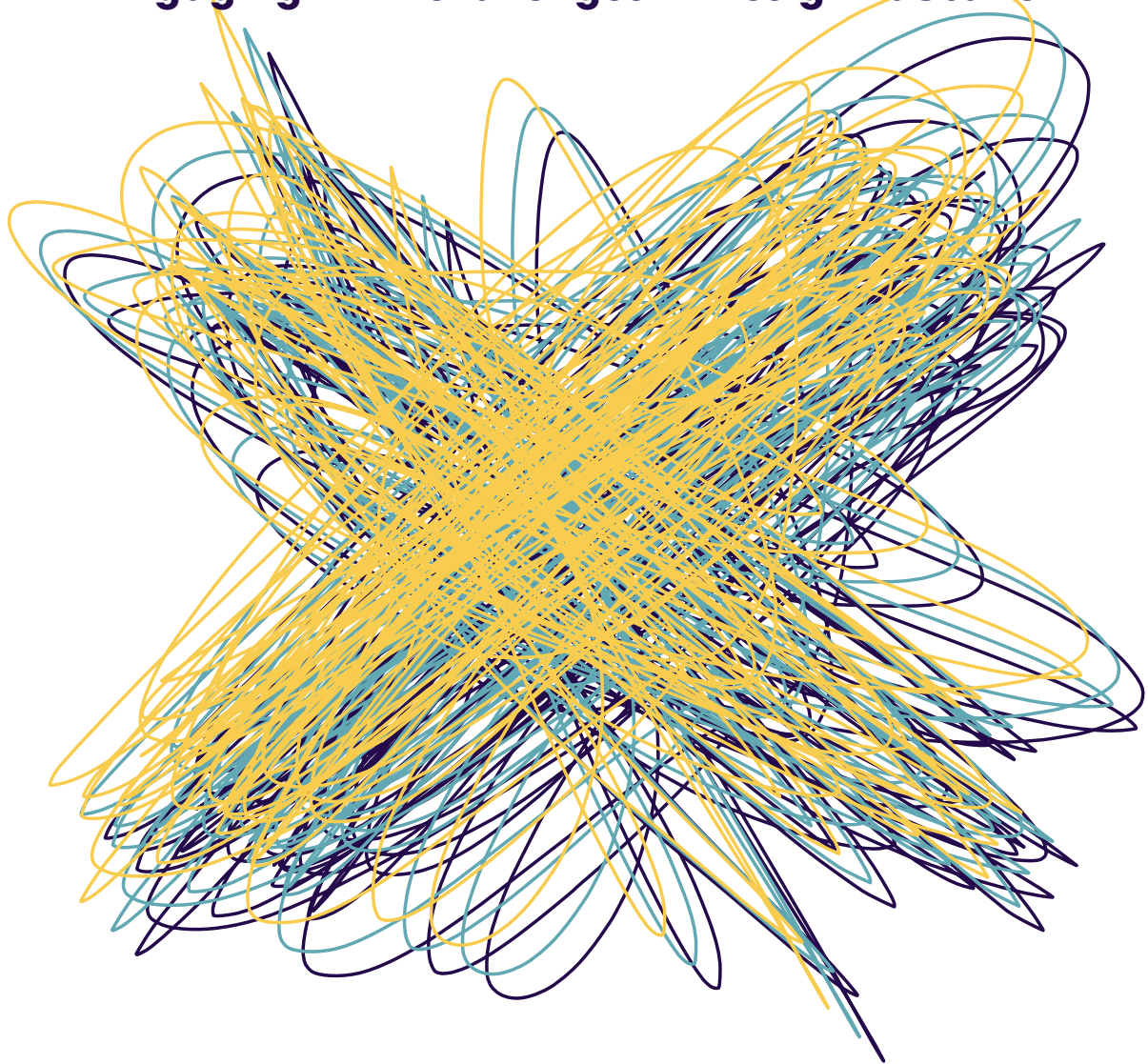


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DRS LEARNxDESIGN 2021

Engaging with Challenges in Design Education



**6th International Conference
for Design Education Researchers**

24–26 September 2021
Jinan | China

Editors

Erik Bohemia
Liv Merete Nielsen
Lusheng Pan
Naz A.G.Z. Börekçi
Yang Zhang

Proceedings of the DRS LEARN X DESIGN 2021

6th International Conference for Design Education Researchers
Engaging with Challenges in Design Education

10th Anniversary of the International Conference for Design Education Researchers
国际设计教育学者大会10周年

Editors

Erik Bohemia
Liv Merete Nielsen
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Experiencing Sustainable Fashion: Have Fun and Feel Clever	226
Hanna Hofverberg and Ninitha Maivorsdotter	
Framing students' reflective interactions based on photos	232
Marije ten Brink, Frank Nack and Ben Schouten	
Critical design literacy through reflection in design	245
Ingvill Gjerdrum Maus	
Encountering development in social design education.....	255
Lesley-Ann Noel	
Exploring practices of critical design literacy.....	264
Eva Lutnæs	

Volume 2 | 卷2

Section 03

Track 03: Alternative problem framing in design education	277
Lesley-Ann Noel, Renata Marques Leitão, Hannah Korsmeyer, Sucharita Beniwal and Woodrow W. Winchester III	
Play Probes	280
Line Gad Christiansen and Sune Klok Gudiksen	
Environmental Education in Protected Areas in Petrópolis	294
Marianne Von Lachmann, Rita Maria de Souza Couto and Roberta Portas	
Reframing Ageing in Design Education.....	307
Emma Gieben-Gamal	
Tilting to Transform	315
Noemi Sadowska and Tara Hanrahan	
Beyond Problem-Solving	318
Allison Edwards and Hannah Korsmeyer	

Section 04

Track 04: Collaboration in Design Education.....	322
Naz A.G.Z. Börekçi, Fatma Korkut and Gülay Hasdoğan	
Collaboration with NPOs in Industrial Design Education.....	327
Zeynep Yalman-Yıldırım and Gülay Hasdoğan	
Towards Radical Synergy for More Just & Equitable Futures.....	338
Audrey G. Bennett, Ron B. Eglash, Roland Graf, Deepa Butoliya , Keesa V. Johnson, Jenn Low and Andréia Rocha	
Transitioning From University to Work in Service Design	358
Daniela de Sainz-Molestina and Andrea Taverna	
Educational Programs in Between Design and Supply Chain	369
Gabriele Goretti and Gianni Denaro	
Collaboration Practices in Industrial Design Education	380
Naz A.G.Z. Börekçi, Gülay Hasdoğan and Fatma Korkut	
Reflections on Shared Mood Boards	395
Anniliina Omwami, Henna Lahti and Pirita Seitamaa-Hakkarainen	
Preparing to Introduce Design Thinking in Middle Schools.....	405
Michael Gibson, Keith Owens, Peter Hyland and Christina Donaldson	
Socially-Engaged Distance Design Collaboration.....	414
Kardelen Aysel and Can Güvenir	
Improving Intercultural Collaboration with Visual Thinking.....	424
Kelly M. Murdoch-Kitt and Denielle J. Emans	
It's the Cultural Difference That Makes the Difference.....	432
Clive Hilton, Muxing Gao and Rong Wei	
Cross-Cultural UX Pedagogy: A China-US Partnership.....	439
Ziqing Li, Colin M. Gray, Austin L. Toombs, Kevin McDonald, Lukas Marinovic and Wei Liu	

Collaboration Practices in Industrial Design Education

The Case of METU From a Historical Perspective, 1981-2021

Naz A.G.Z. Börekçi, Gülay Hasdoğan and Fatma Korkut
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METU Department of Industrial Design, as one of the leading educational institutions in Turkey, has more than 20 years of experience in collaboration projects systematically conducted with external partners. Collaboration with external partners has been a well-established instrument in design studio pedagogy at the undergraduate level in particular. Whether and in which ways the collaboration schemes, the collaborators, their goals and roles have evolved in time received relatively little attention in literature. This paper reviews the collaboration practices of the Department from a historical perspective with cross-references to the local context, identifying the internal and external factors that shaped the design education and research agenda of the Department, as well as the collaboration schemes followed. Revealing five periods of collaboration with external partners in the Department's history, the study puts forth that established schemes followed for collaboration projects in industrial design education contribute to the building and sustainment of collaboration with the right partners, grounded and contextualised project briefs, and an approach that puts education first.

Keywords: university-industry collaboration; industrial design education; semester projects; graduation projects; collaboration schemes

Introduction

University and industry collaboration is one of the crucial drivers of economic development of a country. Private and public sector organisations need to innovate products, services and processes in order to gain competitive advantage. University collaboration enables them to have access to new knowledge. On the other hand, universities need to collect data from industry to address real-world problems and to test their theories and methods for which industry collaboration paves the way (Mgonja, 2017). Governments are encouraging university and industry collaboration for economic growth and wealth generation by establishing incubation centres and science parks with university links, entrepreneurship schemes, R&D grants, tax incentives, performance-based funding for universities, intellectual property rights regime, technology transfer offices, and so on (Ankrah & Al-Tabbaa, 2015; Guimon, 2013). In the countries which lack an established relation between the industry and university, a mismatch occurs between the research missions of university and industry. Another mismatch that occurs is between what students learn at university and what skills they need to work in industry. Educational projects are regarded as a good solution to overcome these mismatches (Nsanzumuhire & Groot, 2020).

Studio projects in design education are often formulated in hypothetical contexts (Camacho & Alexandre, 2019) in order to envision future needs of people and anticipate new solutions. Academy based projects generally remain at concept stage whereas industry-based projects may advance through production stages (Bohemia & Harman, 2014). In the case of having experienced mainly academy-based projects, new graduates usually feel unprepared to deal with real-world problems in industry and the employers complain that they lack essential professional skills (Roberts, 2007; Leblanc & Gagnon, 2016). Collaborating with external stakeholders through design studio projects helps contextualising real-world problems and is beneficial not only for the university and the collaborating institution, but also for the student.



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Middle East Technical University (METU) Department of Industrial Design offers a four-year undergraduate programme. An academic year in the University is two semesters, with 14 weeks each in fall and spring semesters. Studio courses given in all four years are 12 hours per week. We consider the studio courses as the pillar of our undergraduate education, providing a medium in which designerly activities are taught and practiced, and theoretical and knowledge-based courses in the curriculum are synthesized through project-based education. Each year's studio courses have defined sets of pedagogical goals, course objectives and learning outcomes that lay the foundation for the design projects to be carried out. Design projects are determined with relevance to the research agenda of the Department, as well as the design agenda of both the Turkish and the global contexts. This requires to act in line with the latest developments in practice and research, and a major way of doing this is through ties with different sectors in the industry. We strive for carrying out collaboration projects throughout the undergraduate programme (excluding the first year). The collaboration projects in the Department are typically carried out in two forms: (1) as *semester projects* conducted in the regular semesters of the undergraduate programme, and (2) as *graduation projects* conducted in the final semester of the undergraduate programme (4th year, spring semester). We describe our Department's history of collaboration with external partners as beginning in 2002, when we first initiated systematic collaboration with firms following a scheme developed particularly for final (4th) year graduation projects. We come across various examples of collaboration projects in the history of our Department dating earlier than 2002. In retrospect, these earlier examples prove to be influential on our design education, and the professional prospects of our graduates, effective in developing collaboration goals, and determinant in the course of collaborations to follow. This has raised our interest for a study on the Department's collaboration history, through which we could

- review the development of our collaboration schemes,
- pinpoint the milestones affecting our approach to collaboration in industrial design education, and
- identify the influences of these collaborations on the Department's industrial design education and research.

We documented our collaborations in terms of sector, location of firm, date, year of education, design champion from collaborating party, design champion from department, project topic, project duration, type of contribution, and other partners involved in the project, in order to trace how the collaborations were initiated, what the educational objectives were, what the mutual goals were, what benefits were gained, what contributions were made, how the outcomes were reevaluated, and whether and for what reasons the collaborations were repeated. This was the follow-up of a study that started in 2016 and the findings of which presented at the 2017 LearnXDesign conference (Börekçi & Korkut, 2017). Our documentation made on Excel sheets displayed regular collaboration projects between the years 2002-2021. We identified 71 *semester projects* carried out with 69 external partners, with 33 fourth year collaborations, 34 third year collaborations, 3 second year collaborations, and one graduate studio collaboration within these 20 years. *Graduation projects* have involved a much higher number of collaborations since 2002, accounting for over 400 projects with over 300 external partners. In addition, we also reviewed semester and graduation projects dating earlier, between the years 1981 and 2001.

To supplement our study, we collected and reviewed those project briefs that we could access from our records. We reviewed the syllabi of studio courses and graduation project courses for the changes of content that took place over the years. We also reviewed the external (contextual) and internal (Departmental) factors that affected the purpose and conduct of collaboration. We cross-checked our findings through discussions on these collaborations, as authors with between 21 to 35 years of industrial design education experience in the same Department, and with collaboration projects experience in the 2nd, 3rd and 4th year studio courses among the three authors. Our study concluded with the identification of two major outcomes with an impact on the design education and research agenda of the Department:

- five periods of collaboration within the Department history, and
- the evolution of early tutor-initiated collaborations into institutional collaboration schemes (for semester and graduation projects separately).

METU Collaboration Development History

As a result of our review on the collaboration projects conducted in the Department, we have identified five periods of collaboration between the years 1981 and 2021.

Early Years in Collaboration (1981-1995)

Industrial design education at METU began when David K. Munro, an American industrial designer, started to work at METU, Faculty of Architecture in 1969 with the support of the US Agency for International Development (AID). Within his years of employment at METU between 1969-1972, Munro developed the curriculum for a graduate programme in industrial design for the Faculty, gave project-based courses on industrial design (first in Turkey), and supervised master's theses related to product design in the graduate programme of Architecture. Munro also contacted major firms in Turkey through letters, to build relations with the local industry, introduce the field and initiate collaboration. He also organized the first exhibition¹ open to the public in the field of industrial design in Turkey, titled "Endüstri Tasarımı Dünyası" (The World of Industrial Design). The exhibition presented milestones and examples from the history of industrial design in the West; it also included "modern" design from Turkey, as well as examples from student projects developed in the industrial design elective courses that he taught in the Faculty. The elective courses on industrial design continued after Munro's departure.

METU Department of Industrial Design was established in 1979 as a separate unit with a four-year undergraduate programme. The initiative and preparations were undertaken primarily by two instructors, Mehmet Asatekin and Güner Mutaf, with architecture and city planning backgrounds, who also were master's degree students of Munro. The reports prepared for the establishment of the Department directly referred to the economical context and 5-year development plans of Turkey, as well as projections made for the need for industrial design professionals in the industry. The early curricula reflected the Faculty of Architecture's studio tradition, and besides design studio, drawing and modelling courses, included ergonomics, physics, statics, dynamics, psychology, perception, marketing, anthropology, sociology, economics, mathematics, and statistics, with an emphasis on the interdisciplinary nature of the field. The curricula also included compulsory summer practices in industry for the 2nd and 3rd year students. As an important milestone in building international relations, the Department became an associate member of ICSID (International Council of Societies of Industrial Design, currently World Design Organization, WDO) in 1981, remaining the only member from Turkey until the year 2000 (METU's membership is still ongoing) (METU ID, 2018).

An early example of collaboration with industry was initiated through the acquaintance of a studio course instructor with an engineer, Tamer Atauz, working in Alarko (est. 1954), an İstanbul-based engineering company originally founded for producing heating and cooling systems. In 1981, Alarko held a design competition open to METU Industrial Design students, for an electric tea maker; three students were awarded by the company for their design outcomes. The following year, in 1982, collaboration was repeated with Alarko, for a 2nd year studio project on servo motors, again resulting with the awarding of three students. In 1983, a 2nd year studio project was carried out with ties to Aselsan (est. 1975), Turkey's leading defence industry company, on a vehicle walkie talkie. This project was initiated with the efforts of the studio instructor who had professional connections with the company; the project involved a visit to the company's production facilities in Ankara. In 1984, a project on welding pliers and welding machine design was given as a 4th year semester project in relation to Nuriş (est. 1953), an Ankara-based company and the first welding machine producer in Turkey.

In 1988, the department invited well known academics and designers from the UK through British Council grant. John Heskett, David Carter and Frank Height separately visited the Department and gave seminars open to all students and faculty members. In 1988, a group of young professionals graduated from METU established the Industrial Designers' Society of Turkey (ETMK) as an association aiming to promote the profession and defend the professional rights of industrial designers. In 1989, the Department held an exhibition of the graduates' professional works, as part of its 10th anniversary. In 1990, in relation to a 4th year studio project on sanitary ware, a factory visit was held to Toprak Seramik (est. 1981), an Eskişehir-based sanitary ware manufacturer. An in-house ceramics designer, Mehmet Yavaş, acquainted during this visit was invited to the final jury. The company participated in the final jury. In 1994, the Department organized a symposium² titled "Design, Industry and Turkey", the first international academic activity in this field in Turkey. Prof. Bruce Archer, a pioneer in the field of design methods, and the PhD supervisor of one of the academic

¹ METU Faculty of Architecture members Serim Denel, Mehmet Asatekin and Güner Mutaf were involved in the preparations for the exhibition. The United States Information Service (Ankara) provided technical support for the exhibition; it was opened in the Turkish American Association in Ankara in May 1972, and later repeated in the Or-An Yapı Merkezi Exhibition Hall and the Chamber of Architects of Turkey.

² This symposium was sponsored by companies from industry, and the British Culture Committee.

members of staff, was an invited speaker in this symposium. Before the symposium, Prof. Archer organized a workshop³ with the academic staff for the development of a Master's program. It was decided in this workshop that the program should include a research-oriented curriculum and thesis writing. The conference was also accompanied with the first national product design exhibition organised by ETMK, titled "Designers' Odyssey '94".

This first period of early collaboration has been an exploration of how to build ties with the industry first, primarily based on efforts towards promoting the profession and introducing the future professionals. The Department had early connections with the industry through course instructors' personal and professional connections; companies suggested project topics to be carried out in studios, but were not involved in the project processes; they welcomed factory visits, and mainly participated in the evaluation of project outcomes. The government did not yet have policies to encourage university-industry collaboration. The number of industrial designers practicing in the industry were very limited. The Department had motivations for collaborating with the industry, and raise awareness of and promote the profession in society. The first graduates of the Department were given in 1983. The mid-80s was a period that saw the transition from import-substitution industrialisation strategy to liberal economy in Turkey, leading to more interest in import and export trade, and investments made into the development of industry.

We mark the end of this period with significant internal and external events that affected our course of collaboration. With 16 years of experience in undergraduate education, in 1995, the Department carried out an internal review for the development of the studio courses objectives. The resulting matrix displayed the distinctly defined course objectives and learning outcomes for each studio in a complementary way for an overall learning experience for students (Günöven, Hasdoğan, Korkut & Mutaf, 1997). The scheme suggested carrying out projects with industrial relations in the 3rd year and expanding these relations to an international level in the 4th year.

In order to establish the customs union with the EU, Turkey revised its intellectual property regime, and for the first time, a decree law on the protection of industrial designs was issued in 1995. Two members of academic staff were actively involved in the preparations, as representatives of ETMK, the only NGO representing industrial designers at the time. This critical development with the EU resulted in rising interest from the industry in design professions for products with added value.

Pre-mid Years in Collaboration (1995-2002)

Since its foundation the Department had gained experience in industrial design education, initiated relations with industry, and was in contact with its graduates working in industry. The Department now had a second generation of instructors who were, unlike the founding members, educated in industrial design. They also sought graduate degrees in design in Turkey and abroad. The young staff members who returned from abroad brought in new visions of education and research. There was stronger interest from the academic staff in strengthening ties with industry. Motivation and confidence were high, reflecting both on undergraduate education and on building a long-term research capacity for the Department.

In 1996, the graduation projects course was held for the first time in collaboration with industry. Each student found firms with which to collaborate for their design projects, through their own initiatives. Learning from this experience, in 1999 the graduation projects course was carried out in collaboration with three large scale firms, with the contacts initiated by the Department through the in-house designers. One of these firms was Toprak Seramik (est. 1981) with whom the Department had earlier collaboration experience. The second was Vestel (est. 1984), a Manisa-based consumer electronics manufacturer, and currently one of the world's largest OEMs and ODMs. The third was Tepe Mobilya (est. 1969), an Ankara-based contract furniture manufacturer. All three firms were representatives of the strongest industrial sectors at the time in Turkey, carrying out design development activities.

In the meantime, the Department established its master of science in industrial design programme, setting a new perspective for industrial design education and research. In 1997-98 a research project was carried out involving a survey on the professional careers of Department graduates. The results showed that not many had found employment in industry, and there was still not much demand for industrial designers. A significant number of graduates established their businesses specialising in furniture and interior design (Korkut & Hasdoğan, 1998).

In spring 2001, YKK, the largest zipper manufacturer in the world, a Japanese company with a Turkey branch,

³ The title of the workshop was "In-service Short Course on Design Research".

held a competition for the innovative usage of clothes fasteners, open to industrial design students from two universities, METU and Istanbul Technical University (İTÜ) in Turkey. The idea for this competition and invitation to participate came from a graphic design company owned by two METU graduates, Eray Makal and Şölen Bazman. Both universities undertook this competition in their semester projects. The company provided fasteners to be used in the students' prototypes. Three projects were awarded and selected ones were exhibited by the company in Turkish Exporters Assembly (TİM) in İstanbul.

This second period of pre-mid years in collaboration is characterised by the efforts of new generation academics in establishing further relations with the industry for educational purposes, and the introduction of research into the Department agenda. In this stage, collaboration with industry continued with internships and extensive visits to manufacturers in various regions in Turkey within the "Manufacturing Materials" course, with the contacts initiated through the efforts of course instructors. Collaboration projects increased for both semester and graduation projects, and the industry also started showing interest in collaborations. Besides, international relations increased through research connections of graduates and staff members.



Figure 1. Left: 2002 Graduation Projects Exhibition invitation. Right: Graduation project exhibition and jury at METU Culture and Convention Center.

A major event in the Department marked the end of this period and the beginning of a new one for collaboration. In spring 2002, the graduation projects course was carried out in collaboration with industry. All students were matched with an external partner through departmental connections. In parallel to the graduation projects course, MAN Türkiye, supporting six graduation projects, also collaborated with the 3rd year studio and the master's studio for semester projects. At the end of the spring semester the graduation projects were exhibited at METU Culture and Convention Center, open to the public. Posters were printed and invitations were sent out for the announcement of the exhibition and the accompanying final jury, together with an opening reception, all receiving great interest and attendance (Figure 1). The exhibition set-up and opening reception were sponsored by MAN Türkiye. Following this collaboration, the firm employed one of the students whose project it had supported; this student pursued his graduate studies in collaboration with this firm, as one of the first examples of industry supported theses in our Department. The graduation projects course of spring 2002 was the first of a regularly carried out graduation projects scheme that was thereon further developed throughout its 20 years of history.

Mid Years in Collaboration (2002-2009)

The first graduation projects exhibition and jury in 2002 increased the visibility of the Department within industry, and the university. The graduation projects scheme set an example to industrial design departments in Turkey, some of which adopted the METU graduation project collaboration scheme. The graduation projects exhibitions and juries in the following years attracted academics and students from other departments and were visited on a few occasions as field trips.

Our visibility within the university led to a collaboration proposal for a semester project in fall 2002, coming

from a colleague from the university's Mechanical Engineering Department, Cahit Eralp. The colleague had been approached by Arçelik (est. 1955), an İstanbul-based major home appliances company and the first washing machine manufacturer in Turkey, to initiate graduate-level collaboration with the department for the plumbing solutions of a combination product of washing machine and wash basin, targeting the Russian market of small bathrooms. Based on a true need, and the end result of which eventually launched to the targeted market, this project required design solutions for ergonomics and aesthetics. Hence, the colleague suggested our Department as the design party in the collaboration. The project was taken on in the 4th year studio. The success of the collaboration led to another with the same company, immediately following this project with the students in the same semester, on interface solutions and usage scenarios for kitchen appliances. The following semester, Arçelik participated in the graduation projects course as a collaborating firm, and supported the graduation projects of six students. The firm also sponsored the 2003 Graduation Projects Exhibition and opening reception, patented one of the projects, and employed four graduates of that year, three of whom they had supported. Collaboration with Arçelik continued in other sporadic semester and graduation projects in years to come, and was also carried out at a research level with the Department. In 2003, the METU BILTIR-UTEST Product Usability Unit was founded by an academic member of the Department, Çiğdem Erbuğ, and many user research projects were conducted in collaboration with Arçelik.

In fall 2003 and spring 2004, two instructors from the Department opened the "Collaborative Design" elective course in collaboration with four departments from the Faculty of Engineering with the initiative of the Dean of the Faculty of Engineering, Yıldırım Üçtuğ. The course was an opportunity for students and instructors to carry out a project with multidisciplinary collaboration.

In 2003, Fiat company carried out a project called "One Step Ahead" (OSA) to envision the future of automotive products with international partners from their business regions, one being Turkey. Two universities from Turkey, METU and Mimar Sinan University, were invited to carry out student projects. We were approached by the CAD-CAM Robotics Center of METU who had connections with Tofaş (est. 1968), a Turkish automaker and partner of Fiat. Based on the Delphi method, the Italian strategy developer company Radar conducted an international survey with expert panels and identified dimensions and trends, effective on the future of the automotive industry. The company presented the background research, and suggested a future scenario, "forever children", that described the future life-style of generation Y, actually the students themselves who would be the potential users of the cars they envisioned. The expectations from us were the generation of numerous concept ideas in relation to the scenario. With this project, the course instructors developed an idea generation method, "Matrix" (Korkut & Doğan, 2010), to explore four product categories in reference to the five project dimensions as presented by Fiat. The results of the project were exhibited in Torino headquarters together with those of other universities (Korkut, 2004). As a spin-off of the project, one student from the Department found an internship opportunity at Fiat, which evolved into a career path for him in the automotive industry.

In the same semester, fall 2003, a collaboration project was carried out with Koleksiyon (est. 1972), an Ankara and İstanbul-based furniture company. The project involved a mixed design studio (3rd and 4th years) and was on furniture design. Our Department exhibited the outcomes at the Salone Satellite at the 2004 Milan Design Week. The full-scale prototyping, exhibition expenses, and the project catalogue were sponsored by the company. This was the Department's first international exhibition.

The Department's international visibility was highlighted with the international Design and Emotion 2004 conference co-organised with Design and Emotion Society (Netherlands) that METU hosted the same year. Also, the Department's PhD programme was established in 2004. Within this period, the Department started participating in many national events and fairs, international design fairs held in Turkey, and sectoral exhibitions (e.g., furniture, ceramic sanitary ware) with the outcomes of graduation projects. Participation in such events was an opportunity to showcase the outcomes of collaboration projects carried out in the Department, and found media coverage. Participation in these events were in some cases sponsored by collaborating partners. These platforms were an opportunity for us to acknowledge our collaboration and the support we received for design education from the companies, and also opened up new collaboration possibilities with other companies acquainted in these events⁴. Learning from our national and international exhibition experiences, we first published our graduation projects catalogue in 2007. The first semester project catalogue was published for a collaboration project carried out in fall 2007.

⁴ For example, we were approached by Koleksiyon in ADesign Fair 2003, and by Anadolu Cam, a major glass packaging manufacturer, in Galata İstanbul Design Week 2005, for collaboration projects.

Industrial design undergraduate programmes became highly popular in Turkey in this period; there was an increased demand for design education and the entry scores for industrial design programmes increased, with METU being at the top. In the meantime, new departments were being established in public and foundation universities, which increased competition among educational institutions. The Department set up an archive room in the Faculty, displaying the outcomes of past graduation projects, open to visitors and candidate students all year round.

In this period, collaboration for semester projects took place regularly, with two projects carried out each fall semester mainly in the 4th year (Figure 2). Collaborating firms were mainly from large scale companies. Our collaboration portfolio for semester projects in this period includes 16 projects conducted with 14 partners (12 medium to large-size companies, one small-size company, and one association representing the promotional products industry).



Figure 2. Collaboration semester project with Anadolu Cam, fall 2005. Left: Design champions from Anadolu Cam in the 4th year studio. Right: Final presentations at firm headquarters in İstanbul.

During this period, the Department received visitors from the industry to discuss collaboration possibilities; instructors were also invited to visit the industrial premises of firms, some in other cities. Offers for collaboration also came from our graduates employed in the industry, who had also taken part in collaboration projects during their undergraduate education. A reason frequently expressed by these companies was the desire to introduce their companies to the graduates of the near future, and to get to know the interests, perspectives and skills of students, not only as prospective designers, but also as representatives of a generation or a market segment. Depending on their suitability to the course objectives, the instructors suggested collaborations to take place for either semester projects or for graduation projects. Not all proposals for collaboration were realised. Among several reasons, in terms of educational objectives, the Department and the studio instructors have had to be selective to ensure the collaboration experience benefited industrial design education first.

In our collaborations in this period, we received interest from state funded agencies, such as the Turkish Exporters Assembly, who supported various meetings for the progress of the profession and also collaborated in a 4th year project. The Technology Development Zones Act had come into action in 2001, and universities including METU started establishing technopolises. During this period, the METU Technopolis (*ODTÜ Teknokent*) emerged as the new arena for university-industry collaboration, including graduate research particularly for engineering disciplines. Some of our instructors established their own firms in METU Technopolis, and employed interns and graduates. Declaration for Design Support and Research & Development and Design Activities Support Law were finally issued in 2008, raising interest of companies of various sizes in employing industrial designers, and also conducting collaboration projects with industrial design departments. Design Turkey Industrial Design Awards was established in 2008 with the joint effort of Undersecretariat for Foreign Trade, TIM and ETMK, and has been continuing since. Instructors from our Department played major roles in the foundation of Design Turkey Awards. Many graduates employed by the industry have received awards. Again in this period, there was an increase in the number of national design competitions, and some among them have become regular. Students participated in national and international competitions and awards with the outcomes of their collaboration projects. The competitions endorsed by government agencies supporting design, awarded students with grants for graduate studies abroad, or

participation in international fairs. Course instructors also began publishing on the processes and outcomes of graduation projects, making presentations in international conferences. In 2008 METU and TUDelft initiated the International Joint Master of Science Programme in Design Research for Interaction, which started a decade-long international research collaboration in graduate education. Towards the end of this period, a number of graduate theses supported by public funds (The Ministry of Industry) were carried out. We consider this period of collaboration as characterised by the increasing range of sectors in our collaboration portfolio, increased collaboration with small size companies and consultancies particularly for graduation projects, regularity of collaboration in the 4th year studio, collaboration for research, and increased visibility of these collaborations particularly through exhibitions, design fairs, project catalogues and academic publications. Motivations of the industry for collaboration diversified, strengthened and evolved into an interest in the methods and approaches of industrial design education given in the Department, as well as in the outcomes of the projects. We see the end of this period as marked by the retirement of senior instructors and the arrival of a third generation of Department graduates as academics with international PhD degrees and postdoc experience abroad.

Late Years in Collaboration (2009-2019)

The new generation academics contributed to industrial design studio education with their research perspective, introducing new pedagogical objectives into the curriculum, particularly design for sustainability in the 3rd year. In the 2009-2010 academic year, collaboration projects, which have been previously carried out in the 4th year studio, were introduced into the 3rd year studio, defining new types of partnerships (with NGOs, public sector such as schools, non-commercial and non-profit organisations), and design approaches (bottom-up participatory design process supported with scenario building).

In this period, as a follow-up of an earlier collaboration in fall 2006, championed by our graduate Sedef Aksoy, a series of collaborations were carried out with BSH via Profilo (est. 1954), an Istanbul-based white goods producer which has joined BSH in 1995, which led the Department to develop formal agreements including non-disclosure agreement between the parties. In fall 2011, a project titled "Home Heroes" denoting domestic white goods was carried out in the 3rd and 4th years in collaboration with BSH with the participation of the design director Robert Gotchy from Munich Headquarters. The results were exhibited in Munich Creative Business Week. In fall 2016, another collaboration was made for developing resource efficient laundry solutions for the African market. BSH organised a visit of Nigerian engineers to METU to provide contextual and technical information as well as feedback to students' projects.

Starting in 2014, the Department initiated its national biannual design conference series on design research (*UTAK, Ulusal Tasarım Araştırmaları Konferansı*). Currently it is one of the regularly held national design research conferences, for well established and emerging scholars, contributing to the accumulation of design literature in Turkish.

In 2015, World Design Organization announced a new definition for industrial design to its members and the professional community acknowledging the extended range of outputs of the design process from products to systems, services and experiences, and also touched upon the changing nature of the design profession, design process and parties of interest (WDO, 2015). This definition also reflected on the industrial design studio pedagogy in terms of the designerly thinking and practices to be gained as skill sets and mindsets. In this period, approaches, methods, tools and practices in studio-based teaching in the Department came forth. Besides employing commonly known design methodology in the studio, based on arising pedagogical needs, the studio instructors (in most cases involved in graduate research supervision) developed and employed a number of new methods and tools. Academic publications on design methods and tools employed in studio project processes have increased.

The government interest in design and value through design and innovation projects became more evident with the support provided by various bodies to young start-ups as well as students in their graduation semesters. The Scientific and Technological Research Council of Turkey (TÜBİTAK) started its support scheme and a national competition for graduation projects. In 2016, Research & Development and Design Activities Support Law issued its regulation defining the conditions for establishing *design centres* in industries. This was an initiative for some firms to contact our Department for collaboration. In 2017, the new Industrial Property Law came into action. This act clarified that the intellectual property rights of projects carried out in universities would belong to the university. METU established its Technology Transfer Office (TTO) managing its intellectual assets and intellectual property rights. TTO assisted the Department in making agreements with industry partners.

This period has seen an increase in the number of industrial design departments established in both public and foundation universities. There was also an increase in collaborations of other industrial design departments

with industry. Such projects were regularly exhibited in annual fairs and events, such as Design Week Turkey, where universities came together in showrooms. We also saw that collaborations were not exclusive between a department and a firm, and firms chose to collaborate with different industrial design departments in rounds. This has set the stake higher in terms of the educational competitiveness and excellence of the collaboration process and project outcomes.

In this decade, collaboration took place for 44 semester projects, with 26 firms/partners from a wider range of sectors, and was regular for both 3rd and 4th year design studios. The types of collaborating partners in both semester and graduation projects were no longer limited to large and medium sized manufacturing companies, but also included small enterprises, start-ups, technopolis firms, design consultancies, associations, institutions from the public sector, sectoral organisations and industrial clusters. The 4th year studio typically carried out two collaboration projects in the fall semesters, and had the graduation projects in collaboration with the industry in the spring semesters. In this period, there were 18 collaboration semester projects carried out with 16 firms. We saw an increased interest from the automotive industry, with five different firms conducting six semester projects. Automotive projects have become regular in the late years of this period, and they have been handled as student team projects with high-level complexity.

The 3rd year studio also carried out collaboration projects in both the fall and spring semesters, ranging from 2 to 4 a year. In this period, 25 collaboration projects were carried out with 13 partners; 9 of these were from the industry and 4 were NGOs and non-industry partners (Kaygan et al., 2017) (Figure 3). Some of these collaborations involved multiple partners. Collaboration projects have been carried out with firms with an interest in the design for sustainability perspective. Strong ties were established with some of these partners, and they have been involved in repeated collaborations.



Figure 3. Collaboration semester project with Çiğdemim Neighbourhood Association, fall 2013. Left: Visit from association to 3rd year studio. Right: Project outcomes exhibited in the neighbourhood.

The collaboration schemes for *semester* projects included detailed briefing on a design problem brought by the collaborating partners, problematized as a project brief by the course instructors; a well-planned design process and timetable, activities defined for each stage, involvement of collaborating parties where applied, standardised formats for 2D and 3D submissions, planning of how the project outcomes will be disseminated, and a budget for project expenses⁵. The collaboration schemes for *graduation* projects included detailed briefing and timetable for the conduct of the project, code-of-conduct for students, information packs for collaborating partners, and a clear description of how the intellectual property rights of project outcomes are handled. The Department also initiated a project for the forming of a digital archive of past courses and events.

We consider this period of collaboration as characterised by selective and repeated collaborations, well-established ties with particular sectors, and well-established collaboration schemes and project conduct templates according to the educational objectives and the industry sector. The collaborating parties were by

⁵ Project expenses include for students: travel and accommodation costs to outer city firm visits, model making expenses, printing costs for final presentation boards; for Department: project catalogue publishing expenses, exhibition participation and setup expenses.

now well-informed of the professional benefits of design and the importance of supporting industrial design education. Both the Department and the collaborating partners were experienced in collaboration and the management of project outcomes.

We see the end of this period as marked with the increase of student numbers accepted to the undergraduate programme. The programmes in Turkey accept students through a national central examination, and the acceptance quotas for public universities are primarily determined by YÖK (the Council of Higher Education in Turkey). Since its establishment in 1979, the number of accepted students to our Department has increased from 30 to 72 in 2019. Despite the well-established collaboration schemes, the Department started experiencing difficulties in managing collaboration in graduation projects for a highly increased number of students. This increase of student numbers has required a change in the educational approach adopted in our studio courses.

New Generation Collaborations (2019- ...)

In the 2018-2019 academic year, the Department carried out internal meetings for revising studio teaching approaches and studio space usage, due to the increased number of undergraduate students. The studio courses were divided into sections at the beginning of the 2019-2020 academic year, with separate course instructors for each. Studio spaces that once were dedicated to each of the four years have had to be shared between years, in shifted days of the week. In the meanwhile, further young and published academics, and an increased number of research assistants joined the academic staff. Also, academic staff have been taking positions in international organisations, and editorial boards and scientific review boards of academic journals. One of the milestones of this period was the diffusion of collaboration projects into the 2nd year studio; this was as a result of the planning and revisions made to studio sections and the senior studio instructors with experience in collaboration projects, moving on to 2nd year studio. Four collaboration semester projects have been carried out so far, with four firms. Collaboration with industry in earlier years required its own approach, careful selection of the sector of collaborating firm, and planning for adapting the project goals to the second-year studio objectives.

In fall 2019, six collaboration semester projects took place with six partners, making a peak in the number of collaboration projects carried out within a semester in the 3rd year studio. One of these projects involved two external partners; two successive projects were carried out with an external partner, as repeated collaboration. In this period new project topics, such as UX/UI, were introduced into collaboration projects by external partners. There was a rising interest from the financial sector for collaboration projects on digital transition in banking, as well as digital solutions for other finance-related activities. The new generation of collaborators, represented mostly by designers, were equipped with skills and expertise, introducing recent approaches, and methods in user experience design to the students. There was a rapid changing of jobs among these designers who moved on to other firms generally not from the same sector; this resulted in them introducing new firms to us for collaboration.

The most significant event affecting the conduct of studio courses has been the outbreak of the Covid-19 pandemic in spring 2020, resulting in the transition from the physical studio space to distance education. All studio courses, including those conducting collaboration projects, moved on to online teaching. Studio course instructors, students and collaborating partners had to adapt to the new medium, and find new online and digital tools appropriate for the conduct of the projects (Figure 4). The ongoing collaboration projects had to revise their strategies, such as changes in the submission requirements, project calendar, and meeting schedules with firms. Distance education has affected collaboration, and for the first time in the past 19 years, collaboration *semester* projects have not been conducted in the 3rd and 4th year studios in fall 2020. Nevertheless, the 2nd year studio conducted a project in collaboration with a ceramics manufacturer who sent plastic clay material to the students' addresses. Using the advantages of distance education, frequent online meetings were organised with the experts in the company. Graduation projects in 2020 and 2021 have been carried out in collaboration as usual.

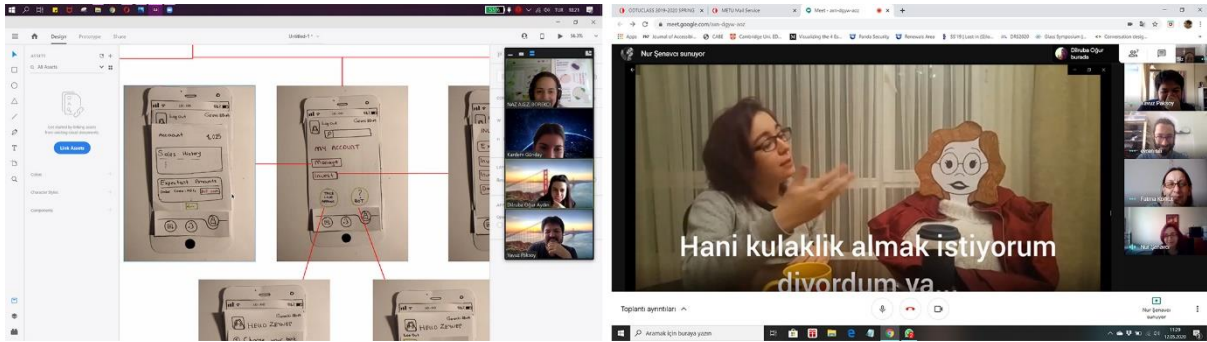


Figure 4. Collaboration semester project with Garanti BBVA, spring 2020; new tools and media employed in distance education.

Although this period of new generation collaboration has recently begun, we see it to be characterised by the introduction of new topics into the field, the involvement of expert designers from collaborating partners, transition to distance education, and online collaboration. Professionals from the collaborating firms are young, and have a past of short professional experiences in firms from different sectors, allowing them to offer us new approaches and methods. Among the difficulties in industrial design education due to not being in the same studio space are, loss of gesture and physical interactions at desk critiques, loss of a sense of scale, and difficulties in 3D prototyping. Among the difficulties due to the online medium are long hours in front of the screen, and being bound to technologies to be able to remain connected. Though, online collaboration has also provided new opportunities that were otherwise not possible for students: instant communication among parties, and accessibility of cloud data at any moment and from anywhere. In the graduation projects course, we observe a more rigorous involvement of collaborating partners demanding regular meetings and disciplined progress from students.

Discussion

Many factors contribute to the success of collaboration with industry in education, which is highly dependent on the fulfilment of expectations of all parties, qualities of the output and their contribution to the visibility of the collaboration, as well as further unforeseen benefits that open up opportunities for all parties. The role of external factors is undeniable, as the political, economic and social contexts deeply affect the design education agenda as well as the motivation of collaborating partners. In this section we mainly refer to the *internal* factors that reflect our approaches to collaboration in industrial design education, in the face of external factors.

Development of Collaboration Schemes and Project Briefs

The establishment and sustainment of collaboration schemes with industry that the Department has developed based on experiences, have contributed to the successful conduct of collaboration projects. In time, separate schemes have developed specialising for semester projects and for graduation projects (METU ID, 2018). Semester projects have in time specialised towards accommodating the educational objectives of 4th, 3rd and eventually 2nd year studio courses. Project processes have settled as templates, allowing the integration of different approaches, methods and tools depending on the project topic and pedagogical needs. Briefs started to incorporate project dimensions, keywords and goals allowing design exploration in a widened solution space. Briefs have also incorporated directives for in-depth design research. Even though most projects require individual submissions, studio activities carried out in student groups are highly made use of. The process planning and timetable set for the projects ensure the regular involvement of collaborating partners in the problem exploration, decision making and evaluation stages. The outcomes of projects are fully documented in the form of catalogues, published on the Department website, announced on Department bulletins and also collected in digital archives. All graduation projects are exhibited; selected outcomes of graduation projects and semester projects are exhibited in various annual exhibitions and events, for the visibility of collaborations.

Design Research in Collaboration Projects

Collaboration schemes and the project processes followed, allow the incorporation of research activities in the studio. We have found throughout years that in-depth exploration of the problem area contributes to divergence in idea generation and the identification of concepts that respond to the design problem (Böreği,

Kaygan & Hasdoğan, 2016). Design research incorporating both literature search and user or field research is given particular importance for students to be able to identify design opportunities rather than bringing immediate responses to design problems as identified by collaborating partners. Depending on the context of the project, such as country, region, and sector, the Department can provide collaborating parties with access to information through research on the user, use context, local culture, knowledge and skills. The collaborating parties can also supply various research output and media, such as marketing and sales strategies, technical and CAD data, product samples, technical expertise, access to users on site and product trials on field, and -in cases when it is not possible to access users directly- user research results from distant regions, and visits from users made to the university premises, for joint discussions and generative activities.

Collaboration Projects as a Research Lab for Developing New Approaches, Methods and Tools

The studio setting (including online studios) has been a field for research also, incorporating research activities made on the course conduct, methods and tools applied, and project outcomes. Having a project process template for collaboration projects allows the incorporation of different tools and methods selected and applied according to the project goals (e.g., developing solutions for user experience), educational objectives (e.g., design divergence for idea generation, learning rapid-prototyping) and pedagogical needs (e.g., increasing sketching abilities of students). The studio has accommodated the research of graduate students, some not directly involved in the studio course but attending as researchers, implementing tools and methods that they have generated as a design intervention, or documenting the design processes for the investigation of studio-based learning (Doğan et al., 2016). The studio instructors also benefit from this setting as a research medium. Many article publications and conference paper presentations have been made on collaboration projects, as well as graduate theses on design education, increasing the research profile of the Department and also of the external partners.

Collaboration Project Types and Sectors

The studio course objectives and learning outcomes of each year play a role in the selection of the sector of the collaboration partner, as well as the determination of the project type to be carried out. How the project topics will be reinterpreted for a problem statement to be given to students are negotiated beforehand with the collaborators, and otherwise collaborators are not directly involved with the process planning and conduct of the project. Certain topics work well in semester collaboration projects for covering the educational objectives and pedagogic goals of a specific year or semester. Firms to collaborate with are selected accordingly, and sometimes collaboration takes place with multiple partners for the same project. Successful collaborations have been repeated and some of the collaborating partners are now regular. These repeated collaborations also allow to change the project topic carried out in the same sector, trying out new themes, gaining expertise in new areas and widening the project spectrum of the Department. Graduation projects strive for covering a wide range of sectors for collaboration. From time to time, there have been inclinations towards certain sectors, due to popularity and rising interest, and projects have clustered around certain sectors⁶. As a strategy the graduation projects course has been determining for the past two years, a common main theme for the projects⁷, undertaken by a wide range of sectors.

Collaboration Patterns

We observe that certain collaboration patterns have emerged, making it possible to recognise towards which direction a collaboration project is going, and intervene with necessary measures for a successful completion of the project, keeping the educational experience of students at the centre. Factors that form these collaboration patterns include preparedness of the Department to conduct projects on a certain topic with a partner from a certain sector, and the preparedness of the collaborating partner to allow the involvement of the course instructors in determining the project statement, planning the process and conducting the project on behalf of all parties. The motivations of the contact persons from all parties, their willingness to communicate, commit and cooperate, and their background and expertise in the field are also among factors. Motivations for collaboration may be related to (1) getting to know the Department, and its know-how,

⁶ Hot topics in graduation projects have included furniture design, design of medical devices, personal digital devices, and lately, user experience design.

⁷ Digital Transition in 2020; Design for Connection in 2021.

approaches and methods related to design education, (2) getting to know the young generation as prospective industrial design graduates and as future local users, (3) obtaining a design vision and inspirational design ideas, and (4) having access to design research. Motivations may also be related to the project outcomes, such as exhibiting in an international fair⁸ and developing prototypes⁹. All these motivations affect the project template used, and the collaboration pattern followed with the partners.

These patterns may differ depending on whether the collaboration is made for the first time, whether it is the main collaboration or the supplementary collaboration if there are multiple partners, whether we have contacted the firm, whether the firm has contacted us, or whether it is a repeated collaboration.

- With some partners, the collaboration is carried out *only once and not repeated*; this may be due to many factors besides an unfruitful collaboration experience, such as closing of the firm, departure of the contact person, or new opportunities not arising.
- With some partners, the collaboration may be *sporadic, from time to time*, due to factors such as change of contact persons within the company, change of company structure and design development agenda, renewal of company's interest in the ongoing issues and updates in design education, or Department's interest in the developments in a particular sector.
- With some partners, the collaboration is *repeated until a saturation is reached*; partnerships may begin, climax, slow down and end, very much depending on the design education agenda of the studio course, as well as the agenda of the collaborating partner.
- With some other partners, the collaboration is *regularly repeated*, due to the success achieved in the collaboration as a result of high motivation for passing on sectoral know-how, high interest in the topic for pedagogical purposes, commitment of all parties, satisfactory project involvement with interesting activities and rewarding results, and contributions to design education.

Conclusion

This paper was an opportunity for us to review our Department's history of collaboration with industry in industrial design education, and the studio courses in particular. This review helped us determine our periods of collaboration with industry, forming frames through which we were able to assess the collaboration experiences in terms of the effects they had on our design education agenda, strategies followed in the courses of collaboration, and the establishment of collaboration schemes. Industrial design education in Turkey began in a period when little was known about design in industry, and university-industry collaboration policies did not exist. The Department strived to build links with industry by creating its own collaboration schemes from scratch, which later constituted best practices for other departments and universities. The historical development of our collaboration practices shows how government policies and their related instruments reshaped our schemes. We see the importance of established collaboration schemes lying in the building and maintaining of strong ties with the "right" partners, and in keeping industrial design education as the main focus. Our collaboration schemes are fed upon evolving studio teaching practices and academic research as well as influenced by the local and global contexts and design agendas. Therefore, it is vital for us to continue national and international relations with other institutions, organisations and the industry, to determine our educational agenda, position ourselves within the design education community, and pursue real-world design problems through these collaborations.

We see these collaboration schemes to be dynamic and evolving. As we move into a new period of collaboration, highly influenced by the circumstances that the pandemic has imposed, we foresee that collaboration in industrial design education will also be affected, requiring new approaches, skill sets and mindsets. The findings of our study may provide insights into the identification and establishment of new collaboration opportunities and schemes. Further studies may involve an exploration of the collaboration schemes in other institutions particularly in Turkey, and the degree to which our collaboration schemes are shared with others. It would also be of interest to investigate these collaboration experiences and their outcomes from the perspectives of the external partners and the students as subjects of industrial design education, to further improve the collaboration schemes for all parties involved.

⁸ Collaboration with Koleksiyon in Fall 2003-2004 to participate in the Salone Satellite at Milan Design Week 2004.

⁹ Collaboration with OMSIAD (Office Furniture Industry and Businesspersons Association) in Fall 2011-2012 for prototypes displaying the process approach and outcome quality to the industry.

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