ISSN: 2146 - 9466

www.ijtase.net

International Journal of New Trends in Arts, Sports &ScienceEducation - 2014, volume 3, issue 4

FATIH EDUCATIONAL PROJECT PREPARED IN ACCORDANCE WITH EDUCATIONAL SOFTWARE USABILITY ASSESSMENT WAS PERFORMED WITH EYE TRACKING AND RETROSPECTIVE THINK ALOUD TECHNIQUES

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ABSTRACT
In this research, enriched books usability assessment was performed with eye tracking and retrospective think aloud techniques. The research is done in the Human-Computer Interaction Laboratory that resides in Computer Education and Instructional Technologies department of Marmara University. Data recording and analysis were obtained from the Human-Computer Interaction Laboratory hardware and software tools. As a result of this study, 6'th grade social studies student course book, prepared in the format of a enriched book are evaluated in terms of usability, enriched books effective, efficient and user satisfaction recommendations are presented to provide access to quality attributes.
Keywords: Fatih Educational Project, E-book, Learning Objects, Usability, Eye Tracking, Think Aloud

INTRODUCTION

Many definitions relevantto the usability were made until today. One of the these definitions is revealed by International Organization for Standardization (ISO, 1997) in the manner that a product or system are evaluated with regards to efficiency, effectiveness and satisfaction.

To be minimized the deficiencies of general methods applied to usability studies until today and to be achieved the more useful objective data, the different techniques were used. Goldberg and Kotval (1999) underlined in their study that the important data as well as more efficient results about the strategies used by users can be achieved. Tonbuloğlu (2010), in support of this view, indicated that including eye-tracking method in the usability studies will positively increase the validity and reliability of the results to be obtained.

Although being fulfilling the task of evaluating interface the data such as how much time spent by users, where they circulated often the mouse, their mimics that they perform which action on which page, where they read are accessed in the traditional usability tests (Pernice ve Nielsen, 2009), it is indicated that eye tracking techniques for obtaining objective and quantitative data provided to users important data in finding objects which they overlooked, are forced, distracted (Akgün, 2010) and will add identifying dimension to usabilityevaluations (Duchowski, 2002; Namahn, 2001).

There are different views about the sufficiency of the number of participants in the usability tests. While Chisman, Diller and Wallridge (1999) hold that 8 participants are sufficient, Dickstein and Mills (2000) argue that 8 to 12 participants are sufficient in the usability tests. Nielsen (2004) examined the relationship between the problems identified at the interface and the number of participants in the usability

tests. As a result of the review, he obtained a result that it allows to determine the problems at the rate of 100% of 15 participants, 90 % of 8 participants and 80 % of 5 participants. Head (1999) focused on the number of the participants and the duration of the tasks given to the participants and indicated that maximum 3 to 5 participants are sufficient for the usability tests , 4 to 5 minutes for every task and maximum one hour for every usability test.

A new and different teaching-learning environment occurring with the changes in the field of Education – Training must bring along a new understanding of the teaching-learning. In this context, it is revealed the needs about whether learning objects prepared in accordance with Fatih Education Project are sufficient in terms of usability such as learnability, effectiveness, efficiency, satisfaction and compliance with the target audience showed up. Currently, there is noadequate study about that these learning objects which prepared and continue to prepare have examined in terms of usability. In this study, carrying out an evaluation of learning objects in the sixth grade social studies textbook prepared in z-book in terms of usability, recommendations are given for accessing learning objects to the qualifications in effective, efficient quality which will provide user's satisfaction.It is thought that this case study has the feature guiding to the new learning objects which will be developed in this area.

METHOD

The research model was determined as a case study.Case study is an empirical research method examining the current phenomenon within the limits of their own life and aiming to reach a conclusion by providing a multi-faceted, systematic and in-depth investigation of situations (Yin, 1984, p. 23; Transmitting: Yıldırım, Şimşek, 2005).During the data collection process, an important point to be considered in the case studies should be benefited more than one type and source of data as possible (Yin, 1984; Transmitting: Yıldırım, Şimşek, 2005, p. 198). In this study, two different data collection methods, document analysis and participant observation, were used together.

Research Problem

Within this research, the sixth grade social studies textbook prepared in z-book format has been evaluated in terms of usability. There are some tools for the use of z-book. These consist of Bracket, Pencil, Drawing, Turkish Language Instituion (TLI) dictionary, Save, Print, Settings, and Games tools. Moreover, interactive lesson descriptions, voiced and two-dimensional animations, educational concept games, learning objects, visuals joints and hypertext links are availablefor students. The tasks for the students were prepared by the researcher. By preparing tasks, expert and teacher's views have been consulted. A preliminary study was conducted for transferring the prepared tasks in a language understood by the students. In this research the three tasks were examined. The tasks were determined such as "opening a portion of the contents, finding the meaning of the word 'hypothesis', changing the page transition effects.

Data Collection Procedure

Inthisstudy, two different qualitative data collection methods; Document Analysis and Participant Observation, were used together. The eye tracking records used in the study are qualified as documents. As to participant observation method was used to obtain thinking a loud for the past data of the participants. In the thinking aloud for the past method, review after task and collaborative evaluation methods were used together.

Computerskillsquestionnairewasusedtoobtaindataabouttheparticipants' computerusageroutine in theirdailylives. Theparticipantsusedtheobservation form in theobserverroomtonotetheparticipants'

behaviors while they are completing the given task. Finally, the satisfaction questionnaire was used to collect data about whether they were satisfied with the practice.

Data Analysis

Therecordsshowingtheeyeandmousemovementswererecordedwiththe Experiment Center 2.4 software. Thedataobtainedwiththe program Gaze 2.4 wereanalyzed. Withthe program Be Gaze 2.4 theparticipant'svalues ; totalfixationcount (fixation), eyefocusingcount in thegriddedarea of interest, overviewsequence, eyedwell time , total heatmap, eyescanpathwereinvestigated.

FINDINGS AND CONCLUSION

In this part, there are the findings and the analysis of data related to 6th grade of elementary school student's textbook in social studies, which is a z-book. When z-book is examined, the participants showed successful performance in carrying out the tasks. In addition the some unfitcases were found. The table showing that the participants focus on the whole was given below.

Tablo 1: Total FixationCount

	1	2	3	4	5	6	7	8	9	10
Total Time	1,1	,49	,44	1	,16	1,05	,5	,23	,5	,46
Number of Focusing	721	008	408	822	902	278	384	092	995	251
Number of RapidEyeMovement	944	181	430	985	921	616	528	187	373	332
Number of Blinks	31	0	1	9	2	06	7	4	2	7

From the data in Table 1, non-parametric Spearman Rho's correlation analysis was applied. On the correlation between participant's number of focusing and total time ($p<.05$) were not significantly related. It will not provide accurate results that the reason why the number of focus is big or small only depends on the elapsed time. It reduces the number of focus that the participants do not have much difficulty in performing the tasks. It is thought that level of attention in the moment participants perform the tasks is a factor that may affect the number of focus as well as the degree of difficulty of the task. When the data about the correlation between total time and the number of blink was analyzed, it is found that there is a high level positive correlation (0.636) at .05 level of significance. By performing tasks, the small number of focusing on a task that has a low degree of difficulty increase the number of participant's blink. Moreover, it is thought that the participant's attention level, excitement level and personal habits during performing task affect the number of blink.

Within this research, participant's behaviours were examined in relation to the tasks. Accordingly,
Participant 1 eyetracking data fromthefirst moment;


Figure1: HeatMap

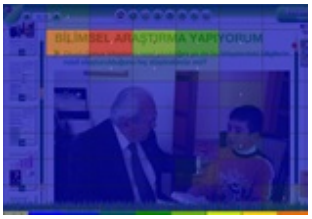
Figure2: Dwell Time


Figure3: Sequence

Participant 1 eyetrackingdata at the time of inspection;


Figure4: HeatMap


Figure5: Dwell Time


Figure6:Sequence

Participant 2 eyetrackingdatafromthefirst moment;


Figure7: HeatMap

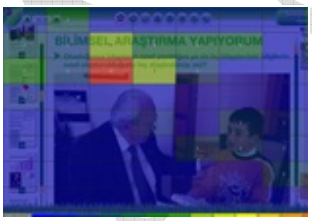
Figure8: Dwell Time

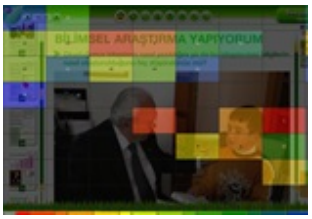
Figure9:Sequence

Participant 2 eyetrackingdata at the time of inspection;

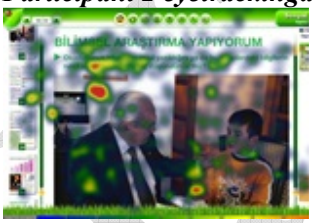
Figure10: HeatMap


Figure11: Dwell Time


Figure12:Sequence

Participant 3 eyetrackingdatafromthefirst moment;

ISSN: 2146 - 9466
www.ijtase.net
International Journal of New Trends in Arts, Sports &ScienceEducation - 2014, volume 3, issue 4

Figure13: HeatMap

Figure14: Dwell Time

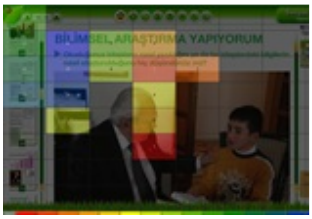

Figure15:Sequence

Participant 3 eyetrackingdata at the time of inspection;

Figure16: HeatMap

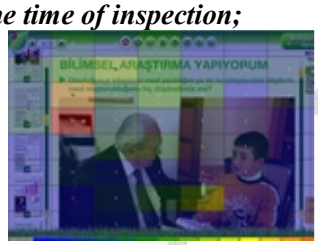

Figure17: Dwell Time

Figure18:Sequence

Participant 4 eyetrackingdatafromthefirst moment;

Figure19: HeatMap

Figure20: Dwell Time

Figure21:Sequence

Participant 4 eyetrackingdata at the time of inspection;

Figure22: HeatMap

Figure23: Dwell Time

Figure24:Sequence

Effectiveness: four of the participants of the study have not been successful in this task. Two of them taking the help and four of them without need any help successfully completed

Efficiency: this task which can be performed in the three steps as the shortest way, 10 participants could carry out in average the third step.The average time which the participants spent by performing this task were obtained in average 1 minute and 47 seconds.

Satisfaction: the task-related thoughts stated by participant: "*I never looked at this section; there could have been a little bigger and glaring icon to be noticed. I noticed that but I couldn't perceive it as a learning object, I thought it might be the video or image so I didn't care. If a similar shape like play button in YouTube was placed on the icon of learning object, I would understand that it was an activity.I*

*did not notice because it wasn't at the foreground. I did nott notice at first sight but was able to notice later. I wish that learning objects were in the upper menu... ".*Thus from the results of the content analysis, it is confirmed that the reasons behind the difficulties encountered during performing this task result from that the learning subject is not symbolically suitable and the icon size and position is less noticeable by the students within the sample.

Eye tracking: the learning objects are placed in the middle of the screen according to the topics. For every topic, there is a different learning subject and it appears symbolically only as the form of image. According to the graph obtained from heat maps (Figure 1, 4, 7, 10, 13, 16, 19, 22) the participants focused mostly on the upper leftpart ofthe screen on the topic page which they have opened as a result of the task. It showed that the participants didnot get difficulty in the taskbut they are looking for a trigger during the performance for the progression of the topic since the focusing areas in the guided domains are not dispersed(Figure 2, 5, 8, 11, 14, 17, 20, 23) and are collected on the left part and their number are small. From overview sequence in guided domains (Fig. 3, 6, 9, 12, 15, 18, 21, 24) during the task, the participants began to scan from the upper left cross of the middle part. Then, they focused on the right and bottom part of screen.

RESULTS AND SUGGESTIONS

A new and different teaching-learning environment occurring with the changes in the field of Education – Training must bring along a new understanding of the teaching-learning. In this context educational software prepared in accordance with Fatih Education Project must be at a good level in terms of learnability, effectiveness, efficiency, satisfaction and compliance with the target audience showed up.

When participants' eye movements were examined, it is found that they looked at firstly the top left of the middle section. After the centre section, that the glances slipped towards the left upper part resulted from can be determined easily the location of subject content. The striking matter is that only one participant has investigated learning objects related to the topic located in the right-middle section. 5 of other 9 participants have noticed learning object but either don't perceive exactly what happened or don't need to examine. Other 4 participants couldn't be even aware of learning objet, didn't focus on this section. The findings of this study are consistent with the research carried out by Schroeder in 1998. The result of this research, it has been found that users who navigate websites look at firstly the mid-section then at left part. From this point, it is thought that the features desired to be seen at first by the participants must be installed middle or left section of the screen

Participants' habits and previous life experiences affect in that direction their expectations by fulfilling the tasks. In this direction some of the participants wanted theplay buttonon the YouTube site in symbolic representation of learning object. While some participants emphasized that the learning object icon should be bigger. Some participants also demanded a manner that the place of learning objects embedded in the main menu rather than the right middle part of the screen.

The concept of education in our country will be changed significantly With Fatih Project. Inorder that the change is not adverselyand the deficiencies that may occur during the change are minimized, the importance of the educational materials prepared for this project is increasing much more. In this context, it is thought that preparing learning objects considering the experiences obtained from the levels of students and the technologicalerawhere they live will be more useful at the change stage.

It is suggested to be carried out more scientific research related to learning objects prepared in accordance with Fatih Education Project. In this context, the usability status of the learning objects belonging to different classes, units and topics can be examined.The usability status of learning objects belonging to the different grade levels can be analyzed.

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