

A COMPARATIVE STUDY BETWEEN DESIGN STUDENTS AND PROFESSIONALS TO UNDERSTAND THE EFFECTIVENESS OF ERGONOMICS EDUCATION IN INDUSTRIAL DESIGN COURSES IN TURKEY

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ABSTRACT

Ergonomics lectures have been a sustained element of industrial design education in Turkey. In this paper, effectiveness of ergonomics education is researched. For this intention a questionnaire survey was conducted with design professionals and students, whom were asked to give their opinion about ergonomics education and application in Turkey through open-ended questions. The results are discussed to see if any improvements can be suggested for certain issues.

Keywords: design, ergonomics, education

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1 INTRODUCTION

Ergonomics is a basic element to be considered during Industrial Design education. Students getting education in this discipline and also professional designers frequently require utilizing ergonomics evaluation methods in their design projects. Most of the Turkish universities providing education in this field include ergonomics and human factors modules in both undergraduate and postgraduate levels. However, it is a matter of research that how effectively students implement ergonomics and use their knowledge in their professional practices during their education.

It is frequently thought that, designers have a tendency to build projects for themselves rather than potential users (Margolin, 1997; Kates & Clarkson, 2003; Kates & Clarkson, 2004). In fact, Pheasant (2003) states that, one of the common mistakes designers make is to think as “The design is satisfactory for me – it will therefore, be satisfactory for everybody else”. Therefore, designers need to use data that are linked with ergonomics, as it “...addresses the psychological aspects of how people interact with products, such as user perception, cognition, memory, reasoning and emotion” (Rodgers & Milton, 2011). This is why ergonomics is a basic part of industrial design education in Turkish universities, as well as other universities worldwide.

As a part of a more in-depth research, the aim of this study was to evaluate ergonomics and human factors education of industrial design departments in Turkey. In our study, we held a survey among 79 students from industrial design departments of various universities and 71 professional designers. In this survey, we tried to identify possible problems in both ergonomics education and application, by means of open-ended questions and likert-scaled questions.

This paper presents the findings derived from the open-ended questions about participants’ thoughts on the effectiveness and relevant issues of ergonomics education in industrial design courses in Turkey. In certain cases, the findings were also supplemented by the data gathered from likert-scaled questions in order to provide a better perspective of participants’ thoughts. The data collected from design students and professionals were investigated separately and then compared with each other. The open-ended questions studied for this paper are:

- How satisfying was the ergonomics module they took during their design education, and why?
- How deeply do the participants think their projects (student or professional projects) are assessed in terms of ergonomics?
- How easily do the participants reach data on ergonomics and why?

2 METHODOLOGY

A structured self-administered online questionnaire survey with open-ended questions was used as the main method of this study (Robson, 2002). This method enabled researchers to send the questionnaire to potential participants easily and more anonymously, also it helped to find possible participants from various universities from different cities. During the preparation of the questionnaire, SurveyMonkey online questionnaire tool was used.

3 RESULTS

The study was examined in three main parts. Firstly, the participants were asked how deeply do they think their projects are evaluated in terms of ergonomics qualities. Afterwards, they answered a question about if they think they reach ergonomics data easily. Finally they replied a question on to what degree do they think their ergonomics education was satisfying.

2.1 Evaluation of Ergonomics Education

The participants were asked about their thoughts on the efficiency of the ergonomics education they received. For this purpose a five point likert scale question (1 means “completely unsatisfactory”; 5 means “very satisfactory”) was used. This question had a following and optional open-ended question, where the participants were asked to give comments about their experiences, if they would like to do so.

According to the results, the mean values for this question were 2.6 for both students and professionals, which are below the average. The most common answer was “had an idea of it” for the both participant groups, which accounts for 45.6% of the students and 56.3% of the professionals.

Regarding the subsequent open-ended part of the question, several reasons were mentioned by 43 out of the 79 students and 27 out of the 71 professionals. During the analysis of their answers, it was observed that both participant groups shared similar comments. Their answers are reviewed and coded into five categories as follows:

- Instructor was incapable
- Insufficient applied studies
- Syllabus was not suitable for industrial design
- Course duration was short
- Syllabus was found poor

The results are presented in Figure 1 as percentage for each of the category and for both of the participant groups.

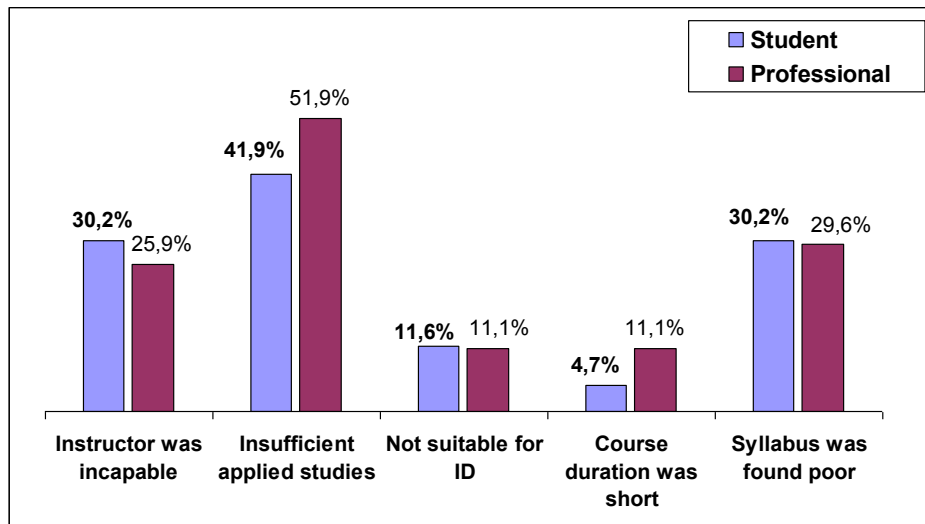


Figure 1. The reasons reflecting participants' dissatisfaction of the ergonomics modules they took

As can be seen from the results, the percentages are very similar in all the categories for both students and professionals, where “insufficient applied studies” were the mostly mentioned category. The common reasons behind their responses are summarised below.

Instructor was incapable: Criticisms on instructors varied from their lack of knowledge to their lack of attendance. Some typical answers are as follows;

“Our instructor didn’t mastered the subject.”(P)

“I think neither students nor the instructor paid the necessary seriousness for this subject.”(S)

Insufficient applied studies: Most of the attendees mentioned that the education they received were mainly theoretical. Their general idea was, for industrial design education, ergonomics should be taught through application and case studies. Some of their comments;

“It was mostly taught through theory; had it been taught with applications, it would be more helpful.”(P)

“It could be more efficient. It should be with application, and if there is any (application), more importance should be given.”(S)

Syllabus was not suitable for industrial design: Participants who thought the course was not suitable for industrial design, expressed problems with respect to lack of connection between ergonomics data given and their relevance to actual design problems. They also argued the knowledge provided was being more suitable for engineering purposes. Some of their answers are as follows;

“...we took the exact same course engineers take, it shouldn’t be like that...”(P)

“Course is too theoretical. Industrial design and ergonomics concepts are not combined in the course.”(S)

Course duration was short: A few respondents mentioned that course hours were not enough for a proper ergonomics education:

“I think ergonomics course hours are not enough...” (P)

“I think subjects were taught superficially because course hours were not enough.”(S)

Syllabus was found poor: Some students argued that the syllabus was insufficient. Their criticisms varied from lack of case studies to lack of sources:

“The syllabus was poor.” (P)

“Present product solutions were examined, but we didn’t discuss what difference can be made on these solutions.” (S)

2.2 Evaluation of Projects Regarding Ergonomics

The participants were asked how intensely their projects were evaluated regarding ergonomics. For this purpose a five point likert scale question (1 means “never”; 5 means “always”) was used. This question also had a following and optional open-ended part, where the participants were asked to give comments about their experiences, if they would like to do so.

According to the results, the mean values for this question were 3.8 for students and 3.5 for professionals, which are both above the average.

When students were asked how intensely their projects were evaluated in terms of ergonomics, 58 out of the 79 attendees shared their thoughts by responding to the open-ended part of the question. Their responses are reviewed and coded into five categories. On the other hand, 32 out of the 71 professionals also answered the same question and, there was only one additional category for them, which is “Unawareness”. All of the six categories are listed as:

- Depends on the sector
- Other product features outweigh
- End-users’ demand
- Inevitability of ergonomics
- Awareness
- Unawareness

The results are presented in Figure 2 as percentage for each of the category and for the both participant groups.

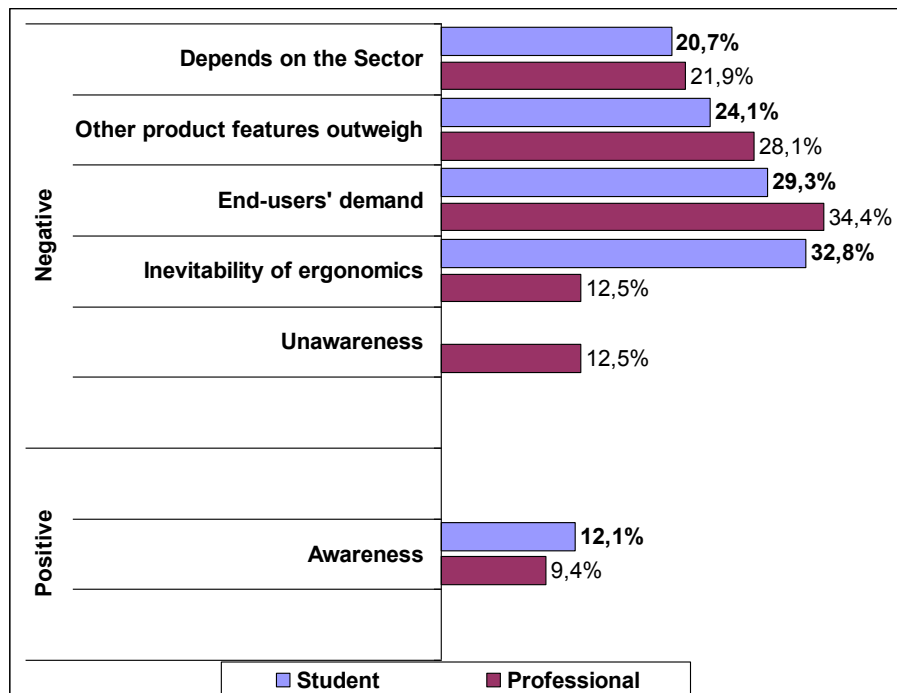


Figure 2. The reasons of why participants think ergonomics is taken/not taken into account

The reasons behind the responses are summarized below.

Depends on the sector: Respondents mentioned that the attention given to ergonomics might differ according to the sector, as well as products. Various factors may affect the attention level; like products’ level of user interaction, segmentation, frequency of use, etc. Examples for responses are;

“Depends on the product.” (P)

“... If it’s something to be frequently used, ergonomics is taken into account.” (S)

Other product features outweigh: Students and professionals both stated that sometimes the importance given to other product features like cost, aesthetics, etc., dims the attention paid to ergonomics.

“If aesthetics is found adequate, ergonomics can be of secondary importance.” (P)

“Usually there won’t be much time left to discuss ergonomics and some other issues because mostly conceptual matters are discussed.” (S)

End-users’ demand: Attendees also mentioned that attention is paid to ergonomics, as end-users value ergonomically designed products.

“Because ergonomics is a vital element that defines comfort of usage.” (P)

“Paying attention to ergonomics makes difference in a product regarding personal health and ease of use.” (S)

Inevitability of ergonomics: Some participants declared that attention is paid to ergonomics because it is an inevitable element of a design project.

“Being ergonomic is the most important feature of a product” (P)

“... the primal feature of a product should be enabling users to use and manage it.” (S)

Awareness: Respondents stated that attention was paid for ergonomics because evaluators are being aware of its’ importance.

“Because final evaluators have taken design education.” (P)

“If we design with consideration of ergonomics issues, our designs become more realistic, so our instructors pay attention for ergonomics.” (S)

Unawareness: Some professionals mentioned that evaluators didn’t pay enough attention to ergonomics as they were not aware about its importance.

“They don’t know how to evaluate.”(P)

2.3 The Accessibility of Ergonomics Data

The participants were asked if they found it easy to reach ergonomics data. For this purpose a five point likert scale question (1 means “never”; 5 means “always”) was used. This question also had a following and optional open-ended part, where the participants were asked to give comments about their experiences.

According to the results, the mean values for this question were 2.7 for both students and professionals, which are below the average. Only two student participants chose the answer “Always”. When students were asked how easily they could reach necessary ergonomics information, most of them mentioned several reasons reflecting their difficulties. 45 out of the 79 students answered this question. Their responses are reviewed and coded into six categories, which are as follows:

- Insufficiency of sources
- Lack of sources written in native language (Turkish)
- Difficulty of finding specific information
- Research related problems
- Availability of similar projects
- Lack of time

On the other hand, 32 out of the 71 professionals also responded to this question, where their responses are coded into seven (five of the categories are the same with students) categories:

- Insufficiency of sources
- Lack of sources written in native language (Turkish)
- Difficulty of finding specific information
- Research related problems
- Lack of time
- Resources are not suitable for industrial design
- Lack of local data

The results are presented in Figure 3 as percentage for each of the category and for both of the participant groups.

The common reasons behind their responses are summarised below.

Insufficiency of sources: Many participants mentioned that they have difficulty to reach ergonomics data because there is a lack of sources.

“Sources are limited and inadequate.”(S)

“There are many helpful ergonomics softwares, but they are still not common.”(P)

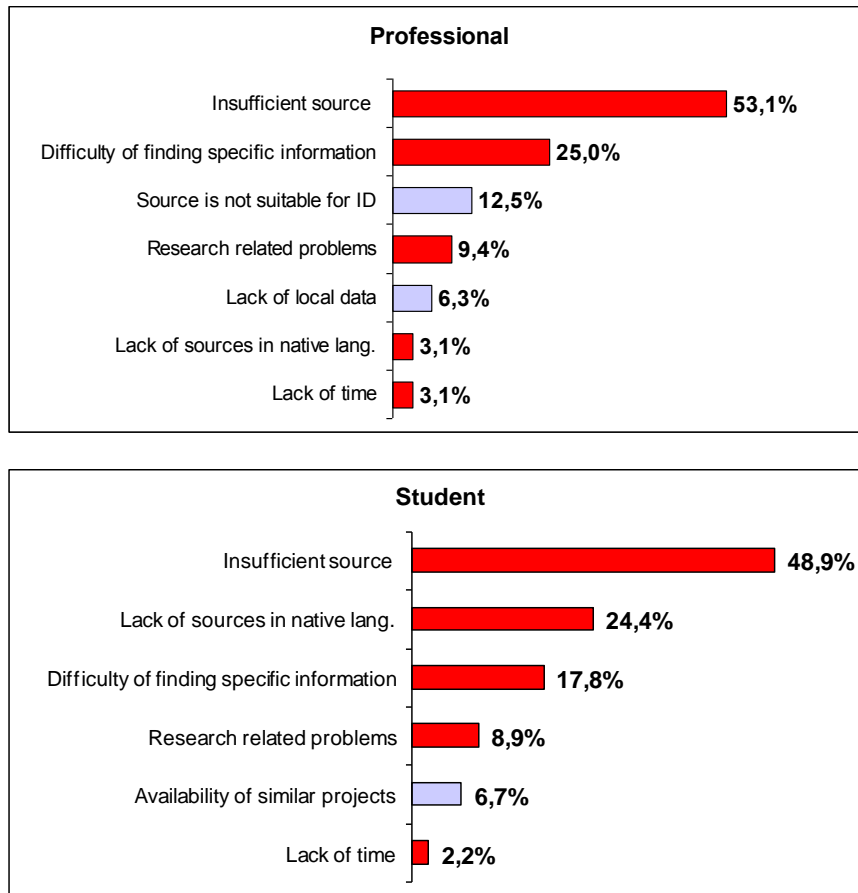


Figure 3. Difficulties in reaching ergonomics data

Difficulty of finding specific information: Attendees mentioned that, ergonomics data needed may differ in accordance with the product they work on, and for specific occasions, it can be difficult to reach the information needed;

“I think, if a unique design is requested, data gathered from various sources are not enough; therefore hands-on studies and observations are needed.”(S)

“Whether or not I can find the information I need depends on the product I design.”(P)

Research related problems: Participants also mentioned some research related problems;

“It is not always possible to be sure about reliability/ objectivity/ timeliness of the information that can be reached.”(P)

“When I don’t know how to search the necessary information, it is hard to reach the data.” (S)

Lack of sources written in native language (Turkish): Lack of sources that can be found in native language is also frequently mentioned as a barrier;

“...Especially, finding sources written in Turkish is extremely hard.”(P)

“If I need an up-to-date source, I need sources that are written in foreign languages. My English, sadly, is not enough for reading those papers.”(S)

Lack of Time: Very few people mentioned that lack of time is also an issue;

“... but to find the time needed to process the information found is an issue.”(S)

“Because a working habit based on internet search is formed as there is no time to talk with users, experts and to examine existing products.”(P)

Availability of similar projects: Some of the students declared that they find the data they need if they can reach to projects which have been done before on similar subjects:

“It depends on whether I can find projects done before on similar subjects.

“It depends on the product. If there are people around me using similar products, then I have more opportunity to get information about ergonomics of the product or to make observations on them.”

Resources are not suitable for industrial design: Many professionals mentioned that the resources they frequently use on ergonomics are not always relevant for industrial design process.

“Ergonomics books mostly contain the same classical calculations and most of them are not for designing products but for designing working area or environments like cockpits.” (P)

“Finding the suitable ergonomics regulations is sometimes extremely hard.” (P)

Lack of local data: Some professionals mentioned that data coming from foreign resources may not be suitable for designing products in Turkey, and local data is needed.

“...Anthropometrical data on foreign sources are not suitable for Turkish ergonomics.”(P)

“Because there are no rules that have universal validity.”(P)

4 RESULTS

Based on the results derived from this research, it can be said that, both professionals and students mentioned common problems for the three topics that were analysed.

When participants were asked about efficiency of their ergonomics education, most of them mentioned that there were insufficient applied studies, their instructors were incapable and syllabuses were poorly designed. Those answers give rise to thoughts about an overall misfit between students' requirements and lectures provided. As most of the participants were not happy about dominance of theoretical information in the lectures, this may indicate that they can not always relate those information to practice. Therefore the results suggest that there are ongoing problems in ergonomics education, as both answer categories and ratings were very similar for both participant groups. However, more studies should be done in order to identify the problem areas in teaching ergonomics in industrial design courses in Turkey.

The question about ergonomics consideration level suggests some similar tendencies among project instructors in universities and professional evaluators in the industry. According to the results, the attention paid to ergonomics depend on variables such as end-users' demand, relative importance of other product features and sector demands. An interesting result is, while many of the student participants considered ergonomics as an inevitable element of product design, the percentage of professionals who also mentioned this fact was noticeably less. This may support the idea that the priority given to certain variables may differ in industry when compared to design education.

Both students and professionals frequently expressed having difficulty in accessing ergonomics data. Insufficiency of resources available for designers' use was the most mentioned problem. In addition, several participants from both groups emphasized that they find it difficult to reach specific information when needed. On the other hand, although students frequently mentioned the lack of resources written in native language as an obstacle, this was not that common among professionals. While professionals mentioned that resources are not suitable for industrial design practice, none of the students also expressed this as an issue for them. This may suggest that, students' are not aware of the quality of information available since their level of knowledge is less sufficient to judge the relevance of the information found. Rather, they require understanding basic of ergonomics. On the other hand professionals frequently need more advanced level of information which is more specific to industrial design practice.

In this research, it was interesting to see similarities in the answers given to questions regarding ergonomics data accessibility and evaluation by both participants groups. This may be because some of the design evaluators and researchers working in the industry are also industrial designers, as mentioned by participants. Also this hints that industrial designers do not face a much different environment when they start their professional studies.

Through these findings, workshops can be formed to discuss possible ways of improvement to ergonomics education. Especially categories that state reasons for inefficiencies may be listed and participants may be asked to form certain methods for effective internalization of ergonomics data among students. On further studies, communication and teaching methods suggested through workshops can be tested and results may be discussed.

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