# ENHANCING INDUSTRIAL DESIGN EDUCATION WITH USER EXPERIENCE DESIGN

## THE ORIGIN AND EFFICACY OF A MULTIDISCIPLINARY UX DESIGN MINOR

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*PAPER ABSTRACT: The field of user experience design has grown to tremendous demand from industry over the past ten years. Education is usually slow to respond to the quick pace of emerging technology professions. However, with a multi-disciplinary planning team, and a strategic combination of existing courses, a user experience design program was developed as a minor at this university in 2013. This paper documents the origin, planning, development, execution, and successful results of this multidisciplinary user experience design minor over the past seven years. It describes the origins based on professional advice, developing curriculum across departments, and new course creation. UX design industry partners collaborate with a final capstone course consisting of cross disciplinary teams of industrial design, graphic design, computer science, marketing, and psychology majors. The UX minor has enhanced each student's education and experience, resulting in substantial job placement in the UX field.*

*Keywords: Design Education, User Experience Design, Multidisciplinary, Teams.*

## 1. INTRODUCTION

The fields of Industrial Design (ID) and User Experience (UX) Design are interrelated. Many ID graduates have transitioned their career from industrial design into UX since the design process, user centered focus, and creative thinking is similar. UX Design has experienced exceedingly high demand from industry, as expressed by professionals in the field and the multitude of open positions posted. This is especially true in the Pacific Northwest region, which is home to many technology and software companies including Microsoft, Facebook, and Amazon. Students of industrial design at Western Washington University (WWU) recognized this emerging field and vocalized their interest in learning more about it back before 2010. The author recognized an opportunity and began research into the profession, its responsibilities, skills, and tools.

Key in this collaboration was Olin Ronning, Design Director and Tucker Spofford, Associate Design Director of the award-winning UX design consultancy, Artefact in Seattle. These alumni of the industrial design program had evolved their own educational foundation in ID into becoming designers of user

experiences. The question put to these professionals, was "what is the current state of the art of UX design? What learning objectives should an educational program strive toward?"

## 2. CONTEXTUAL RESEARCH

User experience (UX) design is a multi-disciplinary profession that is a combination of graphic design, industrial design, psychology, research, computer science and business. It requires both big picture, strategic design skills, and the ability to design the detailed interactions of user interface.

As defined by Pabini Gabriel-Petit; User Experience Design is *"a holistic, multidisciplinary approach to the design of user interfaces for digital products, defining their form, behavior, and content. User experience design integrates interaction design, industrial design, information architecture, information design, visual interface design, user assistance design, and user-centered design, ensuring coherence and consistency across all of these design dimensions."* — *(*Gabriel-Petit, 2005)

User Interface (UI) design is part of UX but *"UX design is focused on anything that affects the user's journey to solve that problem, positive or negative, both on-screen and off. UI design is focused on how the product's surfaces look and function. The user interface is only piece of that journey."* Ken Norton, Partner at Google Ventures (Norton, 2018)

### 2.1 UX DESIGN: OCCUPATIONAL OUTLOOK

The demand for UX Designers and researchers is expected to continue to grow at 13% per year or more. (Eugenios et al, 2017) The average salary in the US in 2021 was $85,000 USD. (Brown, 2021). Due to new complex products and rapid advances in technology, there is still high demand for the UX designer. High technology industries including social networking, mobile devices, smart appliances, and gaming all need UX design to be successful. As social networking, augmented reality, and ubiquitous computing continue to grow, related career opportunities will grow as well. A search for User Experience job postings on Indeed.com reveals over 10 times more UX positions (11,077) than ID (2009). This demand persists even amid a global pandemic. (Indeed.com, April 2021)

According to our industry advisors in 2011, it was exceedingly difficult to find UX designers because there was a lack of suitable education or training available that prepares graduates for this work. Current professionals have come into the field from varied backgrounds and have adapted through learning on the job.

### 2.2 OBSTACLES

In a traditional university setting, graphic design, industrial design, psychology, marketing, and computer science all are organized into separate colleges, departments, buildings, and faculty. However, professional UX design crosses and blurs the boundaries between these disciplines. For a successful UX curriculum, it became clear that it would need to bring separate programs together cooperatively. Although the University claims to value cross-disciplinary endeavors, it inhibits those efforts by its own systemic divisions.

In developing this program, several obstacles stood in the way. Scheduling time with faculty to work on a minor program is challenging when it is not their core responsibility. Coordinating course schedules

between departments is hard due to the complexity of major course progression and limited offerings. Communicating the benefits of the minor to computer science students is difficult due to the rigorous curriculum of their major. Developing new courses and getting them approved and funded can be challenging depending on the willingness and resources of the hosting department.

2.3 OPPORTUNITY
UX Design a discipline deserves its own bachelor's degree, however, due to the organizational and funding challenges within the university system, the proposal to create an entirely new major was rejected. To act quickly and respond to the overwhelming demand from industry, a supplementary minor program was developed and proposed.

## 3. METHODS

The plan to initiate this minor program was to assemble two teams, one of industry professionals and one of representatives from across departments and colleges at the university. Faculty representatives from industrial design, computer science, psychology, marketing, and graphic design were included. Professional industry advisors included a Principal UX Lead, two UX/ID designers, and a UX cognitive scientist.

3.1 CURRICULUM: UX DESIGN ATTRIBUTES AND SKILLS
Through discussions with current professionals and studying job postings, the following attributes and skills were identified as desirable:

**Graphic design:** Screen-based design, composition, visual communication, color, creativity, typography, user-centered design, design process, design thinking, interactive design.

**Industrial Design:** User centered design**,** design process, design thinking, understanding and empathy of users, creativity, lateral thinking, ergonomic design of functional systems.

**Computer science (CS):** Introduction to programming, understanding of how software is built, understand the vocabulary and terminology, communicate with programmers and developers.

**Interaction Prototyping:** Being able to demonstrate and/or test an interface, using tools such as Adobe XD, Visio, and storyboarding.

**Behavioral psychology:** Cognitive psychology, qualitative user research, anthropology, observation of human behaviors.

**Business**: Understanding of business strategy, concepts, innovation, marketing, management

**Human Computer Interaction:** Usability research using analytical and quantitative methods.  This is closely tied with behavioral psychology.

**User Interaction History:** Historical benchmarks in interaction design, UI, patterns, standards, and it's evolution.

3.2 LEARNING OUTCOMES
The objective is for each student to be prepared to work in professional multi-disciplinary teams designing user experiences. The intended outcome is that they will be able to cross-communicate using the various languages and terminology of each discipline. They will be able to understand the unique perspective and alternative approaches that each discipline provides.  In the end, they will have a comprehensive, multi-disciplinary, collaborative, interaction design project to show prospective employers.

3.3 CUSTOMIZED CURRICULA FOR EACH DISCIPLINE
Through some initial discussions, this team began to formulate an ideal UX curriculum specific to each major. Relevant courses were identified and assembled into four course packs. The UX Design minor is intended for industrial design, psychology, design, marketing, and computer science majors only. Students from other majors would not have enough core knowledge of any of the five disciplines to make the minor meaningful or relevant. It consists of 27-32 quarter credits depending on major, which is 7 or 8 courses.

Since industrial design has significant content embedded in the major about visual design, prototyping, sketching, systemic design, and user centered design, the minor adds content in cognitive psychology, computer science, and graphic design. Computer science students have strong coding and functional understanding, so CS majors benefit from courses in graphic design, visual principles, psychology, design history, sketching, and digital design software tools. Psychology and marketing majors augment their education with courses in graphic design, visual principles, computer science, coding, design history, sketching, and digital design software tools. Graphic design majors have much of the attributes for visual design, sketching, and interactions, so their training is enhanced with cognitive psychology, computer science, and industrial design skills.

3.4 EXISTING COURSES INCLUDED IN THE MINOR
The following courses existed within the University and were relevant to the UX Design learning objectives.
**Computer Mediated Communication.** Internet skills and basic principles of effective web site organization and design.
**Computer Programming I.**  Basic concepts of computer programming using an object-oriented programming language.
**Dynamic Web Pages.** Principles and technologies required to produce and distribute internet content, with a focus on site architecture and client-side dynamic pages.
**History of Industrial Design.** A historical overview of mass-produced products, the designers who created them, and their influence on our culture and society.
**ID foundation I – drawing.**  This studio course covers foundational drawing and visual skills pertaining to industrial design. Classical drawing techniques, drawing from life, is taught and practiced.

**Industrial Design CAD Software Skills.** This is a computer-intensive course focusing on software relevant to industrial design, specifically Rhinoceros, Photoshop, Illustrator, and Keyshot.

**Introduction to Psychology.** Examination of basic psychological processes utilizing results of research investigations.

**Cognition**. Provides an overview of the theories, methods, and practical applications of cognitive psychology.

**Design View.** Introduction to design thinking and how design practice affects everyday life in a diversity of cultures (graphic, industrial, architectural, fashion).

**Foundations of Visual Communication.** Issues and topics related to the development of visual communication/graphic design with emphasis on the development of typographic and print culture.

**Graphic Design Concepts.** Introductory course in layout, design, and software with an emphasis on typography.

3.5 NEW COURSES DEVELOPED
The following course were created for especially for this minor or were enabled by the interest and popularity of the subject.

**User Experience Design Multidisciplinary Capstone Project**
This course is the culminating multidisciplinary design project class for the UX Design Minors. Students representing each discipline come together to design a user experience with guidance from industry professionals.

**Applied Cognition for User Experience Design**
This course studies human cognition as it applies to design and how cognitive phenomena lend support to effective interaction of people with digital technology. The focus is on using core principles of cognition to improve user experience with computer-based interfaces.

**Principles of Interaction Design**
This course introduces students to the principles of interaction design with an emphasis on issues and topics related to the development of interaction design, human centered design, and current industry practices. Students will gain knowledge of visual perception and cognition, usability, and functionality. The course explores current industry practices related to the user experience design process, including contextual research, usability testing, ethnography, information organization, navigation, concept development and prototyping.

**Principles of Human-Centered Technology Design**
This course introduces concepts of Human-Computer Interaction (HCI) that enable students to design and evaluate systems that effectively meet human needs. This is a project-focused course covering

fundamental principles of human-centered technology design, iterative design processes, interactive prototype construction, and evaluation techniques.

3.6 ADMISSIONS PROCESS
The student interest in this minor has been high, so a cap was necessary to limit enrollment. About 22 minors are accepted per year. The selection is done twice per year through an application process and review of transcripts. The selection committee comprises of representatives from each of the five programs.

## 4. RESULTS

This UX Design minor has been active for seven academic years, beginning in 2013. Six graduating cohorts have completed the minor to date, from 2015 to 2020, totaling 103 students. This section will look at the results of the minor related to student interest, participation, industry partners, and graduation placement.

4.1 STUDENT INTEREST
Student interest and awareness has increased through the years as evidenced by the increase in number of applications received. This annual number has grown from 30 to 50 students, an average growth of 12% per year. Of these 22 students are typically accepted into the minor.

4.2 CAPSTONE TEAM PROJECT
The UX Design capstone is the culmination of the minor program. This course incorporates all their skills and knowledge together into a realistic project. The process includes team management, problem discovery, design research, concept development, prototyping, user testing and development. It is usually sponsored by industry and guided by UX professionals. Industry partners have included: Microsoft, Blink UX, Artefact, Ten Gun Design, and AirBnB.

4.3 PLACEMENT OF GRADUATES
Graduates of the UX minor have been successful at landing jobs in the UX design fields. This analysis looks at the 100 graduates from 2015 to 2020. Of these 100, 87 are known of their position through their LinkedIn status. 45% are working in UX design and research positions. 41% are in positions related to their major. 6% are pursuing graduate degrees, and the remaining 8% are in unrelated jobs. See the chart below for more information:
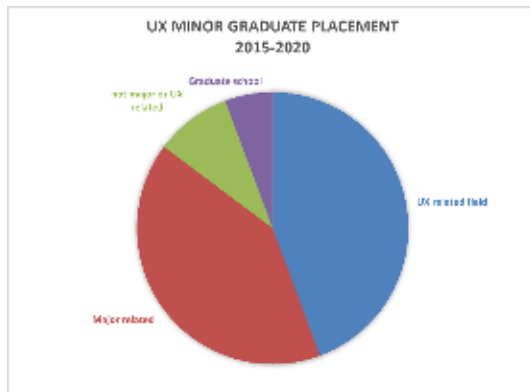
*Figure 1. UX minor professional placement 2015 - 2020*

4.4 STUDENT FEED BACK

Graduates of the minor were asked "how helpful was the UX Design minor in getting your job?" 38% responded "Very Helpful" or "Critical." When asked "What aspects of this minor were most useful or valuable?" graduates wrote:

*"Industry partnerships (Microsoft + Artefact). Design + CS classes. Conducting research online + on campus. Having people try and use your interfaces"*

*"Learning to code"*

*"The presentation skills and design thinking"*

*"Knowing UX best practices and the ability to leverage that knowledge into my designs for retail and advertising is how I got my current job. I sold it as an empathy tool to working with other disciplines like developers and project managers. Good UX makes all designs better."*

*"The capstone project-based class was the most useful class overall"*

*"Articulation of workflows and user interaction during presentations/discussions."*

*"Research, learning how to make design decisions based on user testing and feedback"*

*"The capstone: Presenting at Ten Gun, having a full case study ready for my portfolio, working on all aspects of the UX process during the capstone project. The UX minor on my resume increased my starting salary when I joined the company. I'd say more of the practical skills to do my job came from the design major/BFA and internships though. When I think of the work I do currently, I associate it more with my design major than the UX minor (even though my title is literally UX designer haha!) but the minor was a good experience, and the capstone was relevant and useful."*

## 5. CONCLUSION

This UX Design minor has been a successful and effective venture for these students and the faculty. It was created with a "stone soup" strategy where each department brought their contribution to make a unique multidisciplinary program. While it is not a complete training in UX design, it is a worthwhile supplementary education for motivated students. Most students can complete the requirements within

the timeframe of their bachelor's degree since many of the courses also satisfy general university requirements.

This is one of the few programs in the university where students of five separate disciplines come together to work on a design problem. Industrial design students expand their toolset into the realm of interactive digital products. They have a valuable experience working within a multi-disciplinary team and in the end have a strong UX design portfolio project as evidence of that effort.

5.1 LESSONS LEARNED

One of the most crucial factors in getting this minor established was convincing the department chair and the dean of the college that this was a worthwhile investment. This involved research into the field and presenting a clear case of an industry demand and student interest. Implementation is assured once the gatekeepers of administration are allies.

5.2 SUGGESTIONS FOR IMPLEMENTATION

If a UX or interaction design program does not already exist, most colleges and universities have the component courses that are relevant to UX design within their current curriculum. Establishing a minor is easy when it does not require much additional resources from the university. If one proposes a new course for the minor, strong student interest ensures that classes will be full. The past five years have demonstrated this to be true with the new courses UX Design Capstone, UX Cognition, and Interaction Design. This program became a way to cross departmental silos and build bridges to other programs.

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