WCES-2010

Using user-centered design approach in course design

Z. Ezgi Haliloğlu Kahraman[a] *

[a]Faculty of Engineering and Architecture, Çankaya University, Ankara, 06030, Turkey

Abstract

User-centered design approach is a contemporary design approach which actively involves users at every stage of the design process for the development of more effective, efficient and safe products. This paper is based on a case study that attempts to adapt this approach into course design in order to increase the effectiveness of teaching, and the learnability and success of university students. The paper discusses the phases of the designing process including analysis of student needs, limitations and expectancies in the teaching process, designing teaching activities, and assessment of students about courses designed with respect to user-centered design approach

© 2010 Elsevier Ltd. Open access under CC BY-NC-ND license.

Keywords: User-centered design approach; teaching methods; learnability; effectiveness of courses; course design.

1. Introduction

The term user-centered design was firstly used in the area of human-computer interaction in University of California San Diego in the 1980s (Norman and Draper, 1986). The first applications of user-centered design approach in this area referred the needs and interests of users and focused on the usability of computer design. Those applications proposed easily understandable and usable actions and systems in computer design. This attempt places the users at the center of the design process. The designer who acts as the facilitator and mediator in the design process facilitates the task for the user and enables the use of the product with a minimum effort to learn how to use it (Norman, 1988).

The recent discussions describe user-centered design as a design approach in which the users influence the design process (Abras et al., 2004). In this process, the designer designs products and services for a specific purpose in terms of operations and the tasks that users request (Rubin, 1994). By considering the satisfaction of the users, this design approach aims to increase the use, success and performance of the designed product. At the end of the design process, the user can use the final product with minimum effort and optimum efficiency. Therefore, the user-centered design process specifies the user as an active participant in the design of the product (Johnson, 1998).

User-centered design objects to optimize the usability of designed products rather than forcing users to change their ways to act to use the product. Usability of a product depends on the context of use, the features of the designed product and the profile and satisfaction of users. Within this framework, user-centered design process

---
* Z. Ezgi Haliloğlu Kahraman. Tel.: +90-312-284-4500/215; fax: +90-312-284-8043
E-mail address: ekahraman@cankaya.edu.tr

includes analysis of needs, limitations, preferences and expectations of users, creating design solutions, and evaluations of users about the final version of the design after their use (Peerce et al., 2002).

The field of education concentrates highly on learnabillity and success of students who are the users of the education system. This study examines whether a tutor as a designer of courses in university education may apply similar approach and its methodology to design his/her courses in order to increase the effectiveness of teaching and the success of students. To do this, I attempt to adapt user-centered design approach into the elective courses that I teach in the department of interior architecture in Cankaya University.

The following parts of this study introduce the methods and findings of the case study in which I apply user-centered design approach and its phases to redesign my teaching methods that I use in my courses. The methodological framework of the study covers data collection and data analysis procedures used in this process. Data collection process includes focus groups and questionnaires. Content analysis reveals inputs for the redesigning process of courses and student assessments about courses designed with user-centered design. The second part of the paper discusses the findings of the analytical process. The discussion and conclusion parts summarize the study, assess the findings of the study in relation to the literature about user-centered design, and propose new researches for further studies.

2. Method

To adapt user-centered design approach in course design in university education, I pursued case study methodology. I used this approach to design three of my elective courses that I teach in the department of interior architecture in Cankaya University. These courses based on different dimensions and scales of design are social and cultural factors in design, user needs and satisfaction in interior architecture and urban design. Each of these three-credit departmental elective courses is offered to the third or the fourth year interior design students.

I, first, adapted user-centered design approach to redesign 'social and cultural factors in design'. This course aimed to teach students the interrelationship between physical setting and social and cultural dynamics. Eighteen students taking this course participated into the study. This class had nine students from fourth year; seven students from third year; and two students from second year interior design education.

Second, I used the same approach to design 'user needs and satisfaction in interior architecture', with the involvement of eight students. The whole class was composed of fourth year students. This course attempted to provide students the consciousness of the user dimension in design processes.

Finally, I designed teaching methods of 'urban design' according to user-centered design approach. The objective of the course is to teach students the notion of reading, analyzing, and designing the urban space. The whole class composed of eight fourth year students participated into the study.

2.1. Focus groups and the analytical procedure of revealing factors affecting learnability and success of students

In the beginning of the design process of each of the three courses, I informed students about user-centered design approach and its methodologies that I intended to adapt for redesigning the existing courses. I collected the data for developing teaching methods of courses through focus groups. The focus group for each course included all the students taking the course. This method encouraged students of courses to express and share their perceptions, feelings and ideas with each other about their needs and limitations in their learning process, and their expectations from given courses. Furthermore, focus groups elicited diverse views and proposals of students on teaching methods facilitating their learnability and success in the teaching process.

I asked three questions to focus groups: (i) what are the factors increasing your learnability in courses? (ii) What are the factors increasing your success in courses? (iii) if you were the tutor of this course, which methods would you use to increase the learnability and success of your students?

I reported and recorded the answers of the students in their own conceptualization. To analyze the data collected in focus groups, I conducted content analysis. Content analysis reduced the answers of students into categories of perceptions about factors increasing their learnability and success in their learning process, and their proposals for teaching methods.

2.2. Questionnaires and analytical procedure of revealing evaluations of students about courses

According to the results uncovered in content analysis, I designed the teaching activities of courses. At the end of the each academic semester, I employed questionnaires to students taking my courses in order to collect the data about student evaluations and satisfaction from the course. In the beginning of the evaluation process, I informed students about the objectives of questionnaires. Moreover, to collect the objective assessments of students about courses, I asked them not to write down their names on questionnaires. After distributing the questionnaires, I left the lecture room in order to let the students answer the questions freely.

In the questionnaires, I asked three open-ended questions: (i) what do you think about the content, teaching method, and the tutor of the course? (ii) can you evaluate your satisfaction from this course over 5 (5 indicates maximum satisfaction and 1 indicates minimum satisfaction.)?

The answers of the first question helped me uncover the evaluations of students about courses. To elicit dimensions of evaluations about courses, I analyzed collected data with content analysis. Content analysis grouped the evaluations of students about courses designed with user-centered design approach. I used the answers of the second question to examine the satisfaction levels of students from the courses. To see the diversities in satisfaction levels, I used descriptive statistics.

3. Results (Findings)

The results of analytical procedures include perceived factors affecting learnability and success of students, proposals of students for teaching methods, teaching activities of courses designed according to user-centered design approach, evaluations of students about the courses, and satisfaction of students from the courses. The following parts discuss these findings of analytical procedures.

3.1. Perceived factors affecting learnability and success of students

The perceptions of students about factors that increase the success of students included six dimensions. These factors were the interest of student to the subjects of the course; learning by practicing in the class; existence of a friendly relationship between students and the tutor; existence of effective communication with the tutor, not feeling the need to memorize the subjects of the course by heart, but remembering them through visual association; availability of factors not obstructing the concentration of students such as low number of students, fresh air and moderate temperature in the class.

Table 1. Perceived factors to increase the learnability and success of students, student proposals for teaching methods of courses

Perceived factors increasing the learnability of students	Perceived factors increasing the success of students	Student proposals for teaching method
Presentation of the subject by the use of visual media	The interest of student to the subjects of the course	Presentation of the subject by the use of visual media
Learning by practicing in the class	Learning by practicing in the class	Praxis of theoretical discussions in the class
Student participation into the course by asking questions (class participation)	Existence of a friendly relationship between students and the tutor	Encouraging student to ask questions in the class
Interactive class discussions about the subject	Existence of effective communication with the tutor	Interactive class discussions about the subject
Supporting the theoretical discussion with contemporary examples	Not feeling the need to memorize by heart, but remembering them through visual association	Giving students the opportunity to express their ideas freely during the class
	Availability of factors not obstructing the concentration	Establishing effective communication with the students during the course
		Supporting the theoretical discussion with contemporary examples
		Supporting the subjects discussed in the class with appropriate homeworks

This study also revealed the proposals of students for teaching methods to increase the learnability and success of them. These proposals are presentation of the subject by the use of visual media; praxis of theoretical discussions in the class, encouraging student to ask questions in the class; interactive class discussions about the subject; establishing effective communication with the students during the course; giving students the opportunity to express their ideas freely during the class; supporting the theoretical discussion with contemporary examples; and supporting the subjects discussed in the class with appropriate homeworks. Table 1 shows the content categories which reflects perceptions of students about factors increasing their learnability and success in the learning process, and their proposals for teaching methods of courses.

3.2. Teaching activities

Both the perceived factors increasing learnability and success of students in the learning process and the student proposals for teaching methods guided me in designing the teaching activities of courses. I categorized these activities in six major parts. As Table 2 displays, these activities included tutor's theoretical presentation of the subject by using visual media; enriching the presentation with contemporary developments and examples in the related field; interactive class discussion about the subject; answering the questions of students; praxis of each theoretical discussion through group works in the class; a field study related to the subjects discussed in the course; and an exam including visually supported questions.

Table 2. Teaching activities designed with user-centered design approach, and assessments of students about the courses designed with user-centered design approach

Designed teaching activities	Assessments of students about elective design courses
Theoretical presentation of the subject by using visual media	Praxis of theoretical discussions in the class
Enriching the presentations with contemporary developments and examples in the related field	Presentation of subjects by using various visual media
Interactive class discussion about the subject	Carrying out sincere and friendly relationship with students
Answering the questions of students	Including discussions about various subjects and their relationship between design
Praxis of each theoretical discussion through group works in the class	Not expecting students to memorize subjects of the course by heart
Field study related to the subjects discussed in the course	Including contemporary examples about the subjects
An exam including visually supported questions aiming to refresh the accumulated knowledge	Including examples from Ankara and Turkey
	Encouraging students to express their feelings and ideas freely
	Encouraging student participation to the course
	Including group works that increase learnability
	Including too much group works that strictly controls students
	The only course in the department including field work
	Expecting students to work hard

The bundle of teaching activities aimed to increase the effectiveness of courses, and success and learnability of students. I followed some of these activities in each lecture hour. These are tutor's theoretical presentation of the subject by using visual media; enriching the presentation with contemporary developments and examples in the related field; interactive class discussion about the subject; answering the questions of students; and praxis of each theoretical discussion through group works in the class. I used the field study and the exam as two of the teaching methods and as methods of evaluating the success of student from the course. The learning and grading process of the field study included the process of doing a research in the field, its presentation and writing its report. With the help of visual questions in the mid-term, I intended not only the evaluation of the success of students but also refreshment of the knowledge accumulated during the course.

3.3. Evaluations of students about courses

The last phase of the study grouped the perceptions and evaluations of students under eight categories. These categories included praxis of theoretical discussions in the class; presentation of subjects by using various visual media; carrying out sincere and friendly relationship with students; including discussions about various subjects and their relationship between design; not expecting students to memorize subjects of the course by heart; including contemporary examples about the subjects discussed; including examples from Ankara and Turkey; encouraging students to express their feelings and ideas freely; encouraging student participation to the course; including group works that increase learnability; including too much group works that strictly controls students; the only course in the department including field work; and expecting students to work hard.

Descriptive statistics showed that 92% of students taking the courses evaluated their satisfaction level with 5 which indicated the maximum satisfaction level. 4% of students evaluated their satisfaction level with 4, and 4% of them with 3. There were no students that evaluate their satisfaction level with 2 or 1.

4. Discussion

This study attempted to apply user-centered design approach used in product design processes in teaching. The related literature does not include any studies that used the same approach in course design. However, the findings of the study are consistent with the literature on user-centered design.

Johnson (1998) defines user-centered design process as a process that involves users at every stage of the design process and evaluation of the product. The present study believes the need to design the course through the participation of students. This understanding places students in the center of the process (Abras, 2004) and design the course with the participation of its users in each stage of the decision making and design processes.

Evans (2002) discusses that user-centered design process includes three major phases: pre-design analysis, creating design solutions, and post-design evaluations. The present study followed similar phases in the course design process. The process started with analyzing the needs, constraints, expectations and proposals of students in the teaching process. Peerce et al. (2002) specifies the methods that can be conducted in this process as interviews, questionnaires, focus groups, role playing exercises and/or on-site observations. This study used focus groups to reveal the data for designing courses. This data led to design effective teaching methods that increase user learnability and success. Peerce et al. (2002) describes these outputs of the user-centered design process as effectively, efficiently and safely usable products. According to Abras et al (2004), post-occupancy evaluations as the last phase of user-centered design uncover the assessments of the users about the final version of the design after their use. In this phase designers carry out opinion questionnaires or interviews to collect qualitative data related to user satisfaction and any problems with functionality needing to be solved. The present study conducted questionnaires to elicit student evaluations about courses and satisfaction from courses designed with user-centered design approach. The findings of the study showed that a course design process involving students in every stage created appropriate design solutions for student needs and expectations.

Further research may investigate the appropriateness of user-centered design approach for different fields of university education, and may apply similar methodologies in designing teaching activities of various courses. Moreover, further studies may compare the success and learnability of students in courses designed with user-centered design approach with courses using different teaching methodologies.

5. Conclusion and Recommendation

This paper intended to adapt user-centered design approach in course design and teaching processes. User-centered design approach is a contemporary approach that actively involves users into the design process of computer applications and industrial products in order to develop more effective, efficient and safe products. The intent of the study helped application of a new methodology in teaching since the literature does not include any study that applies user-centered design approach in the field of education. I applied the methodologies of user-centered design approach into three of the elective courses that I teach in the department of interior design in Cankaya University. As it exists in user-centered design approach, the process included analyzing the user needs,

limitations and expectations, designing teaching activities according to the findings of the analysis process, and getting student assessments about courses and evaluating student satisfactions from courses.

First, the discussions in focus groups with the participation of totally 34 students, and content analysis process uncovered perceptions of students about factors affecting their learnability and success, and student proposals for teaching methods. The findings of the analytical procedures illustrated that, in the learning and teaching processes, students needed and expected visual presentation of subjects supported by contemporary examples, praxis of theoretical discussions, class participation, interactive discussions, not memorizing the subjects by heart but methods to let them remember the subjects by visual association, effective communication and a friendly relationship with the tutor, free expression of ideas, appropriate homeworks to review the subjects discussed in the class, and appropriate physical conditions to concentrate the course.

Second, these inputs led to prepare teaching activities of courses that were consistent with user needs, expectancies and proposals involved visual presentations. These activities included contemporary examples, interactive class discussions, answering student questions, praxis of discussions, a field study and an exam providing students to refresh the accumulated knowledge.

Finally, questionnaires with students of courses and content analysis elicited student evaluations about courses The positive evaluations of students about courses proved the consistency of teaching activities with user needs, expectancies and proposals. Furthermore, descriptive statistics about student satisfaction showed that courses designed with user-centered design approach provided maximum satisfaction to 92% of the students taking these courses.

To conclude, this study displayed that user-centered design approach can be used in course design. It revealed that the application of methodologies of user-centered design into teaching process of university education increased the effectiveness of courses, and learnabilty and success of students. This study may lead to further researches using the same teaching methodology in designing various courses in various fields.

References

Johnson, Robert R. (1998). User-centered technology, a rhetorical theory for computers and other mundane artifacts. Albany, NY: State University of New York Press, (Part II and III).

Abras, C., Maloney-Krichmar, D. & Preece, J. (2004). User-Centered Design. In Bainbridge, W. Encyclopedia of Human-Computer Interaction. Thousand Oaks: Sage Publications. (in press).

Rubin, J. (1994). Handbook of usability testing: how to plan, design and conduct effective test. (pp. 3-46). John Wiley & Sons

Norman, D. A. & Draper, S. W. (Editors) (1986). User-Centered System Design: New Perspectives on Human-Computer Interaction (pp.87-124). Lawrence Earlbaum Associates, Hillsdale, NJ.

Norman, D. (1988). The design of everyday things. New York: Doubleday.

Preece, J., Rogers, Y., & Sharp, H. (2002). Interaction design: Beyond human-computer interaction. New York, NY: John Wiley & Sons, (Chapter 9-13).

Evans, Meryl K. (2002, October 8). Peter Merholz and Nathan Shedroff on user-centered cesign. Retrieved November 20, 2009, from http://digital-web.com/articles/peter_merholz_and_nathan_sherdroff/