

# Project Based Human Computer Interaction Course: An Experiment of Online and Face-to-Face Learning Environment\*

ERSUN ISCIOGLU

Eastern Mediterranean University, Faculty of Education, Department of Computer and Instructional Technology Teacher Education.  
E-mail: ersun.iscioglu@emu.edu.tr

The main objective of this study is to assess face-to-face and online project based learning environment in various dimensions according to the opinions of students and their success. The study is designed as a qualitative study. Total 77 under-graduate students participated in this study. Data were collected with focus group interviews, observations and performance evaluation scale (rubric) during this study. Data gathered as a result of the study was analyzed with the descriptive analysis methods. Affirmative and negative opinions of the students on project based Human Computer Interaction (HCI) course and online project based HCI course have been emerged. The success of the students both in project based HCI course and online project based HCI course were found to be high. Furthermore, the opinions of the students also determined the problems on the graphical interface design of Moodle LMS.

**Keywords:** human computer interaction; project based HCI; online project based HCI; Moodle LMS for HCI course

## 1. Introduction

Today technology develops rapidly; in specific the “education” sector and in particular learning environment are significantly affected by this development. Present structure of almost all of the educational institutions and learning environments change and develop in this parallel. These changes undoubtedly provide constitution of new theories, methods and method of applications within the fields of instructional materials from presentation to evaluation phase. Recently, many concepts and methods have been included in the learning environments. It is very important to assess the compliance and effect of each newly developed concept. Furthermore, in order to increase the quality of the education being given, how these new concepts and methods are being perceived by the students should also be determined.

The Internet is an inevitable learning-teaching environment of today’s world [1]. Particularly, by start of the internet technology use in learning environments many concepts such as online, blended etc. became a part of learning-teaching context of today. Online learning, therefore, became the dominant environment of distance education applications [2].

According to a recently issued research report, 65% of the Higher Educational Institutions in the United States of America consider online learning as the most critical element of their long term strategies [3]. Again according to the same report, the number of students who took at least one of their

courses in online environment during fall semester of 2010, is 6.1 million [3]. These results show that online learning has started to be an alternative both for the institutions and the students.

When we glance at online learning applications, it can be observed that generally Learning Management Systems (LMS) are taken as basis in all of them [4]. LMS is a system which is constituted of software that starts automation of educational management integrally [5]. LMS found itself as a standard in an online learning environment. There are many various learning management systems in the market. Samples of these can be Blackboard (commercial software), Desire2Learn (commercial software), CCNet (commercial software), Moodle (open source software), JoomlaLMS (open source software) and ATutor (open source software) [4, 6]. The mostly used systems are Blackboard and Moodle [4]. The most globally preferred software which have open source codes are Moodle and JoomlaLMS [4, 5, 7].

As previously mentioned, learning-teaching environments are being effected by new theories and methods other than Internet Technologies. In recent years, it is being observed that many new methods started to be used in order to increase both quality and interaction in learning-teaching environments and richness of learning environment. Problem/Project based learning, Brain based learning, and Cooperative learning can be given as examples. Conclusively, many learning environments are enriched by both technology and pedagogic (educational sciences) methods and tech-

nologies. Recently, it is being observed that the number of studies particularly on Project based learning, is increasing. There are some examples emerging successful application of Project based learning approach in the Literature [6, 8–13]. However, it is recognized that there are limited numbers of successful examples for project based learning applications in an online environment [18–20]. Project based learning that shall be achieved in online environment has similarities with the face-to-face learning environment. In online project based learning, the project to be performed should be placed in the center of the learning environment and should be supported with various learning resources [17]. The steps that are followed in face-to-face learning environment should also be applied in online learning environment [18].

Experiment and use of new methods and techniques in online learning environment popularity of which rapidly increase today, almost became an obligation. Taking opinions of the students about these applications is a very important requirement for the efficiency of the environment. Additionally, whether these new methods and techniques shall be a solution for the problems faced during use of conventional environments need to be considered as well. In this study, an alternative environment that can be a solution for the problems faced during human computer interaction served (face-to-face) traditionally in previous semesters was designed to be tested. Therefore, online Project based Human Computer Interaction course was selected as the application course (or vehicle of the study).

### 1.1 Purpose of the study

The main objective of this study is to assess face-to-face (f2f) and online project based learning environment in various dimensions according to the opinions of students and their success. Furthermore, one of the objectives of this study is to determine the problems on the graphical interface design of Moodle LMS according to the opinions of the students. In this study, responses of the below given questions tried to be collected in order to achieve the objectives:

- (a) What are the opinions of the students on the f2f project based HCI course?
- (b) What are the opinions of the students on the online project based HCI course?
- (c) What is the level of success of the students in HCI course which is an online and f2f project based course?
- (d) What are the problems on graphical interface design of the Moodle LMS according to the students?

## 2. Method

The study is designed as a qualitative research methodology. Qualitative research is defined as “the research during which a qualitative process is followed in order to present perceptions and events in a realistic and holistic manner in a natural environment” [14]. In qualitative studies it is aimed to expose the nature of various (multiple) points of views or to determine the reason of their origination [21]. According to LeCompte and Goetz (1984), three types of data are being accumulated in qualitative studies which are “data related to environment”, “data related to process” and “data related to perceptions” and the data related to perceptions are related to the opinions of the individuals who participated in the research group, about the process [14]. This study scrutinizes how certain cases are experienced by the persons who live them. Therefore, it is decided that qualitative research method is required to be used in this study.

The data collection method in the study is selected as focus group interview, observation and performance evaluation scale (rubric). More than one data collection method is used and triangulation was provided. Increase in number of data collection techniques assist increase in validity and reliability of the study [14]. According to Synder (2006), this provides contributions such as diversifying (triangulation) the data collection tools, performing more detailed analysis on the problem and increasing the validity of the study [22].

This study was carried out at “Human Computer Interaction” course which is offered at Eastern Mediterranean University (EMU) during 2010–2011 summer term. Students were divided into two groups as f2f and online and totally 77 students (40 of which participated f2f and 37 of which participated online) participated in this study. The distribution of the participants according to their gender is given in below Table 1.

As to be seen from the above Table 1, total 37 students attended the online learning environment (6 female and 34 male). Total 40 students attended the f2f learning environment (5 female and 32 male). Focus group interviews were held with the student

**Table 1.** Gender distribution of the participant

	Students who attended Online Learning Environment	Students who attended f2f Learning Environment
Female	6	5
Male	34	32
Totals	40	37

at the end of the semester and all interviews were recorded with tape recorders. The records of the interviews were analyzed and then are transferred into computer environment. Furthermore, data was collected also by means of observation in this study. The questions used during interviews and the observation form used, were developed by the researcher. Relevant literature and opinions of the experts in the field were taken into consideration during development of both data collection tools. Data obtained as a result of interviews and observations were analyzed by using descriptive analysis methods. Additionally rubric is used in order to measure the success of the students in their projects. Successes of the students were analyzed by three separate field experts (instructors) by using the same rubric. In other words, the successes of the students were determined as a result of the analysis performed with rubric.

### 3. Findings

The findings obtained as the result of this study were transferred parallel to the research questions of the study. In this section the statements of the students are being given as directly quoted.

#### 3.1 Opinions of the students on the f2f Project Based Human-Computer Interaction Course

As mentioned in the previous section, 40 of the students who attended the class, followed courses in f2f learning environment. The course was performed f2f with the students who were present at the classroom. As a result of the interview made with the students, it has been observed that almost all of the students had affirmative opinion on the f2f Project Based HCI Course. Generally, students think that the f2f Project Based HCI course had important contribution in their self-development and assisted to comprehend the basic topics of the course. Furthermore, students mentioned affirmative opinion about time planning, to comprehend real global problems and to control their learning. Some of the answers given by the students on this issue are as follows:

... we had to continuously research for solution of the faced problems and to spend time for these efforts. Therefore, I believe we have learnt each topic more comprehensively ...

... I believe we achieved a deeper learning in all of the studies we have performed both to get a good grasp of the topic and in negotiations we've performed with our friends ...

... we had an opportunity to scrutinize all concepts mentioned in the course, this assisted our self development. I believe at least we've obtained very important information ...

... this course shall have great contributions in my

Professional life. I can say that this course thought me how to get over the problems that can be faced in professional life and most of all how to grasp the issues by making projects ...

According to the statements of the students, it is seen that they comprehend the topics better in HCI course which is given by means of project based learning method and additionally they think the structure of this course has contributed to their self development and professional development. Furthermore, they have stated that group studies also had an affirmative effect. Therefore, we can say that having studied the course within a project based environment caused students comprehend the topics in depth and made them think that their self development are better.

Some of other highlighted opinions of the students on the f2f project based HCI course that was performed face-to-face are as follows:

... I can say that Project had a contribution for me to understand the necessary topics prior to the deadline of the project and in order to complete the studies on time ...

... in the first stages of the Project we faced difficulties to use the time effectively but at the end of the term both my friends and I recognized that we started to use the time effectively in later stages of the term ...

... you continuously have to take responsibility in completion of the project. This was the first time I felt that I took such a great responsibility in a course ...

... we have learnt how to manage a real project in real time ...

... it was necessary to complete all duties by the all members of the group in order to complete the project. Therefore, both my friends and I shared all information we've obtained at every stage of the project. This process helped us to control ourselves continuously ...

It can be understood from the statements of the students that Project Based Learning approach affirmatively affects their self control in learning, Project management, time planning and taking responsibility on their learning. Minority of the students stated negative opinion on this subject. Some of the highlighted opinions of the students as a result of the interviews are as follows;

... we may face difficulties when we have Project studies in the classroom due to inefficiency of the classroom. For example it is not easy to study as a group within the classroom environment ...

... it was possible to utilize computer and internet however during Project studies this requirement is more necessary. It is hard to make a research with the group ...

... there are time restrictions in classroom environment. We need to complete certain duties within a time limit. It may be more useful to perform such studies according to a program we make ...

... we continuously race against time during the courses. In Project studies we may face time loss ...

... we, as the group, tried to come together during courses. However, it was hard to organize all of our friends continuously. Furthermore, it is not very easy to come together face-to-face. Perhaps we could meet with our friends by another method ...

As seen from the above statements, basis of the problems faced by the students during Project Based HCI course depends on environment and communication problems. Students stated that they faced problems due to time loss and difficulty in organization and insufficiency of meeting with each other. Introduction of the courses with more rich (different media) materials by using environments such as LMS, shall enable to minimize and eliminate such faced problems.

There are studies that introduce Project Based studies increasing learning by research [15]. It is determined that students have the opinion that they had important contribution in deep learning and project & time management as a result of these students. This result also supports the findings of [8].

### 3.2 Opinions of the students on the online Project Based HCI Course

During the interviews with the students who took project based learning session online, they expressed that the learning environment is very rich. During the focus group interviews with the students, various highlighted subjects can be observed. Some of the opinions of the students obtained as a result of the interviews are as follows:

... it was possible to utilize any kind of material in online environment. I could access to any information I needed both from the web site and any sources of internet ...

... having known that all materials and any information we may require could be found in the web site of the course was really relaxing. Furthermore, this also caused to increase our motivation. I followed many topics on website without any time limitation ...

... internet is the most important access point to information of today and gave us the opportunity to reach the results very rapidly during our research on the course ...

... being online in the project made us save a lot of time. We were online whenever required or at the time we determined. This helped a lot to my learning ...

... we contacted both our friends and our instructor through computer during all along the project. By this way our studies were affirmatively affected. We could organize our entire meeting program ...

As to be understood from the above statements, students particularly highlight the rich learning environment. Furthermore, it can be observed that students have the opinion that online learning environment affirmatively effect their computer based communication, group work, time management and their achievement/successes.

Minority of the students had negative opinion about effects of online learning environment and the course as a result of the interviews performed. Some of these opinions are as follows;

... students can get interested in various subjects other than the course during online learning and can digress. For example I sometimes found at a very different point when I researched a subject ...

... we continuously communicated our friends and the instructor online during project studies. Particularly the slow chat application caused problems in our communication ...

... we could face difficulties to gather our friends in web environment. For example some of our friends faced difficulties to connect internet ...

As can seen from the above mentioned opinions, the problems generally faced were generally based on the possibility of digression, problems faced during communication and the internet connection. Awareness of students should be raised and infra-structural problems should be remedied prior to such applications. The opinions of the students on the online project based HCI course seem to support the results of [6].

### 3.3 Successes of the students in Project Based HCI Course within online and f2f learning environment

Successes of the students in their projects have been evaluated with the rubric in this study. The distribution of online and f2f groups of this study are given in Table 2.

As to be seen from the Table 2 above, 8 groups of the students constituted f2f groups and 7 of them constituted online groups the total of which are 15 groups. In the f2f given project based learning environment, there were 8 groups having total 5 students in each. There were totally 7 online groups in this study. There were 5 students in 5 of these groups and 6 students in the remaining two of them. The average of students is generally preferred to be 4-5 students in project based learning studies [16]. Therefore, study groups are constituted as given in above Table 2.

The projects performed by the students were evaluated by 3 different field experts (instructors) with the same rubric. Average of the scores taken by the students in the projects they have performed are given in the below Table 3.

**Table 2.** Online and Face-to-Face Groups

	Group No	Students Number Per Group	Total
Online Group	5	5	25
	2	6	12
Face-to-Face Groups	8	5	40

**Table 3.** Evaluation of Projects of the Students

	Average of f2f Groups	Average of Online Group
Expert1	78,1	83
Expert2	77,5	82,1
Expert3	78,6	80
Total	78,1	81,7

As seen in Table 3 above, the results of the projects performed during HCI course seems to be close to each other. Although the results of the students who took the course in online learning environment seem to be some higher, results of all groups are successful. In line with these results, it can be stated that project based learning application makes student successful either it is applied face-to-face or online. Although the difference between two groups is minor, the better success of the online group should not be ignored.

### 3.4 Problems determined by the students on graphical interface design of Moodle LMS

HCI course was passed to the students through Moodle LMS during online sessions. As previously mentioned, one of the objectives of the study is to determine the problems of the graphical interface design of the Moodle LMS according to the opinions of the students. As a result of the interviews performed with the students at the end of the semester, the opinions of the students on Moodle LMS graphical interface design were analyzed. Generally, it is observed that the opinions of the students center on the menus, forums and chat environments. Some of the opinions of the students are as follows;

... there should be a feature in menus to give the users the opportunity to make arrangement as they wish. In this way users may create a usage environment according to their type and level of use ...

... in multi selection cases of the all dropdown menus in moodle, it becomes hard to make a selection ...

... menu do not pop up as a standard in each newly opened window and you may get far from the main menu with a new window ...

... visibility is poor in forums, attachments that shall highlight the discussion in the forums should be added ...

... long discussions in the forums cause information pollution and necessary data cannot be easily reached. A tool that can filter the information may facilitate to reach information easier ...

... Contrast is not taken into consideration in the chat room, reading difficulty is faced since the color variance of the writings is not good ...

... interaction in chat is somehow poor, users should be permitted to send different messages to each other in order to increase the interaction ...

... visibility of the images used in chat room should be increased and attachments to increase interaction should be added ...

As to be understood from the above statements, students wish to have the menus designed in a way to make customization. They also stated that easy selection mode should be applied particularly in the dropdown menus for multi selection alternatives. Furthermore, students think that the visibility of the forum pages should be increased and an attachment that can enable filtering should be added. Furthermore, students' opinions highlight that interaction in the chat environment should be increased and visibility of the images should be increased and particularly contrast should be taken into consideration and color preference should be re-arranged.

## 4. Conclusions

In this study, f2f and online Project based learning environment was assessed in various dimensions according to the student opinions and their success. Furthermore, the problems in the graphical interface design of Moodle LMS were analyzed by the students at the end of the study.

This study determined that f2f Project Based HCI learning environment contributed to Participants' time planning, comprehension of real global problems and control of their learning affirmatively. However, students also had some negative opinions about the environment which were as follows: difficulties in communication or meeting in f2f environment and lack of richness in the learning environment.

In this study during the online Project Based HCI course environment, it was determined that students were affirmatively effected by their group work, time use and success by the rich learning environment (course materials) and computer based communication. Students also expressed a possibility of being interested in other subjects while being online and difficulties which could be faced in online communication (connection problems of the chat/communication platforms) and internet connection.

The success of the students attended the study in the online environment was a little higher than the students who had courses face-to-face. However results show that the level of the success of the students who took the Project Based HCI course f2f is rather high as well.

The problems determined by the students on the graphical interface design of the Moodle LMS generally focused on menus, forums and chat environment. According to the students, menus had to be user customizable and a feature which provides the selection ease in the windows that popup needed to

be added. It was also determined that students think that visuality in the forums of Moodle LMS should be increased and a feature tenable filtering in forum should be added. Additionally, students asked for an increase in the visibility of the images and interaction in chat environment. Furthermore, students emerged the opinion that the color selection in chat environment should be reviewed.

Conclusively in this study during which two different methods were applied rather than traditionally given HCI courses, it was observed that opinions of the students for both methods were affirmative and their success was rather high in both methods. When consider the popularity of the online learning environment recently, experimentation of new applications as performed in this study should contribute developments in this field and shall assist enrichment of learning-teaching environments.

## References

- H. Keser, N. Şen, G. Göçmenler and F. D. Kalfa, Web Tabanlı Öğretim Materyali Hazırlama Sürecinin Temel Evreleri ve İnternet Kullanımına Yönelik Bir Uygulama Örneği, II. Uluslararası Eğitim Teknolojileri Sempozyumu ve Fuarı Bildirileri, 28–30 November 2001, Sakarya, 2001, pp. 189–197.
- B. Su, Experiences of Preferences for Interactive Instructional Activities in Online Learning Environment. Unpublished PhD Thesis. Indiana University, Instructional Systems Technology Department of School of Education, USA, 2006.
- I. E. Allen and J. Seaman, Going the Distance Online Education in the United States, 2011, Babson Survey Research Group (for Sloan C.) [http://sloanconsortium.org/publications/survey/going\\_distance\\_2011](http://sloanconsortium.org/publications/survey/going_distance_2011). Accessed 25.06.2012.
- M. Minović, V. Štavljanić, M. Milovanović and D. Starčević, Usability Issues of e-Learning Systems: Case-Study for Moodle Learning Management System. R. Meersman, Z. Tari, and P. Herrero (eds), OTM 2008 Workshops, LNCS 5333, 2008. pp. 561–570.
- T. Güyer and M. Ş. Üstündağ, Öğrenme Yönetim Sistemleri ve Örnek Uygulama. H. I. Yalın (ed), İnternet Temelli Öğrenme. (1st Ed.). Ankara. Nobel Yayın Dağıtım, 2008. pp. 233–248.
- E. İscioglu, Çevrimiçi Proje Tabanlı Öğrenme Ortamının Öğrenci Algısına ve Başarısına Göre Değerlendirilmesi: Bir Durum Çalışması. Unpublished PhD. Thesis. Ankara Üniversitesi, Eğitim Bilimleri Enstitüsü, Ankara, 2010.
- [http://cevrimici.anadoluu.edu.tr/genel\\_bilgiler/sub04.htm](http://cevrimici.anadoluu.edu.tr/genel_bilgiler/sub04.htm). Accessed 12 October 2009.
- E. İscioglu and I. Kale, An Assessment of Project Based Learning (PBL) Environment Based on the Perceptions of Students: A Short Course Case Study on Circuit Design for VLSI, *International Journal of Engineering Education (IJEE)*, **26**(3), 2010, pp. 564–572.
- J. Macias-Guarasa, J. M. Montero, R. San-Segudno, A. Araujo and O. Nieto-Taladriz, A Project-Based Learning Approach to Design Electronic Systems Curricula, *IEEE Transactions on Education*, **49**(3), 2006.
- A. Stojcevski and D. Fitrio, Project Based Learning Curriculum in Microelectronics Engineering, *14th IEEE International Conference on Parallel and Distributed Systems (ICPADS'08)*, Melbourne, Australia, 2008.
- J. L. Gonzalez-V and J. E. Loya-Hernandez, Project-Based Learning of Reconfigurable High-Density Digital Systems Design: An Interdisciplinary Context Based Approach, *37th ASE/IEEE Frontiers in Education Conference*, Milwaukee, 2007.
- M. Rush, D. Newman and D. Wallace, Project-Based Learning in First Year Engineering Curricula: Course Development and Student Experiences in Two New Classes at MIT, *International Conference on Engineering Education—ICEE-2007*, Coimbra, Portugal, 2007.
- F. Machado, S. Borromeo and N. Malpica, Project Based Learning Experience in VHDL Digital Electronic Circuit Design, *IEEE International Conference on Microelectronic Systems Education MSE '09*, 2009.
- A. Yıldırım, and H. Şimşek, *Sosyal Bilimlerde Nitel Araştırma Yöntemleri*, Seçkin Yayıncılık, Ankara, 2005.
- M. Gültekin, The Effect of Project Based Learning on Learning Outcomes in the Fifth-Grade Science Education, *Elementary Education Online*, **6**(1), 2007, pp. 93–112.
- M. Erdem, Proje Tabanlı Öğrenme, *Hacettepe Eğitim Fakültesi Dergisi*, **22**, 2002, pp. 172–179.
- A., Kolmos, P. Qvist and X. Y. Du, Design of a virtual PBL learning environment—Master in Problem Based Learning (MPBL), 2006, Web: [http://vbn.aau.dk/fbspretrieve/4474433/AK\\_PQ\\_XD\\_SEFI\\_2006.pdf](http://vbn.aau.dk/fbspretrieve/4474433/AK_PQ_XD_SEFI_2006.pdf), Accessed 22 September 2008.
- M. Tuncer, Elektronik Devreler Dersinin Sanal Ortamda Proje Tabanlı Öğrenme Yöntemine Göre Sunulmasının Öğrenci Başarısı ve Görüşlerine Etkisi. Unpublished PhD Thesis, 2007, Sosyal Bilimler Enstitüsü. Fırat Üniversitesi, Elazığ.
- F. Martin and I. Devenish. Project based learning in distance mode: Challenges and triumphs of online engineering student teams, 2007 Web: [www.waceinc.org/pdf/Martin%20&%20Devenish%20\\_%20Project%20based%20learning%20in%20distance%20mode.pdf](http://www.waceinc.org/pdf/Martin%20&%20Devenish%20_%20Project%20based%20learning%20in%20distance%20mode.pdf), Accessed 25 January 2007.
- H. R. Maier, A Hybrid just-in-time/Project-based learning approach to engineering education, *Proceeding of the 2008 AaeE Conference*, Yeppoon, Australia, 2008. [http://aaee.com.au/conferences/papers/2008/aaee08\\_submission\\_M1A4.pdf](http://aaee.com.au/conferences/papers/2008/aaee08_submission_M1A4.pdf), Accessed 12 December 2009.
- P. D. Leedy and J. L. Ormrod, *Practical Research: Planning and Design* (8. ed.), New Jersey: Prentice Hall, 2005.
- A. L. Snyder, Mixed-method designs, In J. H. McMillan & S. Schumacher (eds.), *Research in education: Evidence-based inquiry* Boston: Allyn and Bacon, 2006. pp. 400–420.

**Ersun İscioglu** received the B.Sc. degree in Electrical and Electronic Engineering from the Eastern Mediterranean University, Famagusta, North Cyprus and M.A. degree in Educational Sciences from Eastern Mediterranean University in 2002 and 2005, respectively. He received M.Sc. degree in Electronic Engineering (System-on-Chip Design for DSP and Communications) from the University of Westminster, and the Ph.D. in Educational Technology (Computer Education and Instructional Technologies) from the Ankara University. He is currently Asst. Chair of the Department of Computer and Instructional Technology Teacher Education of Eastern Mediterranean University. His research interests include online and face-to-face Project/Problem/Work Based Learning, Engineering Education, Vocational Education, Distance Learning, ICT Learning, Learning Technologies, Information Forensics and Security, Cryptology, and Computer/Internet (Based) Education.