



## A WEB-BASED MANAGEMENT SYSTEM AND ITS APPLICATION FOR STUDENT DESIGN PROJECTS

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### Abstract

This study introduces a web-based management system called “Design Project” that was developed to direct, monitor and evaluate students’ design projects according to design processes. This software tool was developed as a new module in Moodle, which is an open source learning management system (LMS). It was applied for one academic term with student groups attending the course unit “ETE404-Industrial Design” at the Industrial Technology Education Department, Gazi University and the data obtained from students was analyzed at the end of the academic term. The results of using the LMS were assessed by comparing them with conventional supervisory methods. The results showed that the LMS system increased communication between student-counselor, student-student; facilitated report submission and archiving; and standardized assessment criteria between different instructors.

**Key Words:** Learning Management System, web based design processes, design projects, Moodle.

### INTRODUCTION

In the information age that we live in, rapid changes in information and communication technologies (ICT) have become common in every field of our lives. The tools and materials that we use in our daily lives are renewed almost daily. In paralleled with these changes, ICT applications have inevitably entered into learning and teaching activities.

The use of computers in education, which are among the main ICT devices, dates back to the 1950s. Applications in this field have been defined using many different terms, such as Computer Aided Education–CAE, and Computer Based Teaching (CBT) (Watson & Watson, 2007). With the introduction of the internet and its use in education, many other terms such as Web Based Training, Web Based Instruction, Web Based Learning, and Internet Based Instruction were added to the terms mentioned above. All of these terms define the same thing, more or less. The term e-learning includes all the terms mentioned in terms of web-based electronic tools generally and the use of software in education.

Learning Management Systems (LMS) are currently one of the popular e-learning tools. Similarly to other technological fields, there is no standardization of terminology in LMS and conflict between the usage of terms continues. In the United States of America, LMS and CMS-Course Management system are commonly used. In the UK and Europe, the terms VLE Virtual Learning Environment and MLE-Managed Learning Environment are used (Martin-Blas & Serrano-Fernandez, 2009). These systems are web-based software that is designed to support teaching and learning activities. Typically, they provide a combination of functions that can be carried out online, such as evaluation, communication, content submission, gathering students' works, management of student groups, questionnaires, monitoring tools, wiki, blog, chat, and discussion forums.

When ICT applications are mentioned in technology and design education, mostly CAD (Computer Aided Design), CAM (Computer Aided Manufacture) and general drafting software comes to mind (McCormick, 2004). In web-based tools, web-based online design tools are commonly used (Karakaya & Şenyapılı, 2006). These tools are used at certain phases of student design projects in technology and design education. Learning Management Systems (LMS) can be used to manage, monitor and appraise a design process as a whole.

When used as a verb, the term "design", which means to plan, prepare a draft, or to draw, is derived from the Latin word "designare" (Mitcham & Holbrook, 2006). The process in which designing action is performed is called the design process. In early forms of design methodology, the process was modeled as three phases: analysis, synthesis and evaluation. In the analysis phase, the list of requirements is prepared; In the synthesis phase, more than one solution is created; Finally, in the appraisal phase, the solution which best meets the needs is chosen. Subsequently, different models were created for each stage, and the phases of the process were typically presented in flow charts and they become common. Some of models are linear, while others are cyclical (De Vries, 2005; Beyazit, 2004).

There are many design process models used in technology and design education. The "Design and Technology Curriculum" is an important model, published in 1990 for England and Wales, which influenced curriculums. This model adopted the design-make-appraise approach as the basic concept of the design process (Mawson, 2003). When the same curriculum was revised in 2002, ten phases of the process were listed, as follows: Problem statement, design brief, investigation, proposal, initial idea generation, research, developing the selected idea, planning, making the product, evaluation of the final product (Niekerk, 2008). The most comprehensive study carried out on design process models in education was conducted in 1995 by Johnsey (Johnsey, 1995). In this study, the concept of the design process was described as the method used in order to reach the end. The activities within this process were determined as process behaviors. The design process was seen as a problem-solving process (Jakovljevic, 2004). In the study by Johnsey and in other studies, problem-solving and design processes were used interchangeably (Taylor, 2000). In the study by Johnsey, 17 different model-explaining implicit or open design and processing skills were examined. Twelve common behaviors were determined for these different models. The most striking outcome is that models that seemed to be different fit exactly to each other. It is seen that these models repeat the same thing in general (Johnsey, 1995). Most of these models are included in the group termed structural approach. According to this approach, the process is divided into certain periods and is systematically maintained (Mioduser & Dagan 2007). The common point in all models is the stages continuing from the formation of an idea to the evaluation of the output (Mawson, 2003; ITEA, 2007).

The main purpose of the present study is to create a method for managing, monitoring and appraising student design projects by way of integrating a selected design process model with the Learning Management Systems (LMS), which is currently one of the popular e-learning tools. The present study does not aim to determine or chose the best design process model. A new tool, titled "Design Project", which may operate on the web-based LMS, was developed in order to apply the project management model. Many studies have reported on the success of ICT in general education (Mahdzadeh et al., 2008). However, there are few studies of ICT applications and their effects in technology and design education (McCormick, 2004; Karakaya & Şenyapılı, 2006 ; Yeo & Quek, 2011). It is thought that there are some opportunities and potential benefits from utilizing ICT applications in learning and teaching activities in technology and design education, but there is no conclusive evidence available from previous studies (McCormick, 2004). No previous studies were found of the use of LMS tools in technology and design education. This study presents evidence obtained from the "Design

Project” developed for technology and design education and the use of the tool with students. The first part of this report introduces the software module that was developed and the following part presents the statistical data obtained from the sample application.

## MATERIAL AND METHOD

### “Design Project” Module

There are many commercial LMS applications, including the market leaders, Blackboard and WebCT software. Besides these commercial applications, open source software is also available, the most popular of is Moodle (Modular Object Oriented Dynamic Learning Environment) (Machado & Tao, 2007; Romero et al, 2008).

Moodle was developed by Martin Dougimas at Perth University, Australia and supports 75 different languages (Moodle, 2010; Cole & Foster, 2007). Moodle is free of charge, meaning that its testing user group is very broad. Many new features (block or module) are continuously developed and distributed, and studies suggest that it is more successful than commercial equivalents (Machado & Tao, 2007; Lawler, 2011). The Moodle software is based on an educational philosophy of social constructivism, the basic idea of which is that the best learning is formed by collaborative efforts of people to construct information for others. In this respect, many e-learning platforms are not based on such a philosophy. Many packages are software-centered, whereas the Moodle software is learner-centered (Martin-Blas & Serrano-Fernandez, 2007).

In Moodle, all learning and teaching activities are presented as one module. For example, activities such as homework and quizzes are present as one module in this software. The “Design Project” tool was developed as one module in Moodle. If Moodle is used in the institution as a LMS, the developed module will be easily installed in the new system without involving additional investment cost while activities are carried out for other lessons. If an LMS is not used in the institution, the probability of choosing Moodle is very high, since it is free of charge, widely used and offers other advantages, mentioned above. For this reason, Moodle was preferred as a ready LMS platform for the “Design Project” software tool used in the present study.

The developed module was encoded via PHP programming language in which Moodle software is written. The open source NetBeans IDE 6.7.1 Integrated Development Environment was preferred as the coding environment. Moodle software version 1.9 was used as test platform. The developed module was tested on XAMPP easy installation software which incorporates the necessary software (Apache, MySQL, PHP and Perl) for starting web-based applications and was uploaded to a web server. It was applied for one academic term with student groups attending the course unit “ETE404-Industrial Design” at the Industrial Technology Education Department, Gazi University. MySQL was used as the database management system. The developed module uses 12 new databases in addition to Moodle’s own database tables.

As seen in Table 1, the study determined four user types and the works that can be done by them according to different privilege levels. Hierarchically, administrators have the highest privilege level, while students registered on the system have the lowest privilege level. An instructor (Counselor) is the determinant user in the course and the design process. Instructors may modify the name of the design project module, the highest grade, and the start and end dates. They may monitor students throughout the process, assigning grades that allow students to progress to the next phase. They may also send instructions to the students as a group.

Table 1 :User types and the works that can be done

User Types	The Works That can be Done
System Administrator	The user with all the rights on the system.
Counselor	Users with the highest level in the system other than the Administrator.
Jury	These are users designed to help counselors.
Student	These users are defined only for watching the system.

The jury fulfils the role of an academic assistant who does not give the lecture. The number of juries for a lecture can be defined as desired. Juries cannot change the options of the "Design Project" module (such as name, start and end dates). They might monitor student throughout the process; They may send messages to the students as a group; They may approve students' progress. However, students cannot progress to the next phase based only on the approval of a jury. The approval granted by a jury is only suggestive for the instructor. The main purpose of defining jury members is to enable students to benefit from the knowledge and experiences of other academics. This arrangement ensures that various experts that may be needed in the management of multidisciplinary projects contribute to the process.

Students are the users with the lowest authorization within the system. They can only change the information of their groups, follow their status and that of other students, send messages to the instructor and jury members, and may award points to their friends' suggestions in the problem definition part. However, these points only provide the instructor with supplementary information, as points awarded by students do not change the status of other students.

#### *Adding module to the lesson*

The course instructors that use the lesson opened in Moodle can add the "Design Project" module as a new activity in any week. When instructors choose to add the "design Project" activity, the module data must be input: name, explanation, maximum grade and the start and end dates of the "Design Project" module. The part named "General Module Settings", seen under this form, is the standard Moodle module setting. The group mode adjusts whether student groups can exist in this module and whether these groups are visible to other groups.

After saving this form, all students will see the activity link on the week on which the design project activity was scheduled. A student receiving the lesson will have access to the home page of the module activity, which was developed, by clicking on "Design Project" icon  or a link on the home page of the lesson.

After searching the available models and processes through the literature, "Design Project" module was developed considering the main framework of the process model used in the course ETE 404-Industrial Design that is originated by the adaptation of the examined models to the current educational structure on the basis of the course objectives and expected learning outcomes. Furthermore, the students to take ETE404-Industrial Design Course are candidate teachers for Technology and Design Course at secondary schools and the model structure recommended by the ministry of national education in Turkey is quite identical to the model used in ETE 404-Industrial Design Course (TTKB, 2009).

In the lesson in which the developed "Design Project" was applied, the process was separated into certain intervals as of the 2008-2009 spring semester and a spiral model was built, consisting of stages similar to those of models in the literature. The design process in the lesson was modeled as in Figure 1. Students are guided on the theme of design process models according to the stages in this model and a report is required from students at the end of every stage.

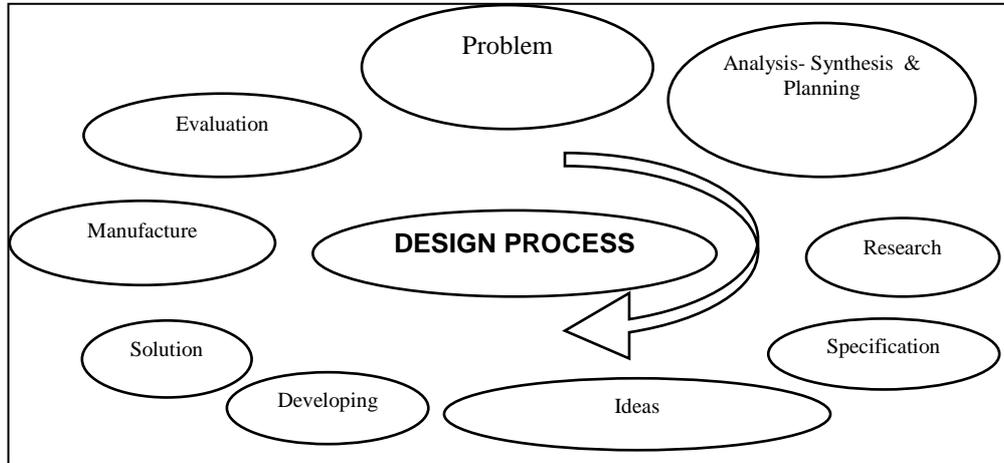
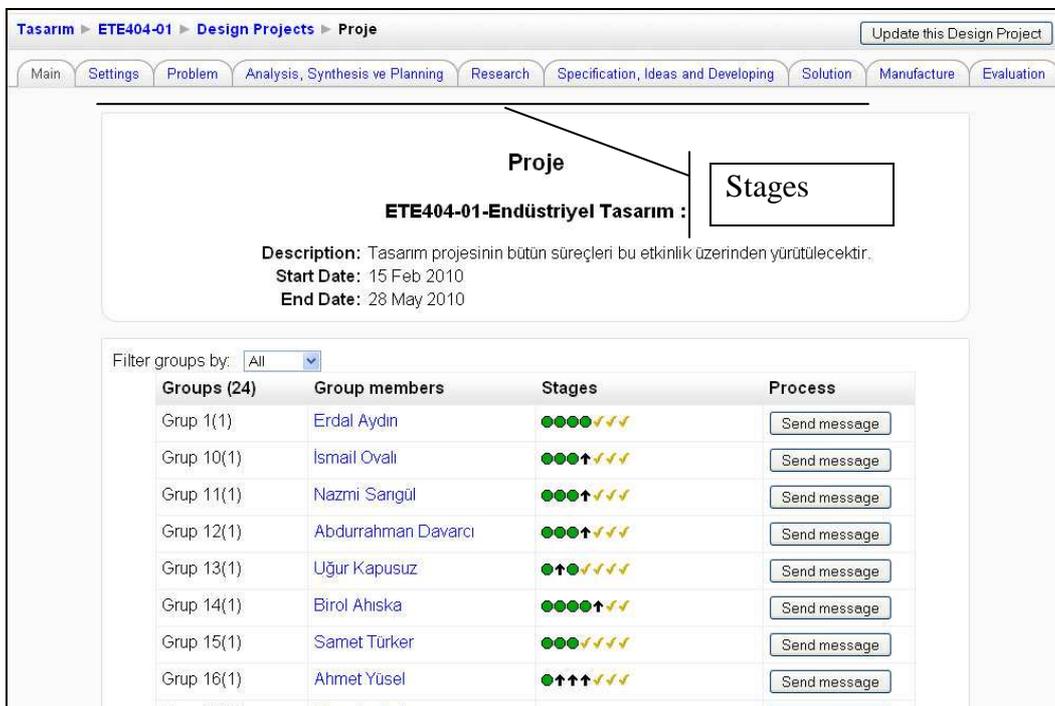


Figure 1: Process model in "ETE404-Industrial Design" lesson

The process model used in the lesson was taken as the basis while developing the "Design Project". Every stage in the design process is defined as one tab on the upper part of the module panel of the activity, as shown in Figure 2. Students' progress on these tabs depends on their receiving approval from their counselors for the previous page and on obtaining a passing grade for the report associated with that page. If this is not achieved, the student continues on the current stage, that is to say, on the previous tab.



Groups (24)	Group members	Stages	Process
Grup 1(1)	Erdal Aydın	●●●●✓✓✓	Send message
Grup 10(1)	İsmail Ovalı	●●●↑✓✓✓	Send message
Grup 11(1)	Nazmi Sangül	●●●↑✓✓✓	Send message
Grup 12(1)	Abdurrahman Davarcı	●●●↑✓✓✓	Send message
Grup 13(1)	Uğur Kapusuz	●↑●✓✓✓✓	Send message
Grup 14(1)	Biröl Ahıska	●●●●↑✓✓	Send message
Grup 15(1)	Samet Türker	●●●✓✓✓✓	Send message
Grup 16(1)	Ahmet Yüsel	●↑↑↑✓✓✓	Send message

Figure 2: "Design Project" module panel

In the "main tab" part of the module panel shown in Figure 2, the name of the lesson and the start and end dates of the lesson are given. In the sub-section in which all of the projects groups are seen, a red "stop" (●) symbol means that this stage is not approved by the counselor; a yellow "approval" (✓) symbol means that this stage is approved by at least one jury member; an up arrow (↑) means that the counselor approved the data

entered into the system and the stage report is expected; a green “completed” (●) symbol means that the report was also evaluated by the counselor with a passing score. The green “completed” symbol means that the stage in question was completed by the student. Thus, the home page of the activity allows the instructor to easily see which level the students are on during the process; this information can also be seen by students. Thus, a student can see where they are in the process and compare their personal progress with other students in the section. The instructor can send a message to selected project groups via the “Send Message” button.

In all tabs other than the problem tab, after entering the required data, data students can click on the “I have entered data, check it” button and notify the instructors that the data has been entered for checking. The system will then send an e-mail notifying the instructors that data have been entered.

#### *Settings / Preparation Tab*

The Settings / Preparation tab is seen by instructors as “Settings”, while it is seen by students as “Preparation” tab. In the settings section, the instructor can register a patent query database, from which students could benefit during the design process. At this stage, students can carry out research from the databases registered in the “Preparation” tab. From this part, the instructor can register the projects carried out by students in previous years in “ETE404-Industrial Design” lesson. At the same time, students can search the projects carried out in previous years.

#### *Problem Tab*

In the “Problem” stage, students are expected to identify a problem and make problem suggestions. The “Problem” tab in the “Design Project” module corresponds to this stage, which is one of the most difficult stages of the design process. The students selecting the “Problem” tab can enter suggestions into the system to address problems related to their projects via the “Add new problem” button. Students can see their previous suggestions, the scores given to these suggestions, the suggestions of other students and their scores with the permission of the instructor as shown in Figure 3.



Suggestions	Author	Comments	Last Comment	Student Score	Jury score	Advisor score
senemgrup (Onaylanmayanlar [+])						
Ebeveynler için tahteravalli	 Senem Erden	0	Senem Erden Fri, 2 Apr 2010, 11:14 PM			

Figure 3: Problem suggestions of students

A student coming to this tab can examine the answers given by other students and instructors about their own suggestions by clicking on the project subject. Students also see the ideas of other students on this screen and can make criticism or suggestion. Students, counselor instructors and jury members can evaluate students' project suggestions on this page by scoring them out of 100 points. In this part, a student is able not only to score his/her own suggestions; he/she can also score all other suggestions. A counselor instructor can amend the system settings to make these scores public or private. If a student's project suggestion is rated above a certain minimum passing score, it is accepted; the button to make a new suggestion is then hidden and replaced by the button suggesting that the related report should be submitted.

#### *Analysis-Synthesis and Planning Tab*

In the Analysis-Synthesis stage, as many questions and answers as possible are tried to be prepared by taking the design project into consideration. The planning stage is an estimated timetable created for the stages of the project, indicating how much time is to be spent on each part of the project. The “Analysis, Synthesis and Planning” tab in the “Design Project” module corresponds to these stages. Students who click on the “Analysis, Synthesis and Planning” tab encounter two sub-tabs. The sub-tab named “Analysis-Synthesis” includes parts for

entering questions and answers, which the student enters and registers into the system; in the “Planning” sub-tab, students may select “Add New Task” using a “Calendar” graphic. The “Add” button allows them to enter the name and the start and end dates of the task. At the same time, the task will be placed automatically in the appropriate time interval on the calendar scheme.

#### *Research Tab*

During the research stage, it is possible to investigate which materials should be used in the project, by determining appropriate and inappropriate materials. Data such as mechanical characteristics, endurance, and physical and aesthetic features are determined. In addition to this data, environment and security factors, ergonomics, people interviewed, appropriate production management, functionality and research into similar products are carried out at this stage. The “Research” tab in the “Design Project” module corresponds to this stage. Students entering the “Research” tab can add data about the materials they choose and other variables mentioned above into the system.

#### *Description and Presenting New Ideas Tab*

Generally, this section is the list of special points (objectives), each of which is referred to the research study. The data related to the materials that are chosen, the general shape of the product, its ergonomics and the groups to which it will address are entered into the system. Data entered by students can be seen by instructors and other students.

#### *Solution Tab*

What are the materials, devices and equipment that will be used in the design; how will they be provided; usage amounts and units are determined. Students enter the required data on the form, which can be seen by instructors. The workflow is entered to be seen both by themselves and instructors.

#### *Production and Evaluation Tab*

In the production stage, students take photos of the studies they carried out and their production stages and register them into the system. Thus, the production stages of each design project can easily be monitored. In the evaluation stage, students are required to undertake self evaluation in an objective way in terms of the product or prototype’s functioning and the parts of the design that should be revised or improved. Data summarizing what the students think about the design in general, future improvements, whether or not they are satisfied with the materials chosen, changes to the color plan, changes in investment cost, security factors; and the ideas of third persons about the design are entered into the system.

## **FINDINGS**

The study included 118 students from the Industrial Technology Education Department, Gazi University. All participants attended the course module “ETE404-Industrial Design” during the 2009-2010 spring semester. The participants were randomly allocated to 5 similar-sized groups. The sections of the lesson and the number of students in these sections are shown in Table 2. Among these sections, Section-01 and Section-04 were chosen as experimental groups that would use the LMS; the respective control groups, using standard teaching methods, were Section-03 and Section-05.

Table 2: Allocation of Students to Sections of “ETE404-Industrial Design” lesson

Section Name	Number of Students
Section -01 (Research Group : Those who use the design project module)	23
Section -02	19
Section -03 (Control group of Section-01)	26
Section -04 (Research Group : Those who use the design project module)	24
Section -05 (Control group of Section 04)	22

In the Section-03 and Section-05 control groups, design project processes were managed using conventional methods as in previous years. In the experimental groups, Section-01 and Section-04, process management was supported on the web via LMS using the “Design Project” module described previously. Both students and instructors in research groups used the tool that was developed to manage project processes. In order to eliminate variability due to personal teaching styles, the same instructors advised both the research groups and control groups.

At the end of the semester, the scores of all groups were examined to determine whether the use of the LMS tool resulted in a difference between the grades of the research groups compared with the control groups.

### Comparing Achievement Scores

The grades applied in Gazi University, Industrial Technology Education Department range between FF and AA. Normality tests were first carried out on the end of semester grades of the study sections (Sections-01 to 05) to test whether there is a significant difference between success proportions between control and research groups. It was decided to carry out a Chi square independence test on the groups, since the achievement scores of the research and control groups did not show consistency with the normal distribution. The frequency distributions of letter grades according to sections are shown in Table 3. The study examined whether or not the grades of the sections depend on the allocation to a section. In this condition, the hypotheses were presented.

$H_0$ : Achievement scores are independent of sections.

$H_1$ : Achievement scores are dependent on sections.

Table 3: Grade distributions of research and control groups

Sections	Letter Grades					Total
	CC	CB	BB	BA	AA	
Section 01	8	8	5	1	1	23
Section 03	8	9	5	2	2	26
Section 04	14	1	6	2	1	24
Section 05	7	10	2	1	2	22

It is observed that the grades less than 5 (12 items) in Table 3 correspond to 60% of the total number of cells ( $5 \times 4 = 20$ ), which is greater than the 20% permitted for Chi square independence tests. Letter grades in the table columns were combined as middle and higher level of success and the test was applied again. The new frequency table formed by combining the columns is given in Table 4.

Table 4: Students Achieving Middle and High Success in Research and Control Groups

Sections	Level of success		Total
	Middle success	High success	
Section01	16	7	23
Section 03	17	9	26
Section 04	15	9	24
Section 05	17	5	22
<b>Total</b>	65	30	95

According to chi square test results, ( $\chi^2 p = 1.312$ , df (degree of freedom) = 3,  $p = 0.726$ ),  $H_0$  hypothesis cannot be

rejected. The results show that the achievement scores are independent from the allocation of research and control group Sections.

A questionnaire was used to determine differences in students' attitudes; the validity and reliability of the questionnaire was tested one year previously. The first part of the questionnaire contains questions on Section (research group), gender and Yes/No questions. The second part was scored using a 5-point Likert type scale (I strongly disagree, I disagree, I neither agree nor disagree, I agree, I strongly agree). The data gathered at the end of the application were examined using the SPSS 15.0 program.

### Analysis of Questionnaire Answers

The questionnaire data showed that 56 of the participants are male (74%), and the remaining 20 are female (26%). The following section examines the responses to the questionnaire. The distribution of responses to the questions is given in Table 5.

Table 5: Responses to the questions

Questions	Section	Yes	No
Did you wait for the date of lesson for counseling and receive approval?	1	50.0%	50.0%
	3	57.1%	42.9%
	4	50.0%	50.0%
	5	43.8%	56.2%
Did submitting the prepared forms take your time?	1	57.9%	42.1%
	3	57.1%	42.9%
	4	45.0%	55.0%
	5	62.5%	37.5%
Would you be more successful if you were in the other section of Industrial Design lesson?	1	5.6%	94.4%
	3	14.3%	85.7%
	4	10.5%	89.5%
	5	6.2%	93.8%
Did you take information/opinion from other instructors except for the instructor of the lesson?	1	89.5%	10.5%
	3	71.4%	28.6%
	4	85.0%	15.0%
	5	75.0%	25.0%
Did you take information about the projects of other students except for your close friends?	1	89.5%	10.5%
	3	81.0%	19.0%
	4	95.0%	5.0%
	5	87.5%	12.5%

Generally, in conventional teaching methods, the counselor instructor of the lesson meets students weekly in a 1-hour lesson and mentors his/her students. By means of the tool that was developed, students can consult the lesson instructor and exchange opinions without waiting for the date of the lesson. The study examined whether or not this feature produced a difference between the sections. The distribution of responses to the question "Did you wait for the date of lesson for counseling and receive approval?" is given in Table 5. The proportion of students answering "Yes" was expected to be lower in the research groups. As expected, the proportion of students saying "Yes" in Section-01 was 7.1% lower than that of the students saying "Yes" in the Section-03 control group. However, the proportion of students answering "Yes" in Section-04 was 6.2% higher than that of the Section-05 control group.

Using the tool that was developed, students can load report forms at the end of stages to the system from home or other locations. In the groups that did not use the tool, students have to take an output of the report forms they prepare and submit them to the instructor of the lesson. The study examined whether or not this feature resulted in a difference between the sections. The distribution of answers to the question "Did



submitting the prepared forms take your time?" is given in Table 5. Since students can easily submit their report forms using the developed tool, the proportion of students answering "Yes" was expected to be lower in the research groups. As expected, the proportion of students answering "Yes" was 17.5% lower in Section-04 than in the Section-05 control group. However, the proportion of students answering "Yes" in Section-01 was 0.8% higher in the Section-03 control group.

A design process and the general process in the lessons attempting to present a product at the end of this process is under the responsibility of the instructor that is assigned as a counselor. The assigned counselor directs and guides students while the design is carried out from its beginning to the end. Each counselor generally works with more than one student on different issues. In these lessons, process and process management depend on the experience of the counselor instructor. For this reason, process management and evaluation cannot be the same and objective for all students. The developed tool is thought to bring a standard form of instruction and guidance to the design lesson. As a result, the study examined students' perceptions of whether or not their success level would differ in a section supervised by a different instructor. The distribution of responses to the question "Would you be more successful if you were in the other section of Industrial Design lesson?" is given in Table 5. A high percentage of students from all sections answered "No" to this question. The expectation at the end of the application was that the proportion of "Yes" answers would be lower in the research groups. This situation was observed in the Section-01 research group, which showed an 8.7% lower "Yes" response than its control group, Section 03. However, the opposite result was found for Section 04 and Section 05.

In conventional teaching methods, there is no transparent mechanism for students to benefit from the knowledge and experiences of instructors other than their counselors, and so this depends on students' individual efforts. For this reason, students cannot benefit completely from the experiences of other counselors or instructors. By means of the developed tool, students can consult and exchange opinions with other instructors, defined in the system as "Jury", in addition to the counselors who instruct the lesson. In order to determine potential difference between the sections, students were asked "Did you take information/opinion from other instructors except for the instructor of the lesson?" as shown in Table 5. Due to the collaborative opportunities provided by the developed LMS tool, it was expected that a higher proportion of students in the research groups would answer "Yes". As expected, the proportion of students saying "Yes" in Section-01 was 18.1% higher than that of the Section-03 control group. Similarly, the proportion of "Yes" answers given by the students in Section-04 was 10% higher than that of the Section-05 control group.

In the conventional classroom environment, it is difficult for students to obtain information about the projects of other students beyond their circle of close friends, which negatively affects the cooperation among students. The developed module allows student to be informed of and to monitor the projects undertaken by a much wider group of other students. When students are informed, they can make comments and suggestions to other students through the system, thus potentially increasing the cooperation among students. The study examined whether or not this feature resulted in a difference between the sections. The distribution of responses to the question "Did you take information about the projects of other students except for your close friends?" is shown in Table 5. As expected, the proportion of "Yes" responses in Section-01 was 8.5% higher than in the Section-03 control group. Similarly, the "Yes" responses in Section-04 were 8.5% higher than in the Section-05 control group.

The general process of the "ETE404-Industrial Design" lesson is under the responsibility of the instructor assigned as counselor. The assigned counselor directs and guides students while a design is carried out from its beginning to the end. Each counselor generally works with more than one student on different issues. In these lessons, process and process management depend on the experience of the counselor instructor. For this reason, process management and evaluation cannot be the same and objective for all students. The developed tool aimed to standardize the process stages that will be followed by each student, independent of the particular counselor. It is believed that process stages can be carried out objectively. Students were asked whether they agree or disagree that "There are no differences between the design lesson groups, in terms of general teaching, attributable to the specific instructor". The distribution of the responses is given in Table 6.

Table 6: Responses to the statement “There are no differences in terms of general teaching between the design lesson groups due to the instructor” according to sections.

Sections	I, strongly disagree	I disagree	I neither agree nor disagree	I agree	I, strongly agree	Total
<b>1</b>	.0%	5.6%	33.3%	44.4%	16.7%	100.0%
<b>3</b>	3 14.3%	6 28.6%	6 28.6%	3 14.3%	3 14.3%	21 100.0%
<b>4</b>	3 15.0%	1 5.0%	6 30.0%	6 30.0%	4 20.0%	20 100.0%
<b>5</b>	0 .0%	1 6.2%	11 68.8%	3 18.8%	1 6.2%	16 100.0%

By means of the tool that was developed, proportion of the students stating “I agree” in research groups was expected to be higher than that of the students in control group. As expected, the proportion of students stating “I agree” and “I strongly agree” in Section-01 was higher than in the Section-03 control group. Similarly proportions of the students stating “I agree” in Section-04 were higher than in the Section-05 control group.

## CONCLUSION

A new web based tool was developed to manage, monitor and evaluate design projects. This tool was added as a module of a common LMS and this increased its preferability. Instructors can use the tool with Moodle software to manage teaching activities for their other lessons in order to manage design projects without requiring additional investment. The developed tool allows large groups of students to be monitored and easily administered in course modules that include management of design projects. The present study can provide an example of different methods of providing students with courses in which design projects are created.

No conclusive evidence was found to indicate whether or not the developed “Design Project” module has an effect on students’ project success. Considering the grade of the lesson as project success, it was seen that there was no difference between the sections using the tool and the sections using traditional teaching methods. Therefore, it can be stated that the use of the module has not demonstrated a direct positive effect on achievement scores. On the other hand, it can also be suggested that it has not resulted in a negative effect. The use of the module did not reduce students’ success. Further studies should determine whether or not the tool has an effect by separately examining factors such as the achievement scores of each stage instead of only achievement score, the durations of completing stages, and the proportions of students reaching the determined targets.

Using the tool that was developed for the study, it is possible for students to consult the instructor at any time and from everywhere. As a result, the student does not have to wait for the date of the lesson to seek advice. The proportions of students waiting for lesson to seek advice are the same in both of the study groups. As expected, one of the experimental groups showed a higher proportion of students seeking advice outside lesson times compared to the control group. In control groups, however, the proportions are not the same. A similar result was obtained in the submission of the prepared homework reports. The developed system allows coursework reports to be quickly and easily submitted via the internet. Nevertheless, students in one of the control groups expressed that they can submit reports faster via the conventional method and these works do not take time. This situation may result from the fact that students do not have the same technical infrastructure available to them outside the campus. Further studies should also consider whether or not students have personal computers and home internet connections.

It was observed that, due to the jury feature, the tool increased the proportion of students benefiting from the knowledge and experiences of other instructors in addition to the lesson counselor. Thus, all instructors can contribute to the design process for issues within their specialization. Similarly, it was observed that a higher proportion of students obtained information about the projects of other students beyond their close friends by means of "Design Project". Thus, it can be suggested that the tool increased cooperation among students.

The developed tool aimed to standardize the lessons for producing a design project. In comparison to the control groups, students that used the "Design Project" system agreed to a greater extent that there were no differences between the groups, in terms of general teaching, related to the instructor. Thus, it can be stated that the tool introduced a certain level of standardization in the different issues such as management, monitoring and evaluation independent the knowledge and experiences of instructor.

It is clear that the "Design Project" tool provided benefit for the lesson instructor in issues such as monitoring, management and evaluation. The instructor can simultaneously monitor students' progress through the project and can send messages to individuals or all students, as necessary. Using conventional methods, filing the coursework submitted after each stage entails a significant workload for the instructor. Locating and examining any stored report also takes time, as this is carried out by hand. However, since the developed system archives coursework reports electronically, no further process is needed, and a required report can be accessed easily and rapidly. Further studies will evaluate the same module from the instructors' perspective, to determine how and to what extent they benefited from the tool. It was observed when using the tool that, although some instructors had much previous experience of using ICT, those instructors who had not used LMS previously were disadvantaged. It would also be possible to determine whether or not these benefits depend on their level of preparedness. Usability tests could also be carried out, to measure the efficiency, effectiveness and satisfaction of the developed tool.

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