



The effect of forming a score-based competitive system in a cyber-drilling atmosphere for learning and motivation

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Abstract

This research focuses on to carry out a structure, in which the desire of having a high score and seeing the name in the top list is used in web-based drills and helps students to be more willing in test solving. The purpose of this study is to determine the effects of web-based drills on motivation and learning in a competitive atmosphere. Furthermore, the study also attempts to determine if the students' levels and frequency of using a computer have an effect on the test scores in a web based system.

Over a period of two week application students logged in the system using their own passwords and solve questions whenever they wanted. The names and photographs of the students who achieved the best scores were declared on the school's website.

In the study, an experimental design has been applied. The data were collected through the database in the web-based drill, pre and post survey to determine the level of and the reasons for students' use of the website and history common exam results. According to the findings of the research, the website that has the competitive atmosphere has a positive effect on students' achievement in their lessons. The application led to a change in students' aim to visit the website and the frequency of their visits.

Keywords: Competitive, Games, Score, Motivation, Web based drills

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Introduction

Changing technology within today's conditions causes the change of individual's sense and functions, perception and thinking habits and learning techniques. As a result of the revolutionary development in contemporary science and technology, the use of the new approaches in the learning-teaching process obligates forming a structure that the professional and private field educators aim at students.

Johnson and Johnson (1974) talk about three types of objective structures in class. The structures are based on cooperation, competition and individualized objective structures. Many studies have been conducted to find if the learning techniques used in these different structures have an effect on learning levels. The research indicates that cooperative learning has important effects on many perceptual learning products and processes such as success, memorizing, transferring, top-level perception, friendship relations, the education of handicapped in normal groups, self-esteem ,attitude, anxiety and controlling (Avsar & Alkıs, 2007; Attle & Baker, 2007). At the same time, it is believed that competition increases the motivation for work, game and education and it is also expressed that competition excites the activities (Yu, Chang, Liu, & Chan, 2002). Bonaparte (1990) studied the effects of learning methods based on competition and cooperative learning, according to mathematical success and self-esteem. The research consisted of 240 students attending grade two in primary school. In the end, Bonaparte observed that there were significant differences in mathematical success and self esteem between the classes in which cooperative learning is used, and the classes in which learning methods based on competition are used. According to Kohn's experimental research, when competition is compared with cooperation, it is determined that less creativity results with less performance decreases satisfaction (Kohn, 1990). In the study that has been conducted over 192 5th grade students in Taiwan about the effect of cooperation and competition on successfulness, it has been found out that the perceptions and behaviors of the students in the experimental group in which competitions were held among the groups, were damaged (Yu, 2001). However, Lam, Yim, Law and Cheung (2004) stated that competition has a positive effect on the aim of the performance and the motivation on learning in class. The use of extrinsic rewards, through carefully planned competitive goals, is an effective tool for extrinsic motivation until intrinsic motivators can operate (Rimm, 1986). Triplett (1989) stated that a bicycle racer performs

better when he conducts his assignment with others or against others compared to the timing he achieves on his own.

The development of technology and communication not only changed traditional learning concepts but also provided the verification of learning, independent from time and place. Web-based educational software, which provides motivation to learners, makes contributions to meaningful learning as well (Hung-Pin, 2008; İçten, 2006; Yenilmez, Cebeci, & Koçak, 2006). Scheidet's (2003) study results indicated a positive trend towards increasing the percentage of students achieving mastery level within a class totally infused with Web-enabled computer technology. Data from student and parent surveys, interviews, and classroom observation mutually supported the conclusion that there was a positive effect on student interest and motivation.

According to Alessi and Trollip (2001), in web based educational software, exercises and repetition have an important role in the reinforcement of learning. At the same time, learners spend time and effort to learn something when they are motivated, and they have the will to learn and to use web based educational software in the future (Malone, 1980). One of the eight methodologies of interactive multimedia learning is drill. The term drill is used for practice, which repeats the material to be learned until it is mastered (Alessi & Trollip, p,10). Persichitte (1995) identifies instructional factors which should be used when evaluating drills. She divides these factors into four subgroups: presentation of information, guiding the student, practice by the student and sense student learning. Luik's (2007) study results indicated that most characteristics related to feedback, presentation of information and questions are the most critical evaluating quality of drills and in designing such educational software.

In exercises and tests, the motivation of students is low because exercise means repetition. In many exercises, the degree of productivity is very low. This is a sufficient reason for students to find exercises boring. To solve these problems, some techniques aimed at increasing motivation can be used. In these techniques, different types of competition, which increases the motivation of students, can be used (Alessi & Trollip, 2001).

The competition can be (a) among students, (b) with the self, (c) against time and (d) against the computer. The competition among students can be performed in two ways. The first one is doing exercises synchronously. The second one is the computerized comparison of the individual success of students. The competition with the self means comparison of the

student's previous success with their current success through drills and tests. Comparison of students' success with their friends' success can be a way to increase the motivation on web-based drills and tests. The competition against time is used to see the change of the student's success after some period of time. Here, time is determined according to students' previous successes (Alessi & Trollip, 2001; Allen, Nguyen & Hsieh, 2006).

According to Yee (2007), many components provide motivation in online games, with the most important one being the desire for success. In this study, it was determined that in online games there is no difference in motivation between girls and boys.

On the other hand, in Tezel's (1999) study, it was emphasized that competitive personality has no effect on academic success. According to the results of Kula and Erdem's (2005) study, it was observed that motivation is useful for learning, but does not involve a quantitative effort. In Kula and Erdem's research findings, the components in games that motivate students are to win bonuses, to rack up points, to gather clues, get scores, get rid of numbers, perform a transaction, to improve intelligence and music, colour and appearance are also used in motivation.

According to Burke and Weir (as cited in Tezel, 1999), competitive people like to be strong and they like to be remembered. It's very important for them to be respected. The functionality of a game's structural components reveals motivating components, educational components and periods (Prensky, 2001). According to Malone (1980), the necessity of motivation in an atmosphere which makes learning effective with interior motivation components are imagination, curiosity and challenge.

Deriving from all of this information, the students' success may be enhanced by increasing their motivation to exercise through drill software prepared in web environment in a competitive atmosphere. This method can serve as a model for utilization and integration of computer technologies in the class.

The Aim of the Study

The aim of the study is to determine the effects of web-based educational drills in a competitive atmosphere of motivation and learning. In the present research, the following hypothesis are tested.

1. There is a significant positive correlation between the academic success in the history course for the students who are in competition and the time spent by them at the site, the scores they make and the number of tests they solve.
2. The application period changes a student's desire to visit the school's website.
3. The application period increases the frequency of a student's visit to the school's website.
4. When computer use experiences are compared, there is a significant difference between students' test scores.
5. When the frequency of the daily use of the computer is compared, there is a significant difference between the students' test scores.

Methodology

In the study, the post-test experimental design has been employed in determination of the correlation between the academic success in the history course for the students who are in competition and the time spent by them at the site, the scores they make and the number of tests they solve (1st hypothesis). A pre-test post-test experimental design was employed in determination of how the application would affect the students' purpose and frequency of visiting the website and (2nd and 3rd hypothesis). Again, post-test experimental model has been employed in determination of the correlation between the students' web test scores and their experience and daily frequency of using computers (4th and 5th hypothesis).

The research group consisted of TEB Ataşehir High School Grade 2 students in the 2007–2008 academic and educational year. The web-based drill application at the school's website that enables the students to take exercises within the scope of history course has been continuing over 2 years and this application that exists within the scope of this study has been modified in a way that creates a competitive environment. The number of students who applied for web-based application was 157. The research consists of only volunteer students and the students have been informed (the top five and the last five student list will be published in the web site). The application has been verified within the scope of the history course. The performance they show in the web-based drill application has not had any affect on their passing grade for the course.

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In the two-week application, students were able to log in to the application named “e-öğrenci” (see Figure 1-a) on www.atasehirlisesi.k12.tr using their own passwords and solve questions whenever they wanted (see Figure 1-b).

By developing this application, a “Top 5” students list was placed on the home page of the school (see Figure 2-a). The list consisted of the names and photos of students who gave the most correct answers, as well as some additional information including when they solved the questions, how much time he used, and his scores on the website. There was also a “Bottom 5” list to create a negative motivation for students and make them solve more questions. Also for motivation purposes, the list of the students that last solved the tests was also added to the home page. Therefore, the students could look at the home page to the “New Solvers” part to learn information such as “the names of the students who had recently used the application and solved the questions, how long ago they solved the questions, how many true answers they had given” to follow the competitors in this competitive system (see Figure 2-b).



Figure 1a. Screen Capture of Web Based Application: Homepage

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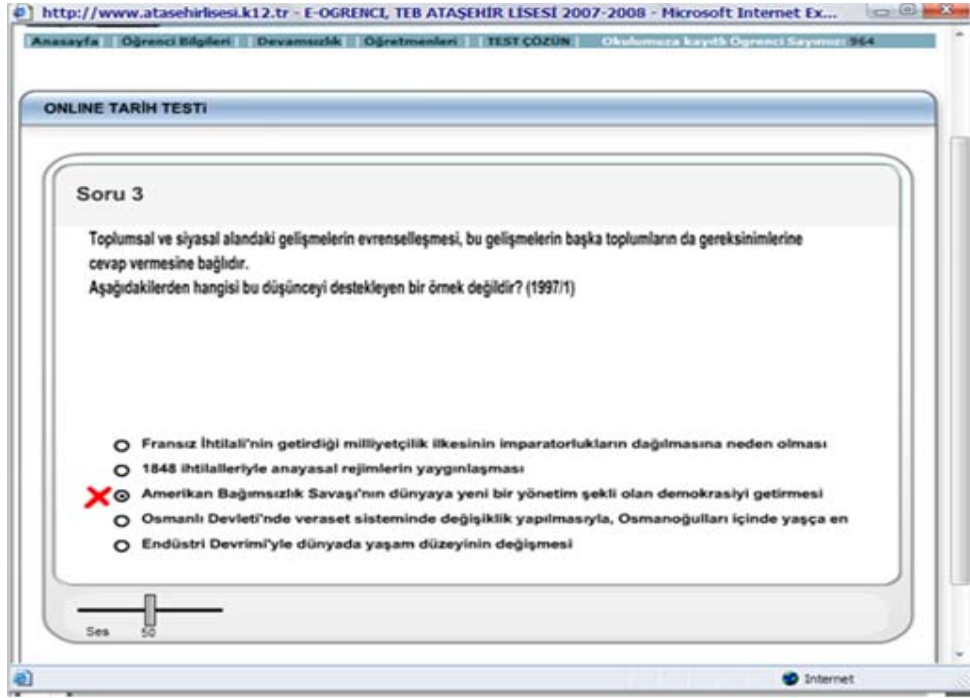


Figure 1b. Screen Capture of Web Based Application: Drills page



Figure 2a. Screen capture of School Web Site: Top 5 list

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The screenshot shows a web page for the Ministry of National Education (T.C. Milli Eğitim Bakanlığı) and T. Emlak Bankası Ataşehir Lisesi. The page is titled 'LİSE 2 TARİH DERSİ E-TEST UYGULAMASINDA'. The main heading is 'Yeni Çözenler' (New Solvers). The page lists the top students who solved the most tests. The list includes student names, their class (10-TA), and their performance: '13 Saat, 47 Dakika önce 3 soruda 1 doğru cevap yaptı.'

Öğrenci Adı	Sınıf	Süre	Sorular	Doğru Cevaplar
ONUR DENERİ	10-TA	13 Saat, 47 Dakika önce	3 soruda	1 doğru cevap yaptı.
ONUR DENERİ	10-TA	13 Saat, 47 Dakika önce	3 soruda	1 doğru cevap yaptı.
ONUR DENERİ	10-TA	13 Saat, 48 Dakika önce	3 soruda	1 doğru cevap yaptı.
ONUR DENERİ	10-TA	13 Saat, 48 Dakika önce	3 soruda	2 doğru cevap yaptı.
ONUR DENERİ	10-TA	13 Saat, 48 Dakika önce	3 soruda	2 doğru cevap yaptı.
ONUR DENERİ	10-TA	13 Saat, 50 Dakika önce	10 soruda	3 doğru cevap yaptı.
VEYSEL GÖZÜBÜYÜK	10-TA	13 Saat, 7 Dakika önce	30 soruda	11 doğru cevap yaptı.
MERVE ALTINŞIK	10-TA	13 Saat, 9 Dakika önce	20 soruda	5 doğru cevap yaptı.

Figure 2b. Screen capture of School Web Site: Last solved test list

The results of the survey, which was prepared by the researchers, was used to determine the level of and the reasons for students' use of the website. The survey was carried out twice, before and after the application. With the survey, students' demographic features are determined and the answers to the questions such as: "how long they have used computers", "for what reasons they use computers", "for what reasons and how often they use the school's web site" are searched.

The developed material for the research is an application, which supplies a web based drill. This application was developed by using the web programming language ASP and database language of SQL technologies. The software is used to allow the student to solve questions on the web through the school's website and to register each student. Through the database in the software, the number of the solved tests, the number of true-false answers and the time spent on test solving are registered. The scores attained by the students in the web-based drill has been calculated by taking into account the number of questions they have answered correctly and the time they spent on the test, thus it has been determined within the perspective of correctly answering the most questions at the shortest time.

Findings

Hypothesis 1: There is a significant positive correlation between the academic success in the history course for the students who are in competition and the time spent by them at the site, the scores they make and the number of tests they solve.

Bivariate Pearson's correlation coefficients were run to determine the degree of relationships among the academic success in history course, web test score, number of solved test and time spent on the web site. According to the results that are given in Table 1 academic success in history course significantly correlates with web test score, number of

Table 1. Pearson correlations among the academic success in history course, web test score, number of solved test and time spent on the web site.

	Web test score	History Common Exam Result	Number of Solved Test	Time spent on the web site
Web test score	1.000	0.55**	0.47**	0.39**
History Common Exam Result	-	1.000	0.20*	0.30**
Number of Solved Test	-	-	1.000	0.20*
Time spend on the web site				1.000

solved test and time spent on the web site at the .05 level ($r=0.55$; $p<0.01$; $r=0.20$; $p<0.05$; $r=0.30$; $p<0.01$). Also, a significant correlation was observed between number of solved test and web test score ($r=0.47$; $p<0.01$). This finding reveals that correlation between academic success in history course and web test score is strong while the others are weak.

Hypothesis 2: The application process changes the desire of students to visit to the school's website.

The analysis results that were verified with the pre-test and post-test results of the students who participated in the Computer Use survey are shown in Table 2. When the table is studied, it can be observed that the percentage of the students who use school's website to solve questions increased from 7.6 to 63.7. The conclusion is that students primarily visit the website to solve the tests.

Table 2. The Comparison Results of the Aim of the Visit to the Website

Why do you visit the school's website?	Pre Test		Post Test	
	Person	Percentage	Person	Percentage
I don't visit	27	17.2	12	7.6
To look at the the announcements	38	24.2	15	9.6
To look at the activities	33	21.0	13	8.3
To look at the school success	14	8.9	2	1.3
To look at the class information	25	15.9	12	7.6
To look at the teachers of the classes	8	5.1	3	1.9
To solve tests	12	7.6	100	*63.7
Total	157	100.0	157	100.0

Hypothesis 3: The application period increases the students' visit to the school's website.

According to the analysis results that were verified with the pre- and post-test results of the students who participated in computer use survey are shown in Table 3. The frequency of students' visits shows a significant difference. It has been observed that the number of the visitors who visited once a week decrease and the visitors who visited a few times a week increased. The number of the people who did not visit decreased from 12.7% to 2.5%.

Table 3. The Comparison Results of the Frequency of Visits to the Website

How often do you visit the school's website?	Pre Test		Post Test	
	Person	Percentage	Person	Percentage
I don't visit	20	12.7	4	*2.5
Once a day	11	7.0	17	10.8
A few times a day	1	.6	20	*12.7
Once a week	45	28.7	40	25.5
A few times a week	23	14.6	44	*28.0
A few times a month	57	36.3	32	*20.4
Total	157	100.0	157	100.0

Hypothesis 4: When the using computer experiences are compared, there is a significant difference between the students' test scores.

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The results of the descriptive statistics carried out for the students computer using experience and web test scores have been given in table 4. According to the information of “how long the students have used computers” that is taken from the using computer survey, Anova Tukey Test is used to make a group comparison of the test scores and the results of the tests are given in table 5. This comparison showed that there is a significant difference between the groups ($F_{(2-154)}=4.12, p < .05$).

Table 4. Descriptive Statistics Results for Using Computer Experiences and Web test Score

Computer Experiences	f(%)	Mean value of Web Test Score	Std. Deviation	Std. Error
0-3	55(35)	42.88	19.35	2.61
3-5	51(32.5)	49.2	23.75	3.33
5>	51(32.5)	36.7	18.95	1.69
Total	157(100)	42.9	21.24	1.70

Table 5. The Comparison of Students’ Test Scores Using Computer Experiences and Implementing the Anova Tukey HSD Test

Web Test Score	Sum Of Squares	df	Mean Square	f	p
Between Groups	4003.81	2	2001.90	4.64	.011
Within Groups	66388.68	154	431.10		
Total	70392.48	156			

When the results of the Scheffé test given in Table 6 is analyzed, using the web test scores, there is a significant difference between the students who have 3–5 years’ experience on using computers and the students who have more than 5 years’ experience. The difference is in favor of the users that have 5 years or more experience using a computer.

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Table 6. The Comparison of Students' Test Scores Using Computer Experiences and Implementing the Anova Scheffe Test

Computer Experiences	Computer Experiences	Square Difference	Std. Error	p
0-3	3-5	-6.40	4.04	.26
	5>	6.13	4.04	.28
3-5	0-3	6.40	4.04	.26
	5>	12.53*	4.11	.01
5>	0-3	-6.13	4.04	.28
	3-5	-12.53*	4.11	.01

*p<.05

Hypothesis 5: There is a significant difference between the students' test scores when the daily frequency of using computer is compared

The results of the descriptive statistics carried out for the frequency of daily using the computer for the students and web test scores have been given in table 7.

Table 7. Descriptive Statistics Results for Frequency of Daily Use of Computer Using and Web test Score

Frequency of Daily Use of Computer Using	f(%)	Mean value of Web Test Score	Std. Deviation	Std. Error
0-3	90(57)	43.8	18.92	1.99
3-5	36(23)	39.8	25.82	4.30
5>	31(20)	44.3	22.16	3.98
Total	157(100)	42.9	21.24	1.70

The frequency of the students' daily use of the computer in the direction of pre-test–last-test comparison of test scores that is determined from the computer use survey is compared by using the Anova Tukey test, and the results are given in Table 8. This comparison showed that there is a no significant difference between the groups ($F_{(2-154)}=4.12, p> .05$).

Table 8.The Comparison of the Students Test Scores and the Frequency of Daily Use of Computers Using the Anova Tukey HSD Test

Web Test Score	Sum Of	df	Mean	f	P
	Squares		Squares		
Between Groups	457.95	2	228.97	.50	.60
Within Groups	69934.54	154	454.12		
Total	70392.48	156			

Conclusion

This research attempted to determine the effects of web-based drills on motivation and learning in a competitive atmosphere. Furthermore, the study also attempted to determine if the students' use of computer levels and frequency have an effect on the test scores in web-based system. The results obtained from the findings are as follows.

There is a positive, significant relationship between students' scores (in a competitive atmosphere) on the website and their academic success in the history course. This result is in agreement with Liu, Li and Santhanam's (2007) results that found the desire for playing games is due to getting a high score as well as the desire for success.

According to the results of the study, a positive correlation has been observed between the academic success in the history course for the students and both the time spent by them at the site and the number of tests they solve, however at a lower level of significance. This situation may have arisen due to leaving up to the student the number of questions that will take place in the test is desired to be taken. Because, by allowing to students to solve as many questions as they wish in one test, despite the questions and answers randomly appearing at each trial, the students' desire to attain high scores through learning the correct answers by short time repetitions may have lead to a low number of solved questions in spite of the high volume of taken tests. In his case, there is benefit in evaluating the correlation between by the number of total questions solved by the students and their success in the history course through conducting new studies. The time spent by the students at the website may also account for learning about their friends' and their own scores, instead of solely solving tests. Even though 63% of the students have stated in the posttest application that they enter the website for solving tests, it would be beneficial to record the time spent by the

students only for solving tests, through modifications of the website, and then analyze this situation.

The positive effect that has been observed on academic success is in contradiction with Kula and Erdem's (2005) results that suggested motivation is useful for learning, but does not have a quantitative effect. In this contradiction, the concept of the exercise used in this application is an important factor. It can be interpreted to be more productive, especially in logical math operations in which paper and pen are not used, and in the texts consisting primarily of oral knowledge. In these kinds of applications, use of computers and paper-pen at the same time leads to a longer period of time for question solving and feedback. This is an important effect, leading to a decrease in motivation. It will be worthwhile to investigate this situation through new studies consisting of different applications.

According to the research findings, it has been observed that creation of a competitive atmosphere increases the number of students participating in the application and their motivation; they also solve questions again and again. At the end of the analyses research, the number of students who did not visit the website decreased from 12.7% to 2.5%. Just as in the survey result that is verified before and after the application, it has been observed that the aim of the students' visits to the school's website changed upon solving tests (increase from 7.3% to 63.7%). This result shows that students can compare their success with that of their friends'. This can be a way to increase the motivation in web-based drills and tests. The application has also affected the frequency of students' visits to the school's website and caused an increase in the number of visits. These results show coherence with the results of other studies (Alessi & Trollip, 2001; Allen, Nguyen, & Hsieh, 2006; Horton, 2000; Malone, 1980; Yenilmez, Cebeci, & Koçak, 2006) which show this application positively affects student's motivation.

According to the research results, when the use of computer experiences are compared, there is a significant difference between the students' test scores, but there is no significant difference when the frequency of daily use of the computer is compared. The explanation may be that when computer use increases in a system in which the students compete with time, abilities that are improved due to the computer games in areas such as focus on the screen, perception and the attention levels regarding the questions on the screen, and the control of the mouse which connected to the reflex are affective on the application. It may be

that these abilities, which are expected to be high in the test structures in which there is no chance to change the marked answers, increases due to the experience of using computer.

Observation of the frequency of daily computer use shows no significant difference between the students' test scores. Perhaps this is because the students use the computer in their free time to communicate, and the test scores are not related to the frequency of daily computer usage, but more likely related to computer use and experience. In the same way, there is a parallelism between the answers in computer attitude skills and this situation.

The results of the study emphasize that, in web based educational applications consisting of e-transformation and distant education used in the public and private sectors in recent years. Findings of this study and the similar studies show us a competitive atmosphere that is created by games and competitions can be used for the aim of motivation and increasing participation.

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