STRATEGIES FOR AN EFFECTIVE UNIVERSITY-INDUSTRY COLLABORATION IN INDUSTRIAL DESIGN EDUCATION: A CASE STUDY OF GRADUATION PROJECTS

.

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Approval of the Graduate School of Natural and Applied Science

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ABSTRACT

STRATEGIES FOR AN EFFECTIVE
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A CASE STUDY OF GRADUATION PROJECTS

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Industrially supported projects, which are an important part of industrial design education, have been carried on with an increasing pace in universities in Turkey for a long time. This thesis develops strategies to improve collaborative projects with industry in industrial design education, by examining how collaboration member benefit from each other's and which problems do they encounter with collaboration; and to find out what the needs and expectations of all members are through a case study of graduation projects. As a case study, the graduation project course in the Department of Industrial Design at Middle East Technical University in 2005 spring semester was chosen, where collaboration with industry has been regularly held since 2002. Results of questionnaires with all collaboration members namely the students, educators and company representatives were evaluated in order to develop strategies. As a conclusion, implications to facilitate further developments of university-industry collaboration projects and academic schemes are reached.

Keywords: Design Education, Collaborative Projects, University-Industry Collaboration.

ÖZ

ENDÜSTRİ ÜRÜNLERİ TASARIMI EĞİTİMİNDE,
ETKİN BİR ÜNİVERSİTE – SANAYİ
İŞBİRLİĞİ İÇİN STRATEJİLER:
MEZUNİYET PROJELERİ ÜZERİNE BİR VAKA ÇALIŞMASI.

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Nisan 2007, 136 sayfa

Sanayi destekli projeler, endüstri ürünleri tasarımı eğitiminde uzun zamandır yer alan vazgeçilmez bir işbirliği türüdür. Bu tez, işbirliği taraflarının birbirlerinden nasıl faydalandıklarını, karşılaştıkları problemleri, ihtiyaçlarını ve beklentilerini, mezuniyet projeleri üzerine bir vaka çalışması yaparak, araştırmıştır. İşbirliği projelerinin 2002 yılından itibaren düzenli olarak uygulandığı Orta Doğu Teknik Üniversitesi Endüstri Ürünleri Tasarımı Bölümü 2005 bahar dönemi, mezuniyet projeleri, vaka çalışması olarak incelenmiştir. İşbirliğinin tarafları olan öğrencilerin, eğitimcilerin ve firma temsilcilerinin görüşleri anket yoluyla incelenmiştir. Elde edilen bulgular doğrultusunda, üniversite-sanayi işbirliğinin ve akademik bakışın gelişimi için stratejiler geliştirilmiştir.

Anahtar Kelimeler: Tasarım Eğitimi, İşbirliği Projeleri, Üniversite-Sanayi İşbirliği

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The author would also like to thank to ID 402 Graduation Project course tutors, students and company representatives who answered the questionnaires in the Department of Industrial Design at Middle East Technical University in 2005 Spring Semester.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

> Exploring new ways of making the educational experience real to product design students has always been of concern to tutors and design institutions. By reviewing some of these established strategies it is possible to see that however well intended there are serious flaws which mean their value to students can only be considered as limited at best (Wilkinson and Sale, 2003).

1.1 Motivation for the Study

Until the beginning of the 1970's, industrial development could not reach a certain level in Turkey and consequently, economic policies for the professional product designers in the field of industrial design could not be integrated to the system. Only from this date on, design of products started to be handled seriously (Er, Er and Korkut 2002). As a result, the education and profession of industrial design could not have been developed for a long time as expected, either, because product design had not been supported due to insufficient government policies or a strong collaboration had not been established between education and industry. It has been possible for educational institutions to establish a strong collaboration with the industry only after the 1990's (Evyapan, Korkut 2005).

In parallel to the developments in this field in the world, also in Turkey, by university and industry collaboration, it is aimed at benefiting mutually in a common ground. The importance of this collaboration has been apprehended better day by day. As a result, higher quality and more successful collaboration examples have been put forth in various fields of education. On the other hand, common projects with industrial

organizations have been realized in recent years, and successful applications have been implemented in the field of industrial design education. Thanks to the collaboration provided, it is possible to observe how the development of industrial design profession is influenced in a positive way.

1.2 Aim, Research Questions and Methodology of the Study

This thesis aims to develop strategies to improve collaborative projects with industry in Industrial Design Education. It examines how collaborating members benefit from, which problems they encounter during collaboration, and what needs and expectations of all members are through a case study of graduation projects.

The term 'collaboration member' is defined as 'industry' and 'educational institute'. On the side of 'industry', the members are referred to as "company representative who have various positions and qualifications such as designers, engineers and managers. On the side of 'educational institute', the members are referred to as students and educators.

The questions to be addressed in the field study are:

- What are the expectations of the collaborators from all parties, namely the students, educators, and company representatives?
- What are their thoughts about the outcomes? What are the problems they encounter?
- What do they think about the benefits of the collaboration?
- What are their views about the strategies to be adopted to improve the collaboration?

In order to gain a broader perspective about the issue in design education a literature survey carry out beforehand. The main questions of the literature survey are:

- How did university-industry collaboration emerge and develop?
- Why is university-industry collaboration needed?
- What are the perspectives of similar collaboration cases in design education?

The questions to be addressed both by the literature survey and the field work are:

- Which strategies can be adopted by the educational institute, for effective university industry collaboration?
- What is an effective collaboration? Is it the one which satisfies the expectations of all parties or should some of the parties have priority?

In order to gain a broader perspective about university-industry collaboration a literature survey was carried out. Through the survey, the emergence and growth of university-industry collaboration with their reasons were investigated. Five collaboration cases from the perspective of educators were analyzed in terms of their advantages and disadvantages.

In order to explore the benefits and problems of collaboration and needs and expectations of collaboration members in detail, a case study was carried out. The Graduation Project Course in the Department of Industrial Design at Middle East Technical University in 2005 Spring Semester was chosen as a case, where collaboration with industry is regularly held. The results of questionnaires with all collaboration members were evaluated in order to develop strategies.

1.3 Structure of the Thesis

This chapter brought up and briefly discussed the essentiality of pursuing such a study. The aim, research questions and methodology of the study are presented.

The second chapter will present and discuss the results of the literature survey. The reasons of emergence and development of university-industry collaboration will be discussed with a brief historical overview. At the end of Chapter 2, five collaboration cases from the perspective of educators will be given together with their advantages and disadvantages.

The design and conduct of the case study will be addressed in Chapter 3.

Findings of the field study will be presented in Chapter 4. The aim of the graduation project course, educational methodology, collaboration procedure, and expectations of the members from the collaboration, benefits of the collaboration members, intellectual property, problems encountered and outcomes of the collaboration will be explored in Chapter 4.

Finally, the findings of the study relating to the stated objectives and their implications for further developments of strategies for effective collaboration will be presented in Chapter 5, together with their implications for further studies.

CHAPTER 2

UNIVERSITY-INDUSTRY COLLABORATION

Scientific and technological studies can be used for developing social prosperity. One of the most important ways of converting accumulated knowledge into production is university–industry collaboration. Collaboration is usually a multidisciplinary process using basic and theoretical knowledge that are obtained from universities.

According to Carayannis, university–industry relations gained new perspectives in the field of research and development in industrialized countries especially since 1970's. There is a growing collaboration between industry, university and government particularly in the United States in the last 20 years (Carayannis, et al., 2000, p. 482).

The basic motivation behind university–industry collaboration in research is to develop research and development capability and innovative potential of the companies, and therefore to increase a country's competitive power (Geisler, et al., 1990).

2.1 Emergence and Growth of University-Industry Collaboration

The foundations of university-industry collaboration can be traced back to the English Industrial Revolution, which led many developments. For example, together with these developments, the technological side of industry became more science originated. In the first half of 19th Century, economist Friaderich List suggested that Germany should first develop technology to compete with Great Britain in world markets. List had brought up a techno-economy policy for developing technology in

his work titled *National System of Political Economy* published in 1841 (Freeman, C., 1989).

According to List, Britain gained, its superiority by technology and Germany had to find its own national system to create technology. In respect of List's model, university produce knowledge and industry use this knowledge for commercial production.

The next section will discuss the rapidly developing collaborations between university and industry in economic, social and political life. These type of collaborations finally focus on research partnership and are needed in national science and technology policies and strategies.

2.2 University-Industry Collaboration in Economical Political and Social Life

To understand the importance of collaboration between university and industry, we should have a look at changes in production process and their economical, political and social reasons since the 1970's. For this reason initially industry's competitive superiority or power of competition, should be discussed.

2.2.1 Industry's Productivity Problem

According to Porter, (1990), power of competition depends on the industry's ability of increasing productivity degree. This ability means rising the production quantity per unit productive power or capital. However, to make this ability permanent more branches in existing industry and more business enterprises are needed. Because, there should be more employment to absorb the lack of productive power, as a result of rising productivity (Porter, 1990).

Porter emphasizes the problems stemming from rising productivity for both economic practice and theory because; this problem has not been solved since the 1970's. Actually, market economy countries face with vital problems in productivity. Market economy can be described as:

> An economic system in which the production and distribution of goods and services takes place through the mechanism of free markets guided by a free price system rather than by the state in a economy. In a market economy businesses and consumers decide what they will produce and purchase, as a opposed to a planned economy where the government decides what is to be produced and in what quantities (Wikipedia, 2006).

These problems as mentioned by Roobeek (1990) can be listed as;

- Rising costs without being directly proportional with productivity,
- Factors that restrict the market's expansion,
- Decreasing productivity acceleration,
- Inadequacy of quality control,
- Extreme production capacity not being able to utilize the investment made,
- Rising bureaucracy in large-scale companies and country administration

Market economy countries try to find solutions for these problems. It is observed that these solutions are expected from technology and science.

2.2.2 Changing the Technological Infrastructure

In order to cope with above-mentioned problems, by expanding the production areas and product range, companies change their technological infrastructure and replace their old technologies with generic technologies. Generic technologies have the ability of changing economical fields and creating new economic activities and sectors. These technologies contain following categories:

- Information Technology (microelectronic, computer, telecommunication)
- Flexible production, flexible automation technology
- New organization technology (based on information technology)
- Developed equipment technology (polymer, optical fibers, biomedical materials)
- Biotechnology and genetic engineering
- Nuclear technology
- Space and aviation technology, (Dicker, 1998)

According to Göker's presentation in the Turkish Chamber of Mechanical Engineers Industry Congress, if these technologies can be applied effectively, problems of rising productivity would be solved. Industrialized countries use this idea to organize production progression as well as their social life. They intend to facilitate national innovation policies (Göker, 1993).

Product development, product design, production management, production machine design are the most important subjects for innovation. As a result, without these innovative steps, just productivity limits the improvement.

2.2.3 Importance of Technology in Competitiveness

According to The Scientific and Technological Research Council of Turkey (TÜBİTAK) Commission Report in first university-industry congress in 1994, technological developments in market economy countries surely produce new conditions on competitiveness. It is clear that countries and their firms, which use generic technologies effectively and develop it day by day, will get the competitive superiority in the world markets. Technology is the main field to realize this superiority. Competence in technology is *sina qu non* condition of the industries to keep up with ongoing developments and maintain their competitive power. The other competencies that the market economies require will be built up on this competency base (TÜBİTAK, 1994).

In today's world, the university-industry collaboration has reached an important stage, as mentioned above, in accordance with the economical, political and societal issues. Industry always has to keep up and keep in step with the technology to be able to exist and compete. University is in the center of science and technology system of the country. This is the main reason that industry has to be in collaboration with the universities (TÜBİTAK, 1994).

2.2.4 Situation in University

Lederman explains the relation between science and technology with the following arguments:

- Science leads to technology,
- Science use technology for its own advancement,
- Much more science leads to much more technology producing (Lederman, 1988)

From this point of view, technology is crucial not only for university but also for itself. According to Lederman, (1988), science and technology reproduce themselves mutually; however, the boundary between them currently became indefinite. It is difficult to determine the limits of fundamental research and applied research. Bruce Archer defines these terms as follows:

> *Fundamental Research:* Systematic enquiry directed towards the acquisition of new knowledge, without any particular useful application in view.
> *Applied Research:* Systematic enquiry directed towards the acquisition, conversion or extension of knowledge for use in particular applications (Archer, 1994).

According to these definitions, fundamental *research* is scientific investigation for its own sake. The goal of *fundamental research* is to gain knowledge and understanding of the physical world, without regard to whether or not the knowledge discovered will be of any practical use. This is different from *applied research*, in which scientific investigation is carried out in order to discover a solution to a practical problem. Universities carry out *fundamental research;* however, to apply the results of fundamental research, universities need industries. The collaboration of universities and industries is needed in these situations.

2.2.5 The Role of National Science and Technology Policy

After the Second World War, it is known that especially Japan and then other newly industrialized countries, including the Republic of Korea, used their national industry and technological strategies to improve technology and science for national development.

According to report written by TÜBİTAK, almost fifteen years ago, OECD countries' Science and Technology Ministers announced that they have considered the factors such as science, technology, economic, social, education, industry and human resources together to plan their political strategy (TÜBİTAK, 1994). Accordingly, the new role of the governments of above mentioned countries was determined by rearrangement of economic, social, political and institutional fields. Governments initially produced science and technology administration policy that is generally called "national policy".

National science and technology policies determine the priorities of science and technology studies and identify their paths to proceed. University–industry collaboration is one of the effective ways to reach the targets of science and technology.

2.3 The Reasons of Collaboration between University and Industry

There are several reasons of collaboration between university and industry. According to Carayannis, reasons and benefits for both university and industry are :

- Sharing of risk and cost for long term research,
- Access to complementary capabilities,
- Access to specialized skills,
- Access to new suppliers and markets,
- Access to state-of-the-art facilities (Carayannis, et al., 2000, p. 483)

According to Yücel (1997), reasons for universities in university – industry collaboration are listed as:

- Self development of academic personnel,

- Developing the studies on fundamental and applied sciences,
- To publish the results in order to contribute to science and disciplinary knowledge.

On the other hand, reasons for the industry in collaboration between university–industry are listed as:

- Developing new technologies for the market,
- Finding solutions for production,
- Developing the product quality,
- Increasing the market share (Yücel, 1997)

2.4 Information Exchange between University and Industry

Schartinger et al. (2002) analyze the types of knowledge interaction between the university and industry, in terms of three important interaction aspects. These are their degree of formalization, their suitability for transferring tacit knowledge and the degree to which they are based on personal contacts. The term "knowledge interaction" is used to describe the interaction during the exchange of knowledge within innovation processes. By interaction, the authors mean all types of direct and indirect, personal and non-personal interactions between organizations and/or individuals from the firm side and the university side (Schartinger et al., 2002). Figure 1 summarizes whether or not certain types of knowledge interaction involve the three important interaction aspects. They define these aspects as follow:

1. The *formalization of the interaction* is an approach to ensure a sufficient level of trust and to reduce uncertainty which has two main functions. First, "to commit human resources to objectives and views", secondly, to avoid appropriability problems by choosing formal arrangements that correspond to needs of the partners involved". (p:305)
2. *Transfer of tacit knowledge* is usually maintained through activities such as talking and listening or demonstrating and copying. New knowledge is very often generated by the new combination of already existing pieces of knowledge. The combination usually occurs through personal interaction and communication processes between individuals. The authors mention a

special case of transfer of tacit knowledge between universities and firms as "the mobility of graduates, i.e. the employment of graduates by firms". At the time of employment, graduates are equipped with tacit knowledge, acquired at universities.

3. *Personal (face to face) contact* (direct personal interactions) build up "social capital such as trust, a joint 'language' and a joint research culture".

Types of knowledge interactions between university and firms[a]

Types of knowledge interaction	Formalisation of interaction	Transfer of tacit knowledge	Personal (face-to-face) contact
Employment of graduates by firms	+/−	+	−
Conferences or other events with firm and university participation	−	+/−	+
New firm formation by university members	+	+	+/−
Joint publications	−	+	+
Informal meetings, talks, communications	−	+	+
Joint supervision of Ph.D. and Masters theses	+/−	+/−	+/−
Training of firm members	+/−	+/−	+
Mobility of researchers between universities and firms	+	+	+
Sabbatical periods for university members	+	+	+
Collaborative research, joint research programmes	+	+	+
Lectures at universities, held by firm members	+	+/−	+
Contract research and consulting	+	+/−	+
Use of university facilities by firms	+	−	−
Licensing of university patents by firms	+	−	−
Purchase of prototypes, developed at universities	+	−	−
Reading of publications, patents etc.	−	−	−

[a] +: interaction typically involves formal agreements, transfer of tacit knowledge, personal contacts; +/−: varying degree of formal agreements, transfer of tacit knowledge, personal contacts; −: interaction typically involves no formal agreements, no transfer of tacit knowledge, no personal contacts.

Figure -1, Types of knowledge interaction (Schartinger et al., 2002, p. 305).

The degree to which above mentioned knowledge interaction types and interaction aspects are involved in the case of graduation projects at Middle East Technical University will be discussed in case study section.

2.5 University-Industry Collaboration in Turkey

2.5.1 Economic Situation in Turkey

According to State Planning Organization (DPT) (2000), Turkey has serious economical problems. Problems such as high rate inflation, internal and external debt,

unemployment, injustice in income distribution and irregularity are the obstacles to become an industrialized country. Since 1999, strict relationship with IMF (International Monetary Fund) caused the problems to become more serious and difficult. It led to an economic crisis. After this unpleasant event, a new economic program was used. However, it did not work and led economy into another crisis. On the other hand, realizing structural reforms to overcome the crises was a positive development; however, it was too late. This delay is very thought-provoking (DPT, 2000).

Small and medium sized enterprises (SMEs) are the basis of economy. They play an important role in improving the Turkish industry's capabilities in production, employment, exportation and investment. On the other hand, these business enterprises were affected badly by the economic crises. Even they were forced to close down (DPT, 2000).

2.5.2 Short Adventure of Science Policy in Turkey

In the first decades of young Turkish Republic, universities tried to figure out the tradition of industrialized countries' systems about scientific and technological improvement. As these activities continued, absence of a planned development organization has been observed. In 1963, TÜBİTAK (Türkiye Bilimsel ve Teknolojik Araştırma Kurumu), (Scientific and Technical Research Council of Turkey) was established for the purpose of organizing, coordinating and promoting basic and applied research. In its first decade, TÜBİTAK only supported universities for their basic research activities as it is described in its foundation purposes. After few decades as the Turkish economy was improved, the mandate of TÜBİTAK also expanded to include industrial technological activities and contract research. One more fact was taken into consideration in The Second Five Year Development Plan [1968-1972] and The Third Five Year Development Plan [1973-1977], technological development and technology transfer. The term *technology policy* was first mentioned in The Fourth Five Year Development Plan [1979-1983] and although the basic policy of TÜBİTAK during the 1960's and the 1970's was the promotion of basic and applied research in natural sciences, at the beginning of the 1980's, *integration of the technology policy*

with the industry, employment and investment policies and enhancing the technological abilities of certain industrial sectors have been envisaged (TÜBİTAK, 2006).

The first science and technology policy document “Turkish Science Policy: 1983-2003” was prepared at the beginning of the 1980's. In the report, the importance and priority areas of technology were identified (TÜBİTAK, 2000).

Turkey's capability in technology was strongly linked with the science capacity, as it is a source of enhanced technology. However, this relation was not one sided. It was necessary to improve technology in order to increase the scientific knowledge and this fact was also recognized. Because of these facts, the provision of interaction between science and technological development became one of the main goals of science and technology policy. This tendency increased the strategically importance of science and technology in economic development and social welfare. In the mean time, technology was included in the “science policies” of the country and they became “science and technology policies” (TÜBİTAK, 1999).

The Supreme Council for Science and Technology, (Bilim ve Teknoloji Yüksek Kurumu) (BTYK) started to work motivated with these considerations at their sixth meeting on December 2000. They took a decision that new science and technology policies should be formulated, and priority areas should be set for the following two decades. The aim was to create an innovative economy and society in the 100th Anniversary of the Republic, in 2003. Then the general secretariat of BTYK, TÜBİTAK developed this project, and it has been approved at the seventh meeting on December 2001 with the name “Vision 2023: Science and Technology Strategies” (TÜBİTAK, 2006).

“Vision 2023” project was the first foresight exercise of Turkey together with three more sub-projects that aim at collecting and evaluating data on the current science, technology and innovation capacity of the country. The project finished their work and submitted to the BTYK in the first half of 2004. In summary, it is believed that the Turkish economy will take new strides with the boost it will get from the wider

recourse to R&D in the coming years. This hope is based on the sizable and ever-growing young population, and on their quest for knowledge and learning. It is also believed that the "Vision 2023" project will have a substantial impact on the Turkey's future science and technology system, not only in terms of the guidelines it will provide, but also the benefits of the process itself (TÜBİTAK, 2006).

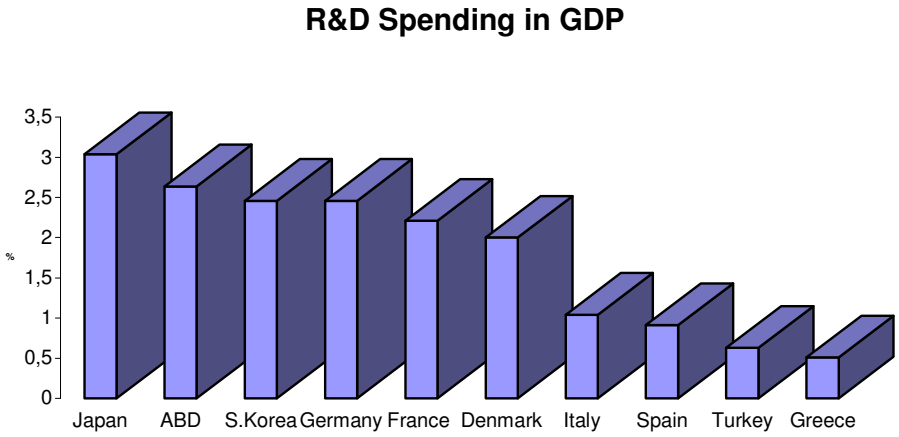

Figure-2, R&D Spending in GDP (OECD, Science and Technology Main Indicators, 2001)

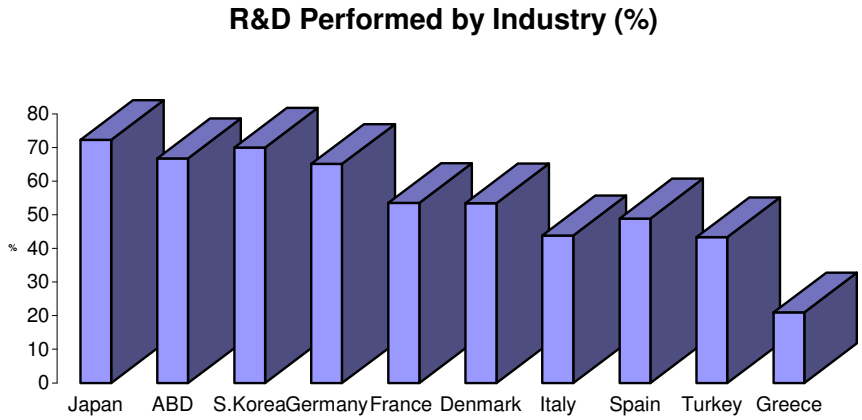

Figure-3, R&D Performed by industry (OECD, Science and Technology Main Indicators, 1998)

2.5.3 European Union Sixth Framework Program and University-Industry Collaboration with SMEs

Sixth Framework Program (FP6) has been in effect on 12 September 2002 and our country has equal position with other members of European Union Countries. FP6 presented many possibilities to SMEs and research institutions such as constant collaboration between member countries, presentation and spreading information, which derived from research, using in practice, finding new research areas, university-industry collaboration, education of technical staff.

Geren (2006), in his presentation, states that, the most important global needs of SMEs' is financial needs for investments. Figure 4 represents the needs of SMEs. It is observed that, the major needs of global needs arise from financial needs. On the other hand, SMEs' technological needs are listed as, transition to electronic trade, automation, predictive maintenance, technological improvements, use of new ICT systems.

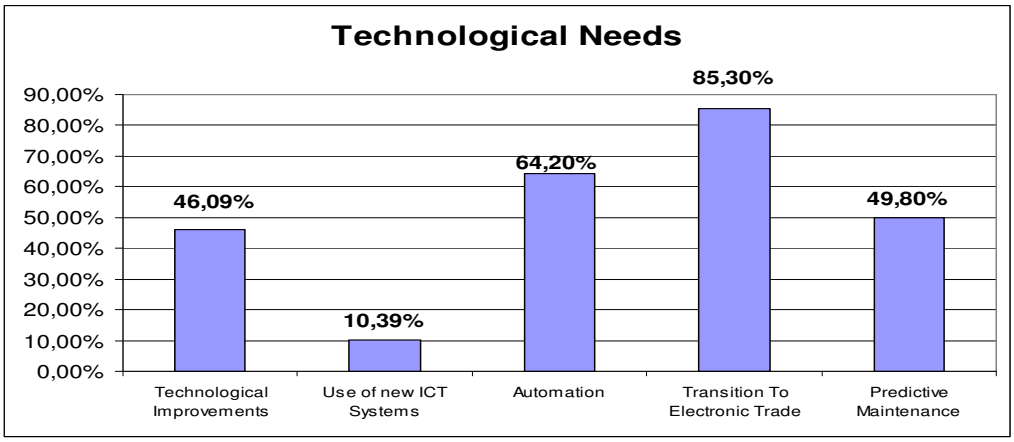

Figure-4, Technological needs, (Geren, 2006).

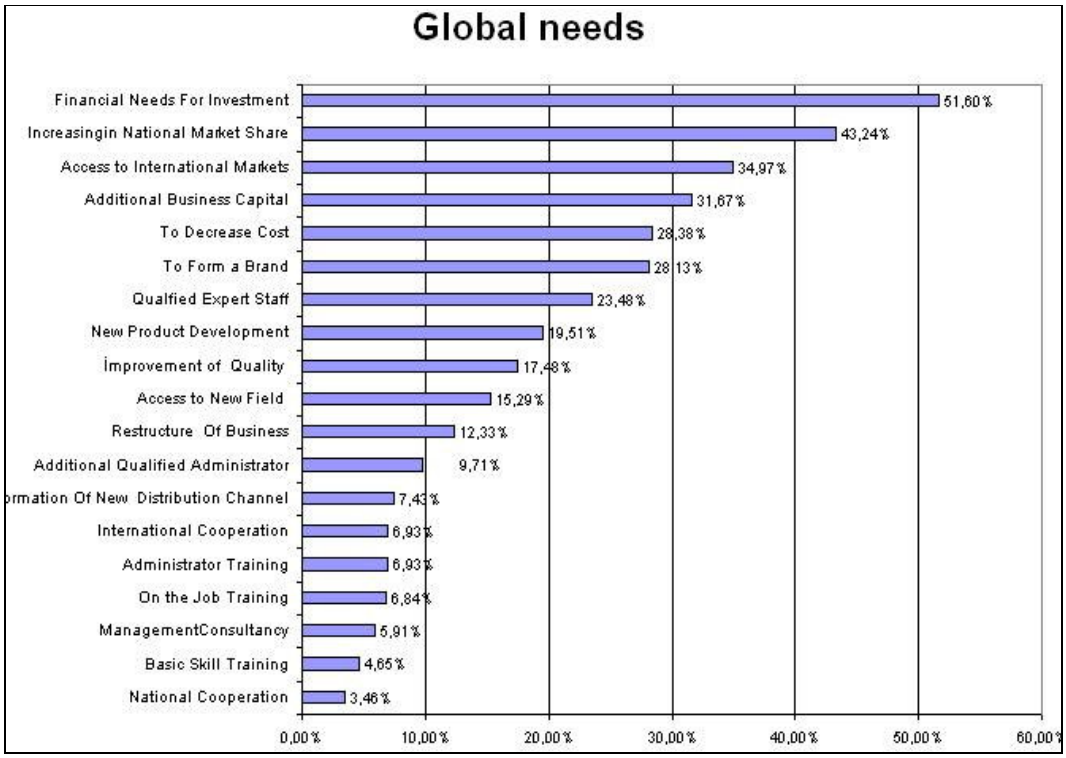

Figure-5, 1184 out of 1850 SMEs; Survey result, (Geren, 2006).

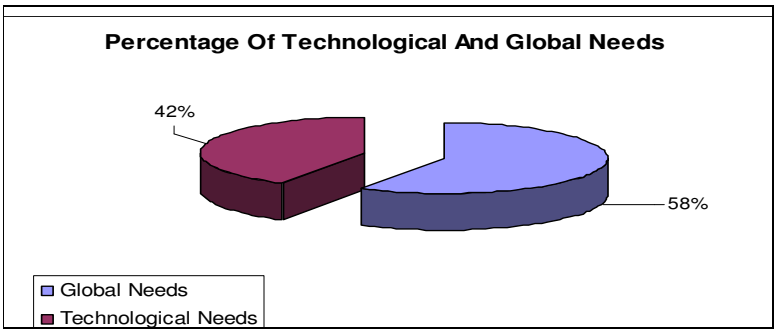

Figure-6, Percentage of technological and global needs, (Geren, 2006).

From the figures, it seems that, SMEs would be potential members of university-industry collaboration. However, collaboration between SMEs and university in education projects causes problems rather than benefits. The problems will be discussed in 2.7.1.

2.6 Design Education and Industry Collaboration

Kotler (2000) and Bruce & Bessant (2002) identify that the economic success of manufacturing organizations depends on their success in their research and development activities, which consist of marketing, design and manufacturing together. As Ulrich and Eppinger (2000) points out, manufacturing organizations initially develop product development capabilities without an overall outlined plan. As most of the organizations lack one or more of these inputs they experienced reduced effectiveness in their R&D activities in the past twenty years.

Lambert (2003) identifies companies, which tend to collaborate with others in a new form of open innovation. This fact gives an important role to universities in the process of stimulating economic growth. The laboratories of universities, which are constantly being invigorated by the arrival of fresh ideas, are forming a good partnership potential for companies that look for collaboration in their R&D activities all over the world.

Lambert (2003) also states that as missions and culture of universities and companies differ from each other. As a result, they bring their difficulties with the competitiveness yet there is much to be gained from working together. In such collaboration projects arguments for development targets, strategic activities and operational decisions are exchanged by two sides and precise formulation of corporate philosophy is promoted, (Spellmeyer and Weller, 2003).

Design students could train their skills of “innovation, identifying problems and taking the context into account when developing solution, but also in teamwork and the coordinating of team activities” by collaboration projects (Spellmeyer and Weller 2003). On the other hand, collaboration projects are the ideal way for companies, the other member of collaboration projects, in terms of having the new ideas, observations and visual point of views from the young and fresh design students (Spellmeyer and Weller 2003).

Evyapan and Korkut (2005) categorized university- industry collaboration cases into three main types: structured, semi-structured and unstructured. They made this categorization by analyzing collaborations held during the Graduation Project Course, which is also subject of this study, in the year 2003 at Department of Industrial Design, Middle East Technical University.

They defined the common character of the *structured collaboration* cases with an institutional communication, and an actual attention in the project. The large-scale companies with R&D facilities were the collaboration members. Companies' short or long-term design needs formulated the project statements. Companies regularly participated in departmental evaluation sessions and responded to students' request for assistance. Outcome of design projects were expected in high level by all companies. Intellectual property rights were an important issue because of the companies' trade secret policy. The level at which the collaborating institutions were represented included both high and low levels.

Korkut and Evyapan (2005) defined s*emi-structured collaboration* types in two sub-categories. The first sub-category comprised of medium to large-scale companies with in-house facilities whose institutional incentive for collaboration was primarily support for design education. Generally, the collaborative projects were not dealing with a real design problem. The companies offered design guidance, technical information and model making supports. This sub-category was lacking institutional interest in the projects because; the company was represented by a person from the design related department. The second sub-category consisted of small-scale production companies, which had no previous collaboration experience. Their main motivation for collaboration was urgent design needs. There was no design related department in these companies. These companies provided specialized technical information and assisting the model making process of the students. The companies were responding to students' desires for assistance. The level of commitment of institutional resources was low. As a result, the success of collaboration depended primarily on the students' initiative. The representatives did participate in

departmental evaluation sessions regularly. Communication with the department was not high in both sub-categories.

The *unstructured collaboration* cases were lacking institutional commitment regardless of the company scale. There were no real needs of companies. In addition, the companies had no real interest concerning the project outcome. All contact persons in this category were designers. Contact persons and the students affected the success of the collaboration. Communication between the department and the company was depending on the contact person. The support was mainly limited to design critiques by companies. On the other side, students organized the management of time and the task planning by their motivation.

According to Hasdoğan, et al. (2006), graduation projects in the same Department in 2005, which are the subject of this thesis, were conducted as *structured* and *semi-structured* types of collaborations. Collaboration cases were categorized into three main types according to companies' motivation: company focused, education focused and need focused collaboration (Hasdoğan, et al., 2006).

In *company-focused collaboration,* the main motivation of the company was to respond to a real design need of the company with a young approach, besides existing design facilities and to enable the students to get closer to the sector.

In *education-focused collaboration,* the motivation of companies was to support the education and investment for future. In this type, company acted as second school for the students and students were guided by a design expert from the companies.

In *need-focused collaboration,* company's motivation was to meet the urgent design needs. Students acted as design consultancy. The advantage of this collaboration for the students was to access the companies' facilities. The disadvantage of this collaboration was that companies generally did not know how to direct to the students.

2.7 Collaboration Cases in Industrial Design Education

Five university-industry collaboration examples in design education are analyzed in the following sections. These examples are selected according to their ways of management, aims, benefits, outcomes and emerged problems. After analyzing five of them, a discussion on the cases will be made according to above mentioned subtitles. The main aim of this section is to compare the perspectives of collaboration examples in relation to the actual case study which is conducted for this study.

First collaboration example was carried out between Istanbul Technical University (İTÜ) and SMEs nearby Istanbul. For the analysis, Şatır and Erkan's "Design for SMEs in industrial design education in Istanbul Technical University, (İTÜ)" titled presentation in the S*ixth International Conference EAD* held in Germany in 2005 and information on the web pages of İTÜ are analyzed from the author's perspective.

Second collaboration example was carried out between Salford University and Unilever in 2002, Kirton Playworks in 2003 and Cannon Hygiene in 2002. For the analysis, Evans and Spruce's "Knowledge networks: Collaboration between industry and academia in design" titled presentation in *Engineering and Product Design Education Conferenc*e held in Napier University, United Kingdom in 2005 is analyzed from the author's perspective.

Third collaboration example was carried out between University of Dar es Salaam (UDSM) in Tanzania, the School of Industrial Design Engineering at TU Delft in the Netherlands and Tanzanian SMEs. For the analysis Christiaans and Diehl's "Knowledge transfer from university to industry" titled presentation in *International Conference on Industrial Design Engineering* held in UDSM, Dar Es Salaam in 2003 is analyzed from the author's perspective.

Fourth collaboration example was carried out between multinational academic virtual enterprises. For the analysis, Horvath et al.'s "Experiences with navigated active learning in multination academic virtual enterprises" titled presentation in

International Engineering and Product Design Education Conference held in Delft, The Netherlands in 2004 is analyzed from the author's perspective.

Fifth collaboration sample was carried out as graduation projects in Industrial Design Department of Western Sydney University (UWS). For the analysis, Bohemia's "Working Knowledge: Industry-Based Projects in an Industrial Design / Engineering Program" titled presentation in *International Engineering and Product Design Education Conference* held in Delft, The Netherlands in 2004 is analyzed from the author's perspective.

2.7.1 Design for SMEs in Industrial Design Education in İTÜ

Management

According to Istanbul Technical University (İTÜ) Department of Industrial Product Design's web pages, the project aims to introduce industrial design to Turkish SMEs, which are members of Istanbul Chamber of Industry (ISO), and have with no previous experience of industrial design. Design service is delivered through senior industrial design students at İTÜ Department of Industrial Product Design who are enrolled in *EUT 492 Graduation Design Project* course (İTÜ, 2006).

Approximately 30 companies are included in the project each year, from furniture, lighting, medical equipment, electrical goods, industrial machinery, metal accessories, plastic kitchen utensils, automotive spare and auxiliary parts to jewellery sectors.

Aims

Informing the SMEs about industrial design with collaborative experimental projects is the main aim of collaboration. Also, letting SMEs to be aware of the importance of design is another aim of the collaboration. Moreover, by collaboration, preparing SMEs to competitive environment is aimed. Another aim is to introduce SMEs to senior industrial design students at İTÜ by giving them the opportunity to experience a product design and development process in a real life context.

Benefits and Outcomes

Some of the projects were developed further by the companies and have been taken to the production and commercialization stages. Job offers have been made by the companies to those students they have worked with. The ISO – İTÜ project gives SMEs the chance to work with student designers without bearing the costs that would come if it were on a professional level. The ISO – İTÜ project also strengthens the self-confidence of young designers to work with or for SMEs.

Emerged Problems

According to Şatır and Erkan (2005), the results of the applied product development studies with SMEs brought the following results:

- Designers who work for SMEs in Turkey are forced to forget their own wishes and create wonders with minimum economical means with a good knowledge of SME's market.
- SMEs generally do production for others; their similar feature is that they do not pay attention to design and even to marketing when they have certain constant customers. As a result, designing alternative products is possible for ones that start their own production.
- SMEs lack of engineers, constructors, R&D's, and marketers; the designer has to cope with and develop the whole design process starting from the initial idea, to mass production, to product launch, sales and the market (Şatır and Erkan, 2005).

According to the present author, parties have rather different backgrounds. As a result, to establish a good dialogue between the company and the student is essential for the success of the ISO-İTÜ projects. Students have to be informed about business realities and the capabilities of SMEs, also, companies with a lack of experience in the industrial design field are needed informing about what industrial design is. Time and managerial support committed to the project by the SMEs and overcoming cultural barriers between the SME and the designer are crucial.

2.7.2 Salford University's Product Design Course

Management

Knowledge Transfer Partnerships (KTP), which help United Kingdom businesses to access to a wide range of expertise available in "Knowledge Base," are enterprises funded by government. "Knowledge Base" means higher educational institutions, colleges, private and state sector research organizations. While academic staff can widen their knowledge on business, university expertise applied to a project has vital importance for the progress of company partner. Each KTP has one member or more, who are successful students assigned to work in a project. Academic staffs help the member that will make the transfer of knowledge, skills and technology easier.

School of Art & Design was provided with a proper framework by KTP. This school is required to support the organizations in new product development: from user to product launch. Academic knowledge, support and supervision are within the reach of commercial organizations involved in KTP. Knowledge transfer available for commercial organizations is created by means of collaboration made between departments and cross disciplinary areas.

Several live industry projects were initiated by Salford University's Product Design course and those projects provided learning experiences for students. Graduate students were also employed and knowledge transfer plans contributed to improve the synergic opportunities within the course structure.

Aims

The collaboration aims to promote and to increase the level of innovation in industry, to provide learning experience for the student, to generate potential innovations in new product conception and to research current trends for institutional companies and to generate potential solutions of commercial value, such as, market search, safety requirements and costs for SMEs.

Unilever, April – June 2002, 18 level 2 Product Design students

An emphasis was put on the generation of new product innovations titled as "The Future of Personal Hygiene." Definitions and investigations were made on market categories and several product concepts were presented. Most of the project findings reflected the research findings and gave hope to future additional innovations.

Kirton Playworks, April – June 2003, 15 level 2 Product Design students

A local manufacturer and an installer implemented this project, which manifested a common scenario. Though the company often developed components or technologies, they had the deficiencies of resources to make an inquiry of markets. In this project, a fundamental level of research was carried out with an emphasis on costs, manufacturing abilities, safety requirements, and market and user issues and following the research investigation design concepts were created and the solutions providing alternatives enabled the company to prototype and test.

Cannon Hygiene, April – June 2002, 8 level 2 Product Design students

Cannon Hygiene Ltd, as a manufacturer and service provider of washroom facilities joining in a project with product design students took interest in widening its product range, which was necessary for replacement with having no design facility at the time of the project. Outside design consultants developed all its previous products. The project aimed at inquiring current trends and creating ideas for new products and encouraging the company to consider developing a structured approach to integrating design.

Benefits and Outcomes

Short term benefits of industry collaboration include the enrichment of academic curriculum and student learning experience. Long term benefits include the enrichment of proper curriculum content, employment opportunities and staff development.

Through this open collaboration, industry could benefit from University's resources. It had also been realized that the best forms of knowledge transfer involve human

interaction and academics and industrialists with each other as they have a lot in common.

Emerged Problems

About emerged problems, there were not any comments given by the author.

2.7.3 Collaboration between (UDSM), IDE and Tanzanian SMEs

Management

This example was in the form of a collaboration project and the collaborators were from the University of Dar es Salaam (UDSM) in Tanzania and the school of Industrial Design engineering at TUDelft in the Netherlands. The project had several objectives. One of them was mainly on Tanzanian firms. TUDelft IDE students highly contributed to "Demo Projects" carried out in Tanzanian industry. The main objective of these projects was about transferring knowledge and the companies in Tanzania achieved this, because they became aware of what they were doing and understood one another and noticed what they could do. There were three main activity areas concerning this knowledge transfer project.

Firstly, IDE courses were going to be organized in UDSM, the College of Engineering and Technology. Courses aimed at educating the students in design engineering. Students lacked knowledge in many important fields such as product design, marketing, innovation management and entrepreneurship. After the courses this lack of information was going to be eliminated to a large extent. Within the scope of these courses, graduates were going to be taught how to perform well for their future engineering duties and this way they were going to bring their knowledge and skills into action in an influential way in many different parts of the world.

Second, before the courses began, it was found appropriate for the academic personnel in the University to be trained for teaching qualifications in the areas of teaching and research as well as IDE courses. In the first year of the project 4 academic personnel from University of Dar es Salaam were given necessary education at the university in Holland. The aim of this application was that those academic personnel were expected

to put their industrial design knowledge into practice in their native countries. They were required to arrange a business plan for a Tanzanian company and they had to cooperate with the said company. The results obtained were submitted to other companies. In the second year 9 academic personnel were given a training course in UDSM by those four academicians to make IDE expertise well known among the teaching personnel.

Third, the idea of providing expertise was not enough in terms of developing entrepreneurship and product development. This IDE approach was especially important to industry because it constantly required well-equipped and knowledgeable graduates from universities. Two activities carried a lot of importance to see what IDE can do for a successful business in industry where there is a fierce competition.

- Demo projects putting an emphasis on different disciplines of Industrial Design Engineering conducted by TUDelft IDE students and UDSM students together.
- Yearly workshops conducted for local company managers to increase awareness.

The following criteria were important to choose the companies for demo projects:

- Only Tanzanian companies,
- Developing new products,
- Industrial Design Products,
- Tanzanian Industry represented by branches,
- Representation of mass industry, SME's, and consultanties.

Aims

The main of the collaboration project is to transfer IDE knowledge, through the creation of awareness, understanding and capabilities among Tanzanian SMEs. In addition, it is aimed to train future graduates and the staffs in IDE at UDSM.

Benefits, Outcomes and Emerged Problems

During a 4-year Project, 19 projects prepared by students have been carried out in Tanzania. An evaluation made by Christiaans and Diehl on demo projects utilized the following studies:

Nuffic

The first evaluation was related to the MHO support to (UDSM). The report was generally positive about IDE Project. It helped a lot for economic growth. It fit well to Tanzanian needs in terms of development of tourism programs and packaging methods, and product strategies and the improvement of the design of artificial limbs.

Student evaluation TU Delft

IDE students implemented a research Project in 2002 while performing their internships in Tanzania. The conclusions of this study emphasizing the effect of the IDE approach on the results of the industry were as follows:

- Local designers were expected to be successful in collaboration with the industry.
- Companies took interest in this IDE approach. But there was also the possibility for them to adopt their old operational ways.
- An IDE program was needed in UDSM. As the students in Mechanical Engineering did not know how to integrate the approach, they might face difficulties in industry.

Company evaluation

A Master of Science student from TUDelft IDE carried out this evaluation study in 2003. The results were as follows:

- Due to differences in culture and language, most DUT students worked independently. This situation avoided the knowledge transfer from IDE student to company employees.
- During this joint internship students rarely got into trouble exchanging knowledge due to cultural differences and time span. Design assignment was inevitable in these few cases.
- Expectations on the internship varied from company to company. While one company was considering the result of the project a valuable contribution to its

product development, the other one considered highly the transfer of knowledge.

- Companies were terribly in need of multi skilled engineers to be able to deal with technical and economical aspects of the company. Likewise, students needed to know about bringing a product to the market, approaching the customer and conducting a market and a customer research.
- IDE is necessary in Tanzania. Many companies state that IDE students must learn to design in a certain context of the society. The product to be designed should reflect the culture of the society.

2.7.4 Multi-nation Academic Virtual Enterprises

Collaboration was carried out between multinational academic virtual enterprises. For the analysis, Horvath et al.'s "Experiences with navigated active learning in multination academic virtual enterprises" titled presentation in *International Engineering and Product Design Education Conference* held in Delft, The Netherlands in 2004 is analyzed from the author's perspective.

Management

According to, Horvath et al., (2004) unlike the past, nowadays, design and engineering education faces new challenges such as educational institutions being open, market oriented, and integrated into the society. Moreover, educational programs are being well suited to students' interest and abilities, students being ready for eliminating the problems resulting from knowledge explosion, globalization of the world, and the fierce competition. Therefore, as students to gain experience for creative workforce, various active learning approaches were conducted and the new opportunities offered by communication technologies were also studied and used in education. Recently, there has been increase in the use of video conferences in engineering courses intended for the groups of international students. Through video conferences, new educational philosophies, organizational set-ups, and pedagogical methods are improved and tested. For example, according to the reports in literature, students put into the position of active learning professionals and creating virtual learning environments played an important role in the approaches. After recognizing the

necessity of experiencing with teaching design and the chances for both students and academics, The Section of Computer Aided Design and Engineering, Faculty of Industrial Engineering, Delft University of Technology in 2001 organized a series of courses called Global Production Realization (GPR), which was supported by University of Michigan (UoM) and Seoul National University (SNU). The core company was an unreal one named Morning Coffee, Inc.

Aims

The aim of the course was to develop a certain global product line and the design and prototyping of a global coffee maker fulfilling the needs in three countries. Students, who were grouped in international teams of 6-8 students from three different continents, joined in lectures and case studies and yet, they encountered some difficulties such as;

- Cultural differences,
- Time zone differences,
- Making good use of video conferences
- Provision of digital-only course materials for students.

A second course was organized in 2002 in Europe to include real companies with the participation of Ecole Polytechnique Federale Laussanne (EPFL), University of Ljubljana and TUD. A consortium was going to be set up as an organizational goal between the companies of LIV Postojna and De Vlamboog BV. The aim of the project was to design and prototype a vacuum cleaner and a head mounted light and respiration protecting unit for welders.

A new framework for the E-GPR was introduced and the concept of academic virtual enterprise (AVE) was improved and conducted with the assistance of De Vlamboog BV forming the industrial core of the AVE and three universities being the knowledge centers.

Product conceptualization was given emphasis in this project and to realize this, students had to make a series of analyses such as extensive trend, competitor, market, technology and user.

Emerged Problems and Outcomes

As a new teaching element, thanks to the introduction of the navigated active learning concept, student teams were given professional guidance and technical assistance. Academic virtual enterprise was extended with the participation of students and staff of University of Zagreb and aided financially and professionally by De Vlamboog. The project was about experimental research on concept products for students to:

- See Their strong and weak points,
- Learn about the potential customers' opinions,
- Inquire new technologies.

Product realization and marketing are distributed according to different physical locations. Virtual enterprises provide possibilities for working on many different boundaries, utilizing knowledge, financial and physical assets, producing and distributing products and services globally. As multinational companies place their products on global markets and SMEs supply spare parts for their larger products, their number will go up in the future. Many designers and engineers with knowledge, experience and skill will be required for future operations in shared virtual environments. According to, Horvath et al., students must be trained and educated in this telecommunication based operations and taught about the concept, infrastructure and activities of virtual enterprises.

The concept of a virtual enterprise was created with the help of experiences in design and engineering education and the availability of necessary information and the communication technologies.

In such a learning environment imitating the functions of industrial virtual enterprises, the project requires mutual collaboration of industry and academic partners and helps the university, to open its doors for a real-life industrial collaboration, to create an environment for students to act professionals, to learn the best practices, methods and tools, to challenge the students with product development tasks, to apply collaborative team work.

Differences in the goals and interests of the co-organizers should be understood well and then harmonized for the success of the organization. In such an organization of GPR course, more finances and efforts were needed to meet the general expenses and increase the number of students. The core company joined in the project because they had a suitable practical reason and hoped to benefit from the course.

There were also the difficulties of finding universities with proper semester schedules and the geographical distributions despite the fact that the academic virtual enterprise was able to integrate all the participants and the other difficulties such as; communication, logistic and management, knowledge platforms, working cultures, different mentalities, different time zones, different design and engineering system platforms.

It was necessary for the students and the staff member to know one another very well for a smooth operation. Student teams had to collaborate with one another to realize the product conceptualization, development, prototyping, and reengineering tasks. It seemed easier to deal with the problems individually by using collaborative methods. Students lacked the knowledge of creative group techniques such as brainstorming and videoconferencing.

Time zone seemed to be another problem. But, later on this could be used to the advantage that the semester project could be worked on a 24-hour basis.

ISDN based infrastructure worked well though it was expensive. Prior to the courses, compatibility issues should be taken into consideration, as communications had to be founded with various sites of the companies involved. The use of Blackboard system was also useful in project management. Students understood that the communication in a virtual environment was a time-consuming activity and also death with the problem of uncertainty paradox. They complained about the limited accessibility of communication equipment.

In the first period of the courses both advantages and disadvantages appeared on the different knowledge platforms. Students following different specializations at the

mother universities had different perceptions of the course and the semester project. Cultural influences could be minimized when interacting with European partners.

During the closing workshop, students enjoyed themselves so much to meet in person, to be members of a community and to visit the involved communities and the company experts.

Students summarized their work and gave oral presentations during the Student Symposium. In the Global Product Exhibition, they could demonstrate their accomplishments through for example, posters, video recording and virtual model animations.

It was not so easy to arrange a video conferencing based course as a regular master course. It was a great chance to have the best lecturers despite too many lectures to be presented. In many cases, the course lectures were logically connected with the student projects.

GPR proved itself to be a good example of an academic virtual enterprise, despite the fact that students were overloaded with the amount of knowledge in the AVE environment. Since students were highly motivated, they ignored this time consuming course. Course organizers were curious about what the results would be if this course were renewed in the next semester.

2.7.5 Graduation Projects in (UWS)

Managements

The School of Engineering and Industrial Design offers an industrial design program at University of Western Sydney (UWS), the final year of which is compulsory for its Postgraduate Degree Programs such as 4-year Industrial Design and 5-year Industrial Design Engineering. In the final year course students aimed at integrating and applying the knowledge and skill they had acquired so far. They found an innovative solution to a design related problem by encouraging students to discover areas, issues and activities that people and industry encounter in their daily activities.

Aims

The main of the collaboration was to integrate and apply the knowledge, skills and experience of students to a particular design related problem by collaborative projects.

Although in the past industry did not add much to final year projects except for sponsorships of similar type in the form of providing a theme and model making materials and/or assisting with industry know-how on account of having very little relevance and interest in the overall success and its final consequence, yet, in 2003 two of the new industry partners offered projects, in which they had more relevance and interest and in this way a new working relationship was established between industry partners and university.

UWS Externa / Signage project (UES)

The industry partner for this project was UWS Capital Works and Facilities (CWF). One of the academic personnel wanted to inquire if CWS would be sponsor a final year industrial design project and improve the existing external directional signage system. At that time, the university was about to conduct a new corporate image and finally, it was agreed that this would be a proper final year project. The project scope included the following points: project objectives, organizational requirements, approach, timeframe and milestones, inclusion and deliverables, exclusions, assumptions, constraints and risks. Prototypes were planned to be set up at one of the university campuses and to this plan, the students would carry out a user survey to evaluate the prototypes and modify the designs. As the subcontractor did not perform the timely delivery of signage prototypes and their installation, the evaluation and testing process was not realized.

CSIRO-TIP's student projects

Five industry-based projects were made in collaboration with Commonwealth Scientific and Industrial Research Organization, Division of Telecommunications and Industrial Physics (CSIRO-TIP). This industry partner provided innovative scientific and technical progress of the software interface. One of the students on working instrument's housing lost his motivation and interest stating that the project leader did not take interest in their progress. Though he was given feedback on concept design by

the leader, he could not move ahead from the conceptual design phase and this delayed the construction of the model.

Benefits;

Benefits identified by students working with the industry-based projects were as follows: working in cross-disciplinary teams, refining their time management skills, gaining experience in project management and working on real life projects and problems. According to a student, changeable requirements could cause problems.

Both UWS academic staff members and students stated that they obtained valuable information through working on the projects. Both groups had new insights into scientific methodologies and this helped them approach to design problems in a different perspective. Academic staff members learned about what problems and issues designers face and had a chance to renew their curriculum to better prepare future students.

CSIRO-TIP also benefited from this project and they began to put a more emphasis on designing for a customer than product orientation. They took interest in the projects, in which what they had lack of knowledge such as industrial design and its use. Learning experience was great, meetings were organized between parties, and a couple of students were asked by the academic supervisors to visit the company. Students were requested to express their impressions on this collaborative activity.

Emerged Problems

As students were required to approach the problems through a wider problem definition in their final year industrial design problem, they tried to find out the activities and issues that people in industry face and direct their attention to user-based solutions.

It seemed that resources were abundant for industry-based projects. Time and energy was spent on initial formation of projects with the partner, provision of approvals from university circles and sustainability of the interactions with the partner.

The partner wished to have more contact with the student supervisor on the subject of charging a project management fee. However, this required more people for the approval of consulting contracts between university and the partner.

Knowing very well that this was mainly a student project, industry partners must consider the project requirements and the possibility of failure. There was also the possibility of students not providing a specific and tangible solution for the design process. Well-defined projects were to be chosen to meet both parties' expectations. In this particular case whether the project turned out to be a success or failure was not going to affect CSIRO-TIP's current situation.

Outcomes

Each party learned a lot from this collaboration and each observed their operational manners to accomplish the program. Industry partner was informed about academic requirements through student presentations in both university and the partner's site. Academic advisors to produce project proposals and present them to the partner supported students. Academic staff members also learned the way of explaining to both students and the partner the value of a broader research perspective to a specific problem.

Together with the advantages and the challenges of such industry based projects, students obtained a chance of working in an industry based environment and became an integrated part of the team. Yet, they had to deal with and satisfy the stakeholders and professionals.

Students supported financially by the partner were able to produce fully working prototypes and presentation models taking advantage of this situation. Since it was hoped that students would produce design solutions and proposals for the partner to be able to start the operation of a prototype, they were expected to go beyond the conceptual design phase and this way they produced detailed design proposals.

In intellectual property, current situation was that if a student generates by himself, then he/she owned it, if a student's supervisor made a contribution, then it was jointly owned. If projects were proposed by industry partners, then they claimed ownership.

Confidentiality was governed with the initial agreements and observed by both academic supervisors and students, since projects had commercial implications.

The possibility of developing more research relationships with industry partners was mainly caused by this student industry based project with respect to academics auditing CSIRO-TIP research projects

Despite many issues that were open to discussion to unite the industry based projects with the final year program, this approach would continue in the future. This was the first time for industrial partners to work with the industrial designers and they expressed their contentment with the results and agreed to continue with the cooperative partnerships. Two of the projects proceeded with the production phase in 2003, two of them were planned to be in the production phase by the end of 2004. Two students were offered jobs by one of the partners, which also initiated collaboration between another division of their organization and the school.

2.7.6 Discussion on Cases from Literature

The collaboration cases from the literature are analyzed as summarized Table 1, in terms of their managements, aims, benefits, outcomes and emerged problems. The author will discuss the cases according to these sub-titles.

Management

All collaboration cases were constituted between universities and collaborative companies. However, in such cases some institutions such as chambers of industry or other universities were acting as another member of collaboration. For example, ISO in the case of İTÜ, and KTP in the case of Salford are the institutional members. On the other hand, there are other universities acting as members of collaboration. In the case of TUDelft-USDM, two universities in different countries and Tanzanian SMEs

are the members of collaboration. In the case of the academic virtual enterprises (AVE), there are several universities collaborating in virtual platform with one company. In case UWS and METU ID Graduation Project (will be analyzed in chapter 4), the members are university and several companies. There is no institutional organization as a member of collaboration.

According to author, collaborating with other universities is not practical, because of communication problems. However, institutions are the important members of collaborative projects. Institutions would be acting for their organizing role, as a result; universities would focus on their educational issues, rather than dealing with financial problems, the problems of companies or the intellectual property rights agreements.

Aims

Main aims differ from case to case. In the case of İTÜ, the main aim was informing the SMEs about industrial design by collaboration projects. In the case of Salford, the same aim was covering not only SMEs, but also, all industry. In the case of TUDelft-USDM, transferring industrial design knowledge from one university to other university and SMEs, which were located in other country, was the main aim. In the case of AVE, the main aim was to distribute product realization and marketing between different physical locations by a virtual education project. In the case of UWS and METU ID Graduation Project, the main aim was to integrate and apply the knowledge, skills and experience of students to a particular design-related problem by collaborative projects.

Benefits and Outcomes

In analyzing all cases, comments on benefits and outcomes could not be found distinctly. As a result, the author categorized these under two titles in one column, (see in Table 1). After analyzing the outcomes and benefits, the main aims of İTÜ, Salford and UWS cases were achieved at the end of the projects.

In the case of TUDelft-USDM and the case of AVE, the outcomes were given. In case of TUDelft-USDM, the main outcome of the collaboration was revealing the IDE

program necessity in both Tanzanian Companies and UDSM. On the other hand, in the case of AVE, the main aim was not achieved and the outcome was to realize that video conferencing-based collaborations were not practical as it is thought.

Emerged Problems

Emerged problems are listed in the last column of Table 1. It is observed that the problems are about *cultural differences of parties*.

In the case of İTÜ, cultural differences occurred because of parties' different backgrounds. Companies with a lack of experience in the industrial design field needed informing about what industrial design was. The problems generally emerged about time and managerial support committed to the project and overcoming cultural barriers between the SME and the designers.

In the case of TUDelft-USDM, cultural difference occurred because of different countries' approach on design issues. Cultural differences, work atmosphere, language barriers between the Dutch and the Tanzanian, prevented knowledge transfer. According to Christiaans and Dielh's (2003) presentation, for companies, it looks difficult to adapt to think differently, after a while; they probably go back to their old way. In addition, expectations were different among the companies.

In the case of AVE, cultural differences occurred because of parties' different location. The time management and making good use of video conferencing and provision of digital only materials for students made unsuccessful collaboration.

In the case of UWS, according to students, challengeable requirements, complexity of projects, dealing with stakeholders from different backgrounds, focus and expectations caused problems.

According to the present author, analyzing managements, aims, benefits and outcomes of the cases and emerged problems that had occurred in the cases, brought important issues to be discussed in relation to the case study. The last Chapter will discuss these issues.

Table - 1, Cases from Literature

	Management	Aim	Benefits, Outcomes	Emerged Problems
2.7.1	ISO members without ID experience ITU ID 492 Graduation Project	• To inform the SMEs about industrial design with collaborative experimental projects, • To let SMEs to be aware of the importance of design, • To prepare SMEs to competitive environment, • To introduce SMEs to senior industrial design students at ITU by giving them the opportunity to experience a product design and development process in a real life context	• Some of the projects were developed further by the companies and have been taken to the production and commercialisation stages. • The job offers made by the companies to those students they have worked with. • The ISO – ITU project gives SMEs the chance to work with student designers without bearing the costs that would come if it were on a professional level. • The ISO – ITU project also strengthens the self-confidence of young designers to work with or for SMEs.	• Parties have rather different backgrounds. • Companies with a lack of experience in the industrial design field are needed informing about what industrial design is. • Time and managerial support committed to the project and overcoming cultural barriers between the SME and the designer are crucial.
2.7.2	KTP Salford University Product Design Course Various Industry Partners	• To promote and to increase the level of innovation in industry • To provide learning experience for the student, • To generate potential innovations in new product conception and to research current trends for intuitional companies, • To generate potential solutions of commercial value, such as; market search, safety requirements, costs, etc., for SMEs,	• Benefits universities; Real world inputs from the commercial world, Confirms relevance of curriculum content, Enhanced students learning experience, Professional practice opportunities for university staff, Financial remuneration, Career opportunities for graduates, Research outputs, Status benchmarking for course, department, university, • Benefits to industry; Access to facilities, Access to existing knowledge across institution, Opportunities to direct research activities, Alternative perspectives not limited by organisation cultures; access to graduates, Access to academic concepts and approaches, Staff trainment opportunities.	• No comment was given.
2.7.3	UDSM Tu Delft IDE Tanzanian SMEs	• To transfer IDE knowledge, through the creation of awareness, understanding, and capabilities among Tanzanian SMEs , • To train future graduates and the staffs in IDE at UDSM,	• To reveal the IDE program necessity in both Tanzanian Companies and UDSM	• Cultural differences, work atmosphere, language barriers between The Dutch and Tanzanian, prevent knowledge transfer • For companies, it looks difficult to adapt to think differently, after a while; they probably go back their old way. • Expectations were different among the companies
2.7.4	(e)-GPR Participant Universities AVE	• To distribute product realization and marketing between different physical locations, as a virtual education project,	• To realize that video conferencing-based collaborations were not practical as it thought.	• Cultural and differences, • Time zone differences, • Making good use of video conferences, • Provision of digital-only course materials for students.
2.7.5	UWS ID Graduation Project Various Industry Partners	• To integrate and apply the knowledge, skills and experience of students to a particular design related problem by a collaborative projects.	• Student Perspective; Working in cross disciplinary teams, refining their time management skills, gaining experience in project management, working on real life projects and problems. • Academic Perspective; Learned about what problems and issues designers face and had a chance to renew their curriculum to better prepare future students. • Industry Perspective; Began to put a more emphasis on designing for a customer than product orientation	• Acoording to students, chalengable requirements, complexity of projects, deal with stakeholders from different backgrounds, focus and expectations could cause problems.

CHAPTER 3

METHODOLOGY

3.1 The Design of the Survey Study

After the literature review on university-industry collaboration in design education, this chapter presents the methodology of a survey study conducted in order to substantiate the literature review findings by concentrating on the situation in Graduation Projects in the Department of Industrial Design in Middle East Technical University (METU).

One of the several ways of doing social science research is case study research, besides other ways, which include experiments, surveys, histories, and analysis of archival information (Yin, 2003).

According to Flyvbjerg, case study methods involve an in-depth, longitudinal examination of a single instance or event. They examine a limited number of variables rather than using large samples and following a disciplined procedure. Case study methods involve systematic way of looking at events, collecting data, analyzing information, and reporting the results. By examining why the instance happened as it did, the researcher may gain what might become important to look at more extensively in future research. By using case study methods, it is possible to generate and test hypotheses (Flyvbjerg, 2006).

In same manner, this thesis uses the case study method to analyze the Graduation Projects in the Department of Industrial Design at METU in the year 2005. By analyzing METU case, the author aimed to generate arguments on how better

collaborative projects with industry in industrial design education can be conducted. According to Yin (2003), case study method uses several techniques to gather in-depth information about the case such as questionnaires, interviews, observation, archival data, etc.

3.2 Data Collection

In order to analyze the collaboration cases during the graduation project course at METU, questionnaires to all collaboration parties composed of open-ended questions were prepared. Besides this, also course documents and the tutors' published articles on the same course were analyzed. The questionnaires aimed to gather information from the parties at two different stages of the process, on the third and last week of the project. Questionnaires aimed to find out:

- How collaboration members, namely students, educators and company representatives of graduation projects, benefit from each other,
- Which problems they encounter during collaboration; and
- The needs and expectations of all collaboration members,

E-mailing and giving questionnaire directly to the parties were chosen as the survey techniques since it is an easy and quick way of reaching all parties at the same time.

3.3 Population and Sample

Population of this study includes the collaboration members in the Graduation Projects Course in the Department of Industrial Design in Middle East Technical University (METU), Spring Semester, 2005. The term 'collaboration members' is defined as 'industry' and 'educational institute'. On the side of 'industry', the members are referred to as "company representatives" who has various positions and qualifications such as designers, engineers and managers. On the side of 'educational institute', the members are referred to as students and educators.

The survey was conducted in two stages. The first one was implemented at the beginning of the semester, the second one in the graduation projects exhibition at the

end of the semester. While, in the first survey, generally questions about the expectations of the parties from the collaboration were asked in the second survey, to which degree these expectations were met was inquired. Considering the issue of confidentiality, the quotes in this subject are given without mentioning the names.

For first stage of the survey, an introductory e-mail explaining the purpose of the study within the attached questionnaire has been sent to collaboration members (Appendix A). In addition, hard copies of the questionnaire were handed out in the second week of the semester.

For final stage of the survey, questionnaires were handed out during the Graduation Projects exhibition. There were two different questionnaires. One of them was for the members, who had replied the first questionnaire. The aim for that strategy was to find out the pure answers of members about how much their expectations were met. The other questionnaire was for the members, who did not reply the first one. In that questionnaire, the aim was to find out both their initial expectations and outcomes of these expectations.

32 of 44 students who took the Graduation Project course, 15 of 34 company representatives who supported the project and 3 of 5 educators participated in the surveys. The distribution of participants to first and second survey was given in following table. The attendance of second survey was higher than the first one. That might result from the distribution of the questionnaires in a formal environment affecting the interest and willingness.

Table-2, Number of people who replied the questionnaires

	The first questionnaire		The second questionnaire, who replied the first one		The joint questionnaire (who did not reply the first one)		Number of people replied
	Total	Replied	Total	Replied	Total	Replied	Total
Students	44	**18**	18	10	26	**14**	**32**
Company Repr.	34	**8**	8	4	26	**7**	**15**
Educators	5	-	-	-	5	**3**	**3**

3.4 Analysis of Data

Bogdan and Biklen defined data analysis as; "the process of systematically searching and arranging the interview transcripts, field notes, and other materials that you accumulate to increase your own understanding of them and to enable you to present what you have discovered to others" (Bogdan and Biklen, 1992). They stated that, data analysis involves the following;

- Working with data,
- Organizing them,
- Breaking them into manageable units,
- Synthesizing them,
- Searching for patterns,
- Discovering what is important,
- Discovering what is to be learned, and,
- Deciding what you will tell others.

For the analysis of the questionnaires context coding is used which is one of the coding categories defined by Bogdan and Biklen. They defined this term to code under which the most general information on the setting, topic, or subjects can be sorted (Bogdan and Biklen, 1992).

In order to analyze the questionnaire results in the case study, Graduation Project Course collaboration members' statements in the questionnaires, their way of responding to the questions, and how the responses fitted into the collaboration members were coded. To achieve a reliable result, first of all, the answers for each question were written one under the other. After re-reading the all answers for one question, a color coding of statements was implement to find out the required subjects' sub titles.

Appendix B.1 illustrates an extract from a coding sheet showing how context coding was practiced. In this appendix, the aim of the question was to find out in which way the students determined *the subject* and *the company.* Answers about *the subject* were coded in the blue color, and answers about the company were coded in orange color. To practice the context coding, the related answers' font color were changed according to define whether the answers were about the subject or the company. In the final stage, the arguments under the same category were grouped.

The same methodology for data analyzing was executed to all questions. To conclude, the analysis of case study materials that allow the author to place his study in such a large scale of context was achieved by using context codes analyzing.

3.5 Limitations of the Study

In the questionnaire, qualitative data are gathered. Limitation of qualitative data is; the quality of the data collection and the results are highly dependent on the skills of the researcher and on the rigor of the analysis. Because all of these methods are dependent on respondents and all results found by the researcher may influence the quantity and quality of information given by respondents.

Qualitative research does not gather quantitative data from a representative sample of the target population. Eventually, this type of research cannot be exposed to statistical analysis to estimate the opinions stated by respondents reflect the opinions of the population surveyed. The most important implication of this limitation is that researcher should refrain from concluding such actual prevalence of specific concerns, attitudes, or beliefs among the target population.

As this survey study is carried out with limited number of respondents who were the collaboration members of Graduation Project Course at METU Department of Industrial Design in the year 2005, the results are only generalized to the mentioned case. These results may not reflect the specific concerns, attitudes or beliefs of the all collaboration cases at METU or in other educational institutions.

CHAPTER 4

CASE STUDY ON GRADUATION PROJECTS

In this Chapter, the outcome of the case study about the Graduation Projects of METU Department of Industrial Design in the year 2005 will be presented. In the first section, how the graduation projects course is organized will be reviewed by consulting the course documents handed to the students and the course tutors' published articles. In the following sections, the results of the questionnaires will be presented.

4.1 Graduation Projects in METU Department of Industrial Design

The second semester of the last year in METU Department of Industrial Design undergraduate program is dedicated to the graduation project course, and the exhibition of these projects to the public. During the whole semester, each student in the department works on one single project that is supported by manufacturing companies or design consultancy companies. The desired result of these projects is to make the students familiar with the climate of business outside, considering the companies as clients.

The Process of Assigning Students to the Projects in Companies

When the semester started, the students were asked to prepare an initial project statement and determine the potential clients. The matching process took two weeks by the communication between companies and students. As an introduction to this project, the department contacted the companies via phone or e-mail and explained the content of the course and collaboration. An explanatory letter was also sent to the company (Appendix C.1). If the company accepts the conditions of collaboration, the

student was given the contact numbers of the company, to coordinate and inform the company about the following steps of the procedure. The combination of the involved 35 companies to the project were a mixture of large, medium and small-scale companies from various sectors such as ceramics sanitary ware, white goods, electrical household appliances, home electronics, automotive industry, office furniture and lighting. Most of the companies' (18 companies) design departments were in İstanbul, 12 companies' were in Ankara and the rests' are in Adana, Bursa, İzmir, Manisa and Eskişehir. The students who built up their project with Ankara companies had more intensive contacts than the students who worked with the companies outside Ankara. Thirteen company representatives attended only one, and 16 of them attended both of the juries out of 35 companies (Hasdoğan, et al.).

Calendar

The term was totally 16 weeks including the final submissions of all project work and the graduation exhibition. The project course, which is 12 hours each week which is on Monday, Wednesday and Friday afternoons was planned and coordinated by a team of tutors. The team of tutors consisted of three fulltime, one part-time instructors and a research assistant. In the course outline, there were several presentations and assignments distributed along the 16 weeks (Appendix C.2). The students presented their projects at various stages which are marked in bold in the calendar in Appendix C.2. The jury evaluated the projects in the seventh week (interim jury) and at the end of the project, in the fifteenth week (Graduation Jury).

Figure-5, The Interim Jury, (Graduation Project in METU Department of Industrial Design in the Seventh Week of 2005 Spring Semester).

Course Activities; Design Critiques, Sketch Book, Workshop and Research Report

Apart from juries, design critiques and discussions were organized throughout the term. The design critiques were arranged to make an intensive communication possible between the tutors and the students. To keep the track of the projects easy, students were requested to organize their ideas and sketches in bound sketchbooks rather than separate sheets.

In parallel to these activities, project workshops were organized. These studies for the project started at the third week with the initial ideas workshop; followed by the constraints, objectives and directives workshop at the ninth week (Appendix C.3). The students were also required to submit a research report in three parts with a planned content. This requirement aimed to make the students familiar with doing supplementary research and presenting their findings in the early phases of the project (Appendix C.4). First part of the report explored the problem area and its submission was scheduled for the fifth week. The second part explored the solution area and the reports were collected at the tenth week. The final part of the report required the students to describe and justify their design decisions, and was collected until the thirteenth week of the term.

Figure-6, 2D (left) and 3D presentation (right), ("Sihouette" project by Aybike Tamer in Graduation Exhibition)

The 2D presentations were submitted at the twelfth week of the term. One week before the submission, a final screening session was held on black and white actual size printouts of draft 2D presentations. As a result, the students could focus on their models during the last three weeks.

Grading Policy

The outline of grading policy was determined before the semester started and introduced on the third week of the term (Appendix C.5). Each stage of the project was evaluated and graded at certain ratios.

Figure-7, Graduation Project Exhibition (left) and Jury, (right), (METU Spring Semester)

Result

The phases of the graduation project was carried out according to the calendar and finalized by the graduation exhibition.

4.2 Analysis of the questionnaires

In the following sections, the author will analyze the responses to the questionnaires. As mentioned in the previous chapter the parties' responses to the questionnaire were analyzed by content analysis technique. Each section below will be devoted to the responses to each question in the questionnaires.

In the beginning of the section, it will be indicated whether the question was asked in the first, second or joint questionnaires. It will be specifically mentioned, if the

responses to the same question differ significantly between the first and the joint questionnaires, since the time they are delivered were different.

The similarities and differences between the answers of different parties to the same question will be mentioned. If there are significant similarities between the responses of the parties to the same question, the answers will be presented collectively. Otherwise, the parties' responses to the questions will be presented separately. All the opinions of the respondents will be tried to be presented even if they are mentioned only once. If some of the opinions were mentioned more than once, then their frequency will be indicated in parenthesis.

4.3 Benefits of University Industry Collaboration

In the first and joint questionnaires all parties were directed the question: "In your opinion, what are the benefits of university-industry collaboration in general?" All of the parties answered to this question by emphasizing similar benefits. These benefits were that when such collaboration is established successfully, parties become experienced and more productive and human sources can be used more rationally. Moreover, parties can have the opportunity to share their technical knowledge and develop practices of meeting together. The answers of the parties concerning above mentioned benefits will be analyzed below.

4.3.1 Experience Gained by the Parties

Thirty students out of 32 agreed on the opinion that gaining experience is one of the most crucial benefits thanks to university-industry collaboration. The students mentioned the following views about the factors, which form this gain:

- A Good preparatory period is constituted for the future, observing the applications of business life, one learned it better and in this way one adapts to business life more easily and faster (21 students).
- Furthermore, sound evaluation of the relationships among bosses, customers and users is made possible. Thus, lots of companies and sectors are known (8 students).

- While forming the projects, one can learn about what sort of difficulties or obstacles are encountered (12 students).
- As a consequence of the collaboration, the unity of application in design process could be accomplished as the parties learn from each other (7 students).
- Moreover, a comparison between the techniques applied by the companies and theoretical information and design processes during the education can be made (5 students).

Ten company representatives out of 15 mentioned the following factors that would be an impact on the experience to be gained at the end of such collaboration

- Undergoing a real personal experience (6 company representatives)
- The opportunity for the industry to observe academic studies and making an evaluation about them (4 company representatives)

According to all educators, benefits to be obtained through gaining experience could be listed as:

- Contacting with diverse and new companies and sectors (3 educators)
- Determining the defects and problems in the processes of collaboration and developing solution proposals with respect to them (3 educators)

4.3.2 Forming Human Resources for the Industry

The following points given below are emphasized by the parties as the benefits of the university-industry collaboration in terms of human resources. 12 students out of 32, 6 company representatives out of 15 and all educators who replied to the questionnaires mentioned the benefits as follows:

- Revealing job possibilities (6 students, 3 company representatives),
- Companies constituting data for human resources (2 students, 6 company representatives, 1 educator),
- Students having an opportunity of to determine their professional field of interest, and possible companies to work in (4 students, 2 company representatives, 2 educators),

- Students developing a project, which can be included in their portfolio and CVs (4 students, 2 educators)

4.3.3 Making up for the Deficiencies of the Parties

The opinions of 5 out of 32 students, 5 out of 15 company representatives and 2 out of 3 educators who mentioned the importance of "making up for the deficiencies of the parties" among the benefits of collaboration are listed below:

- Parties became aware of up-to-date developments and innovations (4 students, 4 company representatives, 2 educators).
- Through the collaboration, design awareness is developed in the companies (3 students, 2 company representatives, 2 educators).
- Educational quality is improved by executing theory and practice together (3 students, 2 company representatives, 1 educator).
- Studies conducted are transferred to the commercial environment where they can nourish, instead of staying in theory (2 students, 2 company representatives, 1 educator).
- A competitive environment is created and subsequently, sector's profit margin and educational institutions' effectiveness increase (2 students, 3 company representatives).

4.3.4 Sharing Technical Information

Three out of 32 students, 4 out of 15 company representatives and 2 out of 3 educators mentioned following items;

- Parties could reach detailed technical information (3 students, 1 company representatives, 2 educators).
- Thereby, the information on whether the projects can be produced or not is shared (3 students, 2 company representatives, 1 educator).
- Moreover, different design methods, techniques and approaches are developed (1 student, 3 company representatives, 1 educator).

4.3.5 Parties Getting Together

Three out of 32 students, 3 out of 15 company representatives and 2 out of 3 educators mentioned that by collaboration projects, it was possible for parties to get together. Following the evaluation of the answers given to this question in the questionnaire, the below opinions could be deduced:

- Students' bright, imaginative and alternative views can be valued (3 students, 2 company representatives, 3 educators).
- Arising problems are discussed in groups, and solutions are found (2 students, 2 company representatives, 2 educators).
- Professionals' enthusiasm and energy can be reflected on students (2 students, 2 company representatives, 1 educator).
- Companies get to know students and learn about them as both future professionals and potential customers (2 students, 2 company representatives, 1 educator).

Above-mentioned issues comprise in general, the benefits of university-student collaboration. Basically, such kind of collaborations provide important advantages such as not only gaining experience and forming human resources, and ensuring progress, but also sharing technical information and meeting with the parties.

4.4 Parties' Expectations from Graduation Projects

In the first questionnaire all, the respondents were asked "What do you expect from the graduation project?" In the second questionnaire, which was delivered to the parties at the end of the term, the respondents were asked to which extent such expectations were realized. As it was mentioned before, the parties who have not responded to the first questionnaire were given a joint questionnaire at the end of the term. In the joint questionnaire, these questions were expressed as:

> "What were your expectations from the graduation projects and the collaboration (from companies, educators, projects, and process) in this semester? At which level your expectations are met from the graduation projects and the collaboration in this semester?"

The responses to this set of questions will be evaluated in the following sections. Where relevant, to emphasize the importance of given answers, realized and unrealized expectations, which are revealed in the second and joint survey, are listed.

4.4.1 Expectations from the Companies and the Companies' Expectations

4.4.1.1 Students' and Educators' Expectations from the Companies

Students' expectations

The students' expectations from the companies are listed as follows:

- Students hoped that companies support them in their model making process order to confirm the production possibility of their project (7 students).
- They also wished the companies to support them in the idea generation phase (4 students).
- Other expectations were support in preparation of presentation boards, provision of prototype and materials, etc. and financial support (7 students).
- In addition to these supports, they also wished that the feedback should be given in accordance with the definition of the project agreed on together at the beginning (3 students).
- Besides, having willingness and interest in the study, helping the student preparing himself/herself for the market conditions, teaching the design processes within the company might be listed as other expectations (7 students).
- As one of the students' expectations from the companies among others, the information that was lasting, noteworthy and usable in business life after graduation appears to be an important one.

One of the answers given by a student to this question caught attention with an emphasis on financial expectation. She said that:

> It was important to get support from the companies, however, this contribution had been deficient, and therefore, we made all of the modeling by our own efforts. It had been so challenging to find modeling materials and a model manufacturer in such a short modeling period. Initially, the model we had considered on a 1/1 scale, had been changed to 1/3 scale during the modeling phase (Students' survey answers).

In the evaluation of foregoing points, to sum up, not receiving financial support from the companies seemed a significant unrealized expectation. Despite such high expectations, unrealized expectations were centered on some company representatives' lack of direct involvement and even some companies' absence from the jury. Substantial and considerable part of the expectations had financial implications and they were listed as not giving support for prototypes, not paying the project expenses, not providing enough support in the field of consultancy. Another reason for the unrealized expectations in this field was that some of the companies were inexperienced on this subject.

While 8 out of 32 students joining in the second survey stated financial support was not provided, five students complained about companies' indifference or in competency.

On the other hand, 6 out of 32 students joining in the second survey mentioned that they had full support from the company. In addition, nine of them mentioned the importance of learning the design process in the companies, production techniques and material knowledge were the other realized supports from the companies.

Educators' expectations

When the educators' expectations from the companies were evaluated, the following items were listed.

- Bringing the students' potential for creativity to light seems an important expectation.
- The educators' other expectations form the companies were a serious evaluation, a constructive criticism and suggestions.
- Additionally, teaching the students the topics they were not familiar, transferring the gained experience to them as a result of their practice and helping them select a genuine project that is appropriate for the assigned time were among other expectations.
- In short, companies were expected to give all sorts of support for the conduct and high-level presentations of the projects.

According to one of the educators, only 4 out of 34 companies did not meet most of the above issues.

4.4.1.2 Companies' Expectations from Graduation Projects

Companies' answers to the question of "What kind of a contribution is expected from the projects for their companies?" can be denoted as follows:

- A different point of view (6 company representatives),
- Information for human resources (6 company representatives),
- Realizable designs for the deficiencies in the companies' design collection (3 company representatives),
- Financial support, advertisement and promotion possibilities from universities for the projects (3 company representatives),
- Developing the companies' ability to be able to work with the other institutions and organizations (2 company representatives),
- A scientific approach in designing (1 company representative),
- Becoming aware of the innovations in design education (1 company representative)

4.4.2 Expectations from Educators and Educators' Expectations

4.4.2.1 Expectations from Educators

In this section, students' and company representatives' answers will not be separated, because the answers were parallel.

- Students and company representatives primary expectation from the educators was their contribution to let the process move ahead smoothly, (14 students, 6 company representatives).
- Another point was to provide possibility for students to design their own processes, (2 students, 2 company representatives).

- Feedbacks given being compatible with the definition of the project and helping students to prepare themselves for the market conditions were other expectations from educators (7 students, 3 company representatives)

From the foregoing expectations, unrealized ones could be pointed out as such:

- According to some students educators could not renew themselves and keep up with the technological developments, (2 students) and they stand detached from the modern approaches. Support given by them was usually about styling (2 students)
- Educators did not know well some of the sectors. Two students made a complaint about not having enough critiques about transportation and vehicle design.
- Critiques could not extend over an adequate period and discontinue at times (3 students).

On the other hand, students and company representatives mentioned following realized expectations:

- 11 out of 32 students stated that they had very useful critiques from their educators.
- 10 out of 32 students and 8 out of 15 company representatives stated that the educators were very successful in organizing the Graduation Projects Course.

4.4.2.2 Educators' Expectations from Graduation Projects

Educators' answers to the question of "What kind of a contribution is expected from the projects for the advantage of higher education institutions?" are listed in the following items:

- Making METU and the department well-known (3 educators),
- METU playing a vital role to introduce the profession to industry and society (3 educators),
- Knowing different sectors and understanding their requirements and the current situations in the markets, acquiring specific information on sectors and gaining experience (3 educators),

- Contacting different companies, understanding companies' expectations from industrial designers, learning designing approaches and designers' positions within the companies, and getting hold of with which professional and expert groups the designers work in teamwork and paving the way for the future graduates (3 educators),
- Developing institutional relations, promoting the department and the university, and providing possibilities for potential collaborations in the future (2 educators),
- Contributing to the participation of the department in several activities and the realization of some activities by the department itself (2 educators),
- Receiving support to make up for technical equipment and infrastructure deficiencies (2 educators),
- Making the students in the department well known and providing possibilities for practical trainings, employments, etc., in the future (2 educators).
- Taking the lead for the other projects (not limited to the educational projects) to be made among the companies, universities, and the department (2 educators).

4.4.3 Expectations from Students

4.4.3.1 Educators' Expectations from Students

All of the educators' expectations from the students were in parallel issues. These expectations are listed below:

- To designate the projects that will progress the collaboration between the companies and the universities,
- To make the project objectives understood well,
- To represent METU in the best manner as much as possible, and
- To work with the companies that shall serve for this purpose.
- To obey the submission date of the projects without failing at all

According to educators' views it was understood that only two students among others participating in the Graduation Projects Course did not meet these expectations.

4.4.3.2 Companies' Expectations from the Students

Along with serious, successful and well-defined projects, formation of a functional designing process and completion of meticulous, promising and visionary projects were all of the company representatives' expectations from the students.

4.4.4 Expectations from the Process

The expectations from the process could be explained as follows:

- Implementing professional support (6 students, 4 company representatives, 2 educators),
- Eliminating the old-fashioned styles (4 students, 3 company representatives),
- Seizing a different perspective in designing and thus creating innovative ideas (2 students, 4 company representatives),
- Questioning the designing techniques and sharing the results (2 company representatives, 2 educators)

4.4.5 Parties' Expectations from Designs

The parties could regard the following points as the expectations from designs:

- Providing convenience for the end user (2 students, 4 company representatives, 1 educator),
- Encouraging to be purchased, having the quality of being attractive, and meeting the needs of the consumer completely, (3 students, 3 company representatives, 2 educators)
- Being easy to be produced, being favorably different from equivalents, and including innovations (2 students, 2 company representatives, 1 educator).

4.5 Choice of the Project Topic and the Importance of the Project

4.5.1 Choice of the Project Topic to Study and the Company to Work with

In the survey, students were asked, “In what way did you determine the company and the topic for study in your graduation project? What were your priorities?”

- Fifteen students out of 25 stated that they achieved to study the subject they wished. One of the outstanding reasons in the choice of the subject was the students’ desire to be specialized in certain sectors in the future as well as doing research in the subjects relating to the sectors they aimed to work in, in the future for their own careers. Another reason was including the outcome of the project in their portfolio would bring an advantageous situation for the job interviews and application for postgraduate studies. Another factor was that the student selects a particular subject, because he/she thought that he/she would be successful in it.
- Eleven out of 24 students stated that they wished to collaborate with a company, about which they had information before. The students make what is meant by “having information about the company” clear in the following way:
    - The companies because of their being institutional affected the students (3 students),
    - Companies, which are employing in-house designers (3 students),
    - To know the company before from their internship or another student project experience (3 students),
    - The company’s design perspective and its popularity among job applications affected the students (3 students),
    - Students chose the company because of the company’s location; financial difficulties and the loss of time during the visit to the company have been influential in making such a preference (3 students).
- 6 out of 32 students were directed by their educators to the companies other than they wished, because either the company they wanted to collaborate had inadequate capacity or the educational institution had weaker contact with the company.

4.5.2 Choice of the Subject and the Importance of the Project for the Companies

Company representatives were asked about how they determined the subject of the project. Fifteen company representatives answered to this question. Some companies delivered more than one opinion.

- Firstly, students' preferences had been considered in the choice of the subject (9 company representatives).
- Secondly, company's needs and requirements, current trends and projects had an impact on it (6 company representatives).
- Furthermore, companies preferred projects that could be realized easily in commercial life considering their production technologies, materials, and compatibility with the variety of the products in the market (3 company representatives).
- Company representatives encouraged the students to make their own preferences in order to not to limit their creativity (2 company representatives)

Projects that were carried out by some of the companies were confidential. Therefore, companies did not want to work with the students in confidential projects even if the students would like to do so.

When the importance of the project for the companies was asked,

- Some company representatives emphasized the importance of developing applicable projects. According to some of them, the needs and requirements of the sector would be met and the deficiencies of the sector would be eliminated by this way (5 company representatives).
- Some company representatives put an emphasis on the significance of getting to know the students and the other companies and observing other projects of the same sector through the juries (4 company representatives).
- Moreover, not only did the company representatives contribute to educational institution, but also they shared their experiences. Some company representatives wanted to study on the projects with the students that they could not spend enough time within the company. Therefore, they wished to

use the opportunity for opening new horizons in designing and production (2 company representatives).

4.5.3 Choice of the Topic and the Importance of the Project for the Educational Institution

In general, the educational institution let the students select the topic according to their own preferences. Yet, students were advised to select them in parallel with the requirements of the companies. The most important reason for such an advice was its motivational effect on collaboration. Students were reminded of the necessity of not choosing topics that are confidential for the company. This was to avoid the possible problems that will arise from the presentations and the exhibition of the project that has confidentiality.

Depending on the answers given by the educators to this question, the importance of the projects for the educational institution can be summed up as follows:

- The projects allow the institution to follow the market closely (3 educators).
- The projects enable building one-to-one communication with the stakeholders in industry (3 educators).
- The projects enable to learn the stakeholders' problems, needs and their views on education, and the working procedures of manufacturers and colleagues in various scales and sectors (2 educators).
- The projects bring an opportunity for the student to utilize the information and skills he/she acquired during the whole educational life and thus, evaluating himself /herself (2 educators).
- Documenting the process and results is important in order to evaluate the quality of the collaboration and the project development both for short term and long-term evaluation (1 educator).
- The projects prepare a platform to represent the institution. Therefore maintaining smooth and correct institutional relations are more important than the variety and the quality of the results (1 educator).

4.6 Parties' Contributions to the Projects

In the survey conducted at the end of the term, all parties were asked what kind of contributions they provided for the projects. The opinions of the company representatives, students, and educators are summarized below.

4.6.1 Students' Contributions to the Projects

According to students' views, contributions made by them to the projects are listed below:

Bringing completely new contributions to the company:

- Creating independent, imaginative ideas despite the existing limitations (8 students),
- Approaching the design problems through the student's perspective (1 student),
- Bringing the briskness, dynamism, excitement for the company through project development process (1 student),
- Contributing to 3D (on computer) product modeling (1 student),
- Informing the company on design process and its execution (1 student),

Contributions to the functions existing in the company:

- Developing new designs conforming with the company's product range, approach to concepts and current technologies (6 students),
- Contributing to the improvement of existing products (1 student),
- Reflecting scientifically the experts' views in the company on the real life situations (1 student).

Eight students saying that they did not contribute much to the companies, put forward the following justifications:

- No enthusiasm in the company (4 students),
- Inconsistency of their designs with the company level (3 students) ,

- Not adding a lot to the company as the company has already had experience to a large extent (3 students),
- No designers in the company (2 students),
- Project definition given by the company is too wide, the company provided with sufficient information to do research, but lack the expertise to bring the project to the final stage (1 student).

Other contributions:

- Emphasizing the importance given by the company to design and design education (3 students),
- Being a mediator for the collaboration of university and industry (1 student),

4.6.2 Companies' Contributions to the Projects

Contributions are evaluated in terms of companies' own perspectives and through the eyes of educational institution and the students. Companies consider that they contribute to projects in the following ways:

- To be a consultant to the project (15 company representatives),
- To form opinions, create brainstorming, and inform on process management (15 company representatives),
- To support the educational institution, show the job-related difficulties to the colleagues that will be new graduates soon, and get the pleasure to share the sectoral information (7 company representatives),
- To support modeling and prototyping, to meet various expenses and to provide materials, application support and technical staff (7 company representatives),
- To realize the designs, raise the student's success to the maximum level, and increase the student's self-confidence (6 company representatives),
- To transfer the experiences and the views (6 company representatives),
- To enable students keeping up with design trends that are changing fast (4 company representatives),
- To constitute a project definition (3 company representatives),
- To inform on market needs and target groups (3 company representatives),

- To provide information on ergonomics, styling and technology (3 company representatives).

4.6.3 Contributions of the Educational Institution to the Projects

The contributions of the educational institution are analyzed through their perspective as well as the company representatives' and students' perspectives. In the light of this analysis, educational institution emphasized the following contributions:

- To make contacts with the companies (3 educators),
- To bring students and the company together (3 educators),
- To plan the process (3 educators),
- To direct the projects as a team through a common design vision (3 educators),
- To open the projects developed during the classes to public in the exhibitions of graduation projects exhibitions (3 educators),
- To design and apply creativity exercises (2 educators),
- To increase the quality of the project, preliminary sketch, presentation and the reports by evaluating all the outputs of the process (2 educators),
- To edit the research reports and correct them, thus constitute the information infrastructure of the project (1 educator),
- To form the standards of the process and correct its faults (1 educators),
- To supply students with infrastructure (studio, workshops, electricity and water, etc.) and technical equipment (computer, internet access, printer and scanner, etc.), (1 educator),
- To promote the unity and team spirit among the students (1 educator)

Students' perspectives on educational institution's contributions, proposals, deficiencies and accomplishments are given below:

Proposals:

- "We must learn to develop our own approach and process" (2 students),
- Professional support should be given for model making or evaluations about models should not be included in the students' overall evaluation (2 students)

- "The project should have started earlier," (2 students)
- "More time should be devoted for concept development," (2 students)
- "Educators, companies and students must work together," (2 students)

Deficiencies:

- Not having enough critics during the process (8 students),
  Technical inadequacies (4 students),
  Lack of knowledge on production techniques (2 students),
  Lack of knowledge on materials and mechanics (1 student),
  Crowded class and insufficient critiques (1 student),
- Designing is affected by the companies' needs and expectations and this should be taken into account during the evaluation, (4 students)
- Having diverse critics from each academic staff; "What they say is quite different from each other," (3 students)
- Educators' lack of market experience, (1 student),
- "They must be more active concerning the problems with company", (1 student)
- "They can not adapt themselves well to the projects", (1 student)
- "The process becomes too rigid, due to the efforts about documentation", (1 student)
- "The process was planned so well, yet it could not be taken under control", (1 student)

In addition to the above issues, five students stated that they received much more support from the companies than the educators.

Contributions regarded as successful:

- Permanent critics, accurate guidance (9 students),
- Taking the process under control (5 students),

Companies stated that educational institution had positive and negative contributions altogether.

Negative contributions;

- "Their educational formats are not parallel with the companies' guidance", (1 company representative).
- "University is the reference point; they evaluate the students, consequently, students pay closer attention to institution's guidance in comparison to the company", (1 company representative).
-

Positive contributions;

- Conceptual guidance and interpretation (6 company representatives),
- Organizing the parties' communication (5 company representatives),
- A scientific and innovative approach (2 company representatives),
- Letting the fanciful students confront with real life situations, (2 company representatives),
- To constitute human resources, (2 company representatives)
- Free from bias, forming more imaginative and different ideas without knowing the production details and limitations, (1 company representative).

4.7 Intellectual Property Rights

The questions "Who should be the parties of an agreement on intellectual property rights? And when to make it and what to cover?" are analyzed in following sections.

Students;

- Fourteen students participating in the survey denoted the necessity that parties of such an agreement must be the students and the company.
- Seven students pointed out those parties of such an agreement must be the students, the company, and the educational institution.
- Eleven students delivered no opinions on this matter.

As regards of the timing of this agreement;

- Seventeen students declared that the timing would be appropriate after the completion of the project,

- Fourteen students stated that it would be necessary to make an agreement just at the beginning of the term
- One student wished it to be made during the get-together of the preliminary jury.

Students maintained that an agreement on intellectual property rights should include the following items:

- Who the intellectual rights pertain to (26 students),
- Parties' liabilities: Process, model making, presentations, costs, production method, the obligation of joining in the juries, financial support, and sanctions (17 students),
- Design, patent and utility model registration (5 students),
- Price to be paid to the designer (4 students),

Companies:

- Three company representatives suggested that the parties for such an agreement should be the company and the institution,
- Two of them suggested it should be the company and the students,
- Four of them suggested it should be the company, students and the institution.

For the timing of the agreement, companies stated the following issues;

- Seven company representatives, with respect to the timing of such an agreement suggested that it would be appropriate just at the beginning of the term,
- Three of them considered it to be suitable at the end of the project.
- Two company representatives emphasized that there was no need to make such an agreement, because the projects were educational and they should be handled in an environment of mutual trust.

According to company representatives, the agreement to be made should contain the following items:

- Who the intellectual rights pertain to (5 company representatives),

- Parties' responsibilities, (5 company representatives)
- The financial issues (5 company representatives),
- Confidentiality (5 company representatives),
- In case of a necessity for a design, patent and utility model registration (1 company representative)

Educational institution:

Educational institution representatives defined the parties as the company, the department, and the students. Considering the probability of students not focusing on the projects, they maintained that the time for the agreement would be more appropriate either at the beginning or at the end of the term, but not just halfway the courses.

Educational institution, describing the content of the agreement to be made as "parties' rights and responsibilities", sends a note containing these rights and obligations at the beginning of the term to companies and students, (Appendix C.1)

4.8 Problems Experienced during Graduation Project Course

The problems experienced during Graduation Project Course are evaluated through the responses of students, companies, and educators as such:

Students:

- The most important problem experienced according to students was about the phase of modeling. Students making models themselves, resulted in poor quality of models. They got into difficulty in making them as they could not find financial support. Some companies did not provide necessary financial support. Nine students did not get this support and did not plan well model making process and subsequently, they could not obtain the desired result.
- Another problem was that companies did not show enough interest in what was going on. The overlapping of process, feedback, and the critics of both companies and the school caused a dilemma on the part of the students. The

companies' were being located out of Ankara, caused problems for three students.

- With a student's own words as "educators wished to camouflage their own deficiencies and in competencies by giving low grades", the motivations of three students diminished and they indicated that they did not get enough support from the educators.
- Hesitating to select the company and not being able to choose the desired company led to motivational breakdown. Three students stated that they could not produce a good project. After the start of the project, the changes and uncertainty in project definition caused troubles to students. The company not setting its expectations from the project beforehand became the main reason for that.
- Two students got into trouble in 3D computer modeling and so, they could not produce a high-quality presentation.
- Another reason for students' motivational breakdown is the company representatives' absence from the jury and impermanent communication with the company. Three students faced that problem.
- A student working with two companies expressed his dissatisfaction about having different directed critiques from parties and traveling between two companies and educational instution.
- Owing to the confidentiality of the project, students getting into difficulty finding sources during the research phase, faced with difficulties during the project (1 student).
- The facilities of some companies fell short of student's expectations. Lack of computer and a designer in the company and not getting enough information on production and materials from other companies could be considered as other problems (2 students).

Considering these conditions, the importance to choosing the right company to work with in the future is underlined. Company's cultural perspective and employed designers in the company, and well-informed companies are the significant motives for the students. Therefore, selecting efficient and competent companies are important for the students.

Company representatives:

- For the companies located outside Ankara, problems arose in time management and communication. This mainly resulted from the distance and students' lack of willingness to carry out the project (5 company representatives).
- Companies hoped that students must have a high concentration level all the time. If not, then this results in decrease of company's motivational level (4 company representatives).
- As the companies could not still comprehend the demands of educational projects, they complain of students being so passive and slow to keep up with the hectic life (3 company representatives).
- Some companies do not perceive well what their responsibilities are and so, they could not provide necessary support for the students. A company representative expressed that he did not know he was expected to participate to the interim jury. However, he had been already informed by educators in the Introductory Letter (1 company representative).
- Another problem undergone by the companies was that the critiques of both companies and educators conflicted most of the time. The project deviated from the company's objective and this damaged the company's motivation (3 company representatives).

Educators:

- The most important problem undergone by the educational institution is lack of finance. Thereby, the institution itself organized the whole process of exhibition following the projects and in this process, the department got exhausted and lost all its energy (3 educators).
- Educators complained of not having the weekly reports regularly. Even if they got it, due to the large number of students, they expressed that they could not follow them closely (2 educators).
- Two companies did not provide the minimum design critiques and took no interest in the project (2 educators).

- Owing to the low participation in the interim jury sessions from the companies and the department's other members, feedback and critiques could not perform (1 educator).
- Some students could not achieve the expected progress despite the close follow-up of the process and the companies' support and interest. Therefore, they could not achieve success during the process (1 educator).
- Some students failed in regular class attendance in the studio and lost their motivation because of companies' disinterestedness and lack of interest in follow-up of the whole process (1 educator).
- Companies' approaches to the projects, their expectations being changeable at times, just halfway of the term and educators' unsatisfactory guidance on some new technologies caused interruptions in the process (1 educator).
- When the companies wished to make an agreement on intellectual property rights during the process of the project, the institute hesitated to make such an agreement thinking that it did not have good samples at hand and that the agreement to be made could not preserve properly the intellectual property rights. This situation resulted in communication failures and motivational flaws (1 educator).

When looked at the projects in general, the problems undergone by the parties had an impact on just few projects, thus, those problems cannot be generalized to all the projects.

4.9 Strategies for a New Graduation Project

The parties were asked what their strategic proposals would be if the projects were made again. In response to this question, several strategic proposals were put forward. These strategic proposals were uttered by the parties and written under the heading of "if made again and strategic proposals."

If made again,

- Students stated that they would act in a more planned way during the process of presentation and modeling (5 students).

- Students delivered their opinions under the expression of “I would make a final agreement on expenses with the company” (4 students).
- Students stated that they would assign more time for styling and technical details (3 students).
- They said they faced with difficulties while making the system design and that they would prefer to concentrate on a certain part of the machine rather than making a complex product and that it would be more useful for them to study on more general issues (2 students).
- They mentioned what they did not do in this project and what they would do if the project were made again saying, “I would visit the firm more often and be more active in the phase of modeling and manufacture and push the possibilities of the firm very hard (2 students).
- They stated their dissatisfaction with the firm they worked together, by saying that “I would not work with the same company” (2 students).
- There were students not working in the specialized areas of the company but developing a new concept by themselves. However, these students expressed a different point of view saying that they would work in the specialized areas of the company and expressed its importance (2 students).
- One of the students said that he did not give the necessary importance to the phase of concept development and stated that he would do just the opposite if it was made again.
- One of the students said that he would design innovative products rather than working on firm’s regular products and believed that the products designed at the time of the graduation project would catch much more attention only when they brought about an innovative understanding.

In above mentioned items, students declared what they would do if those projects were made again.

Strategic proposals by the students can be listed in the following ways:

- The most important strategic proposals were about making agreements beforehand, providing financial arrangements and protecting intellectual property rights (6 students).

- Some students suggested the educators should also audit the companies to the extent that the students are expected to do so. They wished companies and educators to get together more often (5 students).
- They suggested the educators should to give the students more advice concerning the allocation of projects (4 students).
- In addition, some students stated that the number of alternative companies would be increased and potential support of the firms would go up, if the press was invited to exhibitions (4 students).
- Particularly, some students suggested that grading should be made according to the type of projects and for distinct projects in distinct processes, grading should not be made in the same manner (3 students).
- Some students pointed out that the industry-supported projects can be applied in the earlier years of the curriculum. Thus, sectoral focus and specialization can be achieved and possible defects that are encountered in the final year can be noticed and removed at an earlier time (2 students).
- Besides, some students wanted the educators either to be more knowledgeable on materials and production techniques or they wished them not to make misleading evaluations and critiques (2 students).

Company representatives pointed out that in the case of a new collaboration in graduation project,

- They would create more alternatives for the students in choosing the subjects (3 company representatives).
- There have been some firms admitting that they could not plan the process management well and properly. Therefore, this point should be taken under consideration in a new collaboration project (2 company representatives).
- The companies realizing that they did not like the model quality in the final jury and had not given necessary support for this indicated that they wished they had given much more support in the phase of model making (2 company representatives).

Strategic proposals by the firms to the university can be listed as follows:

- Much more emphasis, (4 company representatives) must be given on material, production and technical details (e.g. CAD, CAM).
- More support to the students could be given on time management (3 company representatives).
- Prior to the project phase, negotiations must be conducted on the level of top management but not of design departments (2 company representatives).
- For the firms located out of Ankara, web–based project development follow-up could be achieved (1 company representative).
- Group work could be more productive (1 company representative).
- Students could be allowed to be based in the company for a certain period (1 company representative)
- The companies would volunteer more support if their contributions can be promoted more (1 company representative).
- The students must be thinking freely and creatively so that firms could highly benefit from emerging concept designs (1 company representative).
- Interdisciplinary study should be made more systematically and supported more (1 company representative).
- Students should be taught the methods of developing quick ideas (1 company representative).

In educators' perspectives for a collaboration of a new graduation project;

- Different guests to make their criticisms in the studio could be invited. For instance, they could be educational staff of different classes, educational staff of related departments from diverse universities, ex-graduates, designers working in noncompetitive companies, persons providing design consultancy services, etc., (3 educators).
- Joint seminars for a certain day could be organized with the related departments of other universities conducting their graduation projects in collaboration with companies and the participation of students from both universities could be achieved (3 educators).

- Class could be separated into sections according to the sectors and different processes could be followed in compliance with the requirements of each part (2 educators).
- Brainstorming activities as well as collective assessment activities for the new ideas could be employed more in class environment to encourage more student participation (2 educators).

Educators' strategic proposals are as follows:

- During the process, model making and developing three-dimensional ideas should certainly be emphasized. Educators think that the bottleneck and the tiredness undergone during the phase of developing design ideas resulted from not working in three-dimensional way and thus, missing the key elements in design (3 educators).
- According to educators, just before the start of the new term, students should know which companies they were assigned. Students took this matter so seriously and they got very stressful. Such a stress should not be experienced at the beginning of the term (3 educators)
- Additionally, educators thought that forming the project agreement samples beforehand to be signed just at the onset of the project will help the educational institution to determine its attitude in case such a demand was offered. Resource seeking (like TÜBİTAK or European Union Funded projects) must be implemented for the educational institution in financial shortage (2 educators).

4.10 Similar and Conflicting Issues

Similar and conflicting issues in the collaboration members' responses to the questionnaire are illustrated below. The issues are discussed under the following headings:

Benefits of collaboration

All the collaboration members benefited from the process in a different way, since their needs and expectations are different. By collaboration, students became aware of the different aspects of education and business life. Companies found the opportunity to observe academic studies. On the other side, educators got closer to the real life constraints.

On the other hand all collaboration members mentioned that forming human resources is one of the most important benefits of collaboration. Additionally, all parties became aware of up-to-date developments and make up their deficiencies. By this kind of collaboration, students' ideas and efforts, companies' knowledge and educators' guidance are getting together by sharing both technical and gained information.

Expectations

Students' and educators' expectations from companies were nearly similar. Companies were expected to give all sort of support including guiding the project and supporting high level of presentation of the project. However, students' and educators' priories were different. According to the students, the most common expectation from companies was supporting the project financially, where as, educators' the most important expectation from companies was expert guidance.

Educators were generally seen as the organizer of graduation projects. Their being educators was sometimes being forgotten in graduation project organization. Some students thought that projects were shaped by companies' critics. According to them, educators had some deficiencies in not knowing some sectors and production techniques. However, according to the author, not knowing sectors' all sorts of requirements were very normal. Besides, to give design critics such as, ergonomics, aesthetics, user interactions etc., educators did not have to know all technical aspects of production. In addition, educator's one of the expectations was to contact with companies from different sectors, with which they were not familiar to understand their needs.

Choice of subject

Generally, both companies and educators left the choice of the subject to the students' preferences and their motivation. However, several factors on the side of both the company and the educators affected the students choosing their subjects, such as companies' needs and requirements, production techniques, market requirements, lack of designs in their collections and current trends and educators advices in not to study in confidential subjects.

The answers of expectations of parties and the importance of the project for them, underline the same issues. For example, in the answers of questionnaire, some companies expected "producible designs for the deficiencies in the company's design collection". When they are asked, "what is the importance of projects? Their answers was "the importance of developing applicable projects" Another example could be given from the point view of educators. One educator expressed her expectation as "making METU and the department well-known". Her point of view in the importance of projects was "the projects prepare a platform to represent the institution. Therefore maintaining smooth and the correct institutional relations are more important than the variety and the quality of the results".

In the questionnaires, it is observed that same issues that are listed in expectation of parties and importance of project, stressed by the same respondent of questionnaires. It was observed that parties conflicted these two questions' answers. It might result, because of author's asking these questions one after another made the questioners to be confused.

Contributions;

Contributions of companies to the projects is seen the same from the point view of all parties. Additionally, they were all seen as positive contributions. However, many problems were listed about contributions, when problems undergone were asked.

Intellectual Property Rights;

Intellectual property rights was an important and sensitive issue in such a collaboration project. Parties wanted to protect their rights, while working together.

However, while expectations were asked to all parties, they did not emphasize their expectation on intellectual property rights. Instead of a detailed agreement, students wanted an agreement between the parties to guarantee financial aids.

Problems Undergone;

Commonly faced problems by parties differ from each other. Students' modeling and prototyping was the phase where most of the problems were faced. Companies' being out of Ankara and having time management problem (this problem not only about being out of Ankara, but affect the time management problem) is the most commonly faced problem. The most important problem mentioned by the educational institution is lack of finance.

The most commonly faced problem mentioned by the parties is open to discussion. In such collaboration, if the parties' problems were not parallel, it would be observed that their expectations from each other would be different.

Strategies for a new graduation project;

According to the author, strategies, which were mentioned by the parties, were very accurate. In addition, many strategies indicate a direction for better organization of graduate projects in the future.

CHAPTER 5

CONCLUSIONS

To develop strategies to improve collaborative projects with industry in industrial design education is the main aim of this thesis. First, a literature survey was carried out to find out both emergence and growth of the university-industry collaboration and why the university-industry collaboration is needed. Additionally, different cases from the perspective of academicians were analyzed.

In the following step, a case study was carried out by analyzing the Graduation Projects Course in Industrial Design Department of Middle East Technical University (METU), Spring Semester, 2005. It examined how collaboration members benefited from each other, and what the needs, expectations, and contribution of all members were, which problems they encountered with the collaboration during the conduct of graduation projects.

In this Chapter, research questions are reviewed to develop strategies. Moreover, further studies will be proposed at the end of this Chapter.

5.1 Research Questions Reviewed

The main questions of the literature survey were:

- How did university-industry collaboration emerge and develop?
- Why is university-industry collaboration needed?
- What are the perspectives of similar collaboration cases in industrial design education?

The answer of first question was analyzed deeply in the beginning of Chapter 2. The answer of second question was analyzed deeply in the sections 2.2, 2.3, 2.4 and 2.5. The answer of this question was analyzed in the sections 2.6 and 2.7.

To underline the questions to be addressed in the field study are reviewed in following section.

What are the Benefits of Parties' from Collaboration?

From the students' point of view, university-industry collaboration in industrial design education is a one-to-one simulation of product design process before the graduation. By the help of collaboration, students experience a realistic project experience. In addition, they obtain information and experience on a specific subject. Moreover, students meet with persons working in different sectors (both with designers and from different domains) and practice interdisciplinary work. Furthermore, they are informed of different design methods and techniques, approaches that are used by different sectors. They can be able to introduce themselves to the companies where they will possibly work.

Companies find opportunity to follow different and fresh ideas in the university environment. The educational institution helps them to open their vision by performing research in relation to their work. Companies find opportunity to introduce themselves to the designers of the future. In addition, they experience design consultancy service from the potential customers and professionals of the future.

Educators increase and refresh their knowledge, and get experienced. They can follow up the latest developments related to the sectors. As well as, educators find opportunities to understand the problems of the local industry by the help of collaboration and learn the terminology that companies use.

What are expected from the Parties?

The research question of this topic was "*What are the expectations of the collaborators from both parties, namely the students, educators, and company representatives?"* The answer of this question were deeply analyzed in Chapter 4. To

review the answer of this question, the expectations from parties were analyzed in this section.

Ideally, collaboration projects should involve innovation and novelty that help the user in the project context. Furthermore, collaboration projects' outcomes should be in a producible quality that encourages buying. Collaboration projects' outcomes should respond to a real need. Also, collaboration projects should behave conveniently to a planned process structure. Design methods should be questioned and results should be shared.

Students are expected to understand the companies' and educational institution's objectives of the collaboration project as an educational project. They are expected to get into contact with the companies in a manner that they will represent educational institution. Moreover, they are expected to plan their project progress. Another expectation from students is to be well prepared for the appointments with both tutors and company representatives, also, interim jury and workshops in the studio. They are expected to document well their processes. Furthermore, students are expected to spare time for production of model within the process and high quality of presentation materials with or without company support.

Companies are expected to provide real project statements which are appropriate within the given period of time. In addition, they are expected to provide the information and experience that is otherwise lacking in the students, and which pushes forward the creative potential of the students and that they convey their experiences. Moreover, they are expected to provide support for the implementation of the project and its presentation within a high quality level. Financial support might be ensured, such as, trip and accommodation expenses, plot printing expenses and model construction expenses, etc.

Educators are expected to provide communication with the companies and to meet the student with the company. Also, they are expected to plan the process and to direct the projects as a team with a common vision of design. Another expectation from the educators is to design and apply creative exercises and to provide the informative

infrastructure of the project by creating and amending the research reports. Furthermore, they are expected to evaluate all the outcome of the process, to increase the quality of the project, the drafts, the presentation and the reports.

What are the contributions of Parties' to the Collaborations?

Students contribute to the collaboration by creating independent, imaginative ideas despite the existing limitations. They approach the design problems through student's perspective. Moreover, they bring dynamism and excitement for the company through project development process. Contributing to 3D (on computer and physical) product modeling and informing the company on design process and its execution are the other contributions of students. Besides, students develop new designs conforming to the company's product range, approach to concepts and current technologies. They contribute to the improvement of existing products.

Companies' main contribution to the collaboration is to provide the specific technical information and experiences in the sector. Opening of the company know-how to the student, offering to the student facilities of the company, for example, workshops, human resources are other contributions of companies. Furthermore, companies provide moral support and motivation by increasing of reliability of the project. They also provide the following:

- To promote the professional working methods;
- To show to the students the real limitations of the market and to encourage them to think within such limitations;
- To provide information on subjects such as new technologies, new trends, new requirements;
- To provide support for a qualified and realistic presentations of projects (model and drawings).

Main contributions of educational institution are to prepare and organize the infrastructure for working together of the companies and the students. Also, orientation in the stage of project selection and development and reflecting some of the design methods are the other contributions. Moreover, they organize the exhibitions of graduation projects to public. Besides their contributions directed

towards increasing the employment possibilities and workplace experiences of the students; convey of some new information and methods to the companies.

What are commonly Faced Problems?

Financial Support is the most important problem of the collaboration projects. Students need to be supported in accommodation, modeling process, prints and other presentation material expenses. Unqualified looking model that has been produced by the student leads to a collapse of mood for the student when exhibited, next to the professionally made model by another student in a workshop by rapid prototyping. On the other hand, educational institution needs support in financing the graduation projects exhibition and the participations to other nationwide design exhibitions afterwards.

Companies' location out of Ankara is another important problem. Communication problems, accommodation problems and time management problems have occurred because of the distance between educational institution and companies.

Some companies do not pay enough attention to the juries, therefore the student is detached from the process. Another problem is in respect of the importance that has been paid by the company for the project. If the company provides the student with a project that they would like to realize in the near future, than, the support that has been provided becomes more intense and more tangible. Whereas, some other companies directed the students towards the research of technology projects of the future entirely and to develop projects. As a result, the outcome projects have not gone beyond being concept studies.

Some of the projects could not provide the desired outcome due to the student not paying the required attention and importance to the issue, although the companies have been spending their quite intentioned efforts.

Another problem is not having good examples of agreements about the intellectual property rights, when the companies want to undersign an agreement. Some

companies desire to undersign agreements that leave the educators aside and straight with the student in a manner that does not protect the rights of the student.

5.2 Strategies for University-Industry Collaboration Projects

In the light of the findings of this study, the strategies proposed for educational institutions are listed below under the following headings:

1. Finding the right partner
2. Encouraging teamwork
3. Developing procedures to protect the rights of all parties
4. Finding new institutional partners

Finding the right partner

A transfer of knowledge from enterprises is necessary to cope with the complexity of the subject matter. However, it is rather hard to find a proper enterprise as a partner to collaborate with. In addition, it seems equally hard for an educational institution to choose partners from various fields. Original design not only desires to possess the parties' enthusiasm and diligence but also smooth communication channels.

First, the companies which are experienced in design, should be given priority to collaborate with. The companies, which are not experienced in design, should be invited to see the process and the outputs of collaboration projects, where they can also see, what design can achieve. In this way, such companies would be encouraged to work with design offices. According to the author, instead of collaborating with SMEs, which has not met with design before, companies with design experience should be choosen as a collaboration member.

Realization of exchange of technical equipment, lectures, workshops and visits to companies are important elements of collaboration projects. The process of the graduation projects must be in parallel with the the semester timetable. The success of the project is based on the partners being always ready during its implementation for the exchange of views, ideas, etc. It is agreed that funding, contributions, supply of high-tech, visits to factories, and lectures are highly significant for a productive

collaboration. As a result, it is better for students to select their collaboration members in nearby industry places. By this way, reduction of cost and increase of collective working are possible.

Encouraging teamwork

In comparison to other student projects at earlier stages of the the curriculum at MEU in graduation projects the students are alone throughout the process. As a result they may not be successful in completing the requirements of the course on time.

Rather than individual projects, tasks performed collectively can make use of stronger chacteristics of each individual. Therefore, more group work should be encouraged at certain stages of the projects. For example, the students, who make projects in the same sector can visit each others' companies at least once. They can collaborate in making research, idea development, taking technical decisions, writing the research reports and model making.

Developing procedures to protect the rights of all parties

Intellectual property rights seem to be one of the most important problems. The parties expectations are quite different from each other. There seems to be no concensus among the students and the companies about who should be the parties of an agreement to be signed. The students would like their expenses covered by the companies. Some of them would like this condition to be agreed by the companies by signing an agreement at the beginning of the term. The educators would not like this issue to interfere the process of the student. Therefore they suggest if an agreement will be made either at the beginning or end of the term between three of the parties.

Instead of a detailed agreement, an agreement between the parties to guarantee the financial aids about expenses of students would be ideal. In this way, the motivation of students would focus only to pursue their projects. However, the educational institution's primary aim is to perform the best educational exchange especially for the benefit of student. Therefore, they declare at the beginning of the term that their primary expectation from the firms is to receive expertise. As a result, the educational

institution could not force the companies to cover the expences of the graduation projects since it is a secondary expectation.

On the other hand, the parties should better understand the contributions of each other. Students should appreciate the companies' contribution to their education, instead of complaining about financial issues.

Organizing online and live discussion forums among the parties

In other to eliminate the above mentioned problem and to let the parties to better understand each others' expectations and contributions, discussion forums through internet or live discussion forums on interim jury days can be arranged.

Finding new institutional partners

Besides fulfilling their academic responsibilities, the educational institution seems to struggle with making all the contacts with the companies, finding sponsors for organizing the exhibition, preparing the promotional material and posting them to all related parties in Turkey.

Institutions such as chambers are important members of collaborative projects. Agreements can be made with such institutions to share the responsibility in making contacts with firms and other organizational issues. Therefore the educators would be able to devote more time to focus on their educational issues, rather than dealing with financial problems, the problems of companies or the intellectual property rights agreements, etc.

5.3 Further Studies

This thesis can be regarded as the one of the rare studies, which develops strategies for collaboration projects in design education. As the results of the literature review and survey study show, there is a strong need to study the subject in detail to develop strategies in university-industry collaboration in design education especially in Turkey.

This study analyzes only the Graduation Project Course at METU Department of Industrial Design in the year 2005. Similar studies can be undertaken for other collaboration cases in design education in Turkey. Therefore comparisons can be made between the cases and other case specific problems can be detected.

Other collaboration types in Turkey between university and industry, such as, internship collaborations, collaborative semester projects, industry field trips, presentations, distant collaborations, competitions, technocities etc., can be analyzed in order to observe university industry collaboration as a whole.

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APPENDIX A

A.1.1 Pre-Inscription for Surveys

Dear ……..,

Attached survey is conducted for a master's thesis titled "Industry Supported Projects in Industrial Design Education" in Graduate Program of Department of Industrial Products Design of Middle East Technical University.

The goal of this research is to obtain data concerning how effective these projects can be organized in the future, by inquiring the expectations of the parties (students or educators for educational institutions, designers, engineers and/or managers from the institutions that give support) from each other in industrially supported educational projects.

Research comprises Graduation Projects Course of the Department of Industrial Design of METU for 2004-2005 Spring Terms. Data that will be obtained from the survey will be used anonymously only for this research and personal information will be definitely kept private.

Thank you for your interest and support.
Yours sincerely,

Ömer Orhun Baysal
Industrial Designer

Dear ……..,

First of all, as the lecturer of the graduation project course, I would like to thank you for your supports that you have given up today. We devote some of our research efforts for improving graduation project course in the next years, for creating more efficient university-industry collaboration.

Ömer Orhun Baysal, our master's student graduated in 2003, prepares his thesis on university-industry collaboration. In his study he focussed on graduation projects in order to form an input for the application in our department. Therefore, he carries out a survey study with the students, educators, and companies. He wants to send you a questionnaire soon. You will be contributing to our department about the subject of improving our curricula in the future if you help him and fill in the questionnaire. Thank you in advance.
Best regards.

Assoc. Prof. Dr. Gülay Hasdoğan
Department of Industrial Design, METU.

A.1.2 Anketler için Ön Yazı

Sayın ……,

Ekteki anket, Ortadoğu Teknik Üniversitesi, Endüstri Ürünleri Tasarımı Bölümü, Yüksek Lisans programı dahilinde "Endüstri Ürünleri Tasarımı Eğitiminde, Endüstri Destekli Projeler" başlıklı araştırma tezi kapsamında yapılmaktadır.

Bu araştırma, endüstri destekli eğitim projelerinde, tarafların (eğitim kurumlarından öğrenciler ve akademisyenler, destek veren kurumlardan tasarımcı, mühendis ve/veya yöneticiler) birbirlerinden beklentilerini araştırarak, bu projelerin gelecekte nasıl daha iyi düzenlenebileceğine ilişkin veriler elde etmektir.

Araştırma, 2004–2005 bahar dönemi, ODTÜ, Endüstri Ürünleri Tasarımı Bölümü 4. sınıf mezuniyet projelerini kapsamaktadır. Yapılan anket sonucunda elde edilen veriler sadece bu araştırma için anonim olarak kullanılacak, kişisel bilgiler kesinlikle gizli tutulacaktır. İlginiz ve katkılarınız için teşekkürler. Saygılarımla,

Ömer Orhun Baysal
Endüstri Ürünleri Tasarımcısı

Sayın.....,

Öncelikle bugune kadar mezuniyet projesi cercevesinde verdiginiz katkilar icin proje dersinin öğretim üyesi olarak size tesekkur ederim. Mezuniyet projesi dersini onumuzdeki yillarda gelistirmek, daha verimli bir universite sanayi isbirliği yaratmak icin kurum icinde yaptigimiz bazi arastirmalari bu konuya yönlendiriyoruz.

2003 mezunumuz ve ayni zamanda Yuksek Lisans ogrencimiz Ömer Orhun Baysal Yüksek Lisans tezini Universite - Sanayi Isbirliği uzerine yapiyor. Bölümümüzdeki uygulamalara girdi olusturmak amaciyla çalismasini mezuniyet projeleri üzerine yoğunlaştırdı. Bu nedenle öğrencilerle, eğitimcilerle ve firmalarla anket calismasi yapiyor. Yakinda size kisa bir anket yollamak istiyor. Kendisine yardimci olur anketi doldurursaniz, bundan sonraki uygulamalarin
iyilestirilmesi konusunda bölümümüze katki vermiş olacaksiniz. Şimdiden teşekkür eder saygilarimi sunarim.

Doc. Dr. Gülay Hasdogan
ODTU, Endüstri Ürünleri Tasarimi Bölümü

A.2.1 Students' First Questionnaire

Industry Supported Projects in Industrial Design Education

Middle East Technical University – Department of Industrial Design

Ömer Orhun Baysal- Master of Science Thesis

Name, Surname:

E- mail:

Collaborative Company:

Project Statement:

Please write your answers below the questions as detailed as possible.

1) What are the benefits of the university-industry collaboration in general?

2) What are your expectations from the graduation projects and the collaboration (from companies, educators, projects, and process) in this semester?

3) In what way did you determine the company and subject to study in your graduation project? What were your priorities?

4) What are your contributions to company collaborate with you?

5) What kind of supports do you get from educators? How will this support extend?

6) What do you think about an agreement, signed at the beginning of semester? Who are the parties of an agreement on intellectual property rights?

7) What kind of issues would be in this agreement?

8) Have you encountered any problems since the beginning of project? If yes, what were these problems?

A.2.2 Öğrencilere Gönderilen ilk Anket

Endüstri Ürünleri Tasarımı Eğitiminde, Endüstri Destekli Projeler
Orta Doğu Teknik Üniversitesi – Endüstri Ürünleri Tasarımı Bölümü
Ömer Orhun Baysal – Yüksek Lisans Tez Çalışması

Adınız, Soyadınız:
E-posta:
Birlikte çalışmakta olduğunuz firma:
Proje konunuz:
Cevaplarınızı soruların altına olabildiğince ayrıntılı yazınız.

1) Sizce genel olarak üniversite-sanayi işbirliğinin faydaları nelerdir?

2) Bu dönem mezuniyet projesi dersinden beklentileriniz nelerdir? (eğitimcilerden, firmanızdan, süreçten vb.)?

3) Mezuniyet projenizde çalışmakta olduğunuz konuyu ve firmayı nasıl belirlediniz? Öncelikleriniz nelerdi?

4) Siz beraber çalıştığınız firmaya neler kattığınızı düşünüyorsunuz?

5) Mezuniyet projenizi yaparken, eğitmenlerinizden nasıl bir destek alıyorsunuz? Sizce eğitimcilerin verdiği destek daha farklı olabilir mi? Nasıl?

6) Sizce mezuniyet projesinin <u>başlangıcında</u> firmalarla anlaşma yapılmalı mı? Cevabınız hayırsa neden? Evetse bu anlaşmanın tarafları kimler olmalı?

7) Böyle bir anlaşma sizce neleri içermeli?

8) Projenizde bulunduğunuz aşamaya gelinceye kadar yaşadığınız sorunlar oldu mu? Olduysa bunlar nelerdir?

A.3.1 Second Questionnaire for Students Replied the First One

Industry Supported Projects in Industrial Design Education
Middle East Technical University – Department of Industrial Design
Ömer Orhun Baysal- Master of Science Thesis

Name, Surname:

E- mail:

Collaborative Company:

Project Statement:

Please write your answers below the questions as detailed as possible.

1) At which level your expectations are met from the graduation projects and the collaboration (from companies, educators, projects, and process) in this semester?

2) What were your contributions to company collaborate with you?

3) Do you think an agreement about intellectual property rights would be signed? If your answer is no, would you explain your reasons? If your answer is yes, when would this kind of agreement is signed? Who would be the parties of the agreement?

4) What kind of issues would be in this agreement?

5) Have you encountered any problems since the beginning of project? If yes, what were these problems?

6) If you had started the project again, what would be your priorities in strategies, subjects and methods?

7) What are your suggestions to educational institute about graduation project organization and method?

A.3.1 İlk anketi Yanıtlayan Öğrencilere Gönderilen İkinci Anket

Endüstri Ürünleri Tasarımı Eğitiminde, Endüstri Destekli Projeler
Orta Doğu Teknik Üniversitesi – Endüstri Ürünleri Tasarımı Bölümü
Ömer Orhun Baysal – Yüksel Lisans Tez Çalışması

Adınız, Soyadınız:
E-posta:
Birlikte çalışmakta olduğunuz firma:
Proje konunuz:
Cevaplarınızı soruların altına olabildiğince ayrıntılı yazınız.

1) Bu dönem mezuniyet projesi dersinden beklentilerinizin karşılandığını düşünüyor musunuz? (eğitimcilerden, firmanızdan, süreçten vb.)?

2) Bu yoğun çalışmanın sonunda, siz beraber çalıştığınız firmaya, neler kattığınızı düşünüyorsunuz?

3) Sizce mezuniyet projesiyle ilgili taraflar arasında bir anlaşma yapılmalı mı? Hayırsa neden? Evetse bu anlaşma ne zaman yapılmalı? Tarafları kimler olmalı?

4) Böyle bir anlaşma sizce neleri içermeli?

5) Projenizde bulunduğunuz aşamaya gelinceye kadar yaşadığınız sorunlar oldu mu? Olduysa bunlar nelerdir?

6) Projeye yeniden başlıyor olsaydınız önceki deneyiminizden farklı olarak konu, yöntem ve strateji olarak nelere ağırlık verirdiniz?

7) Tasarım eğitimi ve mezuniyet projesi sürecinin yönetimi konusunda öğretim kurumuna önerileriniz nelerdir?

A.4.1 Joint Questionnaire for Students not Reply the First One

Industry Supported Projects in Industrial Design Education
Middle East Technical University – Department of Industrial Design
Ömer Orhun Baysal- Master of Science Thesis

Name, Surname:
E- mail:
Collaborative Company:
Project Statement:
Please write your answers below the questions as detailed as possible.

1) What are the benefits of the university-industry collaboration in general?

2) What were your expectations from the graduation projects and the collaboration (from companies, educators, projects, and process) in this semester? At which level your expectations are met from the graduation projects and the collaboration in this semester?

3) In what way did you determine the company and subject to study in your graduation project? What were your priorities?

4) Do you think, was your collaboration subject and collaborative company appropriate for you? Was it the right chooses? Why?

5) What are your contributions to company collaborate with you?

6) What kind of supports do you get from educators? How will this support extend?

7) Do you think an agreement about intellectual property rights would be signed? If your answer is no, would you explain your reasons? If your answer is yes, when would this kind of agreement is signed? Who would be the parties of the agreement?

8) What kind of issues would be in this agreement?

9) Have you encountered any problems since the beginning of project? If yes, what were these problems?

10) If you had started the project again, what would be your priorities in strategies, subjects and methods?

11) What are your suggestions to educational institute about design education and graduation project organization and method?

A.4.2 İlk anketi Yanıtlamayan Öğrencilere Gönderilen Bileşik Anket

Endüstri Ürünleri Tasarımı Eğitiminde, Endüstri Destekli Projeler
Orta Doğu Teknik Üniversitesi – Endüstri Ürünleri Tasarımı Bölümü
Ömer Orhun Baysal – Yüksek Lisans Tez Çalışması

Adınız, Soyadınız:
E-posta:
Birlikte çalışmakta olduğunuz firma:
Proje konunuz:
Cevaplarınızı soruların altına olabildiğince ayrıntılı yazınız.

1) Sizce genel olarak üniversite-sanayi işbirliğinin faydaları nelerdir?

2) Bu dönem mezuniyet projesi dersinden beklentileriniz nelerdi? Ne ölçüde bu beklentilerinize karşılık bulabildiniz (eğitimcilerden, firmanızdan, süreçten vb.)?

3) Mezuniyet projenizde çalışmakta olduğunuz konuyu ve firmayı nasıl belirlediniz? Öncelikleriniz nelerdi?

4) Mezuniyet projenizin sergi aşamasında doğru firmayı ve konuyu belirlediğinizi düşünüyor musunuz? Neden?

5) Siz beraber çalıştığınız firmaya neler kattığınızı düşünüyorsunuz?

6) Mezuniyet projenizi yaparken, eğitmenlerinizden nasıl bir destek aldınız? Sizce eğitimcilerin verdiği destek daha farklı olabilir mi? Nasıl?

7) Sizce mezuniyet projesiyle ilgili taraflar arasında bir anlaşma yapılmalı mı? Hayırsa neden? Evetse bu anlaşma ne zaman yapılmalı? Tarafları kimler olmalı?

8) Böyle bir anlaşma sizce neleri içermeli?

9) Projenizde bulunduğunuz aşamaya gelinceye kadar yaşadığınız sorunlar oldu mu? Olduysa bunlar nelerdir?

10) Projeye yeniden başlıyor olsaydınız önceki deneyiminizden farklı olarak konu, yöntem ve strateji olarak nelere ağırlık verirdiniz?

11) Tasarım eğitimi ve mezuniyet projesi sürecinin yönetimi konusunda öğretim kurumuna önerileriniz nelerdir?

A.5.1 Companies' First Questionnaire

Industry Supported Projects in Industrial Design Education

Middle East Technical University – Department of Industrial Design

Ömer Orhun Baysal- Master of Science Thesis

Name, Surname:

E- mail:

Supported students:

Project Statement:

Please write your answers below the questions as detailed as possible.

1) What are the benefits of the university-industry collaboration in general?

2) What are your expectations from the graduation projects and the collaboration (from project, educators, progress, students etc.) in this semester?

3) In what way did you determine the subject to study in graduation project? What were your priorities? What is the importance of the result of project from the perspective of your company?

4) What kind of contributions is expected by your company?

5) What are your personal contributions to the projects? What is the importance of being into the project from your perspective?

6) What kind of contributions is supplied by your company?

7) Do you suggest methods in development of project progress to the students? What kind of methods do you suggest?

8) What are the educational institute and the educators' contributions to Graduation Project Course?

9) What do you think about an agreement, signed at the beginning of semester? If your answer is no, would you explain your reasons? If your answers are yes, who are the parties of an agreement on intellectual property rights?

10) What kind of issues would be in this agreement?

11) Have you encountered any problems since the beginning of project? If yes, what were these problems?

A.5.2 Firmalara Gönderilen İlk Anket

Endüstri Ürünleri Tasarımı Eğitiminde, Endüstri Destekli Projeler
Orta Doğu Teknik Üniversitesi – Endüstri Ürünleri Tasarımı Bölümü
Ömer Orhun Baysal – Yüksek Lisans Tez Çalışması

Adınız, Soyadınız:
E-posta:
Birlikte çalışmakta olduğunuz öğrenciler:
Proje konunuz:
Cevaplarınızı soruların altına olabildiğince ayrıntılı yazınız.

1) Sizce genel olarak üniversite-sanayi işbirliğinin faydaları nelerdir?

2) Bu dönem mezuniyet projelerinde, ODTÜ Endüstri Ürünleri Tasarımı Bölümü ile yaptığınız işbirliğinden (projeden, eğitimcilerden, süreçten, öğrencilerden vb.) beklentileriniz nelerdir?

3) Öğrencinin firmanızla ilgili çalışacağı projenin konusu nasıl belirlendi? Projenin sonucu firmanız açısından önem taşıyor mu?

4) Sizce bu gibi işbirliklerinin firmanıza katkısı neler olmalı?

5) Projeye kişisel olarak hangi düzeyde katılıyorsunuz? Projenin içinde yer almak sizin için hangi açılardan önem taşıyor?

6) Sizce yürütülen projeye firmanızın öncelikli katkıları neler?

7) Öğrenciye projesinin geliştirilme sürecine ilişkin önerdiğiniz yöntemler var mı? Varsa kısaca anlatınız.

8) Sizce projeye üniversitenin ve eğitimcilerin katkıları neler?

9) Sizce mezuniyet projesinin başlangıcında taraflar arasında bir anlaşma yapılmalı mı? Hayırsa neden? Evetse bu anlaşmanın tarafları kimler olmalı?

10) Böyle bir anlaşma sizce neleri içermeli?

11) Projenin yürütülmesi sürecinde, bu aşamaya gelinceye kadar yaşadığınız sorunlar oldu mu? Olduysa bunlar nelerdir?

A.6.1 Second Questionnaire for Companies Replied the First One

Industry Supported Projects in Industrial Design Education

Middle East Technical University – Department of Industrial Design

Ömer Orhun Baysal- Master of Science Thesis

Name, Surname:

E- mail:

Supported Students:

Project Statement:

Please write your answers below the questions as detailed as possible.

1) At which level your expectations are met from the graduation projects and the collaboration (from educators, students, projects, and process) in this semester?

2) What is the importance of the result of project from the perspective of your company?

3) Do you think an agreement about intellectual property rights would be signed? If your answer is no, would you explain your reasons? If your answer is yes, when would this kind of agreement is signed? Who would be the parties of the agreement?

4) What kind of issues would be in this agreement?

5) Have you encountered any problems since the beginning of project? If yes, what were these problems?

6) If you had started the project again, what would be your priorities in strategies, subjects and methods?

7) What are your suggestions to educational institute about graduation project organization and method?

A.6.2 İlk Anketi Yanıtlayan Firmalara Gönderilen İkinci Anket

Endüstri Ürünleri Tasarımı Eğitiminde, Endüstri Destekli Projeler
Orta Doğu Teknik Üniversitesi – Endüstri Ürünleri Tasarımı Bölümü
Ömer Orhun Baysal – Yüksel Lisans Tez Çalışması

Adınız, Soyadınız:
E-posta:
Birlikte çalışmakta olduğunuz öğrenciler:
Proje konunuz:
Cevaplarınızı soruların altına olabildiğince ayrıntılı yazınız.

1) Bu dönem mezuniyet projelerinde, ODTÜ Endüstri Ürünleri Tasarımı Bölümü ile yaptığınız işbirliğinden (projeden, eğitimcilerden, süreçten, öğrencilerden vb.) beklentilerinizi karşılayabildiğinizi düşünüyor musunuz?

2) Projenin sonucu firmanız açısından nasıl bir önem taşıyor?

3) Sizce mezuniyet projesiyle ilgili taraflar arasında bir anlaşma yapılmalı mı? Hayırsa neden? Evetse bu anlaşma ne zaman yapılmalı? Tarafları kimler olmalı?

4) Böyle bir anlaşma sizce neleri içermeli?

5) Projenin yürütülmesi sürecinde, bu aşamaya gelinceye kadar yaşadığınız sorunlar oldu mu? Olduysa bunlar nelerdir?

6) Bir kez daha böyle bir projeye destek verseydiniz önceki deneyiminizden farklı olarak konu, yöntem ve destek olarak nelere ağırlık verirdiniz?

7) Tasarım eğitimi ve mezuniyet projesi sürecinin yönetimi konusunda öğretim kurumuna önerileriniz nelerdir?

A.7.1 Second Questionnaire for Companies not Replied the First One

Industry Supported Projects in Industrial Design Education

Middle East Technical University – Department of Industrial Design

Ömer Orhun Baysal- Master of Science Thesis

Name, Surname:

E- mail:

Supported Students:

Project Statement:

Please write your answers below the questions as detailed as possible.

1) What are the benefits of the university-industry collaboration in general?

2) What are your expectations from the graduation projects and the collaboration (from project, educators, progress, students etc.) in this semester? At which level your expectations are met from the graduation projects and the collaboration in this semester.

3) In what way did you determine the subject to study in graduation project? What were your priorities? What is the importance of the result of project from the perspective of your company?

4) What kind of contributions is expected by your company?

5) What are your personal contributions to the projects? What is the importance of being into the project from your perspective?

6) What kind of contributions is supplied by your company?

7) Do you suggest methods in development of project progress to the students? What kind of methods do you suggest?

8) What are the educational institute and the educators' contributions to Graduation Project Course?

9) Do you think an agreement about intellectual property rights would be signed? If your answer is no, would you explain your reasons? If your answer is yes, when would this kind of agreement is signed? Who would be the parties of the agreement?

10) What kind of issues would be in this agreement?

11) Have you encountered any problems since the beginning of project? If yes, what were these problems?

12) If you had started the project again, what would be your priorities in strategies, subjects and methods?

13) What are your suggestions to educational institute about graduation project organization and method?

A.7.2 İlk anketi Yanıtlamayan Firmalara Gönderilen İkinci Anket

Endüstri Ürünleri Tasarımı Eğitiminde, Endüstri Destekli Projeler

Orta Doğu Teknik Üniversitesi – Endüstri Ürünleri Tasarımı Bölümü

Ömer Orhun Baysal – Yüksek Lisans Tez Çalışması

Adınız, Soyadınız:

E-posta:

Birlikte çalışmakta olduğunuz öğrenciler:

Proje konunuz:

Cevaplarınızı soruların altına olabildiğince ayrıntılı yazınız.

1) Sizce genel olarak üniversite-sanayi işbirliğinin faydaları nelerdir?

2) Bu dönem mezuniyet projelerinde, ODTÜ Endüstri Ürünleri Tasarımı Bölümü ile yaptığınız işbirliğinden (projeden, eğitimcilerden, süreçten, öğrencilerden vb.) beklentileriniz nelerdi? Bu beklentilerin ne ölçüde karşılandığını düşünüyorsunuz?

3) Öğrencinin firmanızla ilgili çalışacağı projenin konusu nasıl belirlendi? Projenin sonucu firmanız açısından nasıl bir önem taşıyor?

4) Sizce bu gibi işbirliklerinin firmanıza katkısı neler olmalı?

5) Projeye kişisel olarak hangi düzeyde katıldınız? Projenin içinde yer almak sizin için hangi açılardan önem taşıyordu?

6) Sizce yürütülen projeye firmanızın öncelikli katkıları nelerdi?

7) Öğrenciye projesinin geliştirilme sürecine ilişkin önerdiğiniz yöntemler oldu mu? Olduysa kısaca anlatınız.

8) Sizce projeye üniversitenin ve eğitimcilerin katkıları neler?

9) Sizce mezuniyet projesiyle ilgili taraflar arasında bir anlaşma yapılmalı mı? Hayırsa neden? Evetse bu anlaşma ne zaman yapılmalı? Tarafları kimler olmalı?

10) Böyle bir anlaşma sizce neleri içermeli?

11) Projenin yürütülmesi sürecinde, bu aşamaya gelinceye kadar yaşadığınız sorunlar oldu mu? Olduysa bunlar nelerdir?

12) Bir kez daha böyle bir projeye destek verseydiniz önceki deneyiminizden farklı olarak konu, yöntem ve destek olarak nelere ağırlık verirdiniz?

13) Tasarım eğitimi ve mezuniyet projesi sürecinin yönetimi konusunda öğretim kurumuna önerileriniz nelerdir?

A.8.1 Educators' Questionnaire

Industry Supported Projects in Industrial Design Education
Middle East Technical University – Department of Industrial Design
Ömer Orhun Baysal- Master of Science Thesis

Please write your answers below the questions as detailed as possible.

1) What are the benefits of the university-industry collaboration in general?

2) What are your expectations from the graduation projects and the collaboration (from project, companies, progress, students etc.) in this semester? At which level your expectations are met from the graduation projects and the collaboration in this semester?

3) What are your personel contributions to the projects? What is the importance of being into the project from your perspective to compare with other educational activities?

4) What kind of contributions is expected by department and university?

5) What kind of contributions is supplied by educators and educational institute?

6) What kind of contributions is supplied by companies?

7) At which level, the students benefit from progress of Graduation Project Course?

8) Do you think an agreement about intellectual property rights would be signed? If your answer is no, would you explain your reasons? If your answer is yes, when would this kind of agreement is signed? Who would be the parties of the agreement?

9) What kind of issues would be in this agreement?

10) Have you encountered any problems since the beginning of project? If yes, what were these problems?

11) If you had started the project again, what would be your priorities in strategies, subjects and methods?

A.8.2 Eğitmenlerin Anketi

Endüstri Ürünleri Tasarımı Eğitiminde, Endüstri Destekli Projeler
Orta Doğu Teknik Üniversitesi – Endüstri Ürünleri Tasarımı Bölümü
Ömer Orhun Baysal – Yüksek Lisans Tez Çalışması

Cevaplarınızı soruların altına olabildiğince ayrıntılı yazınız

1) Sizce genel olarak üniversite-sanayi işbirliğinin faydaları nelerdir?

2) Bu dönem mezuniyet projelerinde, işbirliğinden (firmalardan, öğrencilerden, projelerden ve süreçten) beklentileriniz nelerdi? Bu beklentilerin hangileri ne ölçüde karşılandı?

3) Diğer eğitim projeleri ile kıyasladığınızda mezuniyet projelerini endüstriyle işbirliği çerçevesinde yürütmek ve bu sürecin içinde yer almak sizin için hangi açılardan önem taşıyor?

4) Sizce bu gibi işbirliklerinin üniversiteye ve bölüme katkısı neler olmalı?

5) Sizce yürütülen projelere eğitim kurumunun ve eğitimcilerin öncelikli katkıları neler?

6) Sizce projeye firmaların katkıları neler?

7) Sizce öğrenciler ne ölçüde süreçten faydalanabiliyorlar?

8) Sizce mezuniyet projesiyle ilgili taraflar arasında bir anlaşma yapılmalı mı? Hayırsa neden? Evetse bu anlaşma ne zaman yapılmalı? Tarafları kimler olmalı?

9) Böyle bir anlaşma sizce neleri içermeli?

10) Projenin yürütülmesi sürecinde, bu aşamaya gelinceye kadar yaşadığınız sorunlar oldu mu? Olduysa bunlar nelerdir?

11) Yeniden mezuniyet projesi ekibinde yer alırsanız önceki deneyiminizden farklı olarak konu, yöntem ve strateji olarak nelere ağırlık verirdiniz?

APPENDICES B

B.1 Sample Methodology for Context Coding Data Analysis

Question: In your graduation project, in which way did you determine the **company** and *subject to* study? What were your priorities?

S1 Answer*: XXX Company declared* that they wanted to support graduation project from our school voluntarily. The fact that it will **give model and technical support** was especially the first determining factor for me. But as I said some setbacks changed this situation.

S2 Answer: I have decided on the subject of the project in respect of the field that I *desired and my interest in the subject* of furniture. As for the firm, I decided on it after I made the required research, thinking that this is a firm that I **will have good relations** with during the implementation of the project.

S3 Answer: I wanted to undertake a project for white goods and electronic domestic appliances. I have selected the **appropriate firms from the list** that had been provided by our tutors, and the firm had been determined as XXX. The company *had left me free* in respect of the project statement. I thought of carrying the concept of "YYY" and I have defined my project.

S4 Answer: I wanted to study with any company **located nearby Ankara**. This was important issue for me in considering the communication with the company. The subject was *determined by the company*. They wanted *to complete their "ZZZ" design series.*

The company selection:

- **Expectation from company; giving model and technical information**
- **Location nearby Ankara,**
- **Selection the appropriate company; (2 answers)**
    - **From the list, which was prepared by tutors,**
    - **To think having good relationship with the company,**

The subject selection:

- *Determination by company, (2 answers)*
    - *Company wanted to collaborate on pre-determined subject and make an application to educational institute,*
    - *Company wanted to work on their need,*
- *Determination by student, (2 answers)*
    - *Student interests defined the subject.*

APPENDICES C

C.1.1 Introductory Letter

Middle East Technical University, Department Of Industrial Design, Graduation Project and Graduation Exhibition, 2005

University – Industry Cooperation

Founded in 1979, our department aims at educating creative and innovative designers who are able to use possibilities offered by developing technology and who are sensitive to the needs of the user. We carry out compulsory summer practices and industrial trips as well as graduation projects in collaboration with several organisations from industry because we believe that the education needs to be sensitive to the needs of industry in our country.

What is a graduation project?

It is expected from students to carry out a design project throughout the whole semester with twelve hours course load in the graduation project, which is the last studio course in our curriculum before the graduation. It is essential for this project that the student will reflect the skills that he or she acquired and design approach that he or she formed to the project to be carried out in collaboration with a company. The goal of this is to experience partially the professional life before the graduation. It is expected from the student to bring project proposals to the company at the beginning, however our institution prefers the student to work on a subject which the company is interested to develop or currently working on. It is observed in our previous experiences that in this way both parties benefit from the collaboration. High quality model/prototype and drawings are expected in the presentation of the project. ,All projects are exhibited at Middle East Technical University (METU) Cultural and

Convention Center. Advertisement and publication activities after the exhibition are another subject to which we attach importance. Examples of graduation projects were exhibited in the scope of the activities such as Positive Value Design Exhibition of Turkish Exporters Union, ADesign Fair, Fourth International Design and Emotion Conference, Middle East Technical University (METU), and they took place in different newspapers and magazines.

The benefits that the companies obtain from this cooperation can be summarized under three headings based on our previous experiences and views that were forwarded to us:

- Innovative designs: Development of innovative and creative designs that would even be subject for patent or utility model registration.
- Human resources: Possibility for knowing professionals of the future and evaluating their performances.
- Advertisement: Advertising the companies that supports the education in exhibitions and publications not only performed in the scope of graduation exhibition activities but also at exhibitions and publications that are performed after these activities.

Our expectations from the collaboration

Our primary expectation from the companies is the professional support in the graduation projects that we carried out since 1996 at intervals and continuously since the last three years. This support which will be composed of the guidance and information in subjects such as design, production, marketing and model making requires 6 – 10 interviews (becoming more frequent towards the end). These interviews are performed by the visit of the student to the company as well as the participation of official of the company to interim jury and final jury. Our institutional priority is to finalize the cooperation with a good educational experience.

Our principals about intellectual property rights

Based on our previous experiences and the demands of the companies, the principals that we adopted about intellectual property rights in the scope of graduation projects are as follows:

- Commercial secrets shared by the parties are mutually reserved.
- University, student, and company are common owners exhibition and publication rights related to the projects.
- University, student and company are common owners of intellectual and industrial property rights stemming from the projects.
- Parties give information to each other concerning exhibition and publication (book, brochure, web page, etc.) activities that are carried out within 12 months following the graduation exhibition. After the end of the 12 months the university, the student and the company can perform freely exhibition and publication provided that they indicate the name of the collaborative institutions and the student.
- The student can show his or her project to third parties as a reference at his or her job applications.
- Company, if he wants to produce a project, signs a contract that determines the specifications of this with the student and the university at the beginning of the project (at the end of third week of the semester) or at the end of semester. (Just after the graduation exhibition). Signing of this kind of contracts at the beginning or at the end of the process is preferred because the educational performance of the student may be negatively affected in between.
- If the companies want to follow a different policy about intellectual property rights, interviews concerning this may be carried out at the beginning of the project.

Many companies, with which we collaborated, has helped our students for model building, travel and accommodation (if the company is out of Ankara) depending on their facilities. Besides, we expect to get support in frame of the facilities of the firms by which we cooperated again this year about exhibition, cocktails, and announcements supported by main sponsors since three years.

We believe that the support to be given by our industry and professional designers will give great contribution to design education. Similarly, we also believe that the companies will find opportunity for knowing interdisciplinary and international research environment offered by METU and closely following current design methods used in design education. We will continue to give educational support to our students during the semester by our team consisting of Assoc. Prof. Dr. Gülay Hasdoğan, Assist Prof. Dr. Naz Evyapan, and Assist. Prof. Dr. Fatma Korkut and Mine Hoşgün Soylu besides the professional support to be given by the companies.

Desiring to see you among us at the exhibition of graduation projects of the year 2005 that will be carried out in June,

Assist. Prof. Dr. Fatma Korkut
Chairperson of the Department of Industrial Design of METU

C.1.2 Tanıtım Yazısı

Orta Doğu Teknik Üniversitesi Endüstri Ürünleri Tasarımı Bölümü Mezuniyet Projesi Ve Sergisi 2005

Üniversite-endüstri işbirliği

1979 yılından bu yana eğitim veren bölümümüz, kullanıcının gereksinimlerine duyarlı ve gelişen teknolojinin sunduğu olanakları kullanabilen, yaratıcı ve yenilikçi tasarımcılar yetiştirmeyi hedeflemektedir. Eğitimin ülkemiz endüstrisinin gereksinimlerine duyarlı olması gerektiğine inandığımız için zorunlu stajların ve endüstri gezilerinin yanı sıra mezuniyet projelerini çeşitli endüstriyel kuruluşların işbirliğiyle gerçekleştiriyoruz.

Mezuniyet projesi nedir?

Müfredatımızın mezuniyet öncesi son proje dersi olan mezuniyet projesinde, haftada 12 saatlik bir ders yükü ile her öğrencinin tüm dönem boyunca bir tasarım projesi geliştirmesi beklenir. Öğrencinin eğitimi boyunca edindiği becerileri ve oluşturduğu tasarım yaklaşımını özgün bir şekilde yansıtacağı bu projenin, bir firma ile işbirliği içinde yürütülmesi esastır. Bunun amacı öğrencinin mezuniyetten önce, belli bir ölçüde, profesyonel yaşamın provasını yapmasıdır. Başlangıçta öğrencinin firmaya proje önerileri getirmesi beklenmekle birlikte, öğrencinin, öncelikle firmanın ilgilendiği, geliştirmek istediği veya üzerinde çalıştığı bir konuya yönlendirilmesi kurumumuz tarafından tercih edilmektedir. Böylelikle her iki tarafın da işbirliğinden fayda sağladığı geçmiş deneyimlerimizde gözlemlenmiştir. Projenin, dönem sonunda üst kalitede model/prototip ve çizimlerle sunulması beklenmekte, tüm projeler ODTÜ Kültür ve Kongre Merkezi'nde sergilenmektedir. Sergi sonrası tanıtım ve yayın faaliyeti, mezuniyet projesi kapsamında önem verdiğimiz bir diğer konudur. 2004 yılı mezuniyet projelerinden örnekler, ADesign Fair, Türkiye İhracatçılar Meclisi Artı Değer Tasarım Sergisi, Dördüncü Uluslararası Tasarım ve Duygusal Deneyimler Konferansı, ODTÜ Mezunlar Günü gibi çeşitli etkinlikler kapsamında sergilenmiş, televizyon kanallarında, çeşitli gazete ve dergilerde yer almıştır.

Geçmiş deneyimlerimize ve bize iletilen görüşlere dayanarak firmaların bu işbirliğinden sağladıkları faydaları üç başlık altında toplayabiliriz:

- Yenilikçi tasarımlar: Patent, faydalı model veya tasarım tescili başvurularına da konu olabilecek yenilikçi ve yaratıcı tasarımların geliştirilmesi.
- İnsan kaynakları: Geleceğin profesyonellerini tanıma ve performanslarını değerlendirme olanağı.
- Tanıtım: Gerek mezuniyet sergisi etkinlikleri kapsamında gerekse sonrasında gerçekleştirilen sergi ve yayınlarda eğitime destek veren firmaların duyurulması.

İşbirliğinden beklentilerimiz

1996 yılından bu yana aralıklı olarak gerçekleştirdiğimiz, son üç yıldır ise süreklileştirdiğimiz bu uygulamada firmalardan öncelikli beklentimiz uzmanlık desteğidir. Tasarım, üretim, pazarlama ve model yapımı gibi konularda yönlendirme ve bilgilendirmeden oluşacak bu destek, dönem boyunca (sonlara doğru sıklaşan) 6-10 görüşmeyi gerektirmektedir. Bu görüşmeler öğrencinin firmayı ziyaretiyle olduğu kadar, firma yetkililerinin önjüri ve final jüriye katılımı ile de gerçekleştirilir. Kurumsal önceliğimiz, işbirliğinin iyi bir eğitim deneyimi ile sonuçlanmasıdır.

Fikri haklar konusundaki ilkelerimiz

Geçmiş deneyimlerimize ve firmalardan gelen taleplere dayanarak mezuniyet projesi kapsamında fikri haklar konusunda gözettiğimiz ilkeler şunlardır:

- Tarafların paylaştığı ticari sırlar karşılıklı olarak saklı tutulur.
- Üniversite, öğrenci ve firma, projelere ilişkin sergileme ve yayın haklarının ortak sahibidir.
- Üniversite, öğrenci ve firma, projelerden doğan her türlü fikri ve sınai mülkiyet haklarının ortak sahibidir.
- Mezuniyet sergisini izleyen 12 ay içinde yapılan sergileme ve yayın (kitap, broşür, web sayfası vb.) faaliyetleri konusunda taraflar birbirini haberdar eder. 12 ayın bitiminden sonra üniversite, öğrenci ve firma, işbirliği yapan kuruluşların ve öğrencinin adını belirtmek koşuluyla serbestçe sergileme ve yayın yapabilirler.

- Öğrenci, projesini iş başvurularında referans olarak üçüncü kişilere gösterebilir.
- Firma, bir projeyi üretmek istiyorsa öğrenci ve üniversiteyle bunun şartlarını belirleyen bir sözleşmeyi projenin başlangıcında (dönemin üçüncü haftasının bitiminde) veya sonunda (mezuniyet sergisinden hemen sonra) imzalar. Öğrencinin eğitim performansının olumsuz etkilenmesi söz konusu olabileceği için bu tür sözleşmelerin sürecin en başında veya en sonunda yapılması tercih edilmektedir.
- Firmalar fikri haklar konusunda farklı bir politika izlemek istiyorlarsa buna ilişkin görüşmeler projenin başlangıcında yapılabilir.

Geçmişte işbirliği yaptığımız, olanakları elveren birçok firma, öğrencilerimize model yapımı, (eğer firma Ankara dışındaysa) yolculuk ve konaklama konusunda yardımcı olmuştur. Ayrıca son üç yıldır ana sponsorlar tarafından desteklenen sergi, kokteyl ve duyurular konusunda bu yıl da işbirliği yaptığımız firmalardan olanakları çerçevesinde destek almayı umut ediyoruz.

Endüstrimizin ve profesyonel tasarımcılarımızın sağlayacağı desteğin tasarım eğitimine büyük katkısı olacağına inanıyoruz. Benzer şekilde, firmaların da ODTÜ'nün sunduğu disiplinlerarası ve uluslararası araştırma ortamını tanıma, tasarım eğitiminde kullanılan güncel tasarım metodlarını yakından izleme fırsatı bulacaklarına inanıyoruz. Firmaların sağlayacağı uzmanlık desteğinin yanı sıra Doç. Dr. Gülay Hasdoğan, Yrd. Doç. Dr. Naz Evyapan, Yrd. Doç. Dr. Fatma Korkut ve Mine Hoşgün Soylu'dan oluşan ekibimizle öğrencilerimize eğitim desteği vermeyi dönem boyunca sürdüreceğiz. Haziran ayında gerçekleşecek 2005 yılı mezuniyet projeleri sergisinde sizleri de aramızda görmek dileğiyle,

Yrd. Doç. Dr. Fatma Korkut, ODTÜ Endüstri Ürünleri Tasarımı Bölümü Başkanı

C.2 The Time Plan for the Graduating Project

	Monday	**Tuesday**	**Wednesday**	**Thursday**	**Friday**	**Saturday**	**Sunday**
1	21 February **Class begins** **Assignment 2:** Poster and Invitation	22	23	24	25	26	27
2	28 February **Preliminary Jury:** Poster and Invitation	1 March	2	3	4 March **Visit to Eyüp Sabri Tuncer**	5	6
3	7 March **Jury:** Poster and Invitation **Hand-out:** Research Report	8	9 March **Workshop:** Project Statement and Initial Ideas	10	11 March **Workshop:** Project Statement and Initial Ideas	12	13
4	14 March **Workshop:** Evaluating Initial Ideas *Weekly Report 1*	15	16 Crits Modelling seminars 15:30 – 17:30	17	18 Crits Modelling seminars 13:30 – 15:30	19	20
5	21 Crits Modelling crits *Weekly Report 2*	22	23 Crits	24	25 March Crits **Submission:** Project Statement and Research Report Part 1	26	27
6	28 Crits Modelling crits *Weekly Report 3*	29	30 Crits	31	1 April Crits	2	3
7	**4 April** **Interim Jury** Weekly Report 4	5	**6 April** **Interim Jury**	7	**8 April** **Interim Jury**	9	10
8	11 Crits Modelling crits *Weekly Report 5*	12	13 Crits	14	15 Crits	16	17

9	18 Crits Modelling crits *Weekly Report 6*	19	20 Crits	21	22 Crits	**23**	24
10	25 April Modelling crits **Submission: Research Report Part 2** *Weekly Report 7*	26	27 Crits	28	29 Crits	30	1 May
11	2 May **Final Screening** *Weekly Report 8*	3	4 April **Final Screening**	5	6	7	8
12	9 May *2D Submission* *Weekly Report 9*	10 May *2D Submission*	11 May *2D Submission ends*	12	13	14	15
13	16 May **Submisssion:** Research Report Part 3 *Weekly Report 10*	17	18	**19 May**	20	21	22
14	23 *Weekly Report 11*	24	25	26	27 May *End of Classes*	28	**29 May CCC Setting up of exhibition** **Submissi**
15	**30 May** Graduation Jury and Exhibition *Weekly Report 12* *Finals* >	**31 May Graduation Jury and Exhibition**	**1 June Graduation Jury and Exhibition**	**2 June Removal of exhibition material**	3 >	4 >	5 >
	6 *Weekly Report 13* >	7 >	8 >	9 >	10 >	11 **End of Finals**	12
	13	14	15	16	17 June *Submission of final grades*	18	19
	20	21	22	23	24	25 June *Graduation Ceremony*	**26 June Alumni Day**

C.3 Workshop Outline

Middle East Technical University Department of Industrial Design
ID 402 Graduation Project Spring 2004-2005
Assoc. Prof. Dr. Gülay Hasdoğan, Assist. Prof. Dr. Fatma Korkut, Assist. Prof. Dr. Naz Evyapan, Part-time Inst. Mine Hoşgün Soylu, Res. Asst. Harun Kaygan

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Arpil 18, 2005

Workshop: Revised Project Statements, Constraints, Objectives and Directives

Group 1: Zeynep Arman, Aslı Börü, Elnur Babayev, Bilge Aktaş, Evren Alibaba, Işıl Yıldızel
Group 2: Ertan Zaferoğlu, Nil Güları, Diler Şimşek, Cem Dönmez, Serkan Uslu
Group 3: Saliha Türkmenoğlu, Armağan Karahanoğlu, Gökhan Keman, Funda Özdemir, Burçin Özkır

Group 4: Gülden Malya, Mehmet Turhan, Cem Altıbaş, Feride Toprak, M. Umut Ekim, Alev Oksay
Group 5: Fulya Traş, Nazlı Cila, Sözüm Doğan, Uğur Tosun, Ece Gürakar, Emrah Demirhan
Group 6: Mertcan Karakuş, Burcu Gürsaf, Coşkun Cengiz, Ender Coşkun, Ayşenaz Toker
Group 7: Aslı Yılmaz, Seda Özçetin, Özüm Özkan, Çağlar Karakuş, Levent Özak
Group 8: Ezgi Ozan, Kübra Duman, Senem Tural, Aybike Tamer, Canan Tokdemir

Introduction: 15 minutes
Part 1: 30 minutes

1. Write down your revised project statement on A3 size paper (portrait).
2. Briefly explain your project statement to your friends.
3. Take three A3 papers (portrait), put the following captions on each: Constraints, Objectives, Directives. Write down at least three constraints, three objectives and three directives (CODs) on each paper.
4. Briefly discuss in turn your CODs within the group.

Part 2: 45 minutes

5. Pass your papers to the person on your left. Each group member will now add one constraint, one objective and one directive on his/her friends' papers. Continue until group members believe the lists are complete. Discuss with your group members during the process acting as a user, a client, an expert or a knowledgeable person in the field (45 minutes).

Break: 15 minutes
Part 3: 90 minutes

6. Choose a representative of your group to explain the outcomes.

C.4 The Research Report Format

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March 7, 2005

Research Report

Research Report Part 1 - Exploration of the Problem Area
Due 25 March 2005, Friday

1.1.Project statement
Brief goal statement or problem definition including keywords related with the project statement (at least three). Utilise these keywords in surveys that you are going to conduct in the following sections.

Examples:
Project statement: *Design an outdoor play environment that accommodates the physical exercising needs of visually impaired children between the ages 7-14.*
Keywords: *outdoor play environment, visually impaired children, physical exercise-children.*

For the following sections, the potential sources of information are books, catalogues, journals or magazines, experts, internet, encyclopedias, shop or showroom visits, etc. Explain the content of all images by captions; indicate the sources and references of all material. You may use photographs, sketches, diagrams, drawings, etc. Analyse your findings and organise your report under the following headings.

1.2. Related products, concepts, and design trends in the market
- Make a survey of products and concepts related to your project statement, and the current trends that you find in relevance.
- Organise the material into meaningful categories of your own, towards analysing the state-of-the-art in your problem area.
- Explain why you think these products, concepts and trends are of significance.

1.3. Related technologies, materials, production techniques
- Find information on technologies, materials and if necessary production techniques in common use in related areas.
- Locate new or emerging technologies, materials or techniques.

1.4. Characteristics of the potential user group
- Acquire information on the characteristics, demands, needs, etc., of the potential user group. This may involve human factors data, customer feedback, advertisement or promotion material, etc.
- Make visits, observe and record user behaviour; discuss with the potential user group and stakeholders their needs, opinions and wishes.

1.5. Conclusions
Make a brief discussion towards analysing your research findings. Draw some conclusions that may help in formulating

Critical issues to address
Potential solution areas
Further research topics

FORMAT: 800-1000 words; A4 paper, black & white print-out and a digital copy.

Research Report Part 2 - Exploration of the Solution Area
Due 25 April 2005, Monday (Including revised version of Part 1)

2.1. Project statement (if necessary, revise or reformulate the project statement)

2.2. Project constraints, objectives and directives
Based on the insight and information gained during the first part of your research, develop project constraints, objectives, and directives (CODs). These will lead you towards a detailed exploration of the solution area. These CODs may be related to a spotted problem, technological developments or resources, limitations of the user, a need that is reported or observed, demands or wishes of the potential users, etc. The number of CODs should be plenty enough as to form a basis for your design decisions.

Examples:
Constraints state what must or must not be done. The word ***must*** is used to emphasize the strength of the statement.

*The product **must** be sterile prior to and during packing.*

Objectives are statements less forceful than constraints. These are the statements that the designer strives to achieve as much as possible.

*Potential purchasers of the product **should** find it aesthetically pleasing.*

Directives are the goals that are desirable, but not necessarily urgently important. They may also reflect preferences of style, or personal biases that the designer brings to the project.

*The control mechanism **ought to** be operable single-handedly.*

2.3. Further research
According to the determined constraints, objectives and directives, elaborate your research topics. Make further research into specific issues that reveal themselves as your project develops. Make further observations among the user group, you may also use study models and mock-ups during these observations. Document these sessions if necessary.

2.4. Analysis of potential design solutions
Make further analytical sketches that support these CODs. What kind of design solutions may support these CODs? What are the basic strategies to follow, and which CODs are more critical than the others? What are your priorities, and why? In which way does your research justify these priorities?

FORMAT: 800-1000 words; A4 paper, black & white print-out and a digital copy.

Research Report Part 3 - Justification of Design Decisions
Due 16 May 2005, Monday (Including revised versions of Part 1 and Part 2)

3.1. Project statement (revised if necessary)

3.2. Brief description of the design solution
Briefly describe the physical features and characteristics of your final design.

3.3. Justification of the design decisions
Indicate the reasons behind your design decisions, and discuss your design solution in terms of the following issues. Also indicate which decisions may have to be revised.

Client response
Design features, style
Usage scenario, main advantages and disadvantages
User response
Market potential
Material selection
Production techniques
Cost and price

FORMAT: 800-1000 words; A4 paper, black & white print-out and a digital copy.

C.5 Grading Policy

Middle East Technical University Department of Industrial Design
ID 402 Graduation Project, 2004-2005 Spring Semester
Assoc. Prof. Dr. Gülay Hasdoğan, Assist. Prof. Dr. Fatma Korkut, Assist. Prof. Dr. Naz Evyapan, Part-time Inst. Mine Hoşgün Soylu, Res. Asst. Harun Kaygan

March 8, 2005

GRADING POLICY

% 5 Graduation Projects Exhibition Poster and Invitation
Preliminary Jury: 28 February 2005, Monday
Jury: 7 March 2005, Monday

% 5 Initial Ideas Workshop
9, 11 and 14 March 2005

% 10 Interim Jury (2D work, 3D work, project statement)
4, 6 and 8 April 2005
Jury will be made according to a previously scheduled time-table.

Submissions will be brought to the jury. Punctuality is important.

% 10 Final Screening (2D presentation, 3D work-in-progress)
2 and 4 May 2005
2D presentation: Black and White print-out of the final 2D work that will be exhibited at the Graduation Projects Exhibition.
3D work-in-progress: Report of model making process plan, including information on material, scale, method of modelling, cost, place where the model making is carried out, by whom the process will be assisted and time-plan.

Final screening will be made according to a previously scheduled time-table. Submissions will be made on the mornings of each day for final screening between the hours 10:00 – 12:00. Late submissions may attend the final screening, but they will not be graded.

% 10 Research Report
Research Report Part One: 25 March 2005, Friday
Research Report Part Two: 25 April 2005, Monday
Research Report Part Three: 16 May 2005, Monday
One hard copy, one word document sent by e-mail to nevyapan@metu.edu.tr
It is vital that submissions are made on time in order to receive supportive feedback.

Final Submission of Research Report: 29 May 2005, Sunday at exhibition venue.

One bound hard copy, one CD containing word document and pdf copies of the research report.

% 10 Sketchbook, Documentation and Weekly Reports

Submission: 6 June 2005, Monday
Evaluation of the sketchbooks will take into consideration to which extent various new ideas are generated and explored, to which extent the alternatives are analysed into detail and how well they explain themselves, besides the quality of sketching and orderly layout of the sketchbook.

It is important that the sketchbook reflects the design process of your project. Therefore, please also include in the sketchbooks all documentation that you find relevant. These may be black and white print-outs of sketches on computer, research material, photographs of all 3D work made throughout the process. You can attach a CD containing your digital work (only low resolution jpeg files).

Weekly reports are submitted by e-mail on monday mornings until 12:30 pm to nevyapan@metu.edu.tr. It is very important to receive your weekly reports on time.
Weekly report files are named as follows: surname_report number.doc (e.g. ozkir_1.doc). There are a total of 13 weekly reports. The print-outs of the complete set of weekly reports should be submitted together with the sketchbooks on 6 June 2005, Monday.

% 50 Graduation Jury

30 May – 1 June 2005 (9:00 – 17:30)
% 10 2D Presentation
% 10 3D Presentation
% 30 Design

2D Submission: 9, 10 and 11 May 2005, Monday, Tuesday and Wednesday between the hours 10:00 – 17:00, Room 54.
3D Submission: 29 May 2005, Sunday, METU Cultural and Convention Center.
Late submissions (for either or both 2D and 3D work) will not attend the Graduation Projects Jury and Exhibition.
2D and 3D presentation evaluation will be made by jury members on 30 May 2005, Monday between the hours 9:00-12:30.

Graduation Projects Exhibition set-up: 29 May 2005, Sunday.
Removal of exhibition: 2 June 2005, Thursday.

Each student is responsible for his/her own stand and is expected to attend both the setting up and bringing down of the exhibition. Graduation Projects Jury will be made according to a previously scheduled time-table. Punctuality is important.

+/- %5 Participation in class activities, attendance, punctuality, etc.

SUMMARY

% 5	Graduation Projects Exhibition Poster and Invitation
% 5	Initial Ideas Workshop
% 10	Interim Jury (2D work, 3D work, project statement)
% 10	Final Screening (2D presentation, 3D work-in-progress)
% 10	Research Report
% 10	Sketchbook, Documentation and Weekly Reports
% 50	Graduation Jury
	% 10 2D Presentation
	% 10 3D Presentation
	% 30 Design
+/- %5	Participation in class activities, attendance, punctuality, etc.