

“Oyun oynarken hani birçoğunda şeyi gördüm fiziksel olarak çok kendilerini kontrol edebiliyorlar.” [V12]

4.1.2 Research Question 2:

What are teachers' opinions about technology-enhanced extracurriculum?

a) What about technology use in special education?

In order to investigate research question 2 above, interviews were conducted with teachers' of students with intellectual disability. They were asked questions about, their opinions about technology enhanced extra-curriculum, their technology attitude and suggestions for the current program.

When results were examined, five main coding were occurred. In the table 4.9 codes were given in detail. Besides interview results, demographic questionnaire results will be given in further part of research question 2.

4.1.2.1 Interview Results

In the table below, themes related with teacher opinions about technology and technology-enhanced extracurriculum were given. Given themes and related subthemes were explained in detail one by one. According to interview results, five main themes occurred.

<u>Table 4.5 Themes Related with Research Question2</u>
Cognitive Development
Suggestions for Integrating Technology
Others
Teachers Attitude
Barriers

A) Cognitive Development

To investigate teachers' opinions about effects of technology on cognitive development, sub codes which were given below explained in detail.

<u>Table 4.6 Subthemes Related with Cognitive Development</u>
Using as Reinforcement
Better Understanding
Effective Learning
Provide Visual Support
Multi-stimuli Environment

Using as Reinforcement

Participants (n=4) claimed that technology can be used as reinforcement in special education. One of the teachers stated:

“Materials in the technology-enhanced extracurriculum makes our job quite easier because examples in the activities reinforces what we teach.” [T1]

“[Teknoloji tabanlı programdaki materyaller] Bizim işimizi aslında çok kolaylaştırıyor çünkü oradaki örneklerle bizim anlattıklarımız daha da pekişiyor.” [T1]

Another teacher stated:

“Using technology as reinforcement is more beneficial for us. Using technology while teaching is hard because we have to use real materials and objects. It will be learning by playing in reinforcement part.” [T3]

“Dersler ve programlar biz teknolojiyi özel eğitimde pekiştirici olarak kullanırsak bizim için çok daha faydalı hani öğretim yaparken teknolojiyi kullanmamız bizim için zor gerçek nesnelere ve gerçek materyaller kullanarak öğretim yapmak zorundayız. Pekiştirici kısmında hem oyunla öğrenmek gibi oluyor.” [T3]

One another participant claimed:

“Technology should be used as reinforcement for activities and evaluation unless being head of teachers’ active role in classroom and the classroom activity.” [T5]

“Yani öğretmenin, sınıf içerisindeki aktivitenin önüne geçmemesi, aktif rolünün önüne geçmemesi şartıyla [teknolojinin] değerlendirmelerde ve etkinlik pekiştirici olarak kullanılması gerekir.” [T5]

Better Understanding

When interview results were examined some of the participants (n=2) indicated that students with intellectual disability understand better with technology. One of the teachers stated:

“Students learn and understand better when they see, touch and feel what they learn in technology enhanced materials.” [T4]

“[Teknoloji tabanlı materyallerde] çocuk bunu [konuyu] görüp de görsel olarak da dokunsal olarak da hissedince daha iyi anlıyor, daha iyi görüyor, öğreniyor.” [T4]

One of the parents explained:

“I think that Buse perceives better with technology, computer and tablet. In these devices, there are colorful games and music. I think that when she listens from tablet, she perceives better.” [P2]

“Yani şey Buse mesela teknoloji, bilgisayar, tabletle daha güzel algıladığını düşünüyorum. Hani orada renkli renkli oyunlar falan. Ne bilim Müzik falan olduğu zaman işte tabletle falan dinlediği zaman daha böyle algıladığını düşünüyorum.” [P2]

Provide Visual Support

Participants of the study argued that technology-enhanced extracurriculum provide visual support for students with intellectual disability. One participant explained:

“Being visual or providing example for students with intellectual disability are important because they want to see obviously.” [T2]

“Görsel olmak ya da onlar için bir örnek oluşturması çok önemli çünkü onlar [zihinsel engelli çocuklar] mutlaka görmek istiyorlar.” [T2]

The other participant:

“Like I said, visual elements should be integrated for provide visually and develop other skills like more permanent knowledge.” [T7]

“Dediğim gibi görsellik katması açısından ve diğer uuu becerileri geliştirmesi açısından yani bilgilerin unutulmaması anlamında görselliğin olmasını sağlamayı savunuyoruz zaten.” [T7]

Effective Learning

In the current study one of the participant claimed that involving technology creates more effective learning. Participant stated:

“Technology based program makes our jobs easier because what we tell reinforces with examples in materials and students can see as visually. We tell subject as verbal or on paper but seeing it as technologically is more effective for students.” [T1]

“[Teknoloji tabanlı program] Bizim işimizi aslında çok kolaylaştırıyor çünkü oradaki örneklerle bizim anlattıklarımız daha da pekişiyor ve [öğrenciler] görsel olarak görebiliyor.”

Tamam, biz anlatıyoruz sözel olarak ya da kâğıt üzerinde ama onu teknolojik olarak görebilmeleri onlar için daha etkili oluyor.” [T1]

Multi-Stimuli Environment

One of the participants stated technology-enhanced extracurriculum provides with students with intellectual disability multi-stimuli environment and this makes students learn and understand better. Participant explained:

“... When children seeing it visually, feeling tactually, understands, see and learn better.” [T4]

“...çocuk bunu görüp de görsel olarak da dokunsal olarak da hissedince daha iyi anlıyor, daha iyi görüyor, öğreniyor.” [T4]

B) Suggestions for Technology Integration

To investigate suggestions about technology integration sub codes which were given table 4.7 explained in detail. Teachers explained, using technology for appropriate purposes, supportive purposes and selection of appropriate materials as suggestions.

Table 4.7 Subthemes Related with Suggestions for Technology Integration

Using Technology for Appropriate Purposes

Using for Supportive Purposes

Appropriate Materials Selection

Using Technology for Appropriate Purposes

In the current, participants (n=2) argued that appropriate use of technology will bring success. One of the participants claimed:

“I think that if we integrate technology in an appropriate way, it will be quite successful.” [T7]

“Teknolojiyi uygun şekilde eğitime sokarsak bence gayet başarılı olur.”[T7]

Another participant:

“If you use knife for cutting, it is a good thing. However, you use knife for another purpose it is not a good thing. I think same thing for technology.” [T8]

“Bıçağı ekmeği kesmek için kullanırsanız bu iyi bir şeydir ama başka amaçla kullanırsanız iyi bir şey değildir. Teknolojik aletleri de böyle düşünüyorum.” [T8]

Using for Supportive Purposes

Using technology for supportive purposes was another suggestion which teachers explained in the interviews. One of the teacher stated it by saying:

“Technology can be used supportive for troubled skills like color and numbers because they are abstract terms. It can be beneficial for making abstract concepts concrete.” [T6]

“Destekleyici olarak belki şöyle bir şey olabilir. Zorlanılan becerilerin bizim mesela renk öğretimi ve sayı öğretimi şeydir sıkıntılıdır. Çünkü soyut kavramlardır. Soyut kavramların somutlaştırılması anlamında çok faydası olabilir hani zorlandığımız becerilerde kullanılabilir” [T6]

Appropriate Materials Selection

In the interviews, one of the interviewee volunteer student emphasized importance of appropriate material selection for physical and cognitive development of students with intellectual disability. Volunteer student explained:

“Students with intellectual disability can get things for both their physical and cognitive developments, when appropriate materials develops for them. [V14]

“İllaki hani hem fiziksel hem zihinsel becerilerine katacak birçok şey elde edebilirler uygun materyallerin geliştirilmesi sonucunda tabii ki de bu şart var.” [V14]

C) Others

Important

Teachers (n=4) argued that integrating technology into education is an important issue and integration must be done. One of the teachers explained:

“I think that technology is important for education. It is needed to be used for special education and our children.” [T2]

“Eğitimde teknoloji önemli. Kullanmak gerekiyor hele bizim [özel eğitim] için bizim çocuklar için daha çok gerekli bence.” [T2]

Another teacher stated:

“Role of technology in education is important.” [T4]

“Teknolojinin eğitimdeki rolü büyük.” [T4]

One another teacher stated:

“Technology must be used,” [T6]

“[Teknolojinin] Mutlaka kullanılması gerekiyor” [T6]

Increase attention

Only one of the teachers expressed that technology is a factor that affect students’ attention in a positive way. Interviewee claimed it by saying:

“I think using technology is more efficient on our children. For example, I have an autistic children who gives no response anything in my classroom. When something related with technology happened, kid surprised me that how could she did activities.” [T1]

“Bence bizim çocuklarda daha etkili. Mesela bir otistik öğrencim var hiç bir şeye tepki göstermiyor sınıfta ama teknoloji ile ilgili bir şeye gelince çocuk beni bile şaşırtıyor yani bunları nasıl yapabiliyor diye.” [T1]

D) Teacher Attitude

In the current study, teachers pointed out some titles which were given in the table 4.8. These sub codes showed what teachers’ attitude, feelings and thoughts toward technology.

Table 4.8 Sub Themes Related with Teachers' Attitude toward Technology

Makes Teachers' Job Easier
Makes Teachers' Feel Comfortable
Lack of Technology Knowledge
Easy Reach of Knowledge and Materials
Makes Teachers Powerful
Provides Variety
Teachers should be Educated
Teacher Role

Makes Teachers' Job Easier

According to interviews with conducted with teachers, it is revealed that teachers (n=3) think that technology makes their job easier. A teacher explained:

“Actually, technology makes our job easier.” [T1]

“*[Teknoloji] Bizim işimizi aslında çok kolaylaştırıyor*” [T1]

Another teacher:

“Technology decreased our workload.” [T4]

“*[Teknoloji] Azalttı iş yükümüzü.*” [T4]

One another teacher:

“I think, technology makes it easier. It support and makes our role easier.” [T8]

“*[Teknoloji] Bence bence kolaylaştırır. Rolümüzü kolaylaştırır destekler*” [T8]

Makes Teachers' Feel Comfortable

In the current study, teachers (n=2) claimed that using technology makes them feel comfortable about their role. One of the teacher explained it by saying:

“Technology makes me feel comfortable. It is easier.” [T4]

“*[Teknoloji] ya daha rahat hissettirir daha kolay.*”[T4]

Another teacher:

“I use technology as a teacher. It makes me comfortable.” [T7]

“Ya rolümle ilgili teknolojiyi kullanıyorum. Ya bu beni rahatlatıyor.”[T7]

Lack of Technology Knowledge

Only one teacher explained that lack of technology knowledge is a problem for teachers while using technology. Interviewee stated:

“We cannot reach the resources. You have to create materials for that or you have to you know computer very well. Actually, I do not have that much information.” [T2]

“Kaynağa ulaşamıyoruz hani ya kendin yaratacaksın [materyali] onun için de bilgisayar çok iyi bilmek lazım. O kadar bilgim yok açıkçası benim.” [T2]

Researcher observation notes also indicated that during activities it was obvious that most of the teacher did not know much about technology. When they examined the materials created they excited about use them because they do not have in their school such things and technology. They also tried to play games.

Easy Reach of Knowledge and Materials

One of the teachers claimed that reaching knowledge and materials easier. Teacher explained it by saying:

“Using technology provides with easy reach of knowledge and materials. We were creating materials ourselves. However, now, materials can be reachable on Internet and computer environment.” [T4]

“[Teknolojiyi kullanmak] yani bilgiye daha kolay ulaşmamızı sağlar. Hani uı materyal en azından daha önceden materyal hazırlıyorduk kendimiz. Şimdi materyaller işte internet ortamında ya da bilgisayar ortamında daha kolay ulaşılabilir.” [T4]

Makes Teachers Powerful

Only one teacher expressed that technology makes teacher more powerful. A teacher pointed out:

“I think that technology makes us more powerful.” [T8]

“[Teknoloji] Elimizi kuvvetlendirir öyle düşünüyorum ben.” [T8]

Provides Variety

In the current study, one of the teachers pointed out that technology provides variety in terms of finding materials to teachers. Interviewee explained:

“I think technology provides us with variety.” [T8]

“Hatta [teknoloji] bize çeşitlilik sağlar diye düşünüyorum.” [T8]

Teachers should be Educated

When interviews were conducted, one of the interviewee claimed that they should be educated about technology. Participant stated it by saying:

“For technical problems, we should be educated.” [T4]

“Bize bu konuda bir eğitim verilmeli [Teknik problemlerden dolayı]” [T4]

As an addition to interview result, observers’ notes also suggest that teachers do not know about new technological devices, producing materials and how to use materials produced. They need to be educated about technologies which they faced to get higher benefit.

Teacher Role

Teachers’ active role in the classroom is an important issue. Results of interview with one of the teachers emphasized:

“Technology should be used unless not passing in front of teachers’ active role and the activity conducted in the classroom.” [T5]

“Yani [teknoloji] öğretmenin, sınıf içerisindeki aktivitenin önüne geçmemesi, aktif rolünün önüne geçmemesi şartıyla [kullanılmalı].” [T5]

Researcher’ observation indicated that teacher had concerns about their role when they use technology in their class. They liked materials but also they want to have control over materials.

E) Barriers

In the study, while conducting interviews, teachers explained about some items barriers in front of technology usage in the classrooms. These factors explained in the table 4.9.

Table 4.9 Sub Themes Related with Barriers

Lack of Materials
Lack of Program
Lack of Resources
Technical Problems
Teacher Attitude
Ministry of Education

Lack of Materials

When interviews were conducted, teachers (n=3) expressed that they have trouble finding materials for their lessons. One of the teacher explained it by saying:

“Like I said, we actually have limited programs. For example, yours were different for students and more entertaining.” [T1]

“Dediğim gibi yani programlarımızda kısıtlı açıkçası hani bu konuda mesela sizinki [sizin materyalleriniz] çok farklı onlar için çok eğlenceli gelmişti.” [T1]

The other teacher pointed out:

“Using technology is good for us but we do not have programs so we cannot use them as reinforcement. To use technology as a reinforcement, we should have educational materials and programs.” [T3]

“Bizim açımızdan da güzel oluyor [teknolojiyi kullanmak] ama hani şey yapamıyoruz çok fazla program olmadığı için pekiştirici anlamında da kullanabilmemiz için teknolojiyi eğitim materyallerimiz ve programlarımız olması gerekiyor.” [T3]

In addition to interviews, researcher also observed that teachers of students with intellectual disability do not use such games and activities in technology-enhanced

extracurriculum in their lessons. Teachers were surprised and excited when they see the extra curriculum materials and very interested in them.

Lack of Program

One of the teachers stated that lack of program is an obstacles using technology. Teacher stated:

“Using technology is good for us but we do not have programs so we cannot use them as reinforcement. To use technology as a reinforcement, we should have educational materials and programs.” [T3]

“Bizim açımızdan da güzel oluyor [teknolojiyi kullanmak] ama hani şey yapamıyoruz çok fazla program olmadığı için pekiştirici anlamında da kullanabilmemiz için teknolojiyi eğitim materyallerimiz ve programlarımız olması gerekiyor.” [T3]

Lack of Resources and Substructure

In the interviews, one of the participants explained problem of substructure and resources as an obstacle in front of integrating technology into education. Participant said:

“Problem of substructure and resources” [T5]

“Altyapı ve kaynak sorunu.” [T5]

Technical Problems

One of the teacher explained clearly that they have difficulty in technical issues. Interviewee claimed:

“We have difficulty while installing programs. Education should be given us or we have to take technical support.” [T4]

“Belki program yüklemekte sıkıntı çekebiliyoruz. Bize bu konuda bir eğitim verilmeli ya da teknik destek almak durumunda kalıyoruz.” [T4]

Teacher Attitude

A Teacher expressed that teachers' attitude may be an obstacle for technology usage.

Interviewee explained:

“Teachers' lack of technology may be a barrier because no one can follow technology as same speed. Moreover, some teachers who is older can resist to use technology.” [T7]

“Öğretmenlerin bu konudaki [teknoloji kullanımındaki] yetersizliği olabilir. Yani herkes teknolojiyi aynı hızla takip etmiyor. E bir de belli bir yaşın üstündeki öğretmenler direnç de gösterebiliyor özellikle teknoloji kullanımına.” [T7]

Ministry of Education

A teacher stated that Board of Education and Discipline is an obstacle integrating technology into education. Teacher expressed:

“Integrating technology, we need approval from Board of Education and Discipline. It will presented in there and bureaucratic obstacles will be passed over before using.” [T8]

“Bu [teknoloji entegrasyonu] bizim talim terbiye kurulunun kesinlikle onayından geçmeden yapabileceğimiz bir şey değil bizim için. Orada illaki oraya sunulacak oradaki bürokratik engeller aşılanacak.” [T8]

4.1.2.2 Demographic Questionnaire Results

According to demographic questionnaire which was applied to eight teachers, information about their internet usage, attitude and technology acceptance were determined. In the below section these information were explained in detail.

A) Internet Usage of Teacher

In addition to demographic information such as sex and job about teachers, information about teachers' usage of Internet and technology is also needed to determine their point of view of using technology in special education. Integrating technology is not an issue related with only students.

Table 4.10 Internet Usage of Teachers

Participants	n	%
Internet Usage		
Yes	8	100
No	-	-

Teachers are also related with process of integration or technology usage in a classroom. In the table below, information is given about teachers' technology usage.

Table 4.11 Devices that Teacher Prefer to Use

Used Devices	n	%
Computer	4	50
Laptop	6	75
Tablet PCs	3	37.5
Smart Phone	5	62.5

In the current study, 8 teachers were responded the demographic questionnaire. Participants were asked to explained devices using for accessing Internet. All participants indicated at least one device. When questionnaire results were examined, all teachers ($n=8$) use Internet in their daily lives. Moreover, half of teachers ($n=4$) use computer, most of them ($n=6$) use laptops, 3 of them prefer tablet PCs and finally 5 of the participants use smart phones to access Internet.

Table 4.12 Purposes of Internet Usage of Teachers

Purpose of Internet Usage	n	%
Social sharing platforms (Facebook, Twitter)	3	37.5
Searching on the net.	8	100
Checking emails	7	87.5
Online shopping	4	50
Playing games	1	12.5
Banking	5	62.5

From table 4.12, it can be seen that what the reasons of Internet usage of teacher are. Teachers attended the current study expressed different purposes while connecting Internet. 3 of teachers ($n=3$) using Internet for social sharing platforms such as Facebook, Twitter. All of teachers ($n=8$) have purpose of searching on the net, most of the teachers ($n=7$) checking e-mails, half of them ($n=4$) using it for online

shopping, only 1 of the teachers ($n=1$) playing games on the Internet and finally, 5 of the participants ($n=5$) using Internet for banking. Majority of participants ($n=8$) indicated searching on the net as purpose of their Internet usage.

Table 4.13 Internet Usage Time of Teachers Per week

Internet Usage Time (Per week)	n	%
Less than 5 or 1-5	2	25
Between 6 and 10	1	12.5
Between 11 and 20	4	50
More than 20	1	12.5

In the demographic questionnaire, participants explained about their Internet usage time in a week. 2 participants indicated Internet use duration as less than five hours, 1 of teachers explained usage of Internet between 6 and 10 hours, half of teachers ($n=4$) indicated between 11 and 20 hours and finally, 1 participant explained Internet usage as more than 20 hours in a week. When the table 4.13 were examined, It can be said that majority of participants using Internet more than 11 hours in a week.

B) Technology Acceptance of Teacher

In the current study, to determine teachers' attitude a demographic questionnaire was applied. There were eight teachers attended the questionnaire. In the table 4.14 results of demographic questionnaire was given. In the questionnaire, there were questions about teachers' sex, job, technological devices used. Moreover, teachers were asked 18 questions determine their technology attitude and using technology in their classes. They were supposed to rate themselves from 1 to 5. 1 was stand for strongly disagree and 5 was standing for strongly agree.

Table 4.14 Teachers Technology Acceptance Attitude

Statement	n	Strongly Disagree	Disagree	Undecided	Strongly Agree	
1. Bilişim Teknolojilerini kullanma konusunda sorun yaşamam.	8	-	1 %12.5	1 %12.5	5 %62.5	1 %12.5
2. Bilişim Teknolojilerini kullanmak beni endişelendirir.	8	4 %50	1 %12.5	1 %12.5	1 %12.5	1 %12.5
3. Bilişim Teknolojilerini kullanmak için gerekli becerileri öğrenme konusunda kendime güveniyorum.	7	-	1 %12.5	-	3 %37.5	3 %37.5
4. Bilişim Teknolojileri hakkındaki bilgilerim, meslektaşlarımla karşılaştırıldığında daha sınırlı olduğunu düşünüyorum.	8	2 %25	-	1 %12.5	5 %62.5	-
5. Bilişim Teknolojileri hakkında meslektaşlarımla konuşmaktan hoşlanırım.	8	-	2 %25	3 %37.5	1 %12.5	2 %25
6. Bilişim Teknolojileri kullanırken karşılaşılabilecek problemleri çözemem.	8	2 %25	1 %12.5	2 %25	3 %37.5	-
7. Bilişim Teknolojileri kullanımında başarılıyım.	7	-	-	2 %25	4 %50	1 %12.5
8. Bilişim Teknolojileri kullanımını öğrenmenin kolay olacağını düşünüyorum.	8	-	-	1 %12.5	4 %50	3 %37.5
9. Derslerde Bilişim Teknolojilerini kullanma fikri beni rahatsız eder.	8	5 %62.5	1 %12.5	-	1 %12.5	1 %12.5
10. Derslerde Bilişim Teknolojilerini kullanmak beni korkutur.	8	6 %75	-	1 %12.5	-	1 %12.5

Table 4.14 (Continued) Teachers Technology Acceptance Attitude

11. Derslerde Bilişim Teknolojileri kullanımının zaman kaybı olduğunu düşünüyorum.	8	6 %75	1 %12.5	-	-	1 %12.5
12. Derslerde Bilişim Teknolojilerini kullanmak kendimi iyi hissettirir.	8	-	-	1 %12.5	3 %37.5	4 %50
13. Derslerde Bilişim Teknolojilerini kolaylıkla kullanacağımı düşünüyorum.	8	-	-	-	5 %62.5	3 %37.5
14. Derslerde Bilişim Teknolojilerini kullanmak iş yükümü azaltacağını düşünüyorum	8	-	-	2 %25	4 %50	2 %25
15. Derslerde Bilişim Teknolojileri kullanımının öğrencilerin motivasyonunu arttıracığını düşünüyorum.	8	-	-	-	4 %50	4 %50
16. Derslerde Bilişim Teknolojileri kullanımının öğrencileri korkutacağını düşünüyorum.	8	5 %62.5	3 %37.5	-	-	-
17. Derslerde Bilişim Teknolojileri kullanımı öğrencilerin öğrenmelerinin daha kalıcı olmasına yardımcı olur.	8	1 %12.5	-	2 %25	2 %25	3 %7.5
18. Derslerde Bilişim Teknolojileri kullanımının öğrencileri daha içe kapanık hale getireceğini düşünüyorum.	8	6 (%75)	1 %12.5	1 %12.5	-	-

In the table given above, statements were questions that participants answered in demographic questionnaire. Teachers (n=8) were expected to rate themselves from one to five by considering related statement. 1=strongly disagree, 2=Disagree, 3=Undecided, 4= Agree and 5 was for strongly agree.

According to the table 4.5, teachers (n=6) explained that they do not have problems while using information technologies. Also, they (n=5) think that they are successful in terms of computer usage and teachers (n=6) expressed that they feel confident

about learning skills needed for using Information Technologies (IT). Moreover, they (n=5) stated that their knowledge about technology is limited when it is compared with their colleague. In addition to these teachers (n=5) claimed that they do not have concerns about using information technologies, even they (n=7) think learning how to use IT will easy for them and most of teachers (n=6) also specify that using IT will increase their workload. Furthermore, teachers (n=6) stated that idea of using IT in their classes is not bothered or scared them. In addition to that nearly most of teachers (n=7) indicated that using IT in classes is not a waste of time, even it makes them feel good. All teachers filled demographic questionnaire remarked that they can use IT in their classes easily. Additively, it will increase students' motivation instead of scaring. In addition to these nearly most of participants (n=5) explained argued using IT in classes will make students' learning more permanent and nearly all participants (n=7) remarked that use of IT in classes will not make students self-enclosed.

4.1.3 Research Question 3:

How activities in a technology-enhanced extracurriculum can be improved?

A) Components of the Program

In technology-enhanced extracurriculum, there were different type of activities. These activities were visiting METU museums, drawing pictures on drawing tablets, recording short video, playing simple concept games on touch tablet and tablet PCs, playing physically active games on Nintendo Wii and X Box. These activities were separated into three groups. In the table 4.15 components were given in detail.

Table 4.15 Component of an Effective Technology-Enhanced Extracurriculum

Cognitive Components	Playing concept Games on Touch Table and Tablet PCs Drawing pictures by using Drawing Tablets
Physical Components	Playing physically active games on X Box and Nintendo Wii.
Social Components	Visiting METU Museums Recording Short Video

B) Revisions

After conducting interviews, participants explained about revisions for making components of the technology-enhanced extracurriculum better. These revisions can be seen in Table 4.16 in detail.

Table 4.16 Subthemes Related with Revisions

Game Variety
Limitations
Sustainability
Suggestions for Game Design and The Program

1) Game Variety

In table 4.17 sub themes related with game variety has been showed. Participants of the current study explained different revisions for games. These items were explained in detail.

Table 4.17 Sub Themes Related with Game Variety

More Concept games
Individual and Group activities
Daily Life Activities
More Leveled Games
More Student Controlled Games
Basic to Complex Activities
Physically Active Games
Content of X Box Games Should be changed
More Flexible Activities

More Concept games

While conducting interviews, participants (n=3) argued that there should be more concepts in the concept games in the technology-enhanced extracurriculum. A teacher explained:

“Students were successful while playing games such as colors, animals because they like learning with playing. We can apply it to other concepts.” [T8]

“Özellikle çocuklar oynayarak öğrenmeyi sevdikleri için mesela renkler de ve hayvanları öğrenme de mesela çok çok başarılı oldu. Bunun başka konseptlere uygulayabiliriz.” [T8]

A Volunteer stated:

“I think, we can communicate with students’ schools and learn what they learn and what kind of activities doing. After getting knowledge, materials can be produced on touch table screens for them to reinforce what they learn. It will be better for them.” [V1]

“Bence şöyle bir şey olabilir. Okudukları okulla iletişime geçip orda ne tür şeyler öğreniyorlar ne tür aktiviteler yapıyorlar. Bunlar öğrenildikten sonra onları mesela hani birazcık daha böyle pekiştirilmesi için öğrencilerinin test edilebileceği böyle uygulamalar geliştirilebilirse dokunmatik ekranda bence daha güzel olur.” [V1]

Another volunteer expressed:

“Games on touch table can be developed. More games can be added because students played same game every week as far as I remember.” [V7]

“Dokunmatik ekranda oynanan oyunlar geliştirilebilir. Daha çok oyun eklenebilir çünkü her hafta aynı oyunu oynuyorlardı hatırladığım kadarıyla.” [V7]

Observer’ notes showed that in technology-enhanced extracurriculum, there were a few concepts such as color, shapes and animals in simple concept games activity. There should be more concept to play and practice. The repertoire should be wider. Students with intellectual disability and their teacher liked the games, their attitude towards these games was positive but game variety was not enough for them.

Individual and Group activities

In the study, participants argued that both individual and group activities should be added to the technology-enhanced extracurriculum. One of the teacher expressed:

“Some of children can conduct activities themselves independently and some of them cannot. Activities should be designed by recognizing students and their performances. “[T3]

“Kimi çocuk mesela yalnız başına yapamıyor kimi de bağımsız verilen etkinliği yürütebiliyor. Çocukları tanıyıp ona göre performanslarına uygun [aktiviteler olmalı].” [T3]

One of the volunteer students explained:

“Students were doing these activities individually. There may be activities conducted as group. It is for increasing their communications with their friends. For example, touch table games can be designed as two-player. ” [V13]

“Hmm ya [öğrenciler] bu etkinlikleri bireysel yapıyorlardı ya belki grup şeklinde yapılan şeyler olabilirdi. Arkadaşlarıyla kendi arkadaşlarıyla da iletişimlerini arttırmak açısından yani bilmiyorum. Belki bu akıllı şey akıllı masadaki oyunlar iki kişi oynanabilir hale gelebilir.” [V13]

According to observation notes, it was obvious that games should be design both individual and group playing because some of the students liked working alone and some of them did not. Moreover, providing group games also support students’ communication with each other people around them.

Daily Life Activities

With conducted interviews, it is revealed that many things can be added as an activity to the technology-enhanced extracurriculum. Daily life activities was one of them. Participants (n=2) explained that adding daily life activities will increase students’ awareness and they may use knowledge in their daily lives. One of the teachers claimed:

“Technology should be included in education because our children have lack of experience in daily life activities like going post office, hospital, police office, fire station. They do not know this places, they go hospital when they got sick. However, they need to learn. With daily life activities, students will have chance to be aware of these institutions. ” [T6]

“E şimdi [teknolojinin] kesinlikle işin içerisine girmesi lazım neden bizim çocuklarımızın yaşantı eksiklikleri var. Yani hiçbir şekilde bir postaneye hastaneye, hastaneye en fazla işte rahatsız oldukları zaman gidiyorlar ifaiye karakolu ne bileyim pastaneyi sağlık ocağını vesaire şeyleri yani diğer kurumları bilmiyor bu çocuklar. E şimdi bunları öğrenmeleri gerekiyor. Şimdi eğer ki bu kurumlar onların ayağına gelecek olursa en azından hani varlıklarından haberdar olabilirler.” [T6]

One volunteer expressed:

“Activities related with shopping such as taking milk, bread can be added. Activities related with more daily life and students use in their daily life can be added.” [V6]

“Alışverişle ilgili süt alma, ekme alma o tarz oyunlar eklenebilir. Daha günlük hayata, onların günlük hayatta kullanabileceği tarzda.” [V6]

More Leveled Games

In interviews, participants were asked to talk about revisions of games. Results of interviews showed that there should be more levels in games to make it more complex and keeping students' levels up. One of the teacher claimed:

“In the balloon game, there was no second, third, and fourth level. There should be fourth level. The game was not to be continued. For example, there was no second level in the game and students stayed at same level. By adding further levels, game could be more complicated.” [T6]

“[Balon patlatma oyununda]çalışmanın mesela ikinci ya da üçüncü basamağı ya da dördüncü basamağı olmalıydı. O mesela tek kaldı devamı yoktu onun. Mesela level olarak düşündüğünüz zaman ikinci aşama yok çocuklar hep bir seviyede kaldılar. İkinci üçüncü dördüncü beşinci aşamalar yoktu hani daha karmaşık hale getirebilirdi o.” [T6]

A volunteer student expressed:

“In touch table games, applications were short and simple. There was no further or feedbacks were not enough.” [V15]

“Birde dokunmatik masadaki uygulamalar u bence onlar biraz eksikti. Hani ya çok kısıydılar çok basit kaçtıyordu ötesi yoktu ya da işte geri bildirimleri eksik kalıyordu.” [V15]

Researcher observation also support that there should be more levels in games. Designed games were consisting of only one level. By considering students with intellectual disability different knowledge and interest level, further parts should be provided for them to continue. Moreover, playing same level was boring for some of the students time to time.

More Student Controlled Games

Participants (n=2) of the current study explained that activities should be designed as student controlled and students can attend actively. A volunteer student claimed:

“Activities that students will be more active can be added.” [V2]

“Yeni etkinlik olarak řu eklenebilir daha öğrencilerin daha aktif olabildiđi.” [V2]

A teacher expressed:

“For example, there are smart boards in our school. I think that they are useless. I think that technology will absolutely be useful when students controlled technology themselves, friendly with technology and attended to use actively.” [T8]

“Örneđin okulda, projeksiyon makinesi tahtaya yansıtılan akıllı tahtalar var mesela onun ben çok iře yaramadıđını görüyorum okulda ama diđer olaylar yani çocuđun bizatihi aktif olarak katıldıđı, teknolojiyle dost olduđu, kendi hükmettiđi zaman çocuk kesinlikle iře yarayacađını düşünüyorum.” [T8]

Observation conducted through activities revealed that students liked controlling games. Especially in physically active games like River Rush, they took control of game and enjoyed directing. Their physical problems did not be an obstacle for them to play, and enjoy. In addition to this, students want to have control of games while playing concept games. They got angry when volunteer students interfere with them.

Basic to Complex Activities

Only one participant stated that activities should be cascaded from basic to complex. Participant explained it by saying:

“Like I said, games on touch table and X Box can be cascaded like from basic to complex.” [T6]

“Aslında söylediğim gibi hani o dokunmatik [masadaki oyunların] basamaklandırılması artabilir. Kolaydan zora doğru. Dediğim gibi o oyunun ismi yine aklıma gelmedi benim X Box oradaki olay biraz daha basitleştirebilir basitten karmaşığa doğru gidebilir.” [T6]

Observation notes of researcher claimed that games were not designed as basic to complex structure. Both in concept games and physically active games were consisting of same level of structure. By considering students with intellectual disability differentiations, games should be redesigned as simple to complex structure to provide them variety.

Physically Active Games

One participant teacher, stated that students move limited. They should be physically more active. For that reason, participant stated that physically active games should be added. Teacher claimed:

“We need movement besides cognitive part. I think that our children do not move enough. We have gym classes even if they are limited or we play outside but they are not enough. In this term, physically active games should be increased.” [T7]

“Harekete yani bilişsel kısım elbette var ama onun dışında harekete ihtiyacımız var. Yani yeterince çocuklarımızın hareket ettiğini düşünmüyorum. Sınırlı da olsa beden eğitimi derslerimiz var ya da dışarda oynuyoruz ama bunların yeterli olduğunu düşünmüyorum biraz daha artırılması gerektiğini düşünüyorum. Bu anlamda [fiziksel anlamda aktif oyunların artırılması] iyi olur yani.” [T7]

Content of X Box Games Should be changed

One of the teachers explained that students’ reactions to X Box games was affirmative and students loved games on X Box. However, content of X Box games should redesigned for getting higher benefits. Interviewee stated:

“I think that if X Box games content is changed, students will learn better by playing because they really loved it.” [T8]

“Bu oyunun [X Box oyunlarının] içeriği deęişse daha eęitici bir içerik sağlanırsa çocukların ona bayıldıęını ve oyun oynayarak öğrenebileceklerini daha kolay öğrenebileceklerini düşünüyorum.” [T8]

More Flexible Activities

An Interviewee shared that activities should be designed by considering students’ individual differences. Interviewee explained it by saying:

“Activities can be prepared by considering students’ individual developments and performances.” [T3]

“Çocukların bireysel gelişimleri dikkate alınarak farklı çocuęun performansına uygun etkinlikler seçilebilir.” [T3]

Researcher’ observation indicated that there were different types of students with intellectual disability at the same level and designed games should be consisting of different options for them to be included in games and got benefit. Designed games in technology-enhanced extracurriculum were not enough flexible for meeting different students’ needs.

2) Limitations

In the table below, subthemes related with limitations were given. These sub codes will be explained in detail.

Table 4.18 Sub Themes Related with Limitations

Time
Place
Volunteer
Game Device
Feedback

Time

In the interviews, participants were asked about revisions making technology-enhanced extracurriculum better. Participants (n=5) have the same point. According

to them, time of activities was not enough for students with intellectual disability.

One of the participant explained:

“Reusability should be increased in education. Our students may not comprehend very well when they see once. It is needed that technology usage process should be continued.” [T2]

“O bilgisayar ekranının [dokunmatik masanın] ışıkları falan onlara [zihinsel engelli öğrencilere] ilgi çekici geldi ama biraz bunları tekrarı daha doğrusu eğitimde şeylerini arttırmak lazım bizim çocuklar için. Hani bir kere gördüklerinde [zihinsel engelli öğrenciler] çok iyi kavrayamayabiliyorlar ama bunu biraz [teknoloji kullanımının] sürecini devamlı hale getirmek lazım.” [T2]

Another participant claimed:

“In special education, for making something permanent, learning process is longer. For example, we can pass a new activity, after spending three or four week on previous one.” [T8]

“O hani bir şeyin kökleşmesi için bizde öğrenme sürecimiz biraz uzun olduğu için. Atıyorum 3 ya da 4 hafta bir etkinlik yaptıktan sonra başka bir etkinliğe geçebiliriz.” [T8]

A volunteer student argued:

“I think that one hour in week is not enough for activities. It should be increased.” [V2]

“Etkinliklerin ya haftada bir saat olması bence çok az. Onun bence öncelikle sayısının artırılması lazım.” [V2]

Another volunteer student stated:

“Activities were convenient for students’ progress. However, students with intellectual disability did not spend enough time on activities to show progress.” [V14]

“[Öğrenciler] Bir gelişim gösterebilecek kadar uzun süre kullanmadılar. Tabii ki gelişim göstermelerine elverişli olur.” [V14]

In addition to participants' explanations, researcher observation indicated that the given time was not enough for students to get familiar with activities. They needed more time to get used to technological devices and games. Moreover, more time also needed to see effects of games on students. In time, students learn how to play games and get benefit from them in a long term.

Place

Only two of participants explained limited place as a revision for playing games more comfortably. One of the participants stated:

“There should be bigger places and different games for students with intellectual disability.” [V6]

“Daha büyük bir ortam olabilir onlar [zihinsel engelli öğrenciler] için daha farklı oyunlar.”
[V6]

The other participant expressed:

“I think that appropriate places should be found for games played on Kinect.” [V8]

“Var olan etkinliklerimiz ya Kinect için daha uygun bir yer buluna bilinir bence.” [V8]

While applying technology-enhanced extracurriculum, settings of CEIT department were used. Used place was not good enough to get higher benefit. Especially, devices of physically active games were very sensitive and they need big place. Players' movements are used as movement of game character. If place is not big enough, when someone pass near device, device will take easily the other person' movement. When this extra-curriculum used in a school, a special place should be designed for students to play games in comfortable settings.

Volunteer

An interviewee claimed that number of volunteer is an important issue to get benefit from the program. There should be one volunteer for each child. Interviewee said:

“I think that number of volunteer students should be increased because it will be better if one volunteer cares with one children.” [V5]

“Bir de kiři sayısı yani onlara eşlik eden kişilerin sayısı arttırılmalı bence çünkü bir çocukla bir kiři ilgilense çok daha fazla verim alınır.” [V5]

Game Device

One of the participants expressed that there should be more game devices in the activities. One of the volunteer explained it by saying:

“There should be more game devices instead of one.” [V6]

“Bir iki tane mesela 1 tane Kinect yerine 3-4 tane Kinect konulabilir.” [V6]

Feedback

In the current study, one of the teachers stated that feedback of activities were limited. Interviewee claimed it by saying:

“In touch table games, applications were short and simple. There was no beyond or feedbacks were not enough.” [V15]

“Birde dokunmatik masadaki uygulamalar bence onlar biraz eksikti. Hani ya çok kısaydılar çok basit kaçtıyordu ötesi yoktu ya da işte geri bildirimleri eksik kalıyordu.” [V15]

3) Sustainability

In the table below, subthemes related with sub themes were given. These sub codes will be explained in detail.

Table 4.19 Sub Themes Related with Sustainability

Program

Students

Technology

Program

According to interview results, interviewees argued that technology-enhanced extracurriculum should be in a continuity for getting benefit. One of the participants claimed:

“Reusability should be increased in education. Our students may not comprehend very well when they see once. It is needed that technology usage process should be continued.” [T2]

“O bilgisayar ekranının [dokunmatik masanın] ışıkları falan onlara [zihinsel engelli öğrencilere] ilgi çekici geldi ama biraz bunları tekrarı daha doğrusu eğitimde şeylerini arttırmak lazım bizim çocuklar için. Hani bir kere gördüklerinde [zihinsel engelli öğrenciler] çok iyi kavrayamayabiliyorlar ama bunu biraz [teknoloji kullanımının] sürecini devamlı hale getirmek lazım.” [T2]

Another participant said:

“I am sure that it will be joyful applying five hours implementation of technology enhanced program.” [T6]

“Hani haftada mesela şu kesinlikle güzel olur yani bi beş saat bir [Teknoloji tabanlı] uygulama mesela günde bir saatlik bir uygulama çok keyifli olacaktır eminim.” [T6]

One of the volunteers stated:

“I think that continuity of activities are important.” [V12]

“Biraz daha dediğim gibi etkinliklerin sürekli olması da önemli diye düşünüyorum.” [V12]

Observation notes indicated that students’ reactions changed according to their familiarity with games and devices. Intellectually disabled students’ did not understand what they did at the first time, but in time they conducted activities without need help of volunteer students.

Students

One of the volunteer students explained that same student groups should attend all activities so they can observe whole effects of program. Participant stated it by saying:

“We can follow students’ development in weeks in terms of activities. If same group of students attend activities, we will have chance of evaluating them as whole.” [V9]

“Biz [öğrencilerin] haftalık gelişimlerini takip edebiliyoruz. Bu uygulama öğrenciye ne kattı diye takip edebiliyoruz bugün ki etkinlik. Öyle olsa [aynı grup öğrenci devamlı gelebilse] hani daha böyle bütün bir şekilde değerlendirme imkânımız olurdu.” [V9]

Observation notes of researcher also showed that seeing effects of program on intellectually disabled students’, attendance of students to the technology-enhanced extracurriculum is important. When students first met with devices and games, they could not understand and familiar with them. After first impression, when they started to attend activities during cases, they started to get benefit form devices and use them very well. Their success was continuous parallel with their attendance.

Technology

One of the volunteer students claimed that using technology affects students when continuous usage occurred. Interviewee stated it by saying:

“Technology will affect students definitely when it is continuously used.” [V12]

“Yani belki bir etkisi bir etkisi olacak. Belki değil kesin bir etkisi olacak ama bu [teknoloji kullanımı]devamlı olduğu zaman.” [V12]

4) Suggestions for Design of Games and the Program

In the table below, subthemes related with suggestions for design and the program were given. These sub codes will be explained in detail.

Table 4.20 Sub Themes Related with Suggestions

Suggestions for Design of Games	Using cartoon characters Increasing the sensitivity area of touchable region In concept games, highlighting the target area Defining concept clearly
Suggestions for the Program	Appropriate devices for activities Small Student Groups

Using Cartoon Characters

Only one of the teachers explained that familiar cartoon characters can be used in materials produced. These will make materials more attractive for students with intellectual disability. Interviewee explained it by saying:

“Cartoon film characters can be added. For example, characters like Pepe Cailou which students have already known can be added to materials created so materials can be more colorful.” [T4]

“Çizgi film kahramanları da katılabilir. Atıyorum onların bildiği işte pepe’ydi, Caliou’ydu bu tarz şeylerle [materyaller]daha da renklendirilebilir.” [T4]

Observations during activities showed that students get excited when they see something familiar on the screen. For example, in drawing activity, a Pepe picture was stuck on the drawing tablet. When students with intellectual disability saw the pictures they got excited and their attention increased. Moreover, they made an effort to complete activity. Likewise, at the end of the some concept games, music related with the character PEPE was used and this also made students’ attention awake and they wanted to play again to listen music and see PEPE.

Increasing the sensitivity area of touchable region

Only one of the teachers explained that, sensitivity area of touchable place should be increased for students who cannot use their finger to touch. Interviewee expressed:

“In touch table games, students can use their fingers easily for moving. This sensibility area may be increased like touching with hand for children who cannot use their finger to touch.” [T6]

“Geliştirilebilecek olursa eğer şeyi çok dokunmatik o olay bence tamamiyle geliştirilmeye açık. Şimdi şey çok rahatlıkla kontrol edebildikleri tek parmak yani onun üzerine çok rahat bağımsız olarak hareket edebiliyorlar. Yani hatta onu şey bile yapılabilir el bile yapılabilir yani parmağıyla dokunamayan çocuk için yani bir bölgesel hani odaklandığı bir yerden olabilir diye düşünüyorum o vuruş için yani parmak kullanamayan çocuk için.” [T6]

In concept games, highlighting the target area

One of the volunteer students claimed that in concept games, target areas should be highlighted when students come closer to that place. Volunteer student argued it by saying:

“In concept games, when students bring shapes to closer to the right places, these places can be highlighted to increase students’ motivation instead of putting shapes into right places directly.” [V10]

“Hmmm mesela o şeyde renklerle ilgili şeyler var ama hani bazıları daha kırmızının ne olduğunu bile bilmiyor hani onlar için belki o renkler şeklinde değil de nasıl olabilir? Ya da mesela (düşündü) götürüyor falan hani o anda bıraktığı zaman direkt yerine gidiyor. Direkt mesela yerleşince doğru kabul ediyor. Öbür türlü gidiyor ve biraz yaklaştığında o alanı mesela bir alan belirliyor yapmış gibi şey yapıp hani o motive de edebilir.” [V10]

Defining concept clear

Only one volunteer student claimed about importance of defining concept games. Interviewee explained it by saying:

“For example, in quantity concept games, there were close numbers like 3 and 5 in clusters. This was not situation that can be distinguished. There should be big difference between numbers of clusters.” [V10]

“Ya da mesela o azlık çokluk şeyleri vardı. Hani mesela 3e 5 şeklinde var hani o çocuk onun hani hangisi daha fazla bu çok ayırt edilebilir bir şey değil onların seviyesine göre belki hani 100 taneye ne bileyim” [V10]

Appropriate devices for activities

Only two of the participants explained that using appropriate device is an important for students’ to complete activities. One of the participants argued it by saying:

“Instead of drawing tablet, another tablet PCs could be used because students with intellectual disability could not see what they draw on drawing tablets. Moreover, using tablet PCs would be more familiar for them to use.” [V8]

“Belki hani tablet üzerinde çizselelerdi daha şey Android tablet üzerine ya da farklı işletim sistemleri üzerinde bir uygulama olsaydı mesela. Çocuklara o şekilde verseydik çok daha güzel olurdu. Çünkü hem dokunuyorlar hem çiziyorlar. Alışık oldukları şey hem.” [V8]

Another participant stated:

“Students with intellectual disability had difficulty in drawing pictures on drawing tablets because they could not see what they draw on where they draw.” [V12]

“Ya Çizim yaparken sıkıntı yaşayabiliyor [zihinsel engelli öğrencilerin] çoğu çünkü tablet üzerinde çizim yapıyor ancak bir şey göremiyor. Normal kalem değil bir şey göremiyor. Ekranı bakmasını işte söylüyoruz orada bir böyle şey yani” [V12]

Observers’ notes showed that during drawing activities, students with intellectual disability got excited about what they draw but they had problems with drawing device. They could not see what they draw on drawing tablet and they could not see screen for their pictures. Drawing on tablet and seeing result in different device was hard to follow for them. Instead of using drawing tablets, tablet PCs could be used to get yield.

Small Student Groups

Only two of the volunteer students expressed that students’ group were crowded and they need to be taken care of in small groups. One of the participants explained it by saying:

“Coordination of students with intellectual disability was hard, more time should be spared for them or they should be taken care of in small groups.”

“Dediğim gibi koordinasyonu zor bir şey bunlara [öğrencilere]daha fazla zaman verilmesi veya işte daha küçük gruplar halinde ilgilenilmesi gerekirdi” [V11]

The other participant claimed:

“We could not take care of all students individually because students were crowded. If their number was small, then it would be better.” [V15]

“Yani daha yönlendirici şu çizim tahtasındaki şeyler çok daha yönlendirici olabilir birde hani çok kalabalıktı ya hani öğrencilerin biz hepimiz tek tek ilgilenemedik belki sayı az olsaydı çok daha iyi olabilirdi.” [V15]

4.2 Document Analysis

In the document analysis part, works of students with intellectual disability on drawing pictures by using drawing tablet activity were used. After activities were done, pictures students drew were save with their name on a hard drive and kept in each week. After cases were over, pictures were examined with teachers of students with intellectual disability. Two teachers examined the pictures with researcher. This was the first time for students with intellectual disability to draw pictures by using drawing tablet.

Teachers were claimed that students’ individual differences is important because their performances on drawing tablets changes according to students’ individual differences. Moreover, teachers expressed that students used this device for the first time. They need time to get familiar with device and technology. If they are exposed to that technology continuously, they will show better performances and develop their hand-eye coordination skills. They also agreed on that some of students showed better performances on drawing tablets because their hand-eye coordination, holding pen skills and computer skills were better and some of them did not. One of the teachers explained it by saying:

“We think that using drawing tablet shows individual differences child to child because some of the students are better in eye-hand coordination, have better computer skills and they are more successful in that activity. Some of the students are better on paper, their ability to use pen is better and they can draw pictures by passing over line. It makes more sense for them. Considering individual differences make more sense. For example, using pen is more effective for Emirkan. However, I

saw Furkan's picture and using computer makes more sense for him or Emine has eye-hand coordination and ability to use pen so it makes sense for her to use computer and also it is beneficial for her. It depends on children' individual differences. ” [T3]

“[Çizim tableti kullanımının] çocuktan çocuğa bireysel farklılıklar göstereceğini düşünüyoruz. Kiminin el göz koordinasyonu iyi, bilgisayar becerileri iyi, burada [aktivite de] daha başarılı. Kiminin de hani kâğıt üzerinde, üzerinden kopya çekme kalemle hani kalem kullanma becerisi daha iyi, kalemle geçmesi mantıklı. Hani burada bireysel farklılıkların üzerinden gitmek daha mantıklıdır. Mesela şunu en başa bir alayım. Emirkan, bence şeyde daha mantıklı olur kalemle daha etkili olur onun yapacağı şey ama mesela bir Furkan'ın resmini gördüm. Furkan, bilgisayarda çok daha mantıklı onun hani onu yapabilmesi ya da Emine'nin el göz koordinasyonu kalem tutma becerileri daha fazla geliştiği için mouse becerileri de gelişmiş o yüzden hani daha yararlı ve mantıklı olmuş ama çocuktan çocuğa bu farklılık gösterir. ” [T3]

Observation notes also revealed that while some of the students did a good job on drawing activity, some of them could not because they got bored or could not hold pen to draw.

4.3 Comparisons of Cases

In the technology enhanced extra-curriculum, there were three cases. These cases were different in terms of time activities conducted, student number and activities applied. In the first semester, there were two groups and eight students in each. Each group attended activities four weeks. In the second semester there were five groups and six students in each. Each group attended two weeks to activities. Finally in the last semester, there were five groups and 6 students in each.

First of all, at the end of the study, interview and observation results showed that time is an important issue for conducting technology enhanced extra-curriculum because students with intellectual disability need more time or continues time for conducting activities. Participants of the study claimed that given time for activities was enough for students because students could not get familiar with devices and games easily and they forget what they learn easily. In addition to this, results also

showed that given time for activities was not enough to see program effect. Secondly, student numbers in each case were different. Coordinating crowded groups was harder because each students needed to be cared individually. Student numbers in groups is related with device numbers and volunteer numbers. Observation and interview results revealed that when student groups was crowded taking care of students was harder. Moreover, playing games on devices was problematic because of limited number of devices. Students did not want to wait and do activities. Third and lastly, activities in cases were different. Social activities were different in the cases. In the first and the second cases, visiting museum activity was conducted and in the third case “THBT” dance activity was conducted. Variance in social activities was a request from teachers of students with intellectual disability. Results of the study indicated that students with intellectual disability interested in dance activity more than visiting museum activity. Participants of study expressed that visiting museum activity was boring for some of the students. Dance activity was more entertaining for students because they like listening music and dancing. Observation notes also showed that dance activity was more amusing for students because they tried to dance like how teacher showed them and they actively have role in it. Actually students like to be active in activities.

To sum up, in cases, there were three different contextual issues. These differences were related with number of students attended activities, times for activities and activities applied in the cases.

4.4 Summary

In the current study the aim was to investigate effects of activities in a technology enhanced extra-curriculum on intellectually disabled students' cognitive and physical development. Moreover, teachers' opinions and attitudes were also in research questions wanted to be examined. In the research, 58 students with intellectual disability from "Ankara Sait Ulusoy Özel Eğitim ve Uygulama Merkezi" were the participants. For collecting data interviews, observation, demographic questionnaire and document analysis were used.

Results of the study indicated that technology enhanced extra-curriculum affects students' cognitive and physical development in a positive way. The planned program can be used for reinforcement to provide better understanding and more permanent learning. Games in activities develop students' eye-hand coordination, decision making mechanism and multi-tasking process. Moreover, students can learn simple concepts by playing simple concept games. Furthermore, activities provide multi-stimuli environments and physically active environments for students. As a result, activities increase students' attention, make them physically more active, push them to think and act at the same time.

The current study also revealed that teacher attitude toward technology was positive. Teachers were expressed that using technology makes their job easier, makes them feel comfortable, and makes them powerful. In addition to these, they claimed that technology provides variety of materials and also easy reach to materials. However, teachers also explained that technology should be used as supportive and not pass in front of teachers' active role in the classroom. Besides their technology attitude, teachers also claimed about barriers in front of technology integration. These barriers are lack of materials, program, technical problems, teacher attitudes and ministry of education. In addition these, teachers also explained about some suggestions for technology integration. These suggestions were using technology for appropriate purposes, using technology supportive purposes and appropriate material selection.

Participants of the current study also explained about some recommendations for enriching the current technology enhanced extra-curriculum. These recommendations were collected under four titles game variety, limitations, sustainability and suggestions for design of games and the program. Under the game variety title, participants explained that games should be designed as more leveled, more flexible, more student controlled and basic to complex structure. Moreover, they argued that there should be more concept games, individual and group games, games related with daily life activities, physically active games and different X Box games. Under the limitations, time, place, volunteer, game device and feedbacks were explained as revisions for the current study. Participants also expressed that sustainability of program, students and technology should be provided to get benefit from the program. Finally, participants made some specific recommendations as a revision. These were using cartoon character in games, increasing the sensitivity area of touchable region, highlighting the target area in the concept games, defining concepts clearly, selecting appropriate devices for activities, and small student groups.

CHAPTER 5

DISCUSSION AND CONCLUSION

In this concluding chapter, results found from the current study will be discussed in depth. Discussion chapter is organized as the findings parallel to the literature, unique findings, practical implications of the study, and recommendations for further research. This organization lacks the findings contrary to the literature, which was not a mistake. The results of the analyses revealed that there were no findings that were contradictory to the current literature. However, the researcher found some unique issues that will add to the existing literature.

This study aimed to investigate effects of activities in a technology-enhanced extracurriculum on intellectually disabled students' cognitive and physical development. The second aim was to determine teachers' perception about technology-enhanced extracurriculum and how the activities in a technology-enhanced extracurriculum could be revised. Participants of the current study were 58 students with intellectual disability from "Ankara Sait Ulusoy Özel Eğitim ve Uygulama Merkezi". Participants of the study attended to three contextually different cases in three different semesters. Cases were different in terms of number of students and allocated time for activities. In cases students participated in visiting museum, drawing pictures by using drawing tablets, recording short video, playing simple concept games on touch table and tablet PCs, playing physically interactive games on X Box and Nintendo Wii. Data were collected through, interviews, observation, document analysis and demographic questionnaire. Interviews were conducted with three groups: teachers, volunteer students, and parents. Demographic questionnaire was administered to teachers to determine their attitudes toward technology use. Finally, document analysis was conducted with teachers by

examining students' work on drawing tablets. After collecting and analyzing data, some findings showed similarity with what was found in literature review, whereas some of the findings were unique to the current study. Thus a synthesis of the findings and literature will be presented along with some suggestions and recommendations for implications and further research.

5.1 Findings Parallel to the Literature

Some of the findings showed parallelism with the reviewed literature at the second chapter. In the literature section, special education, needs of special children, technology usage and integration in both normal and special education and effects of such integration was presented. Moreover, importance of teacher attitudes and appropriate material selection in technology integration were emphasized. In the results part of the study, findings also supported the literature.

Technology is being used in many areas and education is an indisputable area where technology integration is very common. In the literature, it is indicated that technology integration into education has positive effects on students' cognitive development (Vernadakis et. al., 2005; Couse and Chen, 2010), and academic success (Parikh, 2002). In the current study, findings showed parallelism with the literature. Interview results conducted with teachers and volunteer students revealed that used materials such as concept games on touch table and tablet PCs help to enhance students' cognitive development. Furthermore, the study remarked that games in activities enhance students' decision-making processes. Games push students to think harder and act instead of being unresponsive.

According to MoNE (2013), slow body progress, distracted attention, difficulty in transfer of what they learn, weak memory and trouble in social relationships are some of indications of intellectual disability. Moreover, communication, physical, cognitive and learning and emotional social development are areas of needs explained by Morris (2001). For overcoming these indications and provide variety, technology can be integrated into special education (Drigas and Ioannidou, 2013;

Lewis, 1997). Furthermore, Uzun et al., (2013) found out in their study that using Kinect technology in special education provides students with visual support, reusability of materials and entertained environment. Teachers of the current study also emphasized these inadequacies and areas of needs. They also suggested that technology should be integrated into learning environments of students with intellectual disability. They remarked that technology usage help to increase students' attention and provide effective learning or more permanent learning by providing multi-stimuli environments. As an addition, participants stated that reusability of materials and repetition was effective on student's learning because students with intellectual disability have distracted attention and have problem transferring knowledge into long term memory. In addition to these, teachers argued that provided opportunities in terms of physical development was not enough for these students. What is more, parents expressed that they do not let their children to attend activities such as swimming because they got sick easily. Interview results and observation notes indicated that physically interactive games such as River Rush and Tennis can be a means to make students' physically more active in a safer and healthier environment. Participants of the study claimed that these games caught students' attention and get them involved and engaged in these games. The games can provide students with the chance of being physically more active. In addition to these, results remarked that technology-enhanced extracurriculum can gave a chance to students with intellectual disability for being more social. Students can met with different people and they played some of the games with a partner.

Besides these, Kengwee and Onchwari (2009) stated that in stage of technology integration, the focus should not be on the devices; technology should be used for supportive purposes. Results of the current study also indicated that teachers have a positive attitude toward technology usage in their classrooms and they think that integration of technology into education is important. However, they had concerns about their roles. Almost all teachers specified that the devices and games can be used to reinforce learning. Moreover, they expressed that technology can be used after class because they use real objects to tell the subject. As an addition, correct and

appropriate use of technology enriches teaching-learning processes (Akkoyunlu, 1995). Interview results indicated that if technology is used for correct purposes, then it can work in special education settings as well.

Furthermore, literature review showed that technology integration has two important roles. These roles are using it as a tool while explain a subject and to make learning process easier (Akgün et. al., 2014). Consequences of the current study also promoted the same ideas. Results of conducted interviews indicated that games such as concept games in the technology-enhanced extracurriculum can be used as reinforcement. Teachers specifically explained that materials can be used after teaching is completed since they use real, tangible objects to explain a certain topic followed by more abstract parts of the topic. In addition to these, participants also expressed that using technology-enhanced materials can provide students with better understanding by making learning easier.

Finally, literature review also emphasized the importance of teacher attitude and competency while integrating technology into education (Hew and Brush, 2007; Aktaş-Arnas, 2005). In fact, teachers' competency of technology usage affects technology usage in classrooms (Samancıoğlu and Summak, 2014). Hence, a demographic questionnaire was administered to teachers to examine their attitudes toward technology usage. Besides this, interview results showed that teachers also argued teachers' attitude as a barrier in front of technology usage and their attitude affects technology integration and usage in the classroom. Some of teachers can even resist learning technology. In addition to these, Hutinger et. al., (2006) expressed that teachers should know both how to use technology and how to integrate technology into education system. Teachers explained that they need training on the technologies they faced with. Moreover, they articulated their belief that using technology decrease their workload and increase students motivation in classroom (Uzun et al., 2013).

To sum up, literature review and findings of the current research shows parallelism in terms of technology integration into both normal and special education, effects of

technology integration, effects of teacher attitude and competency on technology usage in classrooms, needs and effects of the provided extracurriculum. Lastly, the results of the analyses did not reveal any findings that were neither contrary nor contradictory to the current literature.

5.2 Contribution of the Current Study to the Literature: Unique Findings

Beside the findings supporting the current literature, there were some unique findings revealed after the analyses. In addition to positive effects of technology integration on cognitive development, another item related with cognitive development occurred in the current study. Results of the research indicated that using technology enhanced extra-curriculum can help students with intellectual disability learn simple concepts. Participants explained that before activities students did not know the concepts given in the games. After playing concept games, students started to differentiate concepts and give correct answers. Moreover, activities in the planned curriculum, may develop children's multi-tasking processes. Interview results and observation notes remarked that in games students saw the objects, thought and decided which one was true and gave responses with their movements. Furthermore, physically interactive games can push students think and act at the same time. Participants stated that while playing game "River Rush", players supposed to be quick while managing game to collect coins or points. As an addition, results also showed that activities can help developing students' eye-hand coordination. Interview results and observation revealed that activities as especially concept games help improving intellectually disabled students' eye-hand coordination because they were supposed to touch objects where see on the screen. Moreover, participants also expressed that in drawing activities, students were supposed to draw by following the lines on the stuck picture.

Besides these effects on students, some unique findings occurred related with teachers' attitudes towards technology. Teachers argued that using technology-enhanced activities make their job easier, make them feel comfortable, provide variety for them and make their role more powerful. However, they also expressed

that their technology knowledge was limited and they need to be trained. They also stated that activities and devices should not outshine their role in the classroom. Teachers also articulated that to use such technology-enhanced extracurriculum, they need materials, programs, resources and support for infrastructure and technical problems. They also highlighted that they work with the Ministry of National Education and bureaucratic procedures for using and implementing such program can be harder and take a long time.

Lastly, the data analysis also revealed some findings related to the possible revisions for making the designed program better. Interview results and observation notes remarked that more concept games, individual and group activities, daily life activities, physically active games and flexible games needed for such technology-enhanced extracurriculum. Furthermore, participants expressed that while in design process, games should be designed more leveled that go from simple to complex structures. Content of X Box games should be changed and simplified.

Finally, results also indicated that there were some limitations, such as time, place, number of volunteer, game devices and feedbacks. All participants stated that for conducting such activities, there should be bigger place, more time, more volunteer, more device and variety of feedbacks. Consequences also highlighted that for getting benefit from the technology-enhanced extracurriculum, applied program should be continuous, students should attend to the program as a whole and the needed technology should be provided continuously. There were also results related with suggestions for games and the planned program in general. These suggestions were using familiar cartoon characters to grab attention, using hand picture instead of mouse symbol on the screen for increasing focus, highlighting target areas in the concept games to keep undivided attention, defining color more clearly for increasing understanding of the students, working with small student groups to be able to take care of each children.

To sum up, there were unique consequences which were related with the revisions for game variety, limitations, sustainability and suggestions for the program and design of the games.

5.3 Implications

While interpreting and generalizing the result of the study, one should be cautious since technology-enhanced extracurriculum was implemented with only one school and 58 students with intellectual disability as participants. This study contributes to the literature in the field of technology integration into special education and using technology enhanced activities for supportive purposes. Some possible implications are as follows:

This study can provide understanding about effects of a technology-enhanced extracurriculum on students with intellectual disability in terms of cognitive and physical development. Moreover, the current study also shed light on the opinions of teachers of students with intellectual disability and their attitude towards technology usage in classrooms. In addition these, study also remarked recommendations for improving and enriching activities in a technology enhanced extra-curriculum.

The planned program can support intellectually disabled students' cognitive and physical development. Playing simple concept games activity which is in technology-enhanced extracurriculum can be used as reinforcement for learned concepts and provides material varieties for learning processes that might lead to better understanding. The planned program also provided understanding about effects of providing different environments consisting of multi-stimuli. Moreover, technology-enhanced extracurriculum also provided clarity about effects of environments that students with intellectual disability could be physically active without being hurt. Providing physically interactive environments such as X Box and Nintendo Wii make students physically more active and increase their multi-tasking abilities. Moreover, these environments give students a chance to control over the game and develop and improve their decision-making mechanisms.

Besides providing understanding about effects of technology-enhanced extracurriculum on intellectually disabled students' cognitive and physical development, the study also revealed special education teachers opinions about such an extracurriculum and their attitudes toward technology usage in classroom. Moreover, some of the barriers in front of using technology enhanced extracurriculum in special education also explained by teachers. In addition to all implications study also presented recommendations for enriching the current program for getting higher benefits.

To sum up, the current study provided understanding about effects of technology enhanced extra-curriculum in terms of cognitive and physical development of students with intellectual disability, teachers' opinion about integrating such a program into special education, their attitude toward technology usage in classroom. Moreover, it presented some recommendations for enhancing the current program.

5.4 Tips for Designing a Technology-Enhanced Extracurriculum

While designing a technology-enhanced extracurriculum, there are some factors should be considered to not have problems and follow. These factors can be seen in detail in Table 5.1.

Determining need areas
Analyzing current special education curriculum
Specifying teachers' way of teaching and used materials in the classroom.
Designing materials considering students' special needs
Testing designed materials for usability issue

First of all, needs areas of target group should be examined. Moreover, researcher should analyze the current curriculum and learn about the ways that teachers used to teach special students and learn about which materials or devices integrated. Furthermore, teacher should be included in the design process to learn and understand needs clearly. In addition to these, designed games and materials should be tested in terms of usability issues.

Table 5.2 Factors Considered While Designing Games

Game variety
Individual and groups activities
Student controlled games
Using familiar cartoon characters
More leveled, more flexible and simple to complex structure games
Feedback

Secondly, while creating activities games, students' differentiations and disabilities should be considered. For example, games should be designed as more leveled, flexible, and simple to complex structure. Moreover, games can be designed for supporting both individual and group activities. Furthermore, game variety should be provided in such an extracurriculum. For example, in the current study there were a few concept games. More concepts should be included to provide variety. Actually, game variety should be provided both in concept games and physically interactive games. As an addition, familiar cartoon characters should be in games to increase and keep students attention on activities. Besides these, there should be different feedbacks in the games. More, games should be designed as student controlled to increase intellectually disabled students' attention and involved them in the activities more.

Table 5.3 Factors Included in the Activities

Selecting appropriate devices
Involving "Volunteer Students"
More time
Big enough places

Thirdly, creating activities and games may not be enough to get benefit from the extracurriculum. Special children who will attend the extracurriculum cannot use all devices such X Box. There should be people to help them to use devices during activities conducted. In the current study, these people were called as "Volunteer Students". For increasing adaption of these people, they should be informed about special education and special children. Moreover, given time for conducting activities should be controlled because students may spent some time for getting

familiar with devices. Furthermore, places that activities will be conducted should be checked for appropriateness because games played on X Box and Nintendo Wii need some spaces for moving comfortably.

5.5 Future Studies

In the current study, a technology-enhanced extracurriculum was designed for students with intellectual disability. The aim was to see the effects of the applied program on students' cognitive and physical development. For the future studies, while designing such a program, game variety can be provided. Furthermore, provided games can be designed to include more levels and to be more flexible in consideration with students' different disabilities. Student numbers in groups can be decreased to take care of them individually.

The research can be conducted on different cities and schools to see whether the results will show similarity and convergence or not. In addition to these, such a technology-enhanced extracurriculum, including the activities, can be redesigned for other disability types to improve students' abilities for a specific disability.

In sum, as recommendations for future studies, the current program can be redesigned in terms of game variety, flexibility and incorporated game levels. It can be implemented in different schools and different cities. Moreover, such a technology-enhanced extracurriculum can be redesigned for other disability types by considering their needs.

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APPENDIX A

MATERIALS, SOFTWARE AND DEVICES

Drawing Tablet:



Figure A.1 Drawing Tablet

Lapazz brand WP8060 model pen tablet was used for drawing activities. This drawing tool can connect computer via usb entrance. Tablet has pen to draw. It is like drawing picture with a pen on paper but you can see result on computer screen and you can use many colors by using only one pen because the pen is behaving like mouse on computer screen.

Tablet Pc:



Figure A.2 Tablet PC

Tablet pc is a mobile device which has touchable face. It provides opportunity in terms of portability when compare it with computers. It supports one touch at a time. It is good for work personally

Touch Table:



Figure A.3 Touch Table

Touch table is a kind of computer and it consists of a big screen and it keeps all components inside it. It may also count as giant tablet pc. Its surface also touchable and it supports more than one touch at the same time. Touch table can be used for group work. More than one people can play game on it.

Kinect:



Figure A.4 X Box 360 with Kinect

Kinect is a camera letting to take participants body movements as game character body movement. This situation let players feel more in game environment because game character act according to players movement. It also increases players' motivation towards game. Moreover, this kind of games increases the physical acts because of playing style, players have to be active in physically.

Nintendo Wii:



Figure A.5 Nintendo Wii

Nintendo Wii is a device creating physically active game environment for players. It has parts like nun-chuck and board. Nun-chuck is game tool letting player to direct game and making selection in menus. Moreover, while playing games, players use nun-chuck as their arm and hands. Board, on the other hand, is another game tool. Players can make sport such as step by using board. For example, they can create character on game, and measure their weight and control it over time.

APPENDIX B

INTERVIEW QUESTIONS FOR VOLUNTEERS

Aşağıda verilen sorular ÖZTEK projesi kapsamında Sait Ulusoy Özel Eğitim ve Uygulama Merkezi öğrencileriyle Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE) bölümünde gerçekleştirilen etkinlikler hakkında bilgi edinmek amacıyla hazırlanmıştır. Yapılan görüşmelerin sonucu sadece eğitim amaçlı araştırmada kullanılacak olup hiç kimseyle paylaşılmayacaktır.

- 1) Program kaç hafta sürdü?
- 2) Programdaki etkinlikler nelerdir?
 - A. Bölüm
 - B. Müze
 - C. Başka
- 3) Bu etkinliklerin içerikleri nelerdir?
 - a. Bilgi verebilir misiniz?
- 4) Program boyunca tahminen kaç çocukla etkileşimde buldunuz?
- 5) Sizin bu etkinlikler süresince göreviniz ne idi? Açıklar mısınız?
- 6) Öğrencilerin etkinliklere verdikleri tepkiler nelerdir? (Heyecan, sinirlilik, fiziksel/bedensel tepki vb.)
 - a. Açıklayabilir misiniz?
- 7) Öğrencilerin etkinliklere katılımları ve çevreleriyle etkileşimleri hakkında neler söyleyebilirsiniz?
 - a. Birbirleriyle etkileşimleri
 - b. Gönüllüler ile etkileşimleri
 - c. Oyunları tamamlama ya da bırakma

- 8) Sizce öğrencilerin genel olarak daha motive oldukları, sevdikleri /daha istekli olarak katıldıkları etkinlik ya da etkinlikler oldu mu? Hangileri?
- 9) Sizce programa katılan öğrencilerin katılımlarının en yüksek ve en düşük olduğu etkinlikler hangileridir?
- 10) Genel olarak etkinliklerin çocukların fiziksel ve bilişsel gelişimleri üzerindeki etkileri hakkındaki fikirleriniz nelerdir?
 - a. Sizce nedeni ya da nedenleri nelerdir?
- 11) Etkinlikler süresince karşılaştığımız ve öğrencilerin etkinliklerdeki performansları ile ilgili size ilginç gelen olaylar oldu mu? Anlatır mısınız?
- 12) Sizce etkinlikler nasıl revize edilebilir? Ya da yeni etkinlik olarak ne eklenebilir?

APPENDIX C

INTERVIEW QUESTIONS FOR TEACHERS

Aşağıda verilen sorular ÖZTEK projesi kapsamında Sait Ulusoy Özel Eğitim ve Uygulama Merkezi öğrencileriyle Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE) bölümünde gerçekleştirilen etkinlikler hakkında bilgi edinmek amacıyla hazırlanmıştır. Yapılan görüşmelerin sonucu sadece eğitim amaçlı araştırmada kullanılacak olup hiç kimseyle paylaşılmayacaktır.

1. Programa kaç hafta katıldınız?
2. Programdaki etkinlikler hakkında bilgi verebilir misiniz?
 - Müze gezileri
 - Çizim tableti üzerinde resim çizimi
 - Dokunmatik masada ve tablet bilgisayar da kavram oyunları
 - Kinect ve Wii deki fiziksel olarak aktif oyunlar
3. Sizce programdaki etkinlikler içinde çocuklar için en faydalı olabilecek etkinlik /etkinlikler hangileri? Sebebini açıklar mısınız?
4. Eğitimde teknolojinin yeri ile ilgili düşünceleriniz neler? Teknolojinin eğitimdeki rolü ne olmalıdır?
5. Özel eğitimde teknoloji kullanımını ile ilgili neler düşünüyorsunuz / nasıl hissediyorsunuz?
 - Eksiklikler
6. Dokunmatik masa ve tablet bilgisayarlar üzerinde oynanan oyunların çocukların bilişsel gelişimlerine etkisi hakkında ne düşünüyorsunuz?
 - Pekiştirme aracı olarak kullanılabilirler mi? Neden?
7. Derslerinizde ders dışı aktivite olarak teknoloji tabanlı bir programı uygulamanın önündeki engeller nelerdir?

8. Okulunuzda ya da özel eğitim müfredatı içerisinde teknoloji tabanlı bir ekstra program olması öğrencilerin eğitim- öğretim sürecini nasıl etkiler? Neden?
- A. Motivasyon
 - B. Performans
 - C. Bilişsel Gelişim
 - D. Fizikse Gelişim
 - E. Dikkat
 - F. Akran Etkileşimi
9. Öğrencilerinizin katıldığı ders dışı aktiviteye başka neler eklenebilir ya da nasıl revizeler yapılabilir?

APPENDIX D

DEMOGRAPHIC QUESTIONNAIRE

Table D.1 Demographic Questionnaire

ANKET		
Doğum Tarihiniz:		
Cinsiyetiniz:	A)Kadın	B) Erkek
Mesleğiniz:		
Kaç yıldır bu branşta öğretmenlik yapıyorsunuz?		
Lisans eğitimimi Özel Eğitim üzerine aldım. Hayır ise branşınız:.....	A) Evet	B)Hayır
İnternet kullanıyor musunuz?	A) Evet	B)Hayır
Hafta kaç saat internet kullanıyorsunuz?.....		
İnternete erişmek için hangi araçları kullanıyorsunuz?		
a) Masaüstü Bilgisayar	b) Tablet	
c) Akıllı Telefon	d) Dizüstü Bilgisayar	
Aşağıdaki araçlardan hangisini ya da hangilerini kullanıyorsunuz? Kullandığınız araçlar için hafta da kaç saat kullandığınızı belirtiniz? Kullanım sıklığınız		
a) Masaüstü Bilgisayar	
b) Tablet	
c) Akıllı Telefon	
d) Dizüstü Bilgisayar	
İnterneti aşağıdaki amaçlardan hangileri için kullanıyorsunuz?		
a) Sosyal paylaşım sitelerine üye olmak için. (Facebook, Twitter...)		
b) İnternette araştırma yapmak için eğitim amaçlı		
c) E-Postalarımı kontrol etmek için.		
d) Online alışveriş yapmak için		
e) Oyun oynamak için		
f) Bankacılık işlemleri		
g) Diğer.....		

Table D.1 (Continued) Demographic Questionnaire

Lütfen aşağıdaki her bir soru için kendinize 1'den 5'e kadar puan verin.	Kesinlikle Katılmıyorum (1)	Katılmıyorum (2)	Kararsızım (3)	Katılıyorum (4)	Kesinlikle katılıyorum (5)
	Aşağıdaki soruları günlük hayatınızı düşünerek cevaplandırınız.				
Bilişim Teknolojilerini kullanma konusunda sorun yaşamam.					
Bilişim Teknolojilerini kullanmak beni endişelendirir.					
Bilişim Teknolojilerini kullanmak için gerekli becerileri öğrenme konusunda kendime güveniyorum.					
Bilişim Teknolojileri hakkındaki bilgilerim, meslektaşarımla karşılaştırıldığında daha sınırlı olduğunu düşünüyorum.					
Bilişim Teknolojileri hakkında meslektaşarımla konuşmaktan hoşlanırım.					
Bilişim Teknolojileri kullanırken karşılaştığım problemleri çözemem.					
Bilişim Teknolojileri kullanımında başarılıyım.					
Bilişim Teknolojileri kullanımını öğrenmenin kolay olacağını düşünüyorum.					
Aşağıdaki soruları çalıştığınız kurumu düşünerek cevaplandırınız.					
Derslerde Bilişim Teknolojilerini kullanma fikri beni rahatsız eder.					
Derslerde Bilişim Teknolojilerini kullanmak beni korkutur.					
Derslerde Bilişim Teknolojileri kullanımının zaman kaybı olduğunu düşünüyorum.					
Derslerde Bilişim Teknolojilerini kullanmak kendimi iyi hissettirir.					
Derslerde Bilişim Teknolojilerini kolaylıkla kullanacağımı düşünüyorum.					
Derslerde Bilişim Teknolojilerini kullanmak iş yükümü azaltacağımı düşünüyorum.					
Derslerde Bilişim Teknolojileri kullanımının öğrencilerin motivasyonunu arttıracığını düşünüyorum.					
Derslerde Bilişim Teknolojileri kullanımının öğrencileri korkutacağını düşünüyorum.					
Derslerde Bilişim Teknolojileri kullanımı öğrencilerin öğrenmelerini daha kalıcı olmasına yardımcı olur.					
Derslerde Bilişim Teknolojileri kullanımının öğrencileri daha içe kapanık hale getireceğini düşünüyorum.					

APPENDIX E

INTERVIEW QUESTIONS FOR PARENTS

Aşağıda verilen sorular ÖZTEK projesi kapsamında Sait Ulusoy Özel Eğitim ve Uygulama Merkezi öğrencileriyle Bilgisayar ve Öğretim Teknolojileri Eğitimi (BÖTE) bölümünde gerçekleştirilen etkinlikler hakkında bilgi edinmek amacıyla hazırlanmıştır. Yapılan görüşmelerin sonucu sadece eğitim amaçlı araştırmada kullanılacak olup hiç kimseyle paylaşılmayacaktır.

- 1) Çocuğunuz kaç senedir özel eğitim alıyor? Ne tür zorluklar yaşıyorsunuz?
- 2) Çocuğunuzun okulda aldığı özel eğitim hakkında neler düşünüyorsunuz?
 - Zihinsel gelişime katkısı
 - Fiziksel gelişime katkısı
 - Sosyalleşmesine katkısı
- 3) Okul dışında çocuğunuzun eğitimi için bir şey yapıyor musunuz? Bunlar nelerdir?
- 4) Çocuğunuzun okul dışında katıldığı ODTÜ’de yapılan ekstra teknoloji tabanlı program hakkında bilginiz var mı? Neler düşünüyorsunuz?
- 5) Bu programa katılımları sürecinde ve ya sonrasında olumlu/olumsuz herhangi bir gözleminiz oldu mu?
- 6) Günlük hayatta teknolojiden faydalanıyor musunuz?
 - Bilgisayar/Tablet
 - İnternet vb...
- 7) Teknolojiyi ne amaçla kullanıyorsunuz ve bu kullanıma ne kadar zaman ayırıyorsunuz?

8) Çocuđunuzun teknoloji kullanımına karşı tutumu nedir?

-İlgi


-korku vb

9) Özel eğitimde teknoloji kullanımıyla ilgili neler düşünöyorsunuz? Sizce teknolojinin özel eğitimde kullanılmasının çocuđunuzun gelişimine ne gibi etkileri olabilir?

-Olumlu/Olumsuz

APPENDIX F

APPROVAL OF MINISTRY OF EDUCATION



T.C.
ANKARA VALİLİĞİ
Milli Eğitim Müdürlüğü

**ÖĞRENCİ İŞLER
DAİRESİ BAŞKANLIĞI**
T.C. Anıttepe Mah. Dışişleri

Sayı : 14588481/605.99/2394271 11/06/2014
Konu: Araştırma izni

ORTA DOĞU TEKNİK ÜNİVERSİTESİNE
(Öğrenci İşleri Daire Başkanlığı)

İlgi: a) MEB Yenilik ve Eğitim Teknolojileri Genel Müdürlüğünün 2012/13 nolu Genelgesi.
b) 04/06/2014 tarihli ve 6233 sayılı yazınız.

Üniversiteniz Bilgisayar ve Öğretim Teknolojileri Eğitimi Ana Bilim Dalı Yüksek Lisans Öğrencisi Sibel DOĞAN'ın "Teknoloji tabanlı ekstra bir müfredatın zihinsel engelli çocuklar üzerindeki etkilerinin incelenmesi" başlıklı tezi kapsamında çalışma yapma talebi Müdürlüğümüzce uygun görülmüş ve araştırmanın yapılacağı İlçe Milli Eğitim Müdürlüğüne bilgi verilmiştir.

Anket formunun (6 sayfa) araştırmacı tarafından uygulama yapılacak sayıda çoğaltılması ve çalışmanın bitiminde iki örneğinin (cd ortamında) Müdürlüğümüz Strateji Geliştirme Bölümüne gönderilmesini arz ederim.

Zafer YILMAZ
Müdür a.
Şube Müdürü

Güvenli Elektronik İmza
Aslı ile Aynıdır.
12.06.2014

13-06-2014-9448

Yazgar SUBAŞI
Şef

Bu belge, 5070 sayılı Elektronik İmza Kanununun 5 inci maddesi gereğince güvenli elektronik imza ile imzalanmıştır. Evrak teyidi için <http://evraksorgu.meb.gov.tr> adresinden 0fe4-8867-3437-a70d-50e0 kodu ile yapılabilir.

Konya yolu Başkent Öğretmen Evi arkası Beşevler ANKARA
e-posta: istatistik06@meb.gov.tr

Ayrıntılı bilgi için: Emine KONUK
Tel: (0 312) 221 02 17/135

APPENDIX G

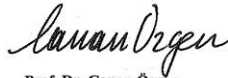
COMMISSION PERMISSION

O.D.T.Ü
FEN BİLİMLERİ ENSTİTÜSÜ
YÖNETİM KURULU KARARI

Tarih: 29.05.2014
Sayı: FBE: 2014/16

GÖREVLENDİRME VE İZİN

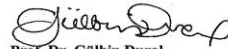
Bilgisayar ve Öğretim Teknolojileri Eğitimi EABD yüksek lisans programı öğrencisi Sibel Doğan'ın 04 Haziran 2014-15 Haziran 2015 tarihleri arasında "Teknoloji tabanlı ekstra bir müfredatın zihinsel engelli çocuklar üzerindeki etkilerinin incelenmesi" başlıklı araştırmasına ilişkin hazırlanan anketi, Sait Ulusoy Özel Eğitim ve Uygulama Okulu ve ODTÜ'de uygulama yapmak için görevlendirilme başvurusu incelenmiş; ilgili danışman görüşüne dayanarak adı geçen öğrencinin isteği doğrultusunda görevlendirilmesine oybirliği ile karar verilmiştir.



Prof. Dr. Canan Özgen
FBE Müdürü



Prof. Dr. Gürsevil Turan
FBE Müd. Yard.



Prof. Dr. Gülbin Dural
FBE Müd. Yard.



Prof. Dr. Ayşen Savaş
Üye

KATILMADI
Prof. Dr. İnci Batmaz
Üye

KATILMADI
Prof. Dr. Serkan Dağ
Üye

APPENDIX H

PERMISSION OF INSTITUTION

UYGULAMALI ETİK ARAŞTIRMA MERKEZİ
APPLIED ETHICS RESEARCH CENTER



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22.05.2014

Gönderilen : Dr. Gökür Kaplan Akıllı
Bilgisayar ve Öğretim Teknolojileri Bölümü

Gönderen : Prof. Dr. Canan Özgen
IAK Başkanı

İlgi : Etik Onayı

Danışmanlığını yapmış olduğunuz Bilgisayar ve Öğretim Teknolojileri Bölümü öğrencisi Sibel Doğan'ın "Determining the Effects of Activities in a Technology Enhanced Extracurriculum on Mentally Retarded Children." isimli araştırması "İnsan Araştırmaları Komitesi" tarafından uygun görülerek gerekli onay verilmiştir.

Bilgilerinize saygılarımla sunarım.

Etik Komite Onayı

Uygundur

22/05/2014

Prof. Dr. Canan Özgen
Uygulamalı Etik Araştırma Merkezi
(UEAM) Başkanı
ODTÜ 06531 ANKARA

APPENDIX I

PERMISSION FOR INSTRUMENT

-----Özgün İleti----- From: akilli@metu.edu.tr Sent: Sunday, May 12, 2013 8:47 PM To: sehnazbg@uludag.edu.tr Subject: Turkce UTAUT Olcegi

Merhabalar
Ben Goknur KAPLAN AKILLI. ODTU BOTEden.
UTAUT olcegiyle ilgili arastirma yaparken, sizin "Pre-service teachers' perceptions about web 2.0 technologies" makalenize denk geldim ve makalenizden bu olcegin Turkceye cevrilmis oldugunu heyecanla okudum. Sayin hocam bu olcegi bizimle paylasmaniz mumkun mudur acaba? Sizin bildiginiz baska cevirileri var midir? Benim yaptigim alanyazin taramalarinda yalnızca sizin isminiz cikiyor. En kısa zamanda haberlesmek dilegiyle :) E-mailinizi heyecanla bekliyorum.
saygilar sevgiler
Goknur
--

Goknur KAPLAN AKILLI, Ph.D.
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From: Sehnaz Baltaci Goktalay <sehnazb@hotmail.com>
Date: 2013-05-12 21:44 GMT+03:00
Subject: Re: Turkce UTAUT Olcegi
To: akilli@metu.edu.tr, Zehra Ozdilek <ozdilekz@gmail.com>

Merhaba Goknur Hanım,
Başka Türkçe çevirisi yok bildiğim kadarıyla. Bizim kullandığımız ölçek
ektedir.
İyi çalışmalar dilerim,
Sevgiler,
Şehnaz

Assist.Prof.Dr. Sehnaz BALTACI GÖKTALAY
Uludag University, School of Education, Computer Education and
Instructional Technology
Nilufer-Bursa-TURKEY
Phone: +90 (224) 2942216

APPENDIX J

THEMES AND CODES IN THE TEACHER INTERVIEWS

Table J.1 Themes and Codes in the Teacher Interviews

Program Duration		
Activities	Playing Physically Interactive Games on X Box	
	Playing Physically Interactive Games on Nintendo Wii	
	Playing Simple Concept Games on Touch Table	Color (Balloon) Animal
	Playing Simple Concept Games on Tablet PCs	
	Drawing Pictures by Using Drawing Tablet	
	Visiting Museum	
	Recording Short Video	
Most Favorite Activities	Playing Simple Concept Games on Touch Table Playing Simple Concept Games on Tablet PCs Playing Physically Interactive Games on X Box Drawing Pictures by Using Drawing Tablet Visiting Museum Recording Short Video	
Effects of Program on Students	Physical Development	Provide Physically Active Environment Support Physical Development
	Cognitive Development	Reinforce Learning Better Understanding Develop Eye-Hand Coordination Support Cognitive Development Learning in Shorter Time Provide Multi-stimulus Environment Pushing Students to Think and Adapt Improve Long-Term Memory Provide Reuse

Table J.1 (Continued) Themes and Codes in the Teacher Interviews

	Others	Positive Increase Motivation Increase Attention Depends on Usage Purpose Social Development
Technology Use in Special Education	Cognitive Development	Using as Reinforcement Better Understanding Effective Learning Provide Visual Support Multi-Stimuli Environment
	Suggestions for Technology Integration	Using Technology for Supportive Purposes Using Technology for Appropriate Purposes Appropriate Material Selection
	Others	Important Increase Attention
Teacher Attitudes towards Technology	Makes teachers' job easier Makes them feel comfortable Makes teacher powerful Provides variety Easy reach of knowledge Lack of technology knowledge Teacher Role	
Barriers	Lack of	Materials Technology Knowledge Resources Programs Devices
	Ministry of Education	
	Technical Problems	Substructure
	Teachers' Attitude	Teachers resisting to learn
Revisions	Game Variety	Sportive Games Group and Individual Activities More Flexible Activities More Simple Games Daily Life Activities More levels in games Simple to Complex Structure Physically Active Games Box games should be Changed. More concept Games More Student Controlled Games Content of X
	Sustainability	Program
	Limited	Time
	Suggestions for Design of Games	Using familiar Cartoon Characters Using hand picture instead of mouse symbol

APPENDIX K

THEMES AND CODES IN THE VOLUNTEER INTERVIEWS

Table K.1 Themes and Codes in the Volunteer Interviews

Program Duration		
Activities	Playing Physically Interactive Games on X Box	Plane River Rush
	Playing Physically Interactive Games on Nintendo Wii	Tennis
	Playing Concept Games on Touch Table	Color (Balloon) *Animal Shapes
	Playing Concept Games on Tablet PCs	Color (Balloon) Animal Shapes Human Body
	Drawing Pictures by Using Drawing Tablet	
	Visiting Museum	
	Recording Short Video	
Most Favorite Activities	Playing Physically Interactive Games on X Box	
	Playing Physically Interactive Games on Nintendo Wii	
	Playing Concept Games on Touch Table	Multi-Stimulus Environment
	Playing Concept Games on Tablet PCs	
	Drawing Pictures by Using Drawing Tablet	
	Visiting Museum	
	Recording Short Video	
Least Favorite Activities	THBT Dance Activity	
	Drawing Pictures by Using Drawing Tablet	Having difficulty in holding pen Boring
	Visiting Museum	
	Recording Short Video	
	Playing Physically Interactive Games on X Box	
	THBT Dance Activity	

Table K.1 (Continued) Themes and Codes in the Volunteer Interviews

Responsibility of Volunteer	Helping Guiding Organization Taking Photos Caring	
Interacted Participants		
Interaction	With Volunteers	Depends on Children Positive Relationship No Relationship
	With Each Other	Depends on Children Positive Relationship No Relationship Close Relationship
Effects of Program on Students	Physical Development	Provide Physically Active Environment Making Students Physically More Active Developing Muscles
	Cognitive Development	Reinforce Learning Learning Simple Concepts Develop Eye-Hand Coordination Increase Multi-Tasking Process Decision Making Provide Multi-stimulus Environment Pushing Students to Think and Adapt Improve Long-Term Memory
	Others	Positive Increase Motivation Increase Attention Having Fun Social Development Technology Attitude Appropriate Material Selection
Reactions to Activities	Feelings	Positive Excitement Feeling Free Happiness Fun Joy Like Negative Bored Fear

Table K.1 (Continued) Themes and Codes in the Volunteer Interviews

	Attitudes	Focus Flow Willing Creative Flow Persistent to Finish Having Control Undecided Positive Motivated Enthusiastic Depends on Child
	Factors Affecting Reactions	Familiarity Games and Activities Voices
Revisions	Game Variety	Concept games appropriate curriculum Different Games More planned activities Daily Life activities Real life related activities Group Activities More complex concept games
	Sustainability	Program Students
	Limited	Time Place Volunteer
	Suggestions for Games Design and The Program	Using familiar Cartoon Characters Using hand picture instead of mouse symbol on the screen Highlighting target area in concept games Small student groups Appropriate devices for activities

APPENDIX L

THEMES AND CODES IN THE PARENTS INTERVIEWS

Table L.1 Themes and Codes in the Parent Interviews

Duration of Special Education		
Difficulties	Illnesses	*Hearing Problem *Acne
	Adaptation	
Contribution of Special Education	Socialization Learn to meet basic daily activities	
Extra Activities	Swimming Riding Horse	
Observation about Program	Positive Depends on Children' reaction	
Purpose of Technology Use	Searching information Social Media	
Attitude of Students towards Technology	Positive Interested Like	