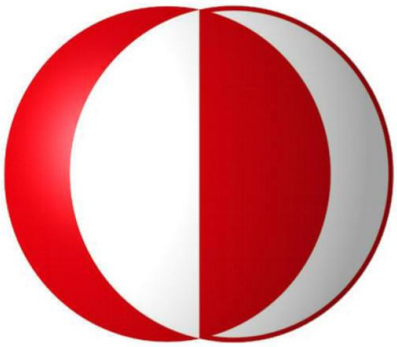

Middle East Technical University
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CEIT609 Virtual Worlds in Education Theory and Design

"Research Proposal"

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INTRODUCTION

1. Background of the Study

Human brain has the ability to improve its capacity in terms of some specific cognitive skills (memory, attention, speed, problem solving, flexibility etc.) with cognitive training (Lumosity, 2013). There are different methods for brain training in the literature (Sarkar, Drescher & Scanlon, 2007. One of them is brain training with computer games. Literature about brain training with computer games demonstrates that these games improve cognitive capacity of brain (Ballard, Sternberg, Katz & Scanlon, 2012; Sarkar, Drescher & Scanlon, 2007).

3D virtual environments are popular among people because their features. They provide users a close experience to real-life and 3D representation of users so, users can immerse in this environment. Users also can interact with both objects and other users in these environments and they can create a community of users (Warburton, 2009). Combining brain training games and features of 3D virtual environments may create more immersive environment for user during brain training. They may also create a community of brain trainers and benefit from each others' experiences to learn more about improving their brains.

Usability in computer games is one of the key factors that help players to enjoy playing the game. It is important because if the game usability is poor, most probably player doesn't want to play the game. It is the same for 3D virtual environments, usability issue is important in order to create an environment where users can interact with the objects easily. Hence, in this research we aimed to develop a 3D brain training virtual environment and examine the effects of this environment on users' cognitive abilities and also usability of the environment.

2. Research Questions

- How much Brain Training Center effective on student's cognitive abilities in terms of *pedagogical* approach?
- How are the *usability* principles implemented in Brain Training Center?

METHODOLOGY

1. Research Method

In this study, the research method will include three step: namely, searching and selection procedures, Data Analysis and qualitative case study.Qualitative research is based on collections with a direct source and key, and it makes researchers concern with how things occur (Bogdan and Biklen, 1998). Since our environment is designed to increase curiosity for discovering and designed to make brain works more with games, case study will be used as research method. Quantitative part will help to examine the effects of virtual environment on users'cognitive capabilities.

a. Searching and selection procedures

The search for relevant literature will be completed in two stages. First, we will examine empirical, peer-reviewed papers that we find in electronic databases using the keyword search virtual world. For specifically the first question, additionally, we will search "pedagogy" keyword. And for specifically the second question, additionally, we will search "usability" keyword. In the second stage, we will use the 'snowball' method by searching for journal papers that are cited in some of the papers that we will have read.

b. Data analysis

After the literature research, according to the papers, we will examine the collected data from these papers. The basic unit of analysis is each individual empirical paper. In order to answer the research questions, we will first examine the following features of virtual worlds to guide our initial approach for especially pedagogical side: illusion of 3-D space, avatars that serve as visual representations of users and the ability to 'act' on the world. For the usability side, we will use the constant comparative method. Specifically, the constant-comparative method involves the following steps: examining each individual paper, forming various usability heuristics (ie, visibility,flexibility, consistency), comparing user interfaces and interaction methods.

c. Descriptive Research (Qualitative case study)

This qualitative case study is an approach to research that facilitates exploration of a phenomenon within its context using a variety of data sources*(Baxter & Jack,* 2008).

According to Yin (2003) a case study design should be considered when: (a) the focus of the study is to answer “how” and “why” questions; (b) you cannot manipulate the behaviour of those involved in the study; (c) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study; or (d) the boundaries are not clear between the phenomenon and context. Because we are examining the efficiency of our environment according to usability and pedagogy, our target should be general audience and so the results shouldn’t be dependent on one’s perspective.

A variety of data collection methods, descriptive method includes the questionnaire, interviews, observations, online log files (eg, chat transcripts) and game scores. The questionnaire typically includes both closedended items and open-ended questions to collect data on participants’ satisfaction, or attitudes about a specific issue (eg, students’ satisfaction of using virtual worlds). Although there are a variety of data collection methods, the use of questionnaires seems to be the main method of gathering research data in virtual world research.

So, case study will be used as a research method in this study in order to investigate the interaction between usability (or pedagogy) and motivation for brain activity in Brain Training Virtual World deeply.

2. Participants

The environment will be applied to middle school students in order to analyze the effectiveness of the virtual brain training center in terms of enhancing their brain training. abilities . The participants age range is 11-14 Our sample is approximately 88 students. The students will be provided to access the environment and use it . Moreover, their scores will be recorded for analyzing their progress while they use the environment.

3. Virtual Environment

Brain Training land is based on an educational play guard with some relaxation and fun sides. In our land, we have 4 buildings based on educational game in attention, speed, memory and problem solving category. These buildings are built in 4 different colors – green, yellow, red and white. These buildings are designed with different indoor objects, games, slides and videos according to its theme.

When a visitor first land in our place, s/he will see a puzzle piece colored with the same color of buildings. The puzzle pieces are placed in parallel way with buildings colors so user can easily find which way is going to the building they want to go.

We have added directions with texts to help users find their way easily.

Besides game buildings there is cafeteria , building for shopping, a relaxation bridge, and picnic area and seminar amphitheater.


4. Implementation and Data Collection

While implementing the case study, after literature search, we will create a set of heuristics of usability as indicated by Federoff's (2002) research and pedagogical adequacy for virtual environment and the games inside the environment. In the case study we will examine how successfully we have implemented our Brain Training Center virtual environment according to the success status of these heuristics.

The data will be gathered via observations and semi-structured interviews with participants. As a data collection tool, two interview protocols will be prepared. The first interview protocol will be used for having demographic information and expectations about virtual worlds from participants. The second one will be used for gathering data about their experiences in experiencing/playing sessions and interview questions will be developed depend on items in Sweetser and Wyeth's (2005) flow scale.

In implementation process, each participant will be interviewed before game playing after that researcher will make an orientation of the virtual environment and the games and participants will have a experiment session for 15 minutes in two weeks (sessions). Each participant will be observed during game experiment sessions. After sessions are completed, each participant will be interviewed about their experiences on virtual world and the games and asked for fill the check list of the usability heuristics and pedagogical affordance list for Brain Training Center Virtual World.

5. Data Analysis

The collected data will be analyzed with content analysis method in this research. In content analysis process, open coding methodology will be used and researcher will work with

another researcher in order to obtain a decision with 100% consensus. Also data triangulation method will be applied for demonstration of data confirmation.

In addition to the success/failure results of our virtual environment in terms of pedagogy and usability, at the end of our analysis of previous research studies, we expect to conclude that virtual worlds may be utilised for the following uses: (1) communication spaces, (2) simulation of space (spatial) and (3) experiential spaces ('acting' on the world) to ensure usability and pedagogical aspect.

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