Work in Progress- Use-Value and Functionality versus Aesthetics and Experience: Inculcation of Design Ideologies in Engineering and Industrial Design Students

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Abstract - This paper compares how different student teams with engineering and industrial design backgrounds approach design problems and create design solutions. We collected data by observing team meetings throughout the design process. While students in both disciplines were essentially designing solutions for clients' future needs, the design prompts were vastly different as was their subsequent approach. Preliminary results show engineering teams designed solutions based on the project requirements, issues of ultimate functionality, and client needs or interpretations of client needs while industrial designers focused on positive user reaction and aesthetics, working around ideas that incorporated unique or creative components to enhance the overall appearance's appeal. In this study we found preliminary evidence that innovation occurs when the designer also takes on the role of the user; here the designer incorporates personal experience with cognitive tools to search the solution space for creative solutions.

Index Terms – Design, Education, Engineering design, Industrial design

INTRODUCTION

Design is a ubiquitous concept in the arts and sciences as well as a foundation for many disciplines. However, the act, process, or art of design is ambiguous when viewed from the perspective of any single discipline. How engineers, artists, and scientists view design and design thinking covers a range of variability under seemingly one concept. The dimensions of the solution space fluctuate in this multidimensional arena of design. While engineering design is conventionally constrained by resources, time, and space, artistic design exists under another set of constrained dimensions. Investigating the technical and creative aspects of design across disciplines can provide an interesting and insightful window into how designers creatively and effectively design.

A defining characteristic of engineering is, unwaveringly, design. Within the domain of engineering, design can assume different roles and compositions depending on the activity or discipline. However, design characteristics are not unique to engineering. Industrial designers execute design solutions to problems based around form, usability, user ergonomics, engineering, and marketing/ brand development [1]. The design approach and overall perspective toward design varies across disciplines as well as designers. An understanding of how these individuals experience the design process will provide a better insight into the specific qualities of design.

The adaptable quality of design can make it difficult to narrow down exactly how engineers and industrial designers work through the design process, but at the same time, this characteristic opens up another interesting question as to whether, despite the differences in discipline, there exists a larger set of design activities that contribute to creative and effective designs. The purpose of this study is to develop an understanding of the design process and the underlying design thinking for industrial design students and engineering students.

DESIGN CONTEXT

The settings observed in this study focused on an engineering design team and a team of industrial design students. While each of these teams and individuals were presented with a design problem, the prompt and surrounding situations varied greatly across each project.

General engineering students were presented with the challenge to develop innovative solutions that address the broad concerns of clients looking for alternatives to the current non-renewable energy practices for their farm located in the Northeastern United States. These students had a specific client who provided them with information about the available resources, general requirements, and client needs regarding the design problem.

Industrial design students began designing under the prompt to design a studio that exists five years into the future. Working under this succinct prompt, the industrial designers essentially devised their own requirements and solution space for the final design. The team students worked on the futuristic studio design as part of an industrial design course but were not required to produce specific deliverable at designated times throughout the design project.
DATA COLLECTION

Initial data collection consisted of field notes and observations as well as an in-depth interview with the participants. While participant interviews are the primary source of data collection in grounded theory studies [2], observations also provided an invaluable source of interactive data in this case. More essential to the study is the process of recording information, or logging data [3] through various forms, e.g. field notes, jottings [4], and descriptive memos and summaries.

We have initially collected observational data on two design teams: the general engineering sustainable design team and the industrial design Dell studio team. Observations of the engineering students occurred weekly throughout the nine-week design project, with each meeting generally focusing on the construction of a required deliverable and lasting from 30-60 minutes, approximately. In addition, we observed studio session observations of the industrial design students during two separate observations lasting approximately four hours.

PRELIMINARY ANALYSIS AND FINDINGS

Preliminary data analysis was done through open coding in order to examine the text for prominent categories of information [5]. The two major themes surrounding the overall design development were the team member roles and related division of tasks and the methods in which team member visualized and demonstrated their individual ideas and concepts to one another, which was primarily through the use of available artifact. In addition, we found that conceptual sketching in industrial design team and the freshman engineering team played an important role in the development of the product. Through these sketches we were able to see how the conceptualization of the design varies between disciplinary teams, either based on form and aesthetic or function. In particular, the role of sketching is important to the acceptability of the design. While the industrial design students were heavily focused on aesthetics and positive user reaction the engineering students were fixated on function.

<table>
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<th>TABLE I: PRIMARY THEMES ACROSS DESIGN TEAMS</th>
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<td><strong>Team Focus</strong></td>
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DISCUSSION AND FUTURE WORK

In this study, we begin to explore the effects of the design task and perspective of the final design on designers across engineering and industrial design disciplines. While the nature of the design perspective and final design outcomes vary across disciplines, a method and set of constraints is applicable to all designers. The nature of design and the distribution of work are similar between and engineering project and industrial design projects, both design teams were able to identify individual roles within the group to focus on specific tasks and activities that occur throughout the design project. Where the difference lied was in how these design viewed the feasibility functionality of their actual product. The engineering team projects required a working model or prototype while the industrial design team’s final objective was to produce a prototype and model that highlighted the functions of the device in an aesthetic model. Further investigation into the perspectives of various designers can provide significant insight into how we view innovation in design literature. Through further observation and analysis, we intend to investigate how innovation occurs when the designer also takes on the role of the user; preliminary results show the designer incorporates personal experience with cognitive tools to search the solution space for creative solutions.

Further multidisciplinary investigation of how these individuals comprehend the design process will provide better insight into the specific qualities of design. There are significant lessons to be learned regarding the definition of creativity and innovation and also preparation of interdisciplinary designers. By understanding the unique characteristics we impart to engineering students compared to students in other disciplines we can design learning experiences that help bridge disciplines and learn from team members with diverse experience.

ACKNOWLEDGMENT

We would like to thank our study participants for their time. This work was supported by NSF Award# ITR0757540.

REFERENCES


