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The effect of hypertexts with different lengths on reading and comprehension skills of the students

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Abstract

In this study, the effect of page lengths of hypertexts which were prepared for reading and learning in Turkish language teaching on the reading and comprehension skills of primary school fifth year students. The study which was designed with experimental method was carried out with 60 students in two sections which were randomly chosen among the fifth grades of primary schools in Kırşehir province. The students in these two sections were randomly assigned as experimental and control groups. An achievement test on reading comprehension was applied as pretest in order to determine the preparedness of both groups. After that, the students were asked to read 4 texts (two of them were narrative and two of them were informative) that were determined to be appropriate for the grade levels by means of scrolling down the page method for the experimental group and page by page method for the control group. A comprehension test that was composed of 25 comprehension questions about the assigned texts was implemented to the student in both experimental and control groups as the posttest. At the end of the study, it was found that the comprehension test scores of the students in group with longer pages were higher than the ones in group with shorter pages.

Keywords: Hypertext, reading, comprehension, scroll, paging

1. Introduction

As the technology appeared in all aspects of our age, it became a must to utilize technology in education. The increase in the amount of the knowledge that should be learned in today's world and the constant update of the learning needs because of the out-of-date knowledge made it necessary to change the perspectives of learning and learning environments (Khan, 1997; Alotaiby, 2005). Reading on the screen is becoming a must because of the rapidly developing information technologies; because, the texts are transferred to the computer pages and they are published through computers. The readers should read on the screen in order to access the new information. Thus, a new type of reading called "reading on the screen" and a new type of reader called "screen reader" emerged (Güneş, 2009).

Learning through screen reading method made it possible to design and develop learning environments that take the differences among the individuals into account and that could be modified according to the personal needs of the users (Brusilovsky, 2003). According to Karchmer (2008), the use of hypertexts and hyper documents is becoming a

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common application in primary schools as a result of the development of the Internet and the fact that many schools have Internet access.

Ministry of National Education (MEB) has also opened Information and Technology Classes at all schools beginning from the 2000s and foresee that students should learn to use computers and a generation who could access the information through the Internet should be trained. In the primary school curriculum which was modified in 2005, "using information technologies" skill took place among the basic skills that students should acquire (MEB, 2005).

MEB reconstruct the learning environments besides program modifications in order to train the individuals using technology. Related to the use of Information Technologies in our educational system, there is an objective in Information Society Strategy which was prepared by State Planning Organization in 2005 that "Information and communication technologies will be one of the basic tools of educational process and the students and teachers will be encouraged to use these technologies effectively". In the light of this objective, Ministry started practices with a project called "Increasing Opportunities and Improving Technology Movement" (FATIH) in 2010 in order to provide laptop computers, overhead projectors and the Internet infrastructure in 620.000 classrooms of all preschool period, primary and secondary schools so that equality of opportunities will be provided; the technology at schools will be improved, and Information Technologies will be used more effectively in learning-teaching process in courses (URL-1, 2011). Therefore, it could be claimed that hypertexts will take place more in educational settings in the following years.

Hypertext is defined as computer-based texts which are not linear and are composed of linked pages with hyperlinks (Naumann, Richter, Christmann and Groeben, 2008). Conklin (1987) defined hypertext as a system in which a text chunk is connected to another through references and the user directly interacts with them. Kozma (1991) defined hypertexts as non-linear texts; Gall and Hannafin (1994) defined it as a way of organizing knowledge which enables to access to text based sources meaningfully but non-linear. The common point of all these definitions is that hypertext is a non-linear text.

According to Lee and Tedder (2003) hypertext technology help the readers to control the presentation of information. Hypertexts, at the same time, are suggested as they let the students to navigate and make the reading comprehension easier; because, this autonomy explains the differences including cognitive needs of the students (Moos and Marroquin, 2010). This flexibility in terms accessing the information in hypertext and hyper environment systems presents students the opportunities to learn; because, students control their own learning by choosing the content within the light of their learning objectives (Jonassen, 1993). Thus, searching and navigating are main actions in hypertext systems that help the users to access the information (Madrid, Oostendorp and Puerta Melguizo, 2009).

The pages in computer environment on which the information is presented are designed as long pages on which the scroll bar is used up and down in order to access the information and short pages on which the information is divided into small pieces and viewed using back and forward button. Piolat, Roussey and Thunin (1997) stated that the user move from the beginning to the end of the document using scroll bar in order to view the content in environments with scroll bar, and the users could move using back and forward buttons on the pages in presentation of the texts in pages.

As the functionality of the reading process is directly related to the design of these environments (Altun, 2000), there is a need to know how screen reading texts presented to the students should be designed and with what kind of texts the most effective results are reached. In this study which was designed for this purpose, the effect of hypertext use with scrolling down the page and moving page by page on comprehension skills of primary school 5th year students in Turkish language courses was examined.

During the preparation of this study, many different studies were encountered about the texts to make the students read on the computers and the environments in which they were presented (Eyüboğlu, 2007; Dünser and Jirasko 2005; Karadeniz 2004; Kılıç and Karadeniz, 2004; Calcarterra, Antonietti, Underwood, 2004; Schwartz, Andersen, Howard, Hong, and McGee 2004; Lee and Tedder, 2003, Graff, 2003; Kim 2001; Ford and Chen, 2000; Leader and Klein 1994). However, these studies were carried out with high school or university students. In literature, the studies with primary school students (Çakmak and Altun, 2008; Riding and Grimley, 1999; Reinking,

1988) were rarely encountered. According to Eyüboğlu and Orhan (2009), although there were many studies about the design of hypertexts (the organization of the menu on the page, different types of hyperlink and menu, colors, navigation tools), one of the characteristics that was examined very rarely was the length of hyper environments or hypertexts. As this study might contribute to fill this gap in literature, this study was conducted in order to determine the effect of scrolling down the page (long pages) and moving page by page (short pages) on the reading comprehension skills of the primary school 5th year students. Within the framework of this general objective, the following questions were asked:

2. Method

This study is an experimental study which was designed according to the model with pretest-posttest control groups.

2.1. Study Group

The study group of the study was composed of 60 students in randomly chosen two sections of 5th grades at a primary school in Kırşehir province in Spring term of 2010-2011 Educational Year. The students who were present at school on the days on which the pretest and posttest were conducted participated into the study. One of the sections was determined to be the control group in which the texts with long pages were read and the other one was determined to be the experimental group in which the texts with short pages were read. There were 31 students in the experimental group. Of these, 48.4% were female students and 51.6% were male students. There were 29 students in control group and 48.3% of them were female students and 51.7% of them were male students.

2.2. The Preparation of texts

The texts were compiled from the course book of Ministry of National Education which had been delivered to the 5th year students as a course book in previous years by Turkish Board of Education and was not being used when this study was being carried out as its period for suggestion had ended so that the students had no chance to see and read the texts before. It was considered that three types of texts should take place in course books according to the 2005 Primary School Turkish Language Curriculum. These were narrative texts, informative texts and poems. The texts chosen to be read in this study were narrative and informative texts. The poems were kept outside the scope of this study. The texts determined to be read were as follows:

Narrative Texts: "Şeker Dede ve Fayların Hareketi" (Sugar Grandfather and the Movements of the Fault)

Informative Texts: "Kalbimizin Sesi ve Siz de Buluş Yapabilirsiniz" (The Voice of Our Heart and You Can Also Invent)

The determined texts were organized as scrolling down the page and moving page by page techniques by the researcher; some visuals to support and make the comprehension easier were added to the texts and they were transferred into the computer environment.

2.3. Application Procedures

The application practices for reading on the screen were carried out in the information technology classes at participants' schools. Before the application, all computers were checked and it was controlled whether they were working or not. It was determined that 16 computers were working and the applications were carried out on these computers. The application process lasted for 4 weeks. The reading on the screen activities were completed by the researcher for 2 hours for the experimental group and 2 hours for the control group on the days and hours of Information and Technology course. As the number of students in both experimental and control groups was higher than the number of computers, the students were divided into two groups; and the first group was asked to read in information technology classes in the first course hour and the second group was asked to read in the second hour.

The other group went on their courses in their own classes with their teachers. Before the application, it was also checked whether the students knew basic commands on the computers or not. As they had taken computer course beginning from the fourth year, it was observed that students had basic computer skills.

The students in the experimental group were asked to read a text for each week which was designed as moving page by page technique. After the texts were read by the students, the students were asked to answer the multiple choice questions about the text.

The same procedure was completed with the control group students using 4 texts which were designed using scrolling down the page technique in Information Technologies courses.

2.4. Measurement Tools

Pretest: A reading comprehension test which was composed of 25 questions was applied to the students in the study group after they were assigned as experimental and control groups. While constructing the reading comprehension test, 39 gains (MEB, 2005: 92-94) which were about reading comprehension of fifth years in Primary School Turkish Language Curriculum were determined. It was taken into consideration that the questions in reading comprehension test should provide these gains. At first, 40 questions were prepared. In order to balance the difficulty levels of the texts in the test, the lengths of words, sentences and paragraphs were given importance. After determining the questions, as the expert view, two Turkish language teachers and two classroom teachers were consulted for the clarity and the appropriateness for the student levels. After making the required changes in the light of the experts' views, the test was implemented to 180 students enrolled at the fifth year of primary school in Kırşehir province. Item discrimination and difficult indexes were found for each item according to the implementation results. The questions with low item discrimination and difficulty indexes were corrected; the number of questions in the measurement tool decreased to 25 and its final version was prepared. At the end of the Kuder Richardson-20 statistical operations which was made in order to investigate the internal validity of the test scores, the KR-20 reliability coefficient for the reading comprehension test that was going to be used as pretest was calculated as .83. This 25-question reading comprehension test was applied to the students in both experimental and control groups within a course hour on the same day.

Posttest: The measurement tool that was prepared as the posttest was composed of 25 questions about the reading texts. The scale was prepared as 30 questions at first and 2 Turkish language teachers and 2 classroom teachers were consulted in order to test the content validity. In the light of the views of the experts, some scale items were removed from the test, some of them were modified and the final version of the test was completed. After students read the texts, this test which was composed of reading comprehension questions about the text was applied to the students in the study group as the posttest.

Each question answered correctly in pretest and posttest was evaluated as 1 point and the wrong answers were not taken into account. Thus, the highest score that students could get in pretest and posttest was determined to be 25.

2.5. Data Analysis

In the data analysis, mean, percentage, frequency and standard deviation techniques were used. While comparing the reading comprehension scores of the students in experimental and control groups, independent samples t-test was used; and while comparing the pretest and posttest scores of the students, dependent samples t-test was used. In comparisons, significance level of 0.5 was taken into account.

3. Findings

The findings related to the reading comprehension scores of experimental and control groups were summarized in the tables below:

Table 1. The results of independent t-test for the pretests of the students in the experimental and the control groups

Groups	N	$\overline{X}$	S	Sd	t	p
Experimental	29	20,2	3,11	58	2,11	0,02
Control	31	18,1	3,73			

According to the findings in the table, there was a significant difference between the pretest scores of the experimental and control group students, which was done in order to determine the reading comprehension levels of the students, in favor of the control group (t (58) = 2,11 and p<.05). While the reading comprehension pretest score means of the experimental group were calculated as $\overline{X}$ = 20,2, the reading comprehension pretest score means of the control group were calculated as $\overline{X}$ = 18,1.

Table 2. The results of dependent t-test for the pretest-posttest scores of the experimental group students

Test	N	$\overline{X}$	S	Sd	t	p
Pre-test	29	20,2	3,11	28	2,92	0,01
Post-test	29	18,5	3,34			

There was a significant difference between the reading comprehension pretest scores of the students in the experimental group after they read on the paper and the reading comprehension posttest scores about the text they read scrolling down the page ((t (28) = 2,92 and P<0.05). While the pretest score means of the students were $\overline{X}$ = 20,2, posttest scores decreased to $\overline{X}$ = 18,5.

Table 3. The results of dependent t-test for the pretest-posttest scores of the control group students

Test	N	$\overline{X}$	S	Sd	t	p
Pre-test	31	18,09	3,73	30	,057	0,96
Post-test	31	18,12	4,14			

There was no significant difference between the reading comprehension pretest scores of the students in the control group after they read on the paper and the reading comprehension posttest scores about the text they read moving page by page (P>0.05). While the pretest score means of the students were $\overline{X}$ = 18,09, their posttest score means were calculated as $\overline{X}$ = 18,12.

Independent samples t-test was applied in order to determine whether there was a significant difference between the posttest scores of the students in experimental and control groups. As there was significant difference between the pretest scores of the students in both groups, the difference between the pretest and posttest scores of the students was calculated and t-test analysis was made using these scores in order to remove the difference. The results of the analysis were presented in Table 4.

Table 4. The results of independent t-test for the posttests of the students in the experimental and the control groups

Groups	N	$\overline{X}$ (Mean Difference)	S	Sd	t	p
Experimental	29	1,7	3,18	58	-2,14	0,03
Control	31	,03	3,17			

4. Conclusion and Discussion

A significant difference was found between the reading comprehension pretest scores of the students in the experimental group after they read on the paper and the reading comprehension posttest scores about the text they read scrolling down the page.

No significant difference was found between the reading comprehension pretest scores of the students in the control group after they read on the paper and the reading comprehension posttest scores about the text they read moving page by page. There were some studies in literature stating that there was no superiority of reading on the screen to reading on the paper. Within this context, Reiking (1988) found in his study that he carried out with 33 students that reading texts on the computer screen which were presented linearly did not cause any superiority to the reading on the printed text in terms of remembering.

In this study, it was examined that whether long page designs with scrolling down the page and short hypertexts with moving page by page had any effects on reading comprehension skills of the students or not; and it was found that there was a significant difference between the posttest scores of the experimental and control group students in favor of the experimental group students who took place in group with long pages. Eyüpoğlu (2007), Bernards, Baker and Fernandez (2002) and Nielsen (1997) found that the readers and students preferred the texts in long pages more. Baker (2003), again, found in her study in which she examined the effects of scrolling down the page and moving page by page on reading comprehension that scrolling down the page had positive contribution rather than moving page by page. Roussey and Thunin (1998) found out that dividing the information into parts and presenting them in a way of moving page by page increased the performance (cited in Bernard, Baker and Fernandez, 2002). The findings of the aforementioned studies overlap with the findings of this study.

In another study, it was found that moving page by page was preferred by novice users, however, this did not cause any significant difference in completing the tasks or searching (Schwartz, Andersen, Howard, Hong, and McGee, 2004). In other studies, it was found that these two techniques had no effect on user performance (Mills and Weldon, (1986); cited in Bernard, Baker and Fernandez, 2002). Bernard, Baker, Chapparo and Fernandez (2004), however, observed in short and long page designs that in short page designs in which there were transitions between the pages the participants could complete reading later; however, they revealed that the perception of effective searching was higher in short pages. When the participants were asked to make a choice between the designs, the long pages with scroll down bars were preferred less. Dillon, Richardson and McKnight (1990) and Piolat, Roussey and Thunin (1997) asked their participants to write summaries after reading the text in designs of short and long pages instead of giving a remembering test; and no significant difference was found between the designs with short and long pages at the end of the evaluations. The findings of these studies did not support the findings of this study.

5. Recommendations

The similar studies with this study, in which the reading comprehension levels of primary school 5th year students for scrolling down the page and moving page by page were investigated, could be carried out in different regions, at different schools, at different grades and for different age groups and the results for how the page lengths and designs of the reading screen and learning materials should be designed for primary school students could be generated.

In this study, the students were presented non-linear hypertext samples in hierarchical structure. Thus, the findings were limited with this type of texts. Therefore, this study could be carried out with different types of hypertexts (linear and complex hypertexts).

The effect of short term memory capacity on reading comprehension while scrolling down the page and moving page by page could be examined.

The effect of using different navigation tools in hypertext environment on reading comprehension skills and disappearance perception of the students in primary schools could be examined.

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