Design Education as an Inclusive Pedagogy

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Abstract. This paper summarizes an inclusive pedagogical experience from the perspectives of design educators and students. It is an overview of a new Collaborative Innovation Minor at an established design program at a major university and a narrative case study of a capstone course- Collaborative Design Development to discuss how non-design students were able to embrace unfamiliar content in cross-disciplinary environment. The author will discuss inclusive pedagogical framework of minor defined by three key design foundations: Design Intent and Opportunity, Conceptualization, and Implementation, each employing its own relevant tools, methodologies, and design approaches. This Collaborative Innovation Minor inspired cross campus participants to engage in design learning from a holistic, user-centered, and interdisciplinary approach.

Keywords: Design education · Collaborative design · Design method
Design thinking

1 Background

Today, the role of design is expanding beyond traditional boundaries with multifaceted challenges and exposure to complex wicked problems. Designers are now invited early in the process to frame the problem and establish empathy with human-centered intentions. They frequently facilitate projects that require creative sensibility and mapping of holistic sequential experience [1]. Such an immersive shift has resulted in considerable growth in the emerging areas of industrial design, design research, UX design, interaction design, social innovation, entrepreneurship, and more. Consequently, creative strategies that originates from the roots of design process—commonly known as "design thinking"—is now being implemented in business and social studies. Utilizing a methodology arising from design's natural heritage, design thinking brings together divergent stakeholders in a dynamic, iterative and deeply human process that accelerates innovative thinking and making.

It is no surprise academia has caught up with this demand and is offering students unique opportunities to engage in innovative creativity. The majority of design programs are established around traditional core competencies (such as ideation, visualization and prototyping) but more leading-edge contents are being delivered in cross-disciplinary platforms to ensure inclusive education. Melsop [2] writes "many Universities are rethinking the traditional pedagogy to encompass nonlinear methodologies and divergent valuable in higher education."

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2 Context

A design program at the College of Liberal Arts launched a new minor in Collaborative Innovation couple years ago. This minor in Collaborative Innovation is conceived of as a dynamic catalyst for process-based, cross-disciplinary collaboration between various academic departments in Liberal Arts and wider interests across the university. The initial constituency of undergraduate students was drawn from within Liberal Arts, but ultimately that constituency has expanded to include students from Engineering, Business and Science, all of whom are involved in bringing successful solutions to complex problems. Building a strong core competency in design thinking and collaborative innovation is intended to fulfill growing demand for this skill among these various communities, attracting broad and diverse student enrollment and re-establishing the primacy of a humanistic, collaborative approach to the complex and integrated challenges facing a rapidly changing world.

The Minor offers a course sequence starting with a large, introductory, lecture-based design thinking course that also fulfills a general university requirement while acting as a feeder for the Minor itself. Participants then cycle through a series of courses introducing various skillsets implicated in design thinking, including research methods, visualization, rapid prototyping and entrepreneurship. The Minor culminates in the capstone course that brings students' various disciplines together in fruitful collaboration to address industry-sponsored projects addressing real world questions.

3 Framing the Curriculum

The Collaborative Innovation Minor curriculum was established on five sequential phases of design pedagogy: Gateway, Inspiration, Ideation, Implementation and Capstone. It resembles the Design framework published by the Neilson Norman Group (Fig. 1) in 2016 [3]. The Gateway and Capstone courses were specifically developed for the Collaborative Innovation minor, but the mid-tier phase classes were cross-listed from Design curriculum to provide a cost-effective yet stable platform for the department. As design education forges new teaching and research alliances across the university, it is important to provide inclusive opportunities with introductory skill-driven courses but at the same time to maintain exclusive values of design major curriculum to avoid pedagogical conflicts. The Collaborative Innovation Minor effectively integrates existing design courses to establish a curriculum that delivers the following learning goals: (1) Understand various assets of a multi-disciplinary environment through an iterative and systematic approach. (2) Identify project scope and design objectives and methodically plan for its execution, including the development of design principles and strategies. (3) Apply design-thinking strategies to evaluate, conceptualize and synthesize "integrated" design proposals. (4) Develop creative design proposals that integrate contextual solutions. (5) Construct a design solution (i.e., a service, product, environment or information) from a human-centered, holistic approach focusing on user experience.

The core principle of the minor is to offer a non-designers fundamental skills and knowledge to facilitate collaborative partnership with experts from diverse areas. Following are the sequential phases of the Collaborative Innovation Minor described in detail.

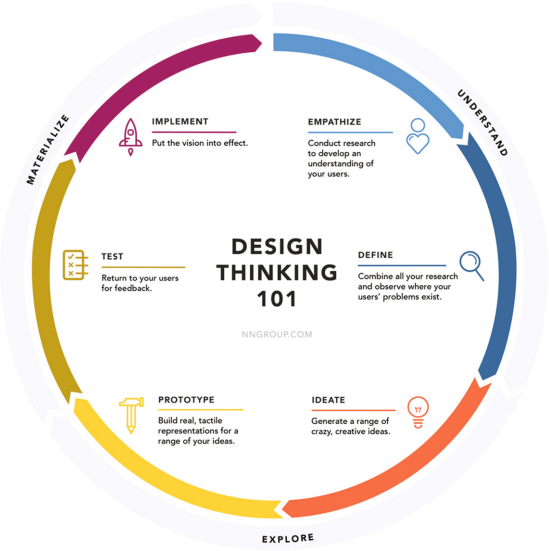

Fig. 1. Design-thinking framework by Neilson Norman Group

3.1 Gateway

Phase 1 Course Options: Design Matters
This introductory course provides the foundation for understanding the assets of design as students engage in articulating the tenets of design thinking methods and apply methodologies to identify problems and develop experiences and product solutions. As a unique hybrid course, students familiarize themselves with the design thinker's toolkit through readings, discussions and short exercises during seminar meetings while deploying these methods and techniques on a series of hands-on collaborative small group projects of longer duration during the Lab sessions. This course is intended for undergraduate students of any discipline interested in learning how the methodology and tools of design thinking can ignite innovation and address problems and challenges across the diverse topics.

3.2 Inspiration

Phase 2 Course Options: Design Research
Inspiration requires discovery and empathy. Thus, the Design Research course is structured with several activities or "modes" that are instrumental in initiating criteria prior to solving problems. The modes during this phase include sensing, reframing, understanding the context and people, and finding opportunities. This course is conceived of as a way to close the gap between research and design and provide students

confidence in framing problems based on informed analysis. Students use clustering, matrices, and stakeholder journeys to discover design opportunities. Though Melsop [2] notes the methodologies can be explored in a sequential order, students are constantly reminded that design processes are non-linear and encouraged to revisit "modes" to redefine intent and refine design opportunities. Students will look for patterns that repeatedly emerge from multiple analyses, but more importantly, will come to understand how to capitalize on their unique backgrounds and contribute to a broader interpretation of emerging patterns.

3.3 Ideation

Phase 3 Course Options: Rapid Visualization, Fundamentals of Design
The third phase of the curriculum focuses on concept development and communication techniques. In these courses, students are exposed to rapid sketching, rendering and presentation techniques as a tool for developing, refining and communicating three-dimensional concepts to others. Visualization skills empower students to facilitate discussions and communicate abstract ideas for further exploration. Learning goals are: (1) Visually communicate concepts clearly and persuasively. (2) Demonstrate creativity in expression, design and conceptualization. (3) Develop and master artistic skill through practice and application.

3.4 Implementation

Phase 4 Course Options: Intro Product Development, Digital Solid Modeling, Web Design, Interaction Design, Social Design
The next phase of the Minor consists of courses that highlight design development, prototyping and final presentations. According to Udell [4] "a prototype is a functional or semi-functional demonstration of a system or project. It can be used to discover issues in the planned execution or plan for a project, prove a strategic approach, or test the value of an idea from a specific aspect." With prototypes, students are naturally exposed to collaborations and interactions which serve as a way to synthesize disparate ideas and incompatible solutions. Prototypes takes many forms, from short animated films and digital models to website framework. However, they all have a common thread of demonstrating ideas in tangible forms to get feedback from users, and in doing so, students will realize that objects and information with adequate service enhance overall experience. In the end, students are able to capitalize on their iterative progress and actively engage in finalizing their ideas.

3.5 Capstone

Phase 5 Course Options: Collaborative Design Development
The capstone project is often incorporated into a curriculum for "assessing how successfully the major has attained the overall goals" (Wagenaar [5]). A similar approach

is adapted into the Collaborative Innovation Minor to assess convergence of expertise from business, political science, entrepreneurship, engineering, science, anthropology, and graphic and industrial design. Collaborating teams of undergraduate students begin with an identification of need and ultimately conclude with comprehensive proof of concept, innovative function, and an appropriately resolved, aesthetically pleasing product or system. [6] Understanding the relative pain points of a particular situation through stakeholder journeys and narratives will encourage students to see various ways that service, technology and objects impact different individual experiences. The insights from multiple exercises are collaboratively translated into guiding principles which are intended to be distillations of more complex discoveries.

One of the projects from this course entered the Disney Imaginations competition in 2017 and won 2nd place out of 336 entries. The proposed concept for "Spirit of Isles" (Fig. 2) is a shamrock-shaped island capable of withstanding all of the seasons located on the campus. Through their research, group members were able to frame critical pain points around the inconsistent Midwestern weather and developed an empathetic concept of outdoor space on our campus that addresses the needs of students, faculty and visitors as a respite from stresses of college life. The project is an example how the dynamic approach inspires students to immerse themselves in an integrative design thinking approach that serves as a catalyst for team-based projects. This team was one of the only interdisciplinary teams in the competition, and judges noted that their presentation touched on diverse aspects of human-centered approach and felt more complete.

Fig. 2. Capstone project from Collaborative Innovation Minor 2nd place in 2017 Disney Imaginations Competition

4 Conclusions

The Collaborative Innovation Minor is relatively new, but within the past two years 32 students have enrolled in the program and there is positive expectation this number will grow significantly in the near future. Students from across the campus have recognized the distinctive attraction of this Minor as it serves as a creative toolbox for their majors. We have been able to attract talented students from the Colleges of Business, Science and Engineering to the Liberal Arts with robust curriculum that prepares them to begin immediate and productive careers across a wide variety of industries where collaborative design thinking is valued at a premium. We're hoping these students promote cross-department and cross-collegiate collaboration, resulting in the spread of divergent thinking across the entire University community. Finally, some of the feedback from the Capstone course reflects the immediate impact on students' thesis work across a wide variety of industries where collaborative design thinking is valued at a premium.

> *"The activities we practiced in the first few weeks were the most useful in my learnings from the class. They are applicable to many fields beyond design and I found it very useful."*

> *"They went along with the lectures really well and definitely helped me work toward my final project in the class."*

In reflection, the demands of collective thinking and creation of team-based experiences are encouraging students to explore design thinking as a tool to enhance their expertise. There is reason to believe design can be inclusively embedded in the core of higher education rather than left as an exclusive training. Conrado [7] states "there are not enough diverse voices, perspectives and experiences shaping the design of the world. While we have made admirable progress, too many entrenched barriers remain that make it difficult for those diverse viewpoints to thrive." The adaptation of design thinking through the Minor platform presented in this paper serves to illustrate a different approach in transforming education into a responsive model. This form of pedagogy is neither definite nor singular in its approach to dovetailing creative collaboration. Rather, the content of the case study and conceptual framework serve as examples for other design educators to learn from and adapt to their teaching methods.

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