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TECHNOLOGY EDUCATION IN PRESCHOOL: AN APPLIED SAMPLE LESSON

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ABSTRACT

Science and technology is rapidly changing and developing in our ages. Human knowledge is being renewed and changed every day. This situation makes technology integration which accelerates accessing information into educational systems inevitable. Developing ICT skills of children starting from early ages gains importance considering the fact that those skills support the ability and attitude to use electronic media their future lives. For this reason, European Union gave a significant place to education of information technologies as naming "Technical Skills" in 111th European Youth Program in order to meet changing trends in both education and labor market in 1993(TEİAŞ, 2010). In the same manner, State Planning Organization of Turkey declared goal as "information and communication technologies will be one of main tools of education process and it will be provided that both teachers and students use those technologies effectively" in the Strategy of Information Society (2006 -2010). Then, Movement of Enhancing Opportunities and Improving Technology", known as FATIH project was started(MEB, 2012). Researches related to FATIH project shows that teachers complain the most the lack of suitable e-content for interactive boards and tablets (Özkan and Deniz, 2014; Gürol, Donmuş and Arslan, 2012; Ayvacı, Bakırcı and Başak, 2014). In this study, it is aimed to present suggestions and experiences for researchers and early childhood educators by showing a sample lesson with various instructional materials based on those gaps in the literature. For this reason, a sample technology education lesson was developed for preschool students. First of all, an e-content which is compatible with interactive boards is developed by using Adobe Flash software considering preschool children's needs and characteristics. Furthermore, various instructional materials is prepared to gain objectives of the lesson. Then, the lesson was applied in a private school with 16 preschool students. At the end of study, suggestions and experiences is reported for future researches.

Keywords: Preschool, Information Technologies, Smart Board, E- Content, Technology Education.

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INTRODUCTION

Science and technology has changed and developed rapidly these days. Human knowledge is being renewed and changed every day. Academic studies related to educational research which provide renewable information source for both educators and students for educational process have been conducted since 1980. In addition to increasing importance technology integration into the education, technological development also shapes professions of today and future apparently. Professions are being changed by focusing technological development. For example, according to statistics, 58 percent of companies prefer individuals who has taken technology training and 73 percent of newly opened companies are technologies based companies in England(Özbayoğlu, 2014). Strandberg(2002) establish a relationship between diffusions of high technology and technological levels of individuals in productive society. Abilities to use technology of individuals and whether they have taken technological training before are closely related to society high technology production, according to him.

In this context, countries that want to high quality labor and strong economy need to give place to technology education in their education policies. Dugger(1997) stated that technology literacy efforts must begin in kindergarten and continue each year through high school in all school across the country. Similarly, technology education is given to children starting at age 6 in developed countries such as Finland, Australia, France, and Estonia(Rasinen, Virtanen, Endepohls-Ulpe, Ikonen, Ebach, & Stahl-von Zabern, 2009). Developing ICT skills of children starting from early ages gains importance considering the fact that those skills support the ability and attitude to use electronic media their future lives. For this reason, European Union gave a significant place to education of information technologies as naming "Technical Skills" in 111th European Youth Program in order to meet changing trends in both education and labor market in 1993(TEİAŞ, 2010). In the same manner, State Planning Organization of Turkey declared goal as "information and communication technologies will be one of main tools of education process and it will be provided that both teachers and students use those technologies effectively" in the Strategy of Information Society (2006 -2010). Then, Movement of Enhancing Opportunities and Improving Technology", known as FATIH was started(MEB, 2012).

Technology education refers a designed process which includes improve problem-solving skills and self esteem by understanding and using available technological facilities(Şenel and Gençoğlu, 2003). Similarly, International Technology Education Association - ITEA(1999) defines technological knowledge as nature and evolution of technology and technological concepts, principles and contextual relationships.

The definition of technology education and standards vary according to cultures and society needs. Dugger and Gilberti(2000) separate technology education into two categories as students' understanding about technology and students' capabilities in technology field. The first category contains cognitive processes such as definitions of fundamental concepts and technological knowledge – how technology works- what is an importance and position of technology in the/our world- ethical issues and terminology related to IT/technology. The second category includes students' technological skills and productivity abilities in information technology field. These two different approach toward to technology education complements each other. Dugger and Gilberti (2000) list 20 standards of the combination of these two approaches as follows.

Nature of Technology

- ✓ Students develop a notion related to technology and its scope.
- ✓ Students develop a notion related to the fundamental concepts of the technology.
- ✓ Students develop a notions related to relationships between both technology and other disciplines and varied technologies.

Technology and Society

- ✓ Students develop a notion related to impacts of technology on the culture, economy, social life and politics.
- ✓ Students develop a notion related to impacts of technology on the nature.
- ✓ Students develop a notion related to society role about development and usage of the technology.

- ✓ Students develop a notion related to impacts of technology on the history Students develop a notion related to impacts of technology on the nature.

Design

- ✓ Students develop a notion related to a/the design (process)
- ✓ Students develop a notion related to the engineering design.
- ✓ Students develop a notion related to roles in the problem- solving process such as problem analysis, research, development, inquiry and invention

Proficiency for Technological World

- ✓ Students develop their skills to participate to design process.
- ✓ Students develop their skills to sustain (maintain) technological devices and systems.
- ✓ Students develop their skills to evaluate effects of technological systems and devices.

Designed World

- ✓ Students develop a notion related to choose and use medical technology
- ✓ Students develop a notion related to agricultural technology usage and selection.
- ✓ Students develop a notion related to energy and power technologies usage and selection.
- ✓ Students develop a notion related to BİT usage and selection.
- ✓ Students develop a notion related to industrial technologies usage and selection.
- ✓ Students develop a notion related to transformation technologies usage and selection.
- ✓ Students develop a notion related to constructional technologies usage and selection.

In 1997, "computer" course have included as an elective course to the primary education curriculum for the first time in Turkey. According to availability of computer laboratory, schools offered an computer course for graders from 4th to 8th and duration of this course was limited to one or two hours per week. However, those days computers was new technological devices and cost of building computer laboratory was excessively high that's why computer courses wasn't widespread all over the country. In 2005, importance of technology education was realized and to meet increasing need of individuals efficiently use technology, computer course was included both primary and elementary school curriculum by Ministry of Education. Similarly, duration of this course was limited an hour per week. In 2007, name of computer course was changed to "Information Technologies" course and duration of the course was increased in primary education curriculum for 4th and 5 the graders. Constructivist educational approach was adopted and information technology course curriculum and instructional materials such as workbooks, students books etc. were rearranged by Ministry of Education in the same year. In addition, Media Literacy course was offered as an elective course for primary school students for the first time in 2007. However, Ministry of Education removed the computer courses from primary school curriculum and it was offered as an elective course for only elementary school students in 2010. Duration of this course was reduced to one hour as well. By the year 2012, educational system was changed and a new educational system called as 4+4+4 have been started. Computer courses offered as an elective course for only elementary school students in Turkey with this new educational system. The latest program is differ from others. In previously, school managements decided to whether information technology course offer for students or not. However, there is a need parent request to open computer course for their children in 4+4+4 system. If there is sufficient request from parents, computer course can open for the elementary school students. Programming subjects was increased and course name was again changed to Information Technology and Software in 2012. Courses have been compulsory course for 5th and 6th graders for the first time and it was offered as an elective course 7th and 8th graders in 2013. Computer course was also graded for the first time in the same year, before 2013 computer courses were elective courses and students didn't graded by ICT teachers.

Current unity title list of students' workbooks available on the Information in Educational Network (EBA) portal are given below.

5th Grade
- ✓ Importance of ICT in daily life
- ✓ Social and cultural contributions of ICT
- ✓ Fundamental concepts of ICT
- ✓ Usage and management of ICT
- ✓ Privacy and security dimensions of ICT
- ✓ Ethical and social values in ICT usage

6th Grade
- ✓ Internet and Communication
- ✓ Communication Devices
- ✓ Information Sharing and Tools
- ✓ Project Development and Management

7th Grade
- ✓ Ten fingers typing
- ✓ Electronic Spreadsheets (MS Excel)
- ✓ Databases
- ✓ Making Web Site (Adobe Dreamweaver)

8th grade
- ✓ Information Systems
- ✓ I am making a website
- ✓ I am making a computer program

ICT (technology) courses are included in only graders from 5th to 8th curriculum and there is no technology course in preschool and first four year of the primary school in our country, as seen above. Exceptionally, some private schools and colleges offer coding and ICT courses from preschool to high school.

Researches related to computer usage in preschool education show that children needs to learn technological skills and how to use them with basic sciences effectively in addition to basic sciences education. It is seen that e-skills or ability to use technological devices are necessary for children to integrate their knowledge with other disciplines (Kaçar and Doğan, 2007). Recently, importance of technology education in preschool has realized and related studies about this subject has also started in our country. In contrary to common belief about using technology in early years at child education harm children in preoperational ages – between 4 and 7 ages- , studies state that computer usage in preschool education with the proper time, content, context and guidance helps children critical, analytical thinking, socializing ability and ability to working collaboratively especially for those who need to special education (Dodge and Colker, 1995; Akkoyunlu and Tuğrul, 2002; Healy, 1998, Papert, 1998). Kartal and Güven(2006) list points that need to pay attention to computer usage in preschool education in their study. These points can be summarized as follows.

- Duration: Duration of the time spent on computer should be limited.
- Purpose: Computer should seen as an device not a goal by children
- Context: Collaborative learning environment and well designed ergonomic working area should be provided such as well lighting, roominess etc.
- Computer should be used for proper and relevant purposes.
- Social Environment: Computer based activities should provide children an opportunity for socializing. For example; child can improve his/her social and democratic skills such as respect the right of others, solving a conflict, making friends.
- Guidance: It should be provided teacher guidance to help students in social, pedagogical and cognitive aspect of teaching activities such as helping focus on subjects, encouraging students, improving children's' verbal abilities, asking discussion questions, keeping distance between computer screen and children, preventing demotivation feeling resulting from failure.

Teaching activities enriched by the use of information and communication technologies does not prevent child's physical activities, verbal communication and socializing opportunities. In contrast, well designed lesson enriched with technology usage improve child's verbal and linguistic communication abilities, problem solving skills, critical thinking abilities and ability to work collaboratively and it provides some other meta-cognitive learnings such as discrimination, establishing pattern, organizing etc.

Likewise Kartal and Güven(2005) suggestions for computer education in preschool, Clements (1999) presents advises related to increasing social interaction in classes where computers are used for educational purposes in preschool. According to Clement (1999), social interaction can be encouraged by placing two seats in front of the computer and one at side of the teacher. Computers can be placed to close each other to facilitate the sharing opinions among children. He also suggests that centrally located computers can increase participation to computer activity by inviting all children near to the computers. Muller and Perlmutter (1985) observed that children who involves computer based activities spent nine times as much time talking to peers during activities than while doing puzzles. Similarly, Elkind(1999) gave some suggestions to teachers related to technology education. He said that teachers need to observe how children themselves overcome the technology and he added that some initial instructions is necessary and certain limits need to be set yet children should be allowed make their choices. Dugger and Gilberti(2000) suggest some example subject for technology education from preschool to K2 level;

- Natural World and human made World
- People and technology
- Systems, sources, process
- Technologies and relationships between technologies and other fields
- Pros and cons of technology usage

Davis and Shade (1999) list concepts could be taught to children in early ages- preschool students as follows;

- ✓ Computer peripherals (processor, hard disc, mouse, keyboard, printer etc.)
- ✓ Working principles of computers (input units, processor, output units)
- ✓ How a computer program works? Coding structure
- ✓ Communication between computers
- ✓ Advantages of using computers
- ✓ Limitations and powerful sides of computers
- ✓ History of computer technologies and the fact that computers was a product of human intelligence and they were invented by human being.

The aim of this study to apply an example lesson about technology education in preschool by using various instructional materials and flash based educational games in light of literature. Flash based educational games are designed for smart boards. Characteristics and needs of preschool students are taken into consideration in design phase of flash based educational games. In addition to flash based educational games, various instructional materials designed for this lesson with the help of preschool educators. It is tried to all instructional materials of the study are enriched by reinforce. Finally, the another aim of this study to contribute children socializing, verbal and motor skills and making suggestions for both researchers and teachers with this study.

An Applied Sample Lesson

As it is mentioned in introduction, computer peripherals subject is chosen from suggested subject list by Davis and Shade(1999) for technology education for preschool students. First of all objective of lesson is chosen. Then strategies, method and techniques are selected to gain this objective. Detailed information about lesson is given Table 1.

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Table 1: Lesson Plan of Applied Sample Lesson

PRIVATE ……. PRIMARY SCHOOL	**DATE:** 26/11/2014
PART 1	
Course Name	Information Technologies
Unity Title	**Introduction to the Information technologies**
Subject	Computer peripherals
Duration	2 hours (40 + 40 minutes)
PART II	
Objectives **Learners will be able to tell name of computer peripherals** **Learners will be able to tell functions of computer peripherals.**	
Precautions (If Exists)	----------
Methods and Techniques	Presentation, gamification, drill and practice
Instructional materials	Smart board, hardware models, leaderboards, flash cards, flash based e-content, PowerPoint presentation
Activities It will be asked to children that what they know about computers and peripherals. Hardware cardboard model will be showed to children and necessary time will be given for children to examine the hardware cardboard models. Then it will be announced that they will learn peripheral of computers and functions of them at the end of lesson. PowerPoint presentation consist of computer hardware photos will be showed and and functions of peripherals will explained by using this presentation. Flashcards will be given to children and it will be asked them to examine the peripherals images on flashcards. The interface of flash based e-content designed for smart board will be introduced to children and rules of games will be announced. Games will be played and scores of the children will be marked to the leaderboards. At the end of lesson, free/necessary time will be given for students to draw an image/picture of peripherals.	
Researcher: …… ……	ICT Teacher: …… ……

Study process is separated into two main parts namely lesson preparation and implementation of the lesson. Preparation process involves subject (unity) selection, preparing lesson plan, developing e-contents and choosing instructional materials. Lesson is consist of motivating learners, recalling prior knowledge of them, lecturing and evaluation phases. Study process is given below as figure 1.

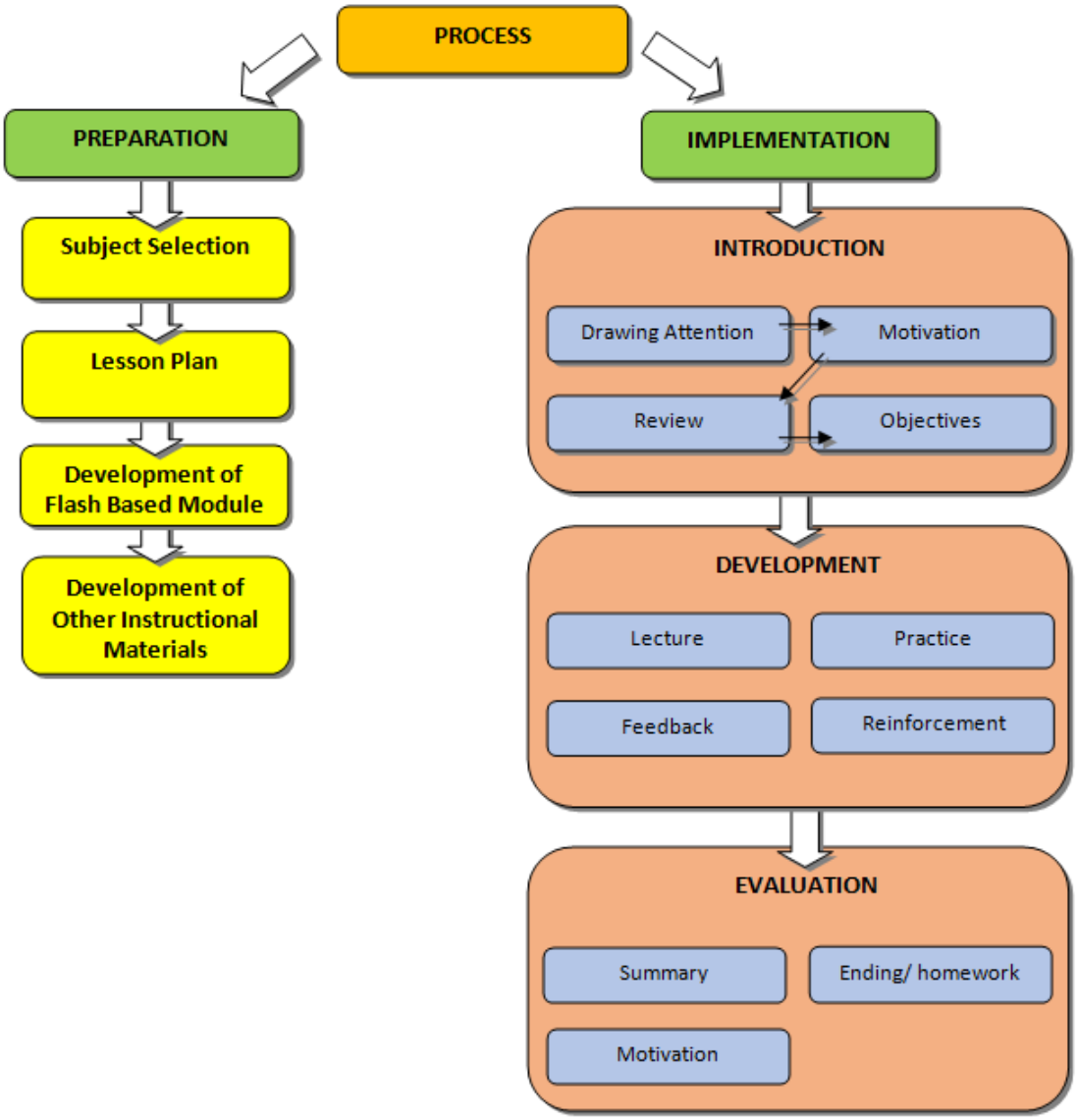

Figure 1: Structure of the process

Development of the Flash Based E- Content

Elkind (1999) argues that there is a significant relationship between children learning and motivation, if a child does not have the learning motivation which results from feeling of curious, inquiry, desire and competition, learning process cannot be efficient or proper. Therefore, Motivational ARCS Model is used in the design of this material. Motivational ARCS model aims to design motivational aspect of learning environments to stimulate and maintain students' motivation toward learning process. The model consists of two major parts. The first part represents components of motivation while the second part is a systematic design process which assists educators in making motivational improvements in given set of learners (Keller, 1987).

Needs and characteristics of preschool students such as illiterate, difficulty at understanding abstract concepts are taken into the consideration in design phase of this material. Flash based module is a kind of drill and practice software and the aim of this material is to provide children to make a practice related to objectives of this lesson.

Flash based module is consist of two educational games. There are 15 questions in the first game of the module. Questions are related to peripherals and their functions. It is expected from children to select an image of the correct answer of questions. It is also planned that game is supported with flash cards. That is, children need to show flash cards of correct answers. Questions of this game are enriched with examples usage of peripherals in daily life and there is a vocalization and various animations for each question. An example screenshots of the first game is given below.

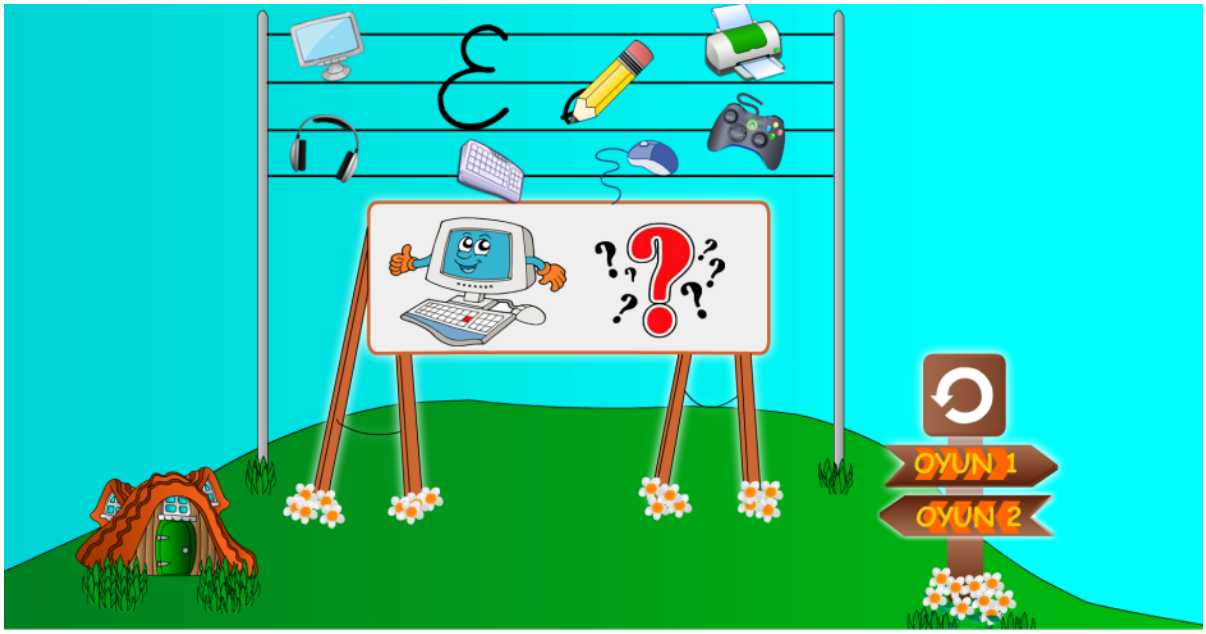

Figure 2: Main Page of Module

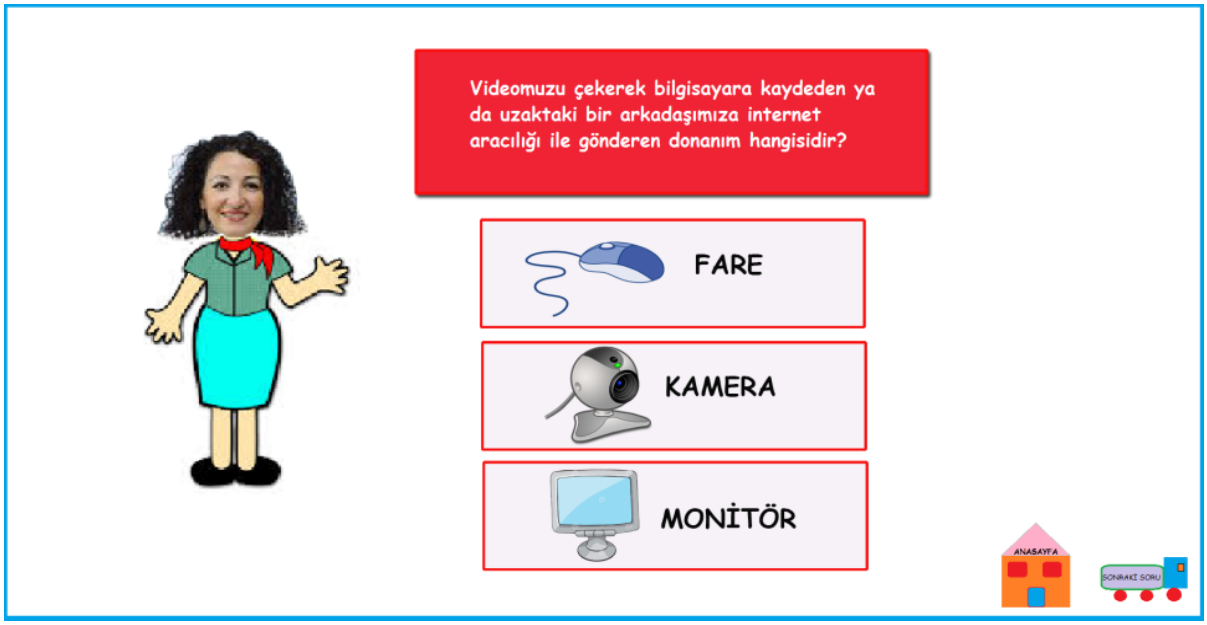

Figure 3: "OYUN 1" Screenshot

The second is a drag and drop style matching game. Game screen is divided into the two sections. There are shadows of peripherals on the top section and images of peripherals are in the bottom section of the screen(Figure 3). Children need to match shadows with corresponding peripherals in the game.

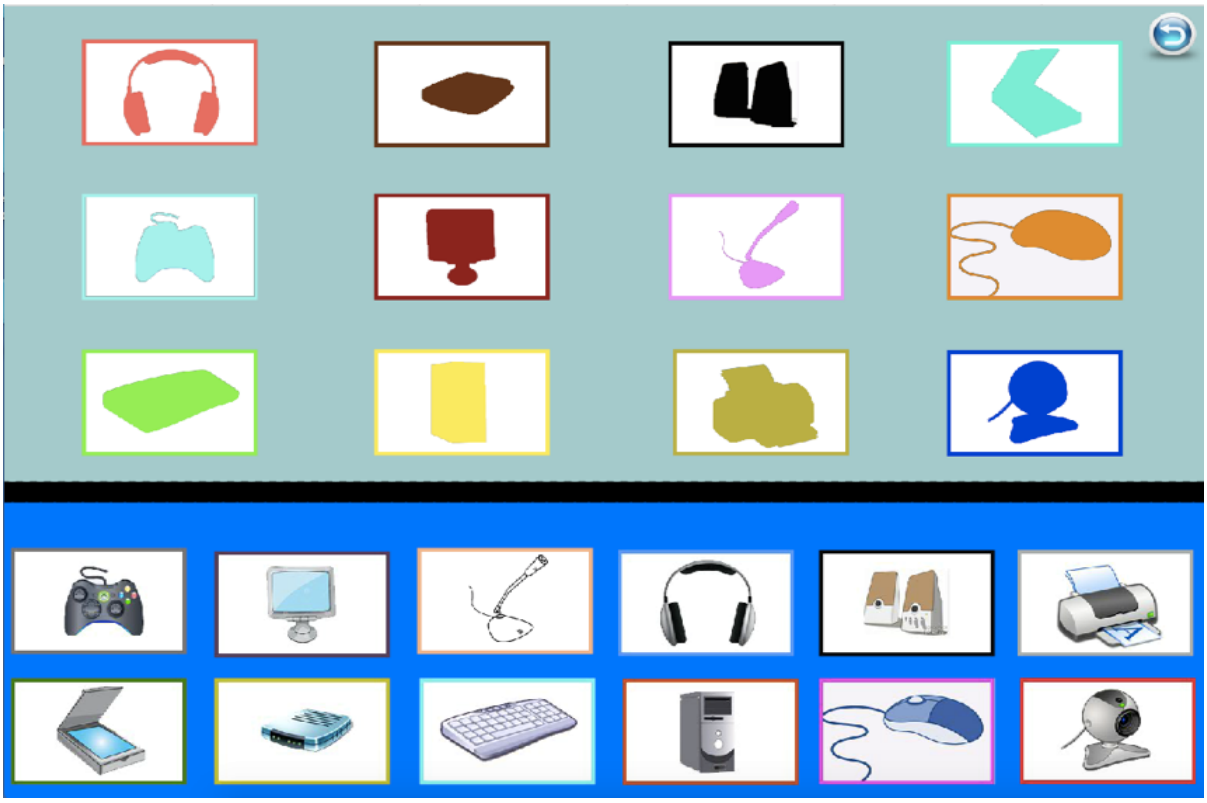

Figure 4: "OYUN 2" Screenshot

Other Instructional Materials

1- Cardboard models of peripherals are prepared by prospective early childhood education teachers to concrete the subject.
2- Flash cards are prepared by using Adobe Photoshop program. Peripheral images are putted on flash cards.
3- PowerPoint presentation is prepared by using photos of peripherals. Since target group of instruction are illiterate, text or written expression isn't used in the presentation.
4- Leaderboard is prepared to mark scores of students. Children's' photos and colorful pins are used for leaderboard to create attractive instructional material.

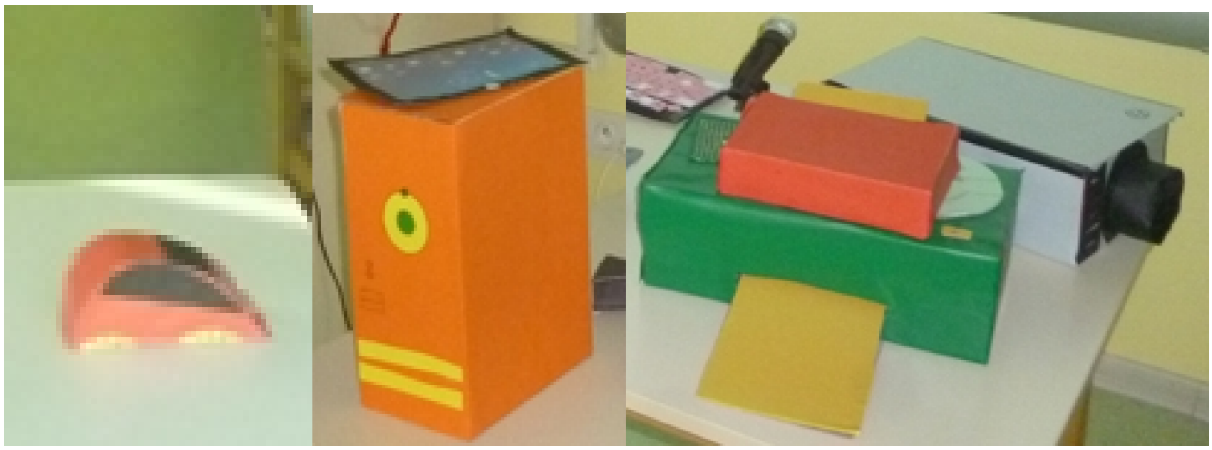

Figure 5: Hardware Cardboard Models

Figure 6: Flash Cards


Figure 7: Leaderboard

IMPLEMENTATION

The implementation of this lesson made in a private elementary school in the spring semester of 2014-2015 academic years. Participants of this study 16 preschool students. The lesson was lasted 3 hours and the lesson was conducted with the teacher of children since researchers weren't familiar with students. Before the lesson researchers prepared various instructional material and obtained information about students such as number of students, name and photos of students and their favorite activities from their children.

The whole lesson is divided into three part namely, introduction, development, evaluation. Each part is explained in detailed below.

Introduction

- At the beginning of the lesson, researchers tried to draw attentions of children by asking questions. For example, do you have a computer in your home and if they have, what are the kinds of their computers, how do they describe their computer.
- In order to motivate children, it is announced that a game would be played during the lesson.
- Rules of lesson such as speaking in order, asking permission to talk vs. are explained to children.

Development

- Peripherals and functions of them were explained to the children by using PowerPoint presentation. It is provided that children observed 3D visual model of peripherals by using cardboard models of peripherals since children need to concrete materials and examples in early ages.
- It is asked to children to compose a desktop computer by using cardboard peripheral model.
- Example scenarios were given to children. For example, your father goes to abroad for business purposes and you want to send a pictures of a toy to your father so can you use a camera?
- Flash cards were distributed to children and necessary time was given children to examine flash cards.
- Flash based material was used to reinforce to new knowledge of children. First of all, material was introduced to children and brief information about rules of games was given.
  - As mentioned earlier, the first game consists of questions related to peripherals and functions of them. Before the starting game, children saw the photo of their teacher on game (figure) screen and they reacted positively. For example; "Hey, look at the screen, our teacher are there". "She looks well". Then, students answered all questions by using previously given flash cards. One of researchers took a note and

inserted a pin for each correct answer of students on the leaderboard. Colors of pins were selected by children. For each question, one student was selected to come the board and mark correct answer on the smartboard. Researchers and teachers gave feedback during the game.

- Students play the second game of the module. The second game is a shadow matching game. Children matched peripherals shadows with corresponding peripheral by drag and drop. All students played the game successfully.
- Children wanted to play again the second game. Each child played one more time the game.

Evaluation

- Questions related to peripherals were asked to children by using flashcard. Collaborative working chance is given to children and children answer questions collaboratively. A pin was added to the leaderboard for each correct answer.
- Lesson was closed with a drawing activity and homework. Children draw their favorite peripheral and color them(Figure 8, 9).
- The homework was given to children. It was asked to the children tell the functions of their favorite peripheral to their parents and friends by using their drawings as a flash card like their researcher did.

Figure 8: Photos from the class

Figure 9: Students' drawings

RESULTS AND SUGGESTIONS

There is a common belief regarding as technology usage in preschool education can cause negative effects on children. However, recent studies shows that information technology education usage in preschool with proper guidance in relevant activities can help children to improve their problem-solving, verbal, linguistic and even physical skills without feeling isolated and inactive by sharing their ideas with their classmates. On account of these reasons, it is obvious that there is need to more research about both technology education and technology usage in preschool.

In this study, it is aimed to provide a sample technology education lesson for preschool students. Computer peripherals is selected subject of this lesson and the lesson was applied in a private elementary school in the spring semester of 2014-2015 academic years. 16 preschool students participated to this study. For the lesson, flash based e- content compatible for interactive boards and various instructional materials were developed. Lesson plan and scheme of the lesson is given previous part of this article. Furthermore, an implementation of the lesson is explained in detailed. Researchers observed that children were willing to participate the instructional activities during the lesson.

The following suggestions are offered based on researchers' observation related to technology education and information technology usage in preschool.

- ✓ Animations can be used in multimedia materials for preschool students.
- ✓ Guidance and necessary supports should be provided to students during technology based activities.
- ✓ Collaborative learning environment should be provided. Children should be encouraged to group working.
- ✓ New trends in educational technologies such as gamification can be used in preschool.
- ✓ Quantity and quality of the educational software for preschool students should be increased.
- ✓ Preschool teachers and preservice preschool teachers should be encouraged to use technology for educational activities and purposes. In-service trainings for preschool teachers can be served.

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