

# TEACHING CO-DESIGN IN INDUSTRIAL DESIGN CASE STUDIES OF EXISTING PRACTICES

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## 1. ABSTRACT

Co-design is a process that allows designers to develop products with greater insight to user needs through the participation of users in the design process. During this process what users say, make, and do is investigated using common research methods in combination with newer generative and exploratory approaches created for this purpose. Despite the prevalence of the co-design process, a lack of studies into the education of designers on co-design have been implemented, leaving a gap of information that needs to be filled in order for co-design to become integrated into design education and practice. The purpose of this study is to understand the current state of co-design education in the U.S. and to assimilate popular teaching techniques, by surveying teaching methods of co-design within Industrial Design programs at U.S. Universities with reputations as leaders in the field. A snowball sampling was performed with schools leaders in co-design. Schools were contacted and given a survey, interviewed with selected participants and assessed on their materials and practices on co-design. Various qualitative data analysis was performed with the surveys, interviews and materials. The conclusion includes a summary of key findings on the teaching of co-design. The significance of this project is to further research into teaching methods of co-design as well as providing a common framework for design educators to follow in higher level learning institutions

## 2. INTRODUCTION

Co-design is a process that allows designers to develop products with greater insight to user needs through the participation of users in design decisions during varied stages of the process. The origins of co-design as an advocated approach can be traced to the 1970s when user-centered design began to enter popularity and eventually brought attention to users' ability to bring new insight into design (Sanders & Stappers, 2008). Since the late 1990s influential researchers such as Sanders, Stappers, and Visser have been writing about the methods, tools, and benefits of co-design, adding to a growing body of research in the area. Co-design has even been assessed to show an increase in product value in empirical studies (Biemans, 1991; Gruner & Homburg, 2000; Steen, Kuijt-Evers, & Klok, 2007). Even though literature can be found on the use of co-design, few papers discuss practices in teaching co-design in Industrial Design. Moreover, no papers can be found which suggest the preferred or common methods of teaching co-design in industrial design. Despite the prevalence of the co-design process, a lack of studies into the education of Industrial Designers on co-design have been implemented, leaving a gap of information that needs to be filled in order for co-design to become integrated into design education and practices.

This paper describes a project undertaken in understating how co-design is taught in undergraduate Industrial Design programs with leading reputations in co-design within the United States. Specific questions to this project include: Which institutions have a leading reputation in co-design education? What is the possible content of co-design education? What methods are being used at institutions with leading reputations in co-design education? What content is being taught at institutions with leading reputations in co-design education? When is co-design being taught at institutions with leading reputations in co-design education? And what similarities exist in how co-design is taught at institutions with leading reputations in co-design education?

Industrial Design programs at U.S. Universities with reputations as leaders in the field were surveyed. Starting with two educators known for practicing co-design, a snowball sampling was performed to determine further schools. A total of seven schools were surveyed. The survey was distributed by email to school chairs or

directors. Follow up interviews were given over the phone to faculty recommended during the survey phase. Any available resources were requested (e.g. syllabus, student projects, list of materials used, etc.) from the interview participants for a material review. Teaching methods were defined through analysis of the interviews and materials. This allowed for a collection of recommendations for teaching co-design as well as the design of a learning aid for students. This practical outcome incorporates findings from literature, interviews, and materials in to a transportable set of reference cards that are designed to be assembled into a co-design protocol. The significance of this project is to further research into teaching methods of co-design as well as providing an overview of standard practices to design educators along with a learning aid for students.

### 3. LITERATURE

#### 3.1 CO-DESIGN, COLLABORATIVE DESIGN, PARTICIPATORY DESIGN, AND CO-CREATION

Co-design has yet to be given a standard definition used by the disciplines and advocates of design. There are different methods and terms that encompass co-design. All of these methods can be part of a co-design process. Contextual design, user centered design, user centered design, human centered design, participatory design, and co-creation methodologies use many of the same tools, but often differ in the way the tools are used. Often the terms collaborative design, participatory design, co-creation, and co-design are used interchangeably despite varied meanings and methods. For the project, co-design was defined as joint creation or the act of users making design decisions in conjunction with designers, particularly during the early stages of the design process.

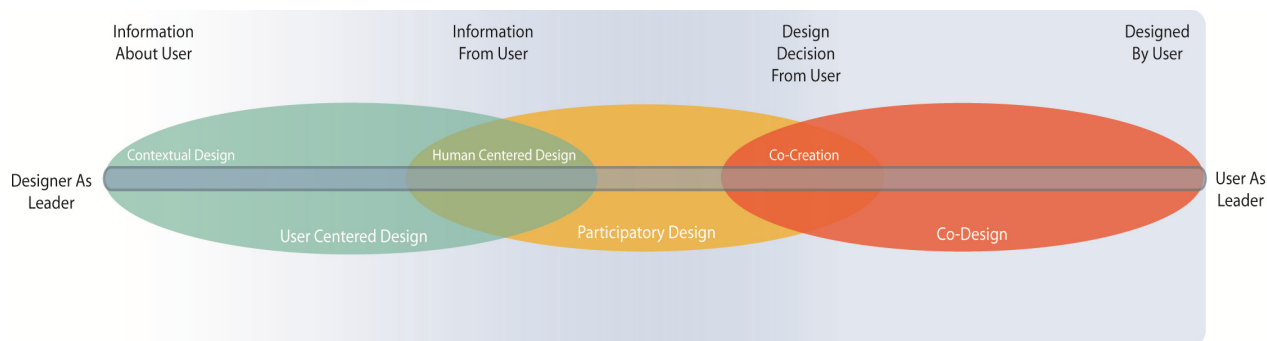


Figure 1. Design process continuum.

These terminologies can be arranged in a continuum that begins with design decisions being the responsibility of the designer and ends with design decisions being made by users alone (see figure 1). The terms are placed along this continuum to demonstrate the interrelationships they maintain with one another. The left can be seen as the common approach of designers creating a user from their experience (Lee, Bichard, & Coleman, 2008). Along the continuum different methods can be used to integrate users further into the design process.

#### 3.2 CURRENT APPROACHES TO CO-DESIGN IN INDUSTRIAL DESIGN EDUCATION

Previous practices in industrial design were mostly concerned with making the products given to designers look and function better. Industrial design as a field has stopped approaching design as the act of making objects and reinterpreted the responsibility of the designer to fulfill the needs of people (E. Sanders & Stappers, 2011). As the purpose of the designer changes, they must learn to incorporate the design thinking capabilities they have available to them in order to evolve with the times (Brown, 2009).

As with research methods, co-design is not taught across all industrial design institutions or in a consistent manner when it is taught. Co-design has begun to be considered an important frontier in design education and taught in industrial design programs, but the way in which it is being taught has not been written about nor have guidelines been created on how or what to teach in order to prepare students to perform the co-design process on their own (Strouse & Arnold, 2009). In order for a co-design to become a standard method in the toolbox of designers, it needs to be introduced during design education. New methods are better integrated and accepted if they are introduced during the training stages of a designers career (Bruseburg & McDonagh-Philp, 2002).

Teaching co-design is a new endeavor in Industrial Design. Co-design cannot be adequately taught in the same manner as other research methods (Hanington, 2007). At Delft they have found that students need hands on experience to grasp these concepts. This has led to students first receiving lectures before participating as users in the process and then as researchers (Stappers & Sleewijk, 2007; Stappers, Visser, & Lugt, 2007). This reflects Strouse & Arnolds finding that the majority design students self-reported themselves as kinetic learners, as well as Weightman & McDonagh's finding that students greatly benefit from a closer interaction with real situations (Strouse & Arnold, 2007, Weightman & McDonagh, 2004).

#### 4. METHODOLOGY

In order to review the current state of co-design in industrial design education mixed qualitative methods were used. Qualitative case study methods allowed for information and insight to be gathered through ethnographic methods. Surveys, interviews, and ethnographic material reviews were used in order to gather a sample of the teaching methods within institutions with leading reputations in co-design education.

The project allowed for up to ten institutions to be selected as participating institutions, in order to gather enough data for qualitative analysis. The main selection criterion for participation was that the school be recognized as a leader in the area of co-design as considered by peer institutions. Snowball sampling was chosen for participant selection and identification because an academic institution's reputation within a specific area can be ambiguous and is not inherently quantifiable. This process began by contacting two known proponents of co-design via email, which will ask their opinion on the leading institutions for co-design education.

The heads, chairs, or deans of the industrial design departments, schools, or colleges at the identified institutions were selected as the survey participants because of their knowledge of their programs' overall goals and faculty interests as well as their lead role within institutions. Participants for the phone interviews were determined through the survey process. The survey asked specifically for recommendations on the faculty member who would be the best to contact for further information on co-design within the institution.

After the schools were selected as participants, the head, director, chair or dean of each program was contacted via email with a request to participate in an email survey on co-design. The e-mail included an introduction to the project, a request to participate, an attached copy of the consent form, as well as the survey. It was determined that due to the small sampling size that all candidate institutions would be contacted until they agreed or declined to participate.

The survey was designed to provide preliminary information on the depth of co-design education within each program as well as to determine who to contact for further information. The survey phrased questions in regards to user engaged design, which was defined as the act of involving users in design decisions or creatively in conjunction with designers, particularly during the early stages of the design process, which is synonymous with the definition of co-design within this project. The survey asked if, when, and what aspects of co-design are taught in the institution as well as who teaches them. The surveys were analyzed along with the interviews and collected materials using focused coding, the act of coding documents line by line while looking for specific information.

From the surveys performed, a contact from each school was determined to be the faculty member with the greatest interest or expertise in co-design. These contacts were be emailed with a request to participate in a phone interview and a copy of the consent form. Respondents were scheduled for a phone interview over email.

The interviews were semi structured with a basic guide and limited to one hour or less. Interviews were performed over the phone and recorded. The interviews focused on understanding what methods, tools and processes of co-design are taught along with how, where, and when they are taught. The interviews were analyzed using focused coding to assess which methods, tools, and processes are taught and how they are taught.

During the phone interviews participants were requested to send copies of any relevant course documents and other materials via email to aid in the review of the schools co-design education efforts. These materials were divided by school along with materials collected off each institutions program website, which included program

goals, curriculum requirements, and course descriptions. Focused coding was conducted on the materials in conjunction with the interviews.

## 5. RESULTS

A total of 7 institutions participated in this project. From two institutions identified as leaders in the field (I1), other institutions were identified (I2, I3, I4, and a non-qualifying institution, referred to as NI1 (see Figure 2). I2 was contacted and identified I1, I3, I5, I6, and I7. I3 contacted and identified I4 and NI1. I5 contacted and identified I2, NI1 and a second non-qualifying institution, referred to as NI2. I6 did not identify any other institutions. I7 was contacted and identified I2, I4, and an eighth institution that was never contacted due to time constraints. The figure below illustrates the recommendations from institution to institution.

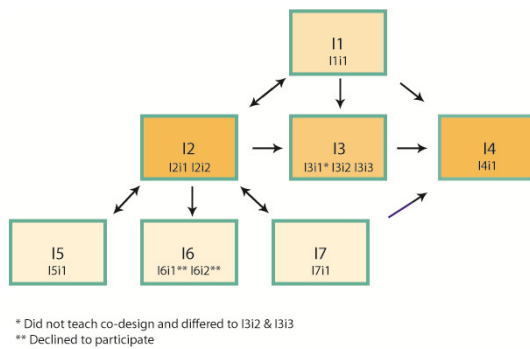


Figure 2. Snowball sampling results.

### 5.1. SURVEY AND INTERVIEW RESULTS

All institutions completed the survey. All institutions were also able to recommend faculty members to participate in the project. From the survey and interviews, a categorization of focus and methods were discerned.

During the interviews there were certain topics that appeared regularly across institutions. While the opinions of participants were not always exactly the same, there were regularities in opinions. The consistent topics found in the interviews were divided into the categories of co-design in the curriculum, teaching methods, participants, challenges, and continued use. Each category was found to have subcategories.

The subcategories found for co-design in the curriculum were the year co-design is taught, multidisciplinary classes, class size, time allotted to teaching co-design, and faculty support. The subcategories found for teaching methods included teaching standard research methods first, teaching in steps, reference materials, minimizing the use of lectures, case study incorporation, too much to teach, process over tools, in class exercises, guest speakers, real world projects, experiences changing students, student's retrospective understanding of value, team work, seeking stories, hands on learning, and reflection. The sub categories found for participants were student sought participants, provided participants and the use of extreme users. The subcategories found for challenges in teaching co-design were student attitudes, exciting students, encouraging students to branch out, teaching integration, communicating with users, and lack of support. The subcategories found for continued use were overcoming biases, opening students' eyes, professional practice and meaningful work.

### 5.2 MATERIAL RESULTS

Not all interview participants followed through with sending materials. Materials were received from five interview participants. The materials received from each institution were not of a consistent type except for the curriculum overviews. The curriculum overviews allowed the percentage of course work in which co-design was taught to be discerned as well as the location of co-design within the curriculum. Due to the diverse and inconsistent nature of the materials collected it was not a valid choice to compare the schools through the material review. Instead a summary of important information from each set of documents was created.

## 6. DISCUSSION

Among the significant findings to discuss are the optimal time to introduce co-design, the type of class in which co-design is best taught, and the goal of co-design courses.

The interview results showed patterns in opinions on the optimal time to introduce co-design. Interview results imply that students do best given a basic introduction to co-design as early as their freshman year and optimally before the end of their sophomore year and a full introduction to the co-design process is optimal during the junior year because the students are further developed in their capabilities.

Co-design is currently taught in both standalone classes that focus solely on the co-design process and within classes that cover other material. Interview results suggest co-design be given a basic introduction in a required course covering other material and fully taught in an elective centered on the co-design process. If students are given an early basic introduction to co-design in a required course, they would be aware of its use and given time to grow accustomed to the concept. While this will not eliminate obstinate students, it will relegate them to a brief introduction on the topic. If a co-design centered elective was then available at a higher level, students who had developed further interest would be able to learn and practice the process in a focused way.

The co-design process can be achieved using many different tools. Interview participants expressed that if students understood the purpose of the co-design processes, the theory behind it, and the basics of execution they can be adept at the process without knowing about all tools thoroughly. After the interview process was completed and analyzed, the need for students to be taught about each co-design tool in detail was reevaluated. If students had access to reference material on existing co-design tools, it would be possible for them to use them in practice after being taught the co-design process as a concept.

While common methods of co-design education were identified, the use of a material review did little to aid in this identification. Although this phase was unsuccessful in creating any quantifiable results, it did assist in creating an expanded qualitative view of class structures and expectations at the institutions that participated in the material review. The material review may have been more useful if a systematic way to ensure the submission of comparable materials was used as well as a way to further encourage the submission of any materials.

## 7. CONCLUSION

This paper described the methodologies and methods used for understanding the state of co-design in U.S. industrial design institutions. Methodologies and methods included survey, interviews and material analysis through qualitative and quantitative analysis. The survey used in this project accomplished three goals that were originally set for it. The survey served as a screening tool to ensure that participating institutions fit the requirements for the interview process and it provided preliminary information on institutions before the interviews. The survey also allowed for the identification of interview participants. Through the analysis of interviews with the identified educators, the similarities or standards in practice were identified and distilled in to recommendations for other Industrial Design educators. The analysis of interviews provided the most information on the methods used for teaching co-design. Recommendations were formed based on the prevalence of use and the consideration of the intensity of support. It was found that in order to facilitate student's education on co-design processes, all faculty members need to support students in learning the co-design process through attitude and knowledge. The interview analysis lead to the conclusion that co-design is best introduced briefly as a part of a required freshman or sophomore course in conjunction with the offering of a higher-level elective that covers co-design in depth. Findings on the structure of co-design courses include using co-teachers or guest speakers to augment instructors' expertise, which requires educators to develop and use contacts with varied capabilities. Also, it was recommended that lectures be minimized while in class exercises and case studies are maximized. Lastly, providing real world participants in students' projects would greatly benefit student's learning about co-design. Overall, the finding of this project suggests that co-design is still in its infancy where most institutions are still struggling how to successfully implement a clear and rich experience of co-design in design education.

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