

# Transferring Experience in Industrial Design Studio Education

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**Abstract:** Design studio courses are the basis of industrial design education. The product design projects carried out by academic and private sector experienced full-time and part-time instructors are shaped inline with the domain and experience of the lecturers. Assessment criteria may also change with the content of each product design project implemented. Instructors convey the values and approaches they consider to the students through the teaching methods they prefer throughout the process. In the industrial design studio education, where teaching takes place through experience transfer, different types of experience and knowledge are brought together by instructors and students collaboratively throughout the process. Within the scope of the study, the different approaches of the full-time and part-time instructors in the project development processes in the product design studios were examined through the professional domains and experiences of the instructors in Turkey. In order to do so, a survey was conducted with both parties. The collected data were analysed with the Chi-Square Independence test, and significant relationships were determined between the experiences, teaching methods, and design process approach of full-time and part-time instructors carrying out the product design studio. Participants' opinions about design techniques, design assessments and shortcomings of education were listed in the table and the distributions of the answers were shown. In this direction, evaluations and suggestions regarding the transfer of experience in product design education have been shared.

**Keywords:** Industrial design education, Experience transfer, Industrial design studio, Teaching methods

## 1. Introduction

Design education is carried out with different methods performed by many partners. Through these multidisciplinary methods, design education aims to utilize particular knowledge acquired in professional life. Industrial design education provides a sustainable design practice infrastructure for students during their education and professional life with the versatile methods it applies (Lai & Peng, 2019; Kolko, 2005). Within the scope of the design education curriculum, it is aimed to convey values such as questioning ability, paradigm approach, system theories, communication

competence, universal values, ethics, cultural and historical awareness, interest in technology, and environmental responsibility (Levy, 1990). The scope of the curriculum in industrial design departments is mass production, user-oriented product design and aesthetics. In a common curriculum structure, the operation of the design studio courses, which constitute the backbone of design education, may vary depending on the structuring origin and approaches of the faculties in which the industrial design department is affiliated (Er, Korkut & Er, 2003).

Industrial design education starts with a basic design studio in the first year and continues with product design studios in the following three years, in Turkey (Er, Korkut & Er, 2003). In this paper, product design definition was used especially to separate product design studio from basic design studio during industrial design education. According to Schaar and Shankwiler (2008) industrial design students are expected to complete the product design process for a period of three years starting from the second- year undergraduate level, in the light of the information they receive in the basic design course. In the design studio, the cognitive abilities and hand skills of the students turn into a product output with the information that different studio instructors convey to them during the studio critiques (Schaar & Shankwiler, 2008). Ulrich and Eppinger (2012, p.14) defined phases of design process, that turning from cognitive abilities to product output, planning, concept development, system-level design, detail design, testing and refinement, production ramp-up. Industrial design process begins from planning to preparation for production in design education and professional design sectors (Yang, You & Chan,

2005). Accordingly, these phases include both designing and manufacturing experience for designers. In this paper design process was approached according to Ulrich and Eppinger's (2012, p.14) arrangement of phases, and it's accepted design instructors can have design and manufacturing experiences apart from each other according to define of Yang et al. (2005). Each new project in studio practice brings new design research and design knowledge. Manzini (2009) defines design knowledge as a collection of different cognitive works that have different purposes in terms of content. Design knowledge, which is clear, negotiable, transferable and collectable, should be clearly articulated by instructors, discussed, and applicable to design students. Thus, design knowledge, which can be called as the research findings, becomes the starting point for all studio participants to produce more information in the design process (Manzini, 2009). The findings of the research that the students

conducted, are re-examined by the instructors that aim to contribute more to students' design processes. At the same time, the different information collected by the students is verified and rich content is created with this information (Wong & Siu, 2012). At this stage of the studio process, the potential for mutual learning arises. Collaboratively, instructors and students share their knowledge and work to build the most efficient design process for the student (Lai & Peng, 2019). Collaborative learning is defined in the literature as students performing research, analysis, and evaluation processes together for the courses conducted with a student-oriented system (Laal & Laal, 2012). This method, which enables students to play an active role in conducting the course, encourages studio instructors to actively communicate with the student in design education (McMahon & Kiernan, 2011). In the industrial design studios, along with the students, the instructors conduct written and visual research on the subject of the project and exchange information make the information exchange continuously. Students also present their research by reconstructing them in their own way of understanding. For this reason, collaborative learning takes place not only among students, but also between studio instructors and students in design education (Eren, Korkut & Burgazlı, 2017).

The design knowledge and experience of the instructors who teach in studios and the methods of transferring these experiences determine the focus of education in the product design studio (Lai & Peng, 2019; Schön, 2017). Depending on whether the instructors are part-time or full-time in the faculty, their duties can also change the communication and teaching styles established by the instructors in the studio. In the literature, these variables were evaluated over the learning outcomes of the students and the differences of sectoral experiences between part-time and full-time instructors were examined (Kirker, 1990; Bolge, 1995; Burgess & Samuels, 1999; Rossol-Allison & Alleman Beyers, 2011). These differences were measured in terms of the instructor's way of teaching the lesson, their communication with the students, and the permanence of the information presented

(Landrum, 2009). In addition, the effects of academic status differences on the university and faculty were evaluated financially and culturally (Glaskin-Clay, 2007). However, it is seen that these studies are carried out in educational areas with written and technical lecture forms. The fact that visual and drawing elements are dominant in art and design education, unlike these studies, causes the design education processes to be excluded from the results obtained in this context. Therefore different approaches of the part-time and full-time design instructors should be examined and create a research area about the transfer of design experiences.

Considering the literature, this paper claims that part-time and full-time studio instructors apply different methods for transferring experience and project assessment in design education. Within this scope, the methods of transferring experience and knowledge were tried to be investigated in industrial design education. The sample group consisted of full-time or part-time instructors participating in design studio courses in industrial design departments. Along with the preferred methods, different focal points in industrial design education were examined depending on the instructors' approaches.

## **2. Instructor's Experience in Industrial Design Studio**

Experience and knowledge transfer happens in different ways during design process in the studio. Design knowledge transfer can be defined according to different knowledge perspectives of Liyanage, Elhag, Ballal and Li's (2009) knowledge transfer method. Industrial design students know and understand design via instructors, manipulate design knowledge, apply the expertise of instructors to their project, access to information and take the designing potential to action. These phases can happen in different ways depending on full-time and part-time instructors' approach. Schön (2017) emphasize that teaching methods of the part-time instructors who have an experience in the private sector and full-time academic staff expose differences in presenting knowledge and experience. This diversity in teaching methods

supports design students in different aspects and helps them to overcome the uncertainties they experience during the project development process. As the learning styles of each student can be different from each other, the use of visual, auditory, and physical learning techniques creates significant differences in educational processes (Kolb, 1984; Demirbaş & Demirkan, 2007). Especially in the design process, experiential approaches improve the design process by strengthening students' empathy skills in the context of user-product relationships. Both the experience transfers of the design instructors and the learning processes of the students by experiment support the learning methods through experience (Dewey, 1938).

Although the goal of the product design studio in design education is a final product output, the education is based on the design process management. An experience-oriented approach is followed throughout the process. This approach allows design studio instructors to transfer their work to students. Thus, it enables the student to understand the user experience and design new experiences by experiencing the design process (Kolb, 1984). For the instructors develop different perspectives in whether private sector or academic life, their approach to product design and development processes and their priorities in approaching students' projects may differ (Glaskin-Clay, 2007). While performing their profession, the industrial designers primarily aim to meet the user through mass production of the product. In academic design studies, in-depth research is carried out on the process of designing the product concurrently with the product itself (Reinikaine & Björklund, 2008). While the evaluation of the design project in the private sector is result-oriented, it progresses with a process-oriented approach in design education (Shavelson, Phillips, Towne & Feuer, 2003; Salama, 2005; Parkash & Kaushik, 2011). The focus in sectoral experience is concrete and technic oriented, the focus in academic studies it is abstract and process oriented. While in educational studies, how the result is obtained is questioned, in the industry, it is interested how much profit will be obtained from the

result due to competitive strategies (Carson, Gilmore & Maclaran, 1998; Url1; Url2). However, both full-time and part-time design instructors, even if they have different specializations, have a common approach to the user and product focus of design projects. Because user-oriented product design is a common design requirement in both design education and private sector studies (Norman, 2013, p.9).

### **3. Transferring Experience and Design Education Methods**

Changing design approaches depending on the experience and knowledge of the instructors in the education process can also affect the education methods (Schön, 2017). These methods and evaluations are carried out with periodic critiques, pre-juries, and final juries in industrial design education. All of the evaluations are aimed at increasing the knowledge of the students and improving their perspectives (Kolko, 2005). The transfer of experiences and knowledge by the instructors with different teaching methods reveals a versatile experience transfer process.

In the last 100 years, it is seen that transferring experience and knowledge from design instructors to the student has taken place in different networks. The master-apprentice relationship in the craft tradition continued during the Bauhaus. In this context, the students, who studied with instructors and with art and design masters as well, were involved in an atelier oriented industrial design education (Lerner, 2005). The diversity in learning and methods brought by instructors with different experiences enabled students to be equipped in a versatile way. Similar studies have been conducted to implement the approach in Turkey. The industrial design education began primarily as an elective course in the faculty of architecture at METU in 1969 (Er et al., 2003). After that, industrial design department was established and industrial design education had its own design curriculum (Karaer, 2011, p.17). Industrial design education has required the guidance of full-time and part-time instructors with different expertise such as art, technology and production. The difference in the

educational techniques and methods of each field has caused a change in the theoretical and practical application weight of the course contents (Buchanan, 2004). Design education, which is developed with contemporary design and education methods, is carried out both in the master-apprentice relationship and in the teacher-student relation, especially in the processes that are carried out one-to-one with the student in design studio. The atelier tradition, which comes from the historical roots of design education, supports the experience-oriented learning style in design studios (Buchanan, 2004). The design processes carried out by the experience transfer method enable the synthesis and use of academic and practice oriented sectoral knowledge. The production, materials, finance, and result-oriented approach of the design practice, combined with the research, analysis, development, and process-oriented approach of academic education, enables students to learn new experiences before they even experience professional life (Leutenecker-Twelsiek, Ferchow, Klahn & Meboldt, 2018). As a result, design students are prepared to business life. According to Peters (2012), a designer should be prepared in a specific design discipline or craft, with broad knowledge in design and with deep knowledge depending on individual orientation and expertise.

In addition to the approaches of full-time and part-time instructors in the design studio, the principles and methods of teaching are applied in the context of industrial design education, as in all educational processes. Teaching methods such as lecture, discussion, case study, demonstration, problem-solving and individual work are used in the critics and presentation studies given to students in product design projects (Köksal & Atalay, 2017). These methods diversify in the industrial design studio operation and enable studio instructors to manage the process with different edits. As an example, the role-playing technique is presented as a method that supports creativity and empathy in the course learning process (Köksal & Atalay, 2017). Thus, design students can understand what was taught, what they hear

and see by being included in the processes (Peters, 2012).

#### **4. Research on Transfer of Experience in Industrial Design Studio Education**

The techniques and methods used by the studio instructors can significantly affect the performance of the product design project by the students. Besides the development of the methods, the instructor's openness to self-improvement reflects on the development of the students (Micari & Calkins, 2021). Instructors' teaching with effective methods ensures that students have permanent knowledge and experience in both undergraduate education and professional life. In line with these values, it is envisaged that a concrete experience will be transformed into abstract concepts with the reflective method in product design studios where teaching is carried out with the transfer of experience (Kolb, 1984). In design education, the different approaches of the instructors, the way of transferring the experiences, and the pedagogical aspect of the communication with the students are seen as processes that should be evaluated for the teaching stages (Boucharenc, 2006). At this point, determining the different methods preferred by full-time and part-time instructors and measuring their cause of selection is important for design education.

##### **4.1. Research Method – Survey**

This study aimed to investigate the ways of transferring knowledge and experience in reference to the experiences of full-time and part-time industrial design studio instructors and the teaching methods they use. Different approaches of the instructors' depending on their design and production sector experiences on the design project development processes was also investigated. In this direction, a survey was prepared in which the experience transfers and teaching methods of design instructors were questioned. In Turkey, industrial design education starts with basic design studio education in the first year. Therefore, within the scope of the research, the sample was limited to the second, third and fourth grade industrial design studio instructors. For the transfer of experience to be based primarily on industrial

design values, all participants are selected among industrial design graduates. A survey prepared in Google Forms was sent to the participants meeting the criteria of having bachelor's degree in industrial design via their institutional e-mail addresses and their LinkedIn addresses. The name of the institutions where the participants' works were not included in the survey in order to construct a general approach about the subject matter. However, the status of being a full-time instructor or a designer working in the private sector and participating in a design studio in the academia is primarily questioned as to the fundamental purpose of the research. The methods and approaches used by the participants in design education are also grouped as variables that change depending on this basic purpose. The survey consisting of 12 questions for design studio instructors was divided into three sections: experience (classification of instructors), experience transfer process (method of conveying information) and evaluating results of design process.

The first section of the survey consists of multiple-choice questions prepared for the classification of instructors who contribute to the industrial design studio. The participants could tick more than one option. The questions covered the following issues:

1. The areas in which the design studio instructor has professional work experience,
2. The status (full-time or part-time) in the university where the instructor participates in the design studio,
3. The design studio courses the instructor participated in the last two years.

A limitation for the last two years has been imposed, considering the variation by years in the undergraduate levels and to control if the instructors participated in a basic design course or not. Right at the beginning, basic design course was excluded from the study.

The second section consists of questions about how and by which sources the instructors convey knowledge and experience to the

students in product design studios. The questions intended to get;

4. Which period of his/her professional experience the instructor mentions most during studio critiques

5. Which methods were used during communication in design critiques,

6. The way of expression in the design critique session,

7. The situations questioned in the student projects,

8. The way of conveying the mistakes that need to be fixed to design students

Except for the seventh question, the answers were prepared as multiple choices for marking just one option. In the seventh question, participants were able to mark all of the five options, as the question aimed to investigate the most common methods for evaluation approach of participants. The same question has an “other” option for adding different opinions.

In the third and last section, it was aimed to evaluate the design project process flow by participants. Questions of the last part aimed to understand:

9. If the instructor evaluated the projects by conducting process or result-oriented approaches,

10. The aspects that the instructor pays attention to in the jury presentations,

11. The type of the communication established with the student during the process,

12. How to eliminate the shortcomings identified in the design studio education as a result of the evaluation?

All four questions were multiple choice for marking just one option. Eleventh question has an “other” option for indicating different opinions.

In line with the questions listed above, the hypotheses that constitute the research questions of the study were obtained. Hypotheses of this study were created with different combinations of the eight questions from survey. For example, first question and second question constituted the hypothesis “a” in the hypothesis table (Figure 1).

The survey answers were analysed with the Chi-Square Test of Independence using the SPSS

program. Analyses are designed to answer the following research questions as follows.

a. Do instructors’ status at universities vary depending on their experience? This hypothesis is constituted from first question and second question.

How the experiences of the product design studio instructors affect the way they work at the university has been examined through their experiences in the private sector. This hypothesis serves to construct a relation between experience and academic status. The aim is to investigate the low rate of manufacturing experience can have a large impact on instructor status.

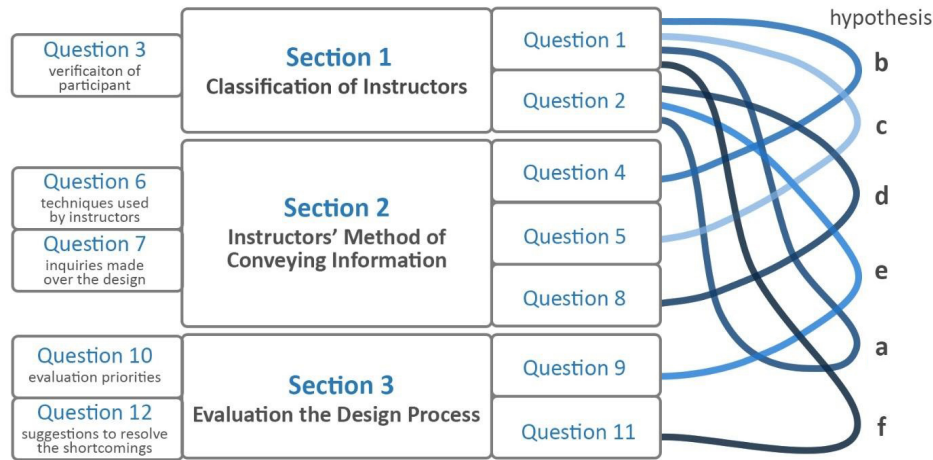
b. Do the examples given by the instructors during studio education vary depending on their experience? This hypothesis is constituted from first question and fourth question.

Instructors profit by their experience to teach product design properly during knowledge transfer process in design studio. Given examples can differentiation such as experiences of instructors. The differences between the examples given by the instructors having design experience in private sector and the instructors without experience aimed to be investigated.

c. Do instructors' teaching methods change depending on their experience? This hypothesis is constituted from first question and fifth question.

Instructors learn different design methods and teaching methods during their different experiences. Experiences of the product design studio instructors can affect the way their teaching methods during studio projects has been examined. The aim is to investigate the differences between the teaching methods of full-time instructors and private sector experienced part-time instructors.

d. Are the instructors’ methods of communicating with the students' mistakes related to part-time or full-time status? This hypothesis is constituted from second question and eighth question. Full-time instructors have



**Figure 1:** Creation of research hypotheses

the opportunity to communicate with students at any time during education in university. However, the main duties of part-time instructors are in the private sector, so their contact with the students is limited. In such a situation, how the approach of these two types of instructors differ to the student's mistakes is aimed to be investigated.

e. Is the focus of the instructors during design projects related to their academic status? This hypothesis is constituted from second question and ninth question.

Instructors, actively participating in design practice, must pay attention to results of the production at the same time with design studio lectures. In design studio, exactly there isn't production phase unlike designing phases. The aim is to investigate how the instructors' status affect an evaluation of the studio project.

f. Does the experience of the instructors as a product designer affect his/her communication style with the design student? This hypothesis is constituted from first question and eleventh question. The communication styles between the instructor and the design students were handled in three types as: regular teacher-student relationship, master-apprentice relationship and managing the design process collaboratively. Within the framework of these three types of interaction, the effect of instructors' product design experience was tried to be examined.

As an addition, participants' responses to sixth, seventh, tenth and twelve questions were collected in order to analyse common approaches in phases of design projects four parts as (Figure 1):

- Techniques used by the instructors in studio critiques,
- Inquiries made over the design during the critiques,
- Evaluation criteria in design project juries,
- Suggestions to resolve deficiencies in studio projects

### 5. Analysis and Findings

33 industrial design instructors from 12 different universities participated in the survey. Participants from five state universities, and seven private universities took part in the study. 24 full-time academic participants had product design experience in private sector previously. 24 participants work as full-time instructors, seven participants are part-time, and two participants have conducted product design project education as jury/project guest members. Part-time affiliations and jury memberships of the full-time academic participants were not considered in the study. For this reason, the coding for the responses of these instructors has been processed as full-time. Similarly, participants who were both part-time instructors and jury/project guest members also were accepted in the analysis primarily with their part-time assignments. It

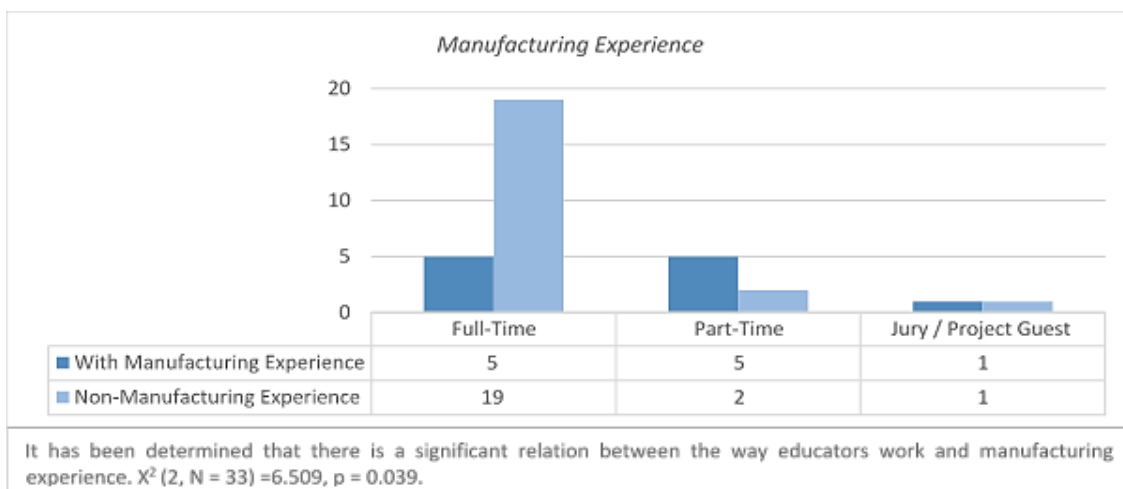
was observed in the participant groups that every instructor who has manufacturing experience on the line of products in private sector also has design experience. Since answers of the participants show that every designer does not work on manufacturing of design products. In this situation manufacturing experience accepted as a separator qualification for analyses. Although there is no comprehensive coding due to the diversity of experience, having design experience in changes due to academic and private sector experience was considered inclusive for the private sector experience. So these experiences were described as with design experience and non-design experience.

The 33 responses to the questionnaire provide the minimum number needed to employ the quantitative method in this study (Eymen, 2007; Akdağ, 2011; Şen, 2019) Since this study is a pre-evaluation for 6 research questions examined, 33 design instructors were approached with equal probability and Simple Random Sample method was found suitable for this study (Kılıç, 2003). The hypotheses were analyzed with the Chi-Square Independence test in the SPSS program due to non-parametric data of the questionnaire (Eymen, 2007). The research questions were examined in six graphics in line with the Chi-Square

Independence tests made in the SPSS program. If the p value of a hypothesis, which is the result of the analysis, is less than 0.05, the hypothesis is provided, and if the p value is greater than 0.05, the hypothesis is not provided (Eymen, 2007). The "p" significance relevance in the four hypotheses from the research questions were found to be less than 0.05 in the analysis. Thus, it was seen that the activities of the sample group changed significantly in these analyses and that they occurred with the majority of the participants in other two analyses. In these graphics, gradients from dark to light show sequential direction of answers from up to end, there is not related with majority of answers.

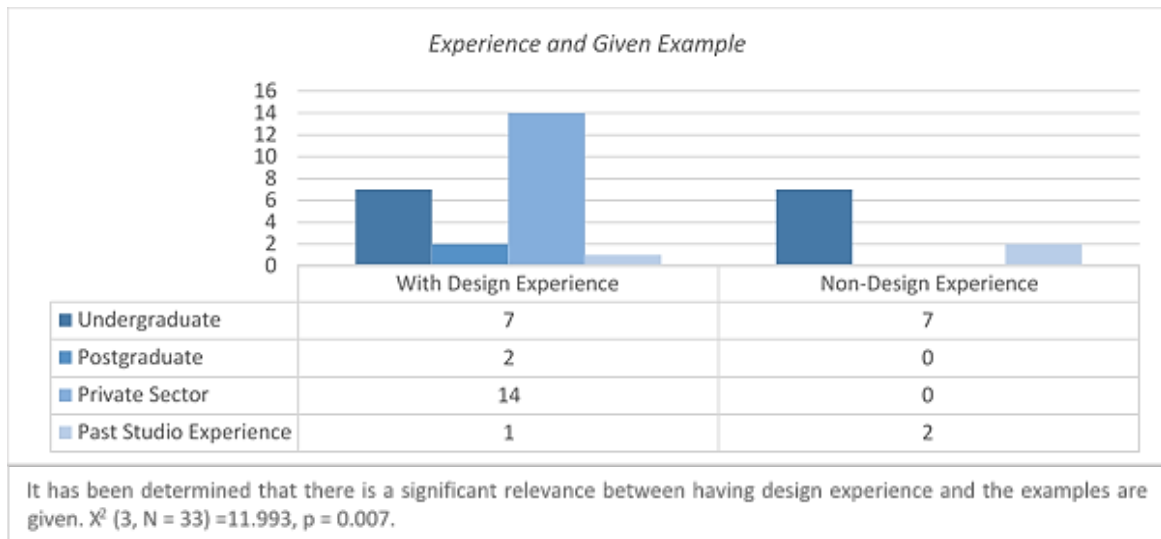
*a.Do Instructors' Status at Universities Vary Depending on Their Experience?*

With the first and second questions in the survey, the distribution of instructors' private sector experiences in the answers was actualized. It was observed that the participants who worked full-time in the institutions where they carried out the design studio training did not have a significant level of manufacturing experience compared to the other participants. It was determined that the rate of manufacturing experience was higher in the participant group consisting of part-time instructors (Figure 2).



**Figure 2:** Relationship between manufacturing experience and working condition





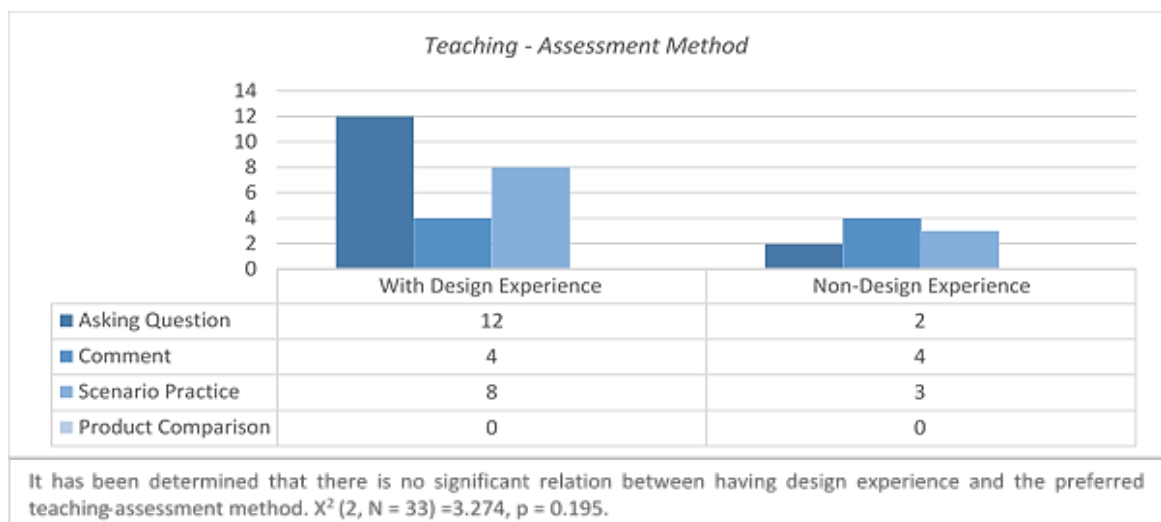
**Figure 3:** The relation between design experience and giving examples.

*b. Do the Examples Given by the Instructors in the Design Education Process Vary Depending on Their Experience?*

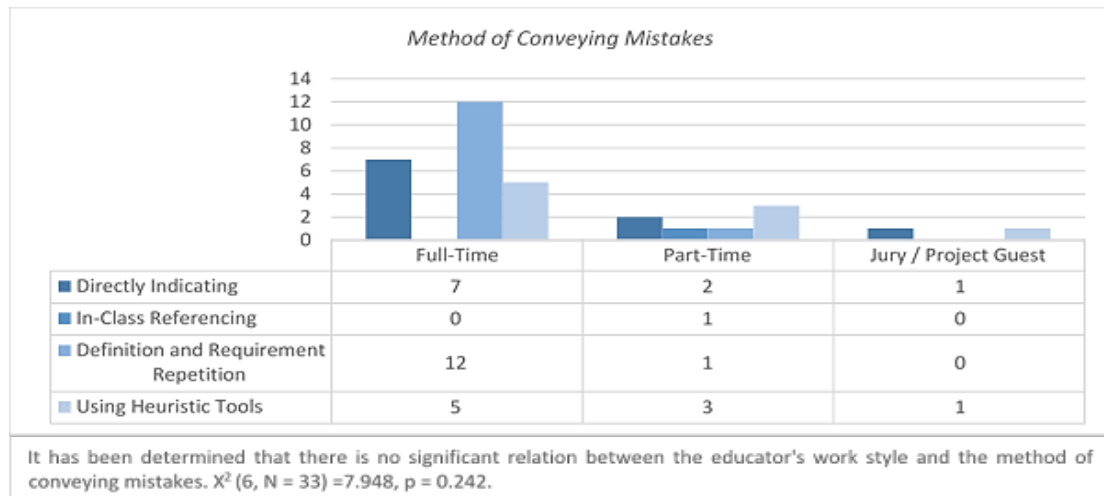
With the first and fourth questions in survey, it has been observed that the examples given in the product design studio vary depending on the experience of the design instructors. While the highest rate of participants with design experience is in the private sector, participants without design experience cannot give examples from the private sector (Figure 3).

*c. Do Instructors' Teaching Methods Change Depending on Their Experience?*

According to the answers of the first and fifth questions, it was seen that instructors with design experience approached the process by using the method of asking questions prominently. Although there was no significant change, it was observed that the instructors who did not have design experience first made comments on the design. It was stated by the participants that no comparison was made by giving examples of existing products in the market (Figure 4).



**Figure 4:** The relationship between design experience and assessment method



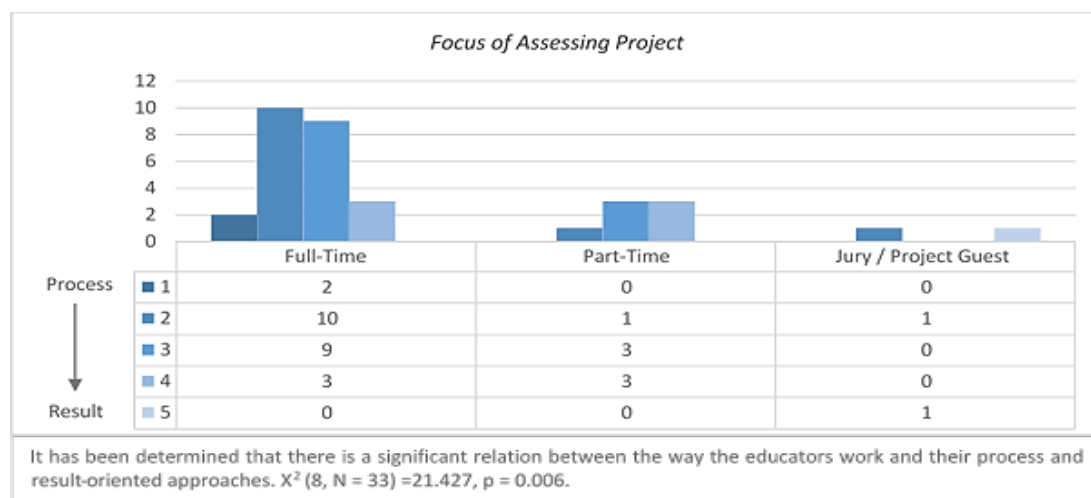
**Figure 5:** The relationship between working style and mistake resolution

d. *Are the Instructor's Methods of Conveying Students of Mistakes Related to the Way They Work at the University?*

Although there is no direct relationship between instructor status and conveying of mistakes, it has been observed that full-time lecturers try to eliminate mistakes by repeating the related descriptions more. According to answers of eighth question, it was determined that the direct indication of the mistake was repeated more frequently than the intuitive understanding of the student. Part-time lecturers, on the other hand, come to the fore when they try to correct student mistakes in intuitive ways (Figure 5).

e. *Is the Focus of the Instructors During Design Projects Related to Their Academic Status?*

In the ninth question, the participants were asked to indicate their focus on design process considering the transition from process to result in five stages as indicated in Figure 7. With answers of second question it was seen that while full-time lecturers followed a process-oriented approach, part-time lecturers were observed to contact the design projects with a result-oriented approach (Figure 6).

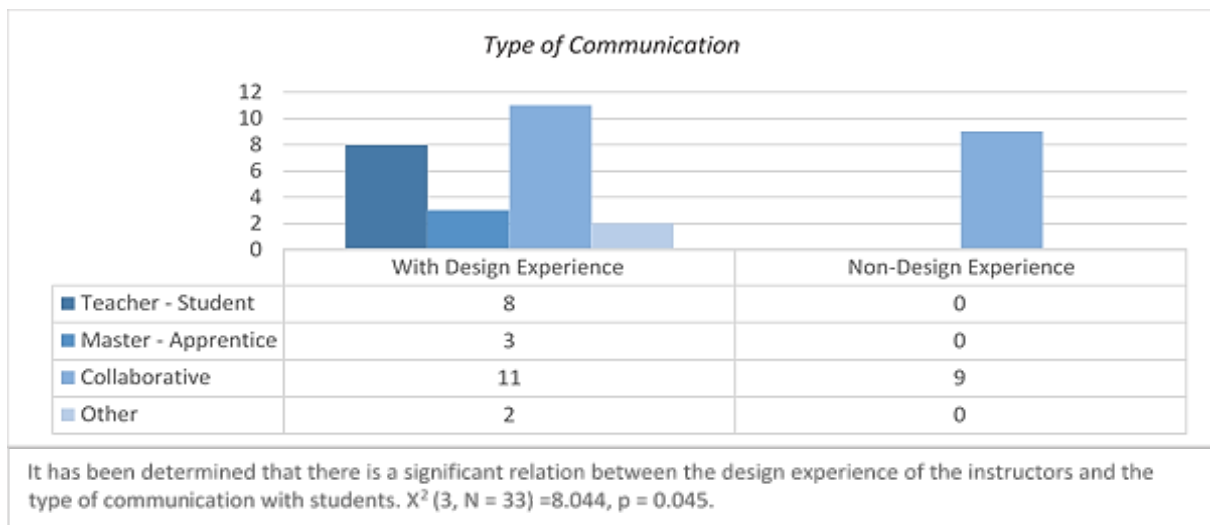


**Figure 6:** Relation between working style and project focus

*f. Does Having Product Design Experience Affect the Way of Communication Between Instructors and Design Students?*

In the 11th question, regular teacher-student relation, master-apprentice relation and collaborative communication of instructor-student relation were examined. With participants' product design experience answers of the first question; although the collaborative learning method is prominent in all of the participants, it has been determined that all of

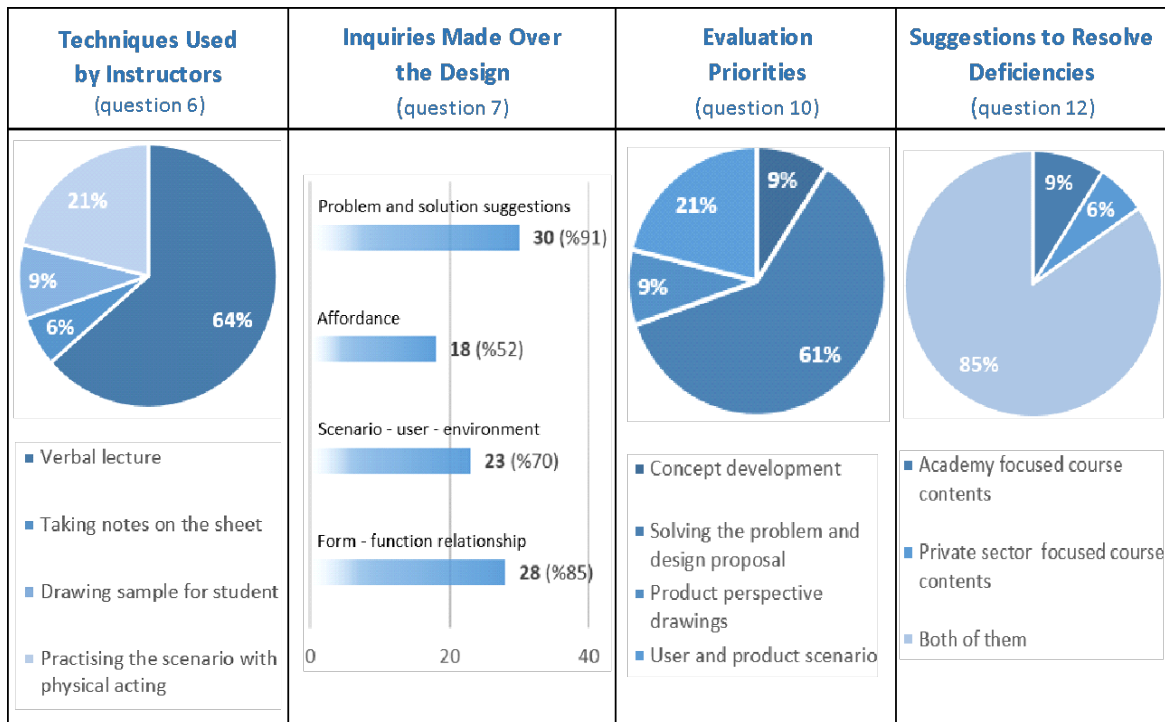
the instructors who do not have product design experience, at a significant level communicate with the student with the collaborative learning method. It has been observed that experienced instructors communicate with standard teacher-student, master-apprentice and role-playing method. As another communication types, participants prefer to use role-playing technique and more experienced friend relationship in communication with students (Figure 7).



**Figure 7:** The relation between design experience and the type of communication with the student

**Table 1:** Options about design techniques, evaluation and shortcomings

	<b>Techniques Used by Instructors</b> (question 6)	<b>Inquiries Made Over the Design</b> (question 7)	<b>Evaluation Priorities</b> (question 10)	<b>Suggestions to resolve Deficiencies</b> (question 12)
<b>Options for Questions</b>	Verbal lecture Taking notes on the sheet Sample sketching Expression with physical acting	Problem and solution suggestions Visualization methods Difference from existing products Cause of purchased by user Affordance Scenario - user - environment Production method Section and detail drawings Model making Material selection Geometrical relationship Form - function relationship Practicing previous critiques	Concept development Solving problem and design proposal Perspective drawings User and Product Scenario Technical drawings Material and production techniques suggestions Quality of model making	Academy focused Private sector focused Academy and private sector



**Figure 8:** Highlights from answers of four questions

In addition to the Chi-Square Test of Independence for survey responses, four questions were analysed as a discussion about design education. Table 1 was created with the options prepared. In these evaluations answers of full-time and part-time instructors were analysed together and majority of answers were showed with graphs in Figure 8. Gradients from dark to light show sequential direction of answers from up to end, there is not related with majority of answers.

•Techniques Used by Instructors in Their Design Critique Process

According to the answers to the sixth question, it was observed that the methods of guiding the student during the design critiques did not change according to the experience or the type of affiliation (part- time or full-time), 64% of the participant instructors gave the students critique by verbal expression. 21% of the participant use physical acting on scenario expression, 9% of the participants drawing sample sketches and 6% of the participants taking notes on the student’s sheet during design critiques.

•Inquiries Made Over the Design in the Critique Process

In order to find out the issues to be considered during studio critiques, the participants were set free to choose more than one option in the seventh question. Accordingly, it was determined that 91% of the design instructors examine how the problem and solution suggestions were associated with each other in student's design. 85% of the participants indicated that they examine the form-function relationship in design projects. It was observed that 70% of participants consider user-time-environment relationships in the scenario. In addition, 52% of participants question the affordance of the product.

•Evaluation Priorities in Design Project Juries

Tenth question suggested the consecutive design steps from concept design, systematic design, detailed design, test to prototyping as the evaluation criteria for jury presentations. It was seen that 61% of the participants evaluated the projects considering design problems and proposal studies. In the presentations where the user-product relationship of the participants

was examined at a rate of 21%. It was determined that the full-time instructors had priority in evaluations on concept design and perspective drawings, unlike other participants. There 9% rates are both concept development criteria and perspective drawings.

•**Suggestions to Resolve the Shortcomings Seen in the Product Design Process**

According to answers to the last question of the survey, 85% of the participants' state that the shortcomings they encounter in product design studios should be overcome by both theoretical – academic courses and practical – sectoral courses. Considering the ratio of the two suggestions within themselves, it was stated that they could be supported more with theoretical academic research and analysis-oriented course contents.

**6. Conclusion**

The design processes carried out by full-time and part-time instructors with different experiences in industrial design studios vary depending on their knowledge and expertise. As there are different learning methods for students, the change in teaching methods also changes the communication dimension between the instructor and the student. Industrial design education, which develops from the atelier practice system, also includes experiential learning methods in the studio system. Master-apprentice or teacher-student relationship established depending on the system applied ensures that design education is an effective preliminary preparation for professional life. The changing rhythms of product design processes in the private sector are experienced in industrial design education in a fictional method, and it is aimed for students to benefit from previous experiences.

In this study where the transfer of experience in the product design process was analysed, the experiences and teaching methods of full-time and part-time design instructors were evaluated. The level of significance obtained in the data analysed in the research hypothesis 'b' showed that the experiences of the design instructors were effective on the examples they gave to the students in the design critique process.

Examples that are the result of private-sector acquisitions such as user empathy in the design process, production and material proposals, financial evaluations are given as preliminary information in professional life for students. With these examples, according to hypothesis 'c', it is seen that design experienced instructors approach student designs with the technique of asking questions. The questions asked for a clear and understandable design process direct the students to re-evaluation and help them find their own solutions. Also, it is seen that the design proposal offered by the student is not directly compared with the existing products in the market, and the critique process is advanced by interpreting it in a scenario.

The result of the hypothesis 'd' showed that mistakes in students' approach to design and the design process are tried to be removed by repeatedly transferring the definitions of product design and design requirements by full-time lecturers during the critique process. However, a pedagogically intuitive approach is required by following the learning styles of the student, with auditory, visual or physical expressions. In the output of the same question, part-time instructors are observed to guide students to produce their own solutions in the process by directly indicating the mistake. It is understood that the reason for the guidance in the design process may be the areas focused on design projects. The answers of the second and ninth question in the survey show that while full-time instructors have a process-oriented approach to the product design projects in the studio, part-time instructors' approach is more result-oriented. In this direction, it can be said that while full-time design instructors make regulations and inquiries about students' execution of the process, part-time instructors evaluate the attributes that characterize the product output.

According to the results of hypothesis 'a', the high rate of manufacturing experience among part-time lecturers has emerged as the source of result-oriented assessment. The experience gained from production and material-oriented studies is also conveyed through comments that exemplify these processes. It is seen that a

design proposal that is close to the final product is wanted to be evaluated as the output of the comments and critiques made. In this context, it is expected that there will be a different communication between the experiences of the instructors and the students. With the 11th question, it has been observed that instructors with product design experience can maintain the same relationship

with students depending on the relationships they have experienced in the private sector. It can be said that the experience of design instructors, who continue to transfer design experience in the master-apprentice relationship, is effective in the production focus. It is prominent that regular teacher-student communication is preserved. However, the interaction is mostly in the form of collaborative learning between instructors and students. It has been observed that design instructors with private sector experience use various communication methods with students, while instructors who do not have design or manufacturing experience continue their design education with only collaborative communication with students.

In the answers to question six, the use of verbal expression in a critique process as a communication method has emerged as a situation in contradiction with the provision of visual-based education in product design studios. In design studios where teaching methods by drawing or presenting are in the background, these methods should be introduced to the process. It is seen that the instructors take the role of the user with physical movements and can operate the process in the product-user relationship stages where the role-playing technique is frequently used. The answers of the seventh question showed that these methods of teaching in the design process are primarily applied to correctly evaluate the relationship between problem and solution suggestions and form-function relationship by the student. Regarding the physical role-playing technique, design instructors expect the product to be constructed within a scenario in the context of the user, time and environment. In this scenario, what the

product will perform, namely its affordance is questioned. According to eighth question, there are similar evaluation criteria in product design juries as in critiques. The relationship of the design problem with the product output is seen as the basic learning area of product design education. Since the concept development process, in which design idea production and student-specific design approach are transferred, is also at the first steps of the design process, this attitude of full-time and part-time instructors is supported by a process-oriented approach in itself. The correct use of drawing techniques is seen as a necessity of product design is an important factor in understanding how solution proposals are reflected in the product. Although the visualization studies of the product are at the first stages in the evaluation criteria, the lack of communication with the students by drawing in the project critiques creates a contradiction.

### **6.1. Discussion and Suggestions**

The process-oriented approach of industrial product design education shows that the student specific idea and thinking structure is valued within the design process. These values should also be reflected in teaching methods and new techniques should be applied with a pedagogical approach. The skills of the design students should be suited for modern times. To train designers with up-to-date design methods, a modern design education curriculum developed with social sciences and technology should be applied (Meyer & Norman, 2020). In addition to the outputs discussed above, this study shows, understanding the needs of students with an intuitive approach required by the field of education and solving the mistakes made in a way that the student can best understand is a method that design studio instructors should also apply. Although full-time instructors are close to this approach, part-time instructors, in particular, should strive to communicate more with students. The working conditions of the instructors should positively affect their closeness and contribution to the field of education and students. The differences in full-time and part-time instructors and therefore in the working areas ensure the diversification of the focal points within the

design studio. This diversity presents the points that design students should pay attention to both in the design process and the product outputs more clearly. It would be beneficial to ensure that instructors with different experiences and focuses in the design studios come together and that more instructors and designers from outside of the university should be invited to the design studios as guests.

According to outputs of the study, collaborative learning is not only among students; knowledge and experience sharing is also realized between instructors and students. While these collaborative works increase the processes that empathize with the student, it also enables the students to get closer to the experience of full-time and part-time instructors. Now, the regular teacher-student communication level should be exceeded in industrial design studios, and collaboratively focused on the production of shared values. Collaborative knowledge-creating processes that support the theoretical and practical infrastructure of product design education should continue to be implemented collaboratively by the design instructor and students by developing methods of editing to the scenario and changing roles related to the user.

Full-time and part-time instructors should set an example for students with the work they prioritize in design critique processes and jury evaluations. The visual outputs expected from the design process should be supported visually by the instructors. Because with the development of visual perception of students who continue industrial design education, their learning skills by drawing and watching increase. It is very important to bring these methods into the process in design studios where teaching methods by drawing or show remain in the background. To strengthen the student's empathy ability, the instructors must be able to empathize with the student correctly and apply the role-playing technique in user scenarios. In experiential design studios focused on learning by seeing and doing, instructors' presentations such as sample drawings, models, products and processes will increase the motivation of the students. Thus,

students will be able to construct their design processes more consciously to achieve the 'good design'.

The development of different forms of understanding, such as the visual perception of design students, throughout design education includes related issues that need to be studied. The change in the communication methods of the instructors with the students at different stages of the design process and the ways of understanding/perceiving the design instructors' directions constitute research questions for future studies. Along with the learning outcomes of students in design education, as in other literature studies, the teaching techniques and approaches of part-time and full-time instructors to the design process can be re-evaluated from the student's perspective (Kirker, 1990; Bolge, 1995; Burgess & Samuels, 1999; Rossol-Allison & Alleman Beyers 2011). At this point, unlike the existing literature, it is possible for design students to evaluate their educational processes with their verbal, visual and physical outputs after knowledge transfer. The study conducted in Turkey is planned to be improved by increasing the number of participants and stated research questions. Thus, the study is expected to be a resource for the development of student-oriented, process-oriented, and experience-oriented teaching methods in design education.

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