

## Laboratory Control System's Effects on Student Achievement and Attitudes<sup>1</sup>

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### Abstract

*Problem Statement:* The current study investigates whether the learning environment designed based on the laboratory control system affects the academic achievement, the attitude toward the learning-teaching process and the retention of the students in computer education.

*Purpose of Study:* The study aims to identify the laboratory control system based learning environment's effects on students' academic success on computer education, the related attitudes in the learning-teaching process and the permanence of the information that is learned.

*Methods:* The study was conducted with 66 10th grade students attending a state high school in Kayseri in the 2010-2011 school year. Out of 66 students, 33 were assigned to an experimental group and 33 were assigned to a control group. While the control group students were educated primarily based on lecturing and presentations reflected through a projector, the experimental group students were trained in an active learning environment that was designed based on the laboratory control system. Both of the groups were administered the "Scale of Attitudes towards Learning and Teaching Process" and the "Achievement Test" as a pretest and posttest. The Achievement test was applied again after five weeks to find out if the learning has permanence.

*Findings and Results:* Findings show that the experiment/test group educated in an active learning environment created with the Laboratory Control System was more successful than the control group educated in a

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conventional environment. Also, there was a significant difference in permanence points of the experiment/test and control group. These results show that learning environments designed according to the Laboratory Control System are more effective in computer education. In addition, the experiment group students' attitudes about the learning process were more positive than control group students' attitudes.

*Recommendations:* In light of these results, creating an active learning environment using the Laboratory Control System is recommended. In this environment classes should be involved in the learning by giving students active missions like leadership. This can increase the students' success, the permanence of the lessons learned and also improve the attitudes of the students toward the lesson.

*Keywords:* Laboratory Control System, NetSupport school, active learning environment, student interaction, computer education.

### **Introduction**

It is of great importance to educate individuals so that they can use technology, have access to information, produce new information from the information obtained and market this information. Some required and elective courses are offered in formal education for students to acquire information-related skills. One of these courses is Information and Communications Technologies (ICT) offered in elementary and secondary schools. The ICT course is required in Vocational and Technical high schools and is an elective in general high schools. In schools where the course is elective, computer laboratory facilities and application opportunities comprise an important factor affecting the success of the curriculum.

In vocational and technical high schools, the computer laboratory facilities are better than those of the general high schools. In general high schools, one computer can be shared by two or three students, reducing the efficiency of teaching. Package programs such as Word, Excel, etc. are comprehensive programs requiring students to work individually and then discuss what they have learned with their peers. In this regard, the active learning environment designed for the experimental group allows students to be involved in the process. because of this, they can be more successful and one class hour can be spent more effectively.

In instruction, it is better for students to see the teacher's screen using a projector or TV screen. By looking at the teacher's screen, students can better see the processes or the internet pages where information can be obtained about these processes. Projectors or screens can also be used to show students' work. This allows students to evaluate themselves based on their peers' work (Vural, 2004: 257). The more crowded classes are, the more difficult it becomes for students to see the screen. In this regard, ICT applications may offer some help.

As noted by Sulak (2007), teachers think that the main problems encountered in ICT courses are inadequate class hours and course content that is too comprehensive for the time allotted, a shortage of computers in laboratories, deficiencies in the infrastructure and the low number of projectors available. In this regard, necessary precautions should be taken to make better use of the limited resources and analyze the learning processes and related variables.

Cüre and Özdener (2008) found a high level positive correlation between teachers' success of ICT applications and attitudes toward ICT. Moreover, the teachers think that ICT facilitates learning, enhances the success of students and teachers, draws the interest of students, and are necessary for teaching to be effective. However, they believe that in crowded schools it can be quite difficult to make full use of ICT and that using ICT increases their responsibilities. In response to these problems, active learning environments can be created through an LCS in classes including computer applications in ICT laboratories. Thus, both students' success can be enhanced and positive attitudes toward the learning-teaching process can be developed.

In general, software programs enabling teachers to see the screens of students and to show their screens to the students can be called computer laboratory control (CLC) software. Examples of such programs include Netop School, Netop Remote Control, NetSupport School, iTALC, etc. (Altun, Kışla and Çobanoğlu, 2009: 413). Laboratory control systems (LCSs) allow students to conduct their class activities over a teacher-centered computer. The system facilitates communication and is cost-effective (Smaldino, Lowther and Russell, 2008: 343). The teacher can watch what students are doing and help when necessary without going to the students on their computers. Strategic use of educational technologies facilitates and fosters learning and teaching. Given the need for cooperation, communication and innovative pedagogic approaches will make more effective use of educational technologies (Webster and Murphy, 2008: 1). A network is needed for the remote control of the lessons in computer laboratories. LCS is a system having the potential to contribute to educational environments. Moreover, this system provides students with the following opportunities (Thai, 2008: 78):

1. A network is established
2. It fosters students' problem solving skills through explanations supported by graphs and handwritings.
3. It fosters student interest in lessons and improves their interaction with each other.
4. It directs students to more enhanced production by allowing them to customize their multi-media notes and generating a platform for students to share their products.
5. It helps teachers to evaluate student behaviors and students to evaluate their learning styles more effectively.

An LCS can provide help for teachers in classroom management in a computer laboratory. These systems help teachers to manage their classes or schools and assign certain students specific tasks. Such a system can also provide assistance in storing student information and developing class reports. The system offers alternative options to store student profiles and involve students in the platform (Duffy, J.L., McDonald, J.B. & Mizell, 2005: 157).

An LCS can manage all computers and operations in these computers (Jelemenská, Koine and Čičák, 2010). NetSupport School was designed to improve the learning process by enabling users to watch and control their monitor screens (Hope, 2010: 233). In laboratory environments where the number of students can be high, it can be difficult and time-consuming to deal with students on a one-by-one basis. In an environment designed with an LCS, teachers can help their students by entering students' computers over their own computers without moving around the classroom. An LCS also has chatting and messaging capabilities. The teachers and students can chat or communicate through written messages. They can find solutions to problems by means of written messages. Thilakarathna, Keppitiyagama, Zoysa, Jasinghe and Hansson (2010) conducted a study titled "Design and Evaluation of an Application Software for Informal Peer Group Learning." In this work, informal cooperation was established by sending messages to each other over the LCS. It was also effective in nurturing cooperation. In some research studies, students were asked whether LCS contributes to informal cooperation and group discussions and positive responses were obtained.

As well established, the main goal of education is not only to instill desired behaviors in students, but also to prevent undesired learning outcomes from occurring. Through an LCS, the teacher can see the incorrect operations of students and intervene immediately. In this way, possible erroneous learning can be corrected without delay. An LCS, for example in NetSupport, allows teacher to watch students' classroom activities over a teacher-centered computer. The system facilitates the communication and is cost-effective (Smaldino, Lowther and Russell, 2008: 343).

Teaching-learning environments designed based on LCS may have many contributions to education. International research on the educational environments designed based on an LCS system shows that LCS programs enhance student-student and student-teacher interaction, facilitate the remote control of students, and enable teachers to control and monitor their students individually (Communication News, 2001). In addition, LCS-based classroom environments are cost-effective and access to forbidden sites can be controlled (Briner, Roberts and Worthy: 2005; Simpson, Crews, Rydl and Roge: 2005). As Moor (2006) put it, in traditional laboratory environments, it may become very difficult for students to see the exercises shown on the projector. Jones, Peters and Shields (2007) reported that LCS programs such as NetSupport School provide students with opportunities to learn individually. Also, through this system, administration of online exams is very easy.

In addition to the findings reported in the current study, it was found that the LCS is suitable for connecting a network system by Nicholson, Nicholson and

Valacich (2007) and that the LCS is useful in creating a cooperative laboratory environment (Sigle, Critcher and Agarwal (2007)). Moreover, it was reported that the LCS makes a positive contributions to learning how to learn (Business Wire, 2008), reduces the possibility of cheating, saves time and improves informal communication (Maharjan and Falla, 2009); Thilakarathna, Keppitiyagama, Zoysa, Jasinghe and Hansson (2010)).

No research looking at the effects of using LCS in teaching-learning environments in different aspects was seen in the literature in Turkey. Therefore, the main purpose of the present study is to investigate the effect of learning environment designed based on LCS on student achievement and their attitudes towards learning-teaching process. For this purpose, several hypotheses were tested.

Hypotheses related to the achievement test are as follows:

1. a. There is no significant difference between the pretest academic achievement mean scores of the groups.
- b. There is no significant difference between the posttest academic achievement mean scores of the groups.
- c. There is no significant difference between the achievement mean scores of the groups.
- d. There is no significant difference between the retention mean scores of the groups.
  
2. a. There is no significant difference between the pretest and posttest mean scores of the experimental group students learning in an environment where LCS is used.
- b. There is no significant difference between the posttest and retention mean scores of the experimental group students learning in an environment where LCS is used.
  
3. a. There is no significant difference between the pretest and posttest mean scores of the control group students learning in an environment where LCS is not used.
- b. There is no significant difference between the posttest and retention mean scores of the control group students learning in an environment where LCS is not used.

Hypotheses related to Attitudes towards Learning-Teaching Process are as follows:

1. a. There is no significant difference between the pretest attitude mean scores of the experimental and control groups.

- b. There is no significant difference between the posttest attitude mean scores of the experimental and control groups.
2. There is no significant difference between the pretest and posttest attitude mean scores of the experimental group students.
  3. There is no significant difference between the pretest and posttest attitude mean scores of the control group students.
  4. There is no significant difference between the achievement attitude mean scores of the experimental group students and the control group students.

## Method

### *Research Design*

In the present study, experimental design with pretest-posttest control group was employed. As can be seen in Table 1, the experimental group was taught in an environment created with LCS and the control group was taught without using LCS.

**Table 1.**

### *Operations Performed in the Study*

|                           | Before the application    | Throughout the application (6 weeks) | At the end of the application | 5 weeks after the application |
|---------------------------|---------------------------|--------------------------------------|-------------------------------|-------------------------------|
| <i>Experimental group</i> | Pretest<br>Attitude scale | With LCS                             | Posttest<br>Attitude scale    | Retention test                |
| <i>Control group</i>      | Pretest<br>Attitude scale | Without LCS                          | Posttest<br>Attitude scale    | Retention test                |

### *Research Sample*

The study group of the current research consists of 66 10<sup>th</sup> grade students attending a state high school in Kayseri. Out of 66 participants, 33 were assigned to the experimental group and 33 were assigned to the control group. The experimental and control groups were determined by taking the students' first term ICT course academic achievement mean scores and pretest academic achievement test mean scores through an unbiased assignment method.

According to independent samples t test result, there is no significant difference found between the first term ICT course academic achievement mean scores of both groups ( $t_{64} = -1,256$ ,  $p > 0,05$ ). This shows that the groups were at the same level before

the application. There is also no significant difference between the pretest achievement mean scores of the experimental and control groups ( $t_{64} = -1,859$ ,  $p > 0,05$ ). This shows that both of the groups were at the same level in the field of Web design before the application.

#### *Research Instrument and Procedure*

In order to determine the academic achievement of the students in Web design, an achievement test consisting of 28 items was developed. While developing the test, opinions of the teachers giving Web Design course were sought and the validity of the test was established using expert opinions. Difficulty and discrimination levels of the test items were tested through a piloting conducted with 100 students attending the vocational high schools. The mean difficulty of the test was found to be 0.53 and hence, it is a moderately difficult test. In the present study, a 38-item attitude scale developed by Demirli (2007) was employed to determine the effect of learning process on student attitudes. Cronbach Alpha reliability coefficient was found to be 0.932.

#### *Teaching Environments*

The application was carried out in the second term of 2010–2011 school year for six weeks by using Dreamweaver CS4 program to teach web design. Groups were administered the pretest at the beginning of the application and the posttest at the end of the application. A retention test was administered five weeks after the completion of the study. While the control group students were taught by means of lecturing supported with projector presentations, the experimental group students were taught by installing NetSupport School Tutor Console on the computer of the instructor and NetSupport School Student on the computers of the students. Teaching methods such as lecturing, question-answer and role-play (assigning the role of a leader to the students) were used.

## **Results**

#### *Results Related to the Achievement Test*

In relation to the achievement scores of the present study, it was investigated whether the Web design achievement scores of the experimental and control groups varied depending on the groups (experimental and control) and measurements (pretest and posttest). First, parametric test hypotheses were tested in order to determine the tests to be used to analyze the hypotheses. Thus, the Levene test was determined to be useful in comparing the independent samples, and the Kolmogorov Smirnov tests were determined to be useful in comparing the dependent samples and the distributions and homogeneity of variances were found to be normal. Hence, in testing all the hypotheses, dependent and independent samples t tests from parametric tests were used and the results are presented in Table 2.

**Table 2.**

*t* Test Results concerning the Achievement Test Scores of the Experimental and Control Groups

| Groups / Test                  | N  | $\bar{X}$ | SS   | sd | Levene test** / KSZ*** |       | t test |        |
|--------------------------------|--|-----------|------|----|------------------------|-------|--------|--------|
|                                |  |           |      |    | F                      | p     | t      | p      |
| Hypothesis 1-b):               | There is no significant difference between the posttest academic achievement mean scores of the experimental and control groups. |           |      |    |                        |       |        |        |
| Experimental group posttest    | 33   | 85,51     | 8,06 | 64 | 0,006**                | 0,938 | -2,978 | 0,004* |
| Control group posttest         | 33   | 79,54     | 8,22 |    |                        |       |        |        |
| Hypothesis 1-c):               | There is no significant difference between the achievement mean scores of the experimental and control groups.                   |           |      |    |                        |       |        |        |
| Experimental group achievement | 33   | 77,93     | 8,65 | 64 | 0,890**                | 0,349 | 3,350  | 0,001* |
| Control group achievement      | 33   | 71,33     | 7,30 |    |                        |       |        |        |
| Hypothesis 1-d):               | There is no significant difference between the retention mean scores of the experimental and control groups.                     |           |      |    |                        |       |        |        |
| Experimental group retention   | 33   | 78,51     | 8,20 | 64 | 0,012**                | 0,912 | -5,160 | 0,000* |
| Control group retention        | 33   | 68,33     | 7,82 |    |                        |       |        |        |
| Hypothesis 2-a):               | There is no significant difference between the pretest and posttest academic achievement scores of the experimental group.       |           |      |    |                        |       |        |        |
| Experimental group pretest     | 33   | 9,69      | 6,48 | 32 | 0,779***               | 0,579 | -41,56 | 0,000* |
| Experimental group posttest    | 33   | 85,51     | 8,06 |    |                        |       |        |        |
| Hypothesis 2-b):               | There is no significant difference between the posttest and retention mean scores of the experimental group.                     |           |      |    |                        |       |        |        |
| Experimental group posttest    | 33   | 85,51     | 8,06 | 32 | 0,831***               | 0,495 | 9,397  | 0,000* |
| Experimental group retention   | 33   | 78,51     | 7,82 |    |                        |       |        |        |
| Hypothesis 3-a):               | There is no difference between the pretest and posttest achievement mean scores of the control group.                            |           |      |    |                        |       |        |        |
| Control Group Pretest          | 33   | 6,84      | 5,94 | 32 | 0,564***               | 0,908 | -55,26 | 0,000* |
| Control Group Posttest         | 33   | 79,54     | 8,22 |    |                        |       |        |        |
| Hypothesis 3-b):               | There is no significant difference between the posttest and retention mean scores of the control group students                  |           |      |    |                        |       |        |        |
| Control group posttest         | 33   | 79,54     | 8,22 | 32 | 0,648***               | 0,795 | 15,459 | 0,000* |
| Control group retention        | 33   | 68,33     | 8,20 |    |                        |       |        |        |



\* $p < 0.05$  significant \*\* Levene test: Independent samples \*\*\* K.S.Z.Kolmogrov Smirnov test: Dependent samples

A significant difference favoring the posttest mean scores of experimental group was found ( $t_{(64)} = -2,978$ ,  $p < 0.05$ ). Thus, it can be argued that the learning environment designed based on an LCS is more successful than the traditional learning environment. This favors hypothesis 1-c: There is a significant difference between the achievement mean scores of the experimental group and control group in favor of the experimental group ( $t_{(64)} = 3,350$ ,  $p < 0.05$ ). Hence, it can be argued that the learning environment designed based on LCS is more successful.

The results establish Hypothesis 1-d: There is a significant difference between the retention mean scores of the experimental and control group favoring the experimental group ( $t_{(64)} = -5,160$ ,  $p < 0.05$ ). The retention level of the experimental group is better than that of the control group. The results also support Hypotheses 2-a and 2-b): There is a significant difference between the pretest and posttest mean scores of the experimental group students ( $t_{(32)} = -41,56$ ,  $p < 0.05$ ). The learning environment designed based on an LCS increased the students' achievement. However, there is still a significant difference between the posttest and retention mean scores of the experimental group students ( $t_{(32)} = 9,397$ ,  $p < 0.05$ ). The students forgot some of what they had learned. The reason for forgetting this information may be the five-week interval between the posttest and retention test.

(Hypotheses 3-a and 3-b): There is a significant difference between the pretest and posttest mean scores of the control group students ( $t_{(32)} = -55,26$ ,  $p < 0.05$ ). That is, the traditional learning environment also improved the students' achievement. This may be because the students learned Web design-related subjects for the first time. There is also a significant difference between the posttest and retention mean scores of the control group ( $t_{(32)} = 15,459$ ,  $p < 0.05$ ). This shows that the students in the control group also forgot what they had learned to some extent.

#### *Results Concerning the Experimental and Control Group Students' Attitude Scores in relation to Learning-Teaching Process*

*Results related to pretest attitude scores of the experimental and control groups.* There is a significant difference between the attitudes of the groups (hypothesis 1-a). ( $t_{(74)} = -0,784$ ,  $p < 0.05$ ). This indicates that both of the groups had similar attitudes towards learning-teaching process prior to the application.

*Results related to posttest attitude scores of the experimental and control groups.* There is a significant difference between the posttest attitude mean scores of the groups ( $t_{(74)} = -6,054$ ,  $p < 0.05$ ). Therefore, it can be argued that learning environment designed based on an LCS affected the students' attitudes more positively than the normal learning environment.

*Results concerning the experimental group students' pretest attitude and posttest attitude scores.* As a result of Wilcoxon test administered on the pretest attitude and posttest

attitude scores of the experimental group students, significant differences were found for many items. Thus, first the items whose pretest and posttest scores are significantly different are discussed and then some other items thought to be important are discussed.

It is seen that before the application, the students agree with this negative statement *"I get tired of investing too much effort in class"* ( $\bar{X}$  pretest: 3,78) and after the application, they stated that they strongly disagree with the same statement ( $\bar{X}$  posttest: 4,33). This may prove that instruction given in this process makes students active through both teacher-student interaction and student-student interaction; so, students were not bored and were willing to invest effort. In this environment of active interaction, the students stated that they feel prone to sharing their opinions with their peers ( $\bar{X}$  pretest: 3,72 -  $\bar{X}$  posttest: 4,39). In such environments, students are more willing to make effort to explain and defend their opinions.

The students' agreement with the statement *"I like being given an opportunity to create my own goal"* increased throughout the application ( $\bar{X}$  pretest= 4,18;  $\bar{X}$  posttest= 4,75). The students' opinion about the statement *"I like being given an opportunity to control myself"* became more positive during the application ( $\bar{X}$  pretest: 3,93;  $\bar{X}$  posttest: 4,72). When the students think that they belong to the learning environment, they feel more confident ( $\bar{X}$  pretest: 4,18-  $\bar{X}$  posttest: 4,57) and see themselves as a part of the learning environment. Therefore, the students feel more comfortable during class activities ( $\bar{X}$  pretest: 3,72 -  $\bar{X}$  posttest: 4,39) and they believe that they could learn better in an environment where they feel relaxed and confident ( $\bar{X}$  pretest: 4,03 -  $\bar{X}$  posttest: 4,33). These results show that the students enjoy explaining and defending their opinions.

Prior to the application, the students agree with the statement *"I feel confident when equality of opportunity is ensured"* ( $\bar{X}$  pretest: 4,18) and after the application, they strongly agree with the same statement ( $\bar{X}$  posttest: 4,78). In the environment designed based on LCS, the teacher shows the same interest to all students over his/her computer. The students feel that they are given opportunities to construct their own meanings ( $\bar{X}$  pretest: 3,69 -  $\bar{X}$  posttest :4,57) and they like being given the opportunity of deciding what to do ( $\bar{X}$  pretest: 4,12 -  $\bar{X}$  posttest: 4,78) The students believe that they can manage their time more effectively in the learning environment designed based on an LCS as they are interactively involved in the process and they are provided with immediate feedback ( $\bar{X}$  pretest: 3,72 -  $\bar{X}$  posttest :4,12)

In conclusion, the students instructed in the learning environment designed based on LCS reported no negative attitude towards this environment. In this

environment encouraging students to be interactive and active, the students did not avoid assessment and being assessed and clearly stated their opinions.

*Results related to pretest and posttest attitude scores of the control group students.* There is no significant difference for most items in the pretest and posttest attitude scores of the control group students. Also, the control group students' posttest scores for many items are lower than their pretest scores. This may be because the students taught in the traditional learning environment are far away from interaction, they cannot practice what they have learned and the course subjects are new to them. At the same time, after the teacher finishes lecturing over the projector, not much time is left to the students; hence, they cannot find enough time to practice what they have learned from their teacher's lectures.

Students like being in a more interactive environment ( $\bar{X}$  pretest: 4,15 -  $\bar{X}$  posttest: 4,06). Moreover, they feel happier when they are evaluated through multiple assessment techniques (Item 32:  $\bar{X}$  pretest: 4,12 -  $\bar{X}$  posttest: 4,09). There is a slight decrease in the posttest mean attitude score of the students when compared to the mean score of the pretest. The traditional learning environment does not provide students with an interactive learning setting.

The students stated that they are willing to conduct research in the learning environment ( $\bar{X}$  pretest: 3,96-  $\bar{X}$  posttest: 4,36). They also believe that their learning became easier ( $\bar{X}$  pretest: 4,06-  $\bar{X}$  posttest: 4,51). One of the reasons for the small positive change in the attitudes of the students in this learning environment may be the instruction given about how to do web design, which many students find interesting.

In conclusion, it can be seen that the mean scores of the students taught in the learning environment designed based on an LCS are better than those of the students taught in the traditional learning environment for many items. This shows that learning environment designed based on an LCS has better effects on student attitudes.

*Results related to the gain attitude mean scores of the experimental and control groups.* There is a significant difference between the gain attitude mean scores of the groups ( $t_{(64)} = 4,417, p < 0.05$ ). This shows that the learning environment designed based on an LCS positively affects student attitudes.

## Discussion and Conclusion

No significant difference was found between the pretest achievement scores of the LCS and the traditional learning environment. That is, both of the groups were equal to each other at the beginning. There is a significant difference between the posttest achievement mean scores of the groups favoring the experimental group.

This proves that the learning environment where experimental group was instructed is more effective than the traditional learning environment of the control group. This finding concurs with the findings of Hope (2010: 233), Jones and et al. (2007) and Rawat et al. (2008).

There is also a significant difference between the retention scores of the experimental and control groups. This may be because the experimental groups students' learning in an LCS find more opportunities to practice. There is a significant difference between the pretest and posttest mean scores of the experimental group students. That is, the LCS learning environment enhanced the students' achievement. The reason for this, as supported by Smaldino et al. (2008: 343), may be because an LCS facilitates communication and students get more involved in the learning process.

There is a significant difference between the posttest and retention scores of the experimental group students. This shows that the students forgot a little of what they had learned. The drop from the posttest means score to mean retention score is not large.

There is a significant difference between the pretest and posttest scores of the control group students. That is, the traditional learning environment also improved the students' achievement. The reason for this may be because the students learned the subject for the first time.

There is a significant difference between the posttest and retention scores of the control group students. This shows that the students forgot the information to some extent. When the posttest and retention mean scores are examined, it is seen that a larger deficit was experienced by the control group compared to the experimental group.

There is a significant difference between the gain achievement mean scores of the experimental group and the control group favoring the experimental group. As stated by Atıcı (2007), in the evaluation of the efficiency of an environment, achievement scores are good indicators. As emphasized by Thai (2008: 78), an LCS creates a platform for students to share their solution suggestions with their peers and teachers, and as such, it directs students to enhanced production.

There is no significant difference between the experimental and control group students' pretest mean scores of attitudes towards learning-teaching environment. This shows that both of the groups had similar attitudes at the beginning. There is a significant difference between the posttest attitude scores of the experimental group and the control group. This shows that the learning environment designed based on an LCS had more positive impacts on student attitudes than the traditional learning environment. This finding parallels the finding reported by Yıldırım (2009).

There are significant differences between the pretest and posttest scores of the experimental group students for many items. Particularly in relation to the attitudes

required by the active learning environment and accordingly offered by it (having pleasure in being in an interactive environment and feeling the opportunities are given to construct individual meanings etc.), positive significant differences were observed. Therefore, it can be argued that in such an environment, students exhibit more positive attitudes and their achievement is positively affected. This finding concurs with the finding reported by Thilakarathna et al. (2010) and Döşlü (2009).

There is no significant difference between the pretest and posttest scores of the control group students for many items. These items are, in general, the ones required by the active learning environment that entail interaction with other individuals. There is a significant difference between the achievement attitude mean scores of the experimental and control group students favoring the experimental group. Thus, it can be argued that the learning environment designed based on an LCS has more positive effects on student attitudes. In classes where computer programs are taught, the learning environment should be created based on an LCS, and students should be assigned active tasks and allowed to see each other's work so that they can actively participate in lessons. Teachers should give continuous feedback to their students by watching their screens through the LCS.

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## Laboratuvar Kontrol Sistemi'nin Öğrenci Başarısına ve Tutumuna Etkisi

### Atıf:

Cicek, F. G, & Taspinar, M. (2016). Laboratory control system's effects on student achievement and attitudes. *Eurasian Journal of Educational Research*, 64, 247-264  
<http://dx.doi.org/10.14689/ejer.2016.64.14>

### Özet

*Problem Durumu:* Bilgisayar ve bilgisayara dayalı bilgi ve iletişim teknolojilerinin her alanda kullanımının yaygınlaşması sonucu son yıllarda eğitim kurumlarında alana yönelik eğitim verilmeye başlanmıştır. Bu nedenle bilgisayar programlarının öğretildiği öğrenme ortamı önem kazanmıştır. Bireylerin bilgisayar öğrenme başarılarını ve tutumlarını etkileyeceğini düşünülen aktif bir öğrenme ortamının oluşturulup değerlendirilmesi önem taşımaktadır. İşte bu bağlamda, bilgisayar öğretiminde Laboratuvar Kontrol Sistemlerine göre tasarlanan öğrenme ortamının öğrenci başarısına ve öğrenme - öğretme sürecine ilişkin tutumlarına etkisi incelenmesi hedeflenmiştir.

*Araştırmanın Amacı:* Bu araştırmanın temel amacı, LKS ile düzenlenen öğrenme ortamının öğrenci başarısı ve öğrencinin öğrenme - öğretme sürecine ilişkin tutumları üzerindeki etkisini incelemektir.

*Araştırmanın Yöntemi:* Araştırma, 2010-2011 Eğitim ve Öğretim yılı Kayseri'de bulunan bir devlet lisesinin 10. sınıf öğrencilerinden oluşan 66 denek üzerinde yürütülmüştür. Denekler 33'er öğrenciden oluşan deney ve kontrol olmak üzere iki gruba ayrılmıştır. Her iki grubun ön test başarı puanları arasında anlamlı fark bulunmamıştır. Bu anlamda her grup öğrenimden önce web tasarımı ile ilgili eşit seviyede bilgiye sahiptirler. Kontrol grubu projeksiyonla öğretim yapılan geleneksel öğrenme ortamında, deney grubu ise Laboratuvar Kontrol Sistemine göre tasarlanan aktif öğrenme ortamında web tasarımı öğrenmişlerdir.

Web tasarımı Dreamweaver CS 4 programı ile anlatılmış, MEB'in uzaktan eğitim sitesinde bulunan Adobe ürün kullanım kılavuzu öğrencilere dağıtılmıştır. Bu kılavuzda aşağıdaki bulunan 10 konu başlığı 6 haftada işlenmiştir: Dreamweaver Temelleri, İçerik Ekleme, Resimlerle Çalışmak, Stil Sayfaları Oluşturmak, Bağlarla Çalışmak, Tablolara Çalışmak, Çoklu Ortam Bileşenlerini Kullanmak, Kullanıcı Etkileşimi ve Ajax Bileşenleri, Formlarla Çalışmak, Şablonlar Siteyi Yönetmek.

Laboratuvar Kontrol Sistemine göre tasarlanan öğrenme ortamında Netsupport laboratuvar kontrol yazılımı kullanılmıştır. Bu yazılımın beyaz tahta, öğrenci ekranlarını izleme, öğretmen bilgisayarından öğrenci bilgisayarlarına girilmesi ve müdahale (yardım etme) etme, bilgisayar seslerini kontrol etme, öğrencilerin girdikleri web sitelerine kısıtlamalar getirme ve izin verme, öğrencilerin



bilgisayarındaki uygulamalara izin verme ve engelleme, öğrencilere test uygulama, öğrencilerin bilgi depolama aygıtlarını kontrol etme, öğrencilere dosya transferi yapma, öğrencilerin ekranlarını kilitleme, öğrencilerin ekranlarını diğer öğrencilerin ekranlarında paylaşma, öğretmen bilgisayarının ekranını tüm bilgisayarlarda paylaşma, öğrencilerin ekranlarına yıldızlar koyarak geri bildirimler verme özellikleri kullanılarak aktif öğrenme ortamı oluşturulmuştur. Geleneksel öğrenme ortamında ise projeksiyon cihazı ile anlatım yapılmıştır.

Deney ve kontrol grubunun her ikisine de öğretimden önce ve öğretim sonrasında Başarı Testi, Öğrenme ve Öğretme Sürecine Yönelik Tutum Ölçeği uygulanmıştır. Başarı testi öğretimin bitiminde ve öğretimin kalıcılığına bakmak için de öğretimden 5 hafta sonra tekrar uygulanmıştır.

Web Tasarımı Başarı testi, Medyasoft firmasının hazırladığı “ Adobe Web ve Grafik Tasarım Eğitimi” sertifika sınavı sorularından 20 adet test sorusu seçilerek hazırlanmıştır. Test soruları genellikle bilgi, kavrama gibi alt bilişsel basamakları içerdiği için 20 test sorusuna ek olarak, 8 adet de açık uçlu soru hazırlanmıştır. Test maddelerinin güçlülüğüne ve ayırt ediciliğine Web Tasarımı bölümü bulunan 5 adet meslek lisesinde 100 öğrenciye pilot olarak uygulanarak bakılmıştır. Bu çalışma sonucunda maddelerin güçlükleri ve ayırt edicilik indeksleri incelenerek çıkarılması ya da düzeltilmesi gereken bir madde bulunmamıştır. Öğrenme- Öğretme Sürecine İlişkin Tutum Ölçeği olarak, öğretimin yürütüldüğü e-portfolio sürecinin öğrenci tutumları üzerine etkisini belirlemek amacıyla hazırlanan ölçek kullanılmıştır.

*Araştırmanın Bulguları:* Bulgular, Laboratuvar Kontrol Sistemi ile oluşturulan aktif öğrenme ortamında öğrenim gören deney grubunun, geleneksel öğrenme ortamında öğrenim gören kontrol grubuna göre daha başarılı olduğunu göstermektedir. Aynı zamanda deney ve kontrol grubunun kalıcılık puanları üzerinde anlamlı bir fark vardır. Bu sonuçlar Laboratuvar Kontrol Sistemine göre tasarlanan öğrenme ortamlarının bilgisayar öğretiminde anlamlı düzeyde etkili olduğunu göstermektedir.

*Araştırmanın Sonuçları ve Önerileri:* LKS ile düzenlenen öğrenme ortamında derse katılan öğrencilerle, geleneksel öğretim ortamında derse katılan öğrencilerin öntest başarı puanları arasında anlamlı bir fark bulunmamıştır. Bu bulgu uygulama öncesinde iki grubun birbirine denk olduğunu göstermektedir. Deney grubunun öğrenim gördüğü LKS ile düzenlenen öğrenme ortamının normal ya da geleneksel öğrenme ortamına göre daha başarılı olduğu, bu araştırmanın önemli sonuçlarından birisidir. Aynı zamanda deney grubunun öğrenim gördüğü LKS ile düzenlenen öğrenme ortamında öğrenilen bilginin normal öğrenme ortamında öğrenilen bilgiye göre daha kalıcı olduğu ortaya çıkmıştır.

LKS'nin kullanıldığı öğrenme ortamında öğrenim gören deney grubu öğrencilerinin ön -son tutum puanları arasında birçok maddede anlamlı fark vardır. Özellikle aktif öğrenme ortamının gerektirdiği ve sonuç olarak sunduğu tutumlarda olumlu yönde anlamlı fark çıkmıştır ve bu ortamda öğrencilerin daha aktif, derse daha ilgili ve

olumlu tutumlar sergiledikleri ve başarılarını olumlu yönde etkilediği şeklinde yorumlanabilir.

Bilgisayar yazılımları ya da Bilgisayar programlama dilleri anlatılan derslerde LKS ile öğrenme ortamı oluşturup öğrencilere bu öğrenme ortamında liderlik gibi aktif görevler verip ve birbirlerinin yaptıkları etkinlikleri görmelerini sağlayarak öğrencilerin aktif bir şekilde derslere katılmaları sağlamak öğrencilerin başarılarını, öğrenilenlerin kalıcılığını ve bunlara ek olarak öğrencilerin derse yönelik tutumunu artıracaktır.

Bunlara ek olarak, öğrenme- öğretme sürecine yönelik tutumlarda deney grubu öğrencileri, kontrol grubuna göre daha fazla olumlu tutum sergilemişlerdir. Bu anlamda, Laboratuvar Kontrol Sistemi ile aktif öğrenme ortamı oluşturup öğrencilere bu öğrenme ortamında liderlik gibi aktif görevler verilerek öğrencilerin derslere katılmaları sağlamak öğrencilerin başarılarını, öğrenilenlerin kalıcılığını ve aynı zamanda öğrencilerin derse yönelik tutumunu artıracaktır.

*Anahtar Sözcükler:* Laboratuvar Kontrol Sistemi, NetSupport school, aktif öğrenme ortamı, öğrenci etkileşimi, bilgisayar öğretimi.