Tutorial

Toward a Model of UX Education: Training UX Designers Within the Academy

—Feature by
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Abstract— **Problem:** *Increased demand for user experience (UX) designers requires new approaches to teaching and training the next generation of these professionals. We present a model for building educational programs within academia that train job-ready designers.* **Key concepts:** *To be successful, this model necessitates a working knowledge of the UX process, the systematic use of sound principles during the design of digital products and services. The model also requires a pedagogical approach that puts learners in a position to solve real problems and that treats them as apprentices on their way to competency.* **Key lessons:** *Academic institutions clearly have parts to play in producing job-ready UX designers, but barriers exist to doing so, including access to adequate training in UX best practices. To overcome these barriers, we provide tips for understanding core UX competencies, developing partnerships with UX practitioners, and deploying UX education courses and programs.* **Implications:** *Though the barriers to producing sufficient numbers of well-trained UX designers are significant, the combined ingenuity of devoted professionals in both academia and industry can be leveraged to create sound educational opportunities for UX learners from all walks of life.*

Index Terms—*Education, training, user-centered design, user experience.*

INTRODUCTION

Recent job growth in the field of user experience design (UX) has created an exigency within academia for training a new generation of job-ready UX practitioners. According to recent surveys of UX professionals by Onward Search, UserTesting, and the Nielsen Norman Group, an increasing number of work teams assigned such diverse tasks as marketing, product development, and web development rely on core UX skill sets as a primary function of their jobs [1]–[3]. Besides this increase in demand, these industry-based studies have also uncovered the diversity of UX as a professional practice, ranging across usability testing, information architecture, content strategy, user research, interaction design, and user interface (UI) design. At the same time, growth in undergraduate majors and graduate degrees that feature UX as a core part of curriculum has been slow. And even when opportunities for learning UX are available, few consistent pedagogical models exist.

Our goal in this tutorial is to provide lessons learned from our combined experience teaching

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UX. Our target audience is academics who want to inject UX education into their existing programs or to launch new programs. Guiseppe Getto has been researching and practicing UX methods and teaching undergraduate and graduate courses in UX and related topics for more than four years. Fred Beecher has been working in the UX industry since 1998 and teaching UX to external clients, internal staff, and the industry at large since 2007. During that time, they have each developed specific methods for introducing UX as both a conceptual framework and a professional practice to students and professionals from a wide variety of backgrounds. More recently, Getto has collaborated with Beecher to bring his pedagogical methods in line with those employed in Beecher's successful UX apprenticeship program that has produced 8 full-fledged UX designers to date. Through this collaboration, we hope to offer a model for UX education that will be useful for academics teaching in programs in technical and professional communication (TPC) and related fields.

The research questions we used during the development of this model include:

(1) What are the elements of an educational model for training job-ready UX designers in academia?
(2) What core competencies should such trainees be introduced to?
(3) What are barriers to creating UX education programs in academia, and how can these barriers be overcome?

To answer these questions, we present below key concepts relevant to UX education, including the UX process, UX pedagogy, apprenticeship, and curriculum planning. These concepts have been amassed from the wealth of industry-based literature related to UX, from relevant academic literature on this topic, from the few articles written directly on the subject of UX education, and from our own experiences as educators. Next, we present key lessons from the frontlines of UX education. Foregrounded here are successes, failures, and tensions that we have experienced between the demands of education and the demands of professionalization. Finally, in our implications for practice, we reflect on what further work is necessary within academia to make the training of UX designers a matter of course rather than a fringe trend. Ultimately, we hope through this tutorial to encourage more scholarship, research, and practice on this very pressing topic.

KEY CONCEPTS

This section will introduce concepts from literature on the UX process, UX pedagogy, apprenticeship tie-ins with the field of technical and professional communication, and literature on curriculum planning. These areas were considered because all are key to the training of UX designers and represent the key pedagogical, conceptual, and practical affordances available to academic professionals who want to engage in UX education. As we discuss below, these concepts were pulled from sources in both industry and academia, each of which brought different strengths to the table.

Selection of Literature for Review The main goal of our literature review was to synthesize best practices in UX education created by professionals engaged in this activity or in related activities (e.g., UX design or curriculum planning). This approach limited the scope of our literature review significantly because though much UX education happens through on-the-job training and webinars, and as an introduction to professional theory and practice in university courses, there are few academic programs devoted specifically to training job-ready UX designers, and still fewer articles and no books devoted to this topic. Much of the literature reviewed below was first encountered by the authors because they needed to define concepts and provide readings for students and trainees. It thus represents less the results of a systematic literature review and more a collection of key

readings that we have found useful when introducing UX to our students and trainees.

At the same time, while writing this article, we conducted several rounds of keyword searches in a variety of UX-focused trade journals (i.e., *Boxes and Arrows*, *UX Magazine*, *Smashing Magazine*, etc.). We also conducted a search of the TC EServer, CompPile, and IEEE Xplore databases. Finally, we also conducted a basic internet search using the Google search engine. The fact that we found precious few works directly devoted to our main key words (UX+education, UX+teaching, UX+training, and UX+curriculum) is not surprising, given that this is a highly emergent area. We included all literature from this search that seemed relevant to one or more of the following concepts:

(1) **The UX Process:** competencies central to UX designers.
(2) **UX Pedagogy:** components of an approach to teaching UX.
(3) **Apprenticeship:** the importance of an experiential, realistic approach to UX education.
(4) **Curriculum Planning:** approaches to the building of actual courses and programs in UX.

We excluded all literature from our search that didn't deal directly with any of these topics.

Through this search, we also identified university programs in UX that are closely linked to the field of technical and professional communication. From this list of programs, we chose to review three program websites in depth: the University of Washington, Bentley University, and Kent State University. We selected these three programs based on their proximity to the field of technical and professional communication and their development as programs in UX that fit the core competencies from literature on UX education, as evidenced by a review of their programs' websites.

Key Concept 1: The UX Process—The Central Competencies to Develop Through UX Education The contemporary field of UX is an heir to the older field of user-centered design (UCD), a field focused most directly on placing user requirements at the center of design processes. As UCD was defined by Courage and Baxter in 2005 [4, p. 4]:

> To maximize the usability of a product, the user should be involved from the product's inception. The earlier the user is involved, the less repair

work needs to be done at the final stages of the lifecycle (e.g., after a usability test). The [design] process should begin with user requirements gathering. By collecting user requirements, you can gain an understanding of such things as what your users really want and need, how they currently work or would like to work, and their mental models or mental representations of their domain. This information is invaluable when creating a superior product.

Here, we see a model that is focused on placing user needs at the center of the design process through requirements gathering. One of the main goals of requirements gathering is avoiding repair work after a digital product or service goes to market.

In UX literature, this concept of placing the user at the center of the design process has been codified as the UX process or UX lifecycle, and is defined as the sum total of processes a given product or service must go through to ensure that it meets the standards for a high-quality user experience [5, p. 47]. These processes are often broken up into four discrete but overlapping stages: preliminary research, prototyping, usability testing, and maintenance [6, p. 28]. Besides UCD, contemporary UX also draws on a range of older professional practices related to the design of effective digital products and services, including usability testing [7], information architecture [8], content strategy [9], user research [10], interaction design [11], and UI design [12].

For contemporary UX, these practices are interwoven into a complex design process that involves all of them to some degree. Compare the following definition of UX from Michael Cummings' blog to that of Courage and Baxter [13]:

the judicious application of certain user-centered design practices, a highly contextual design mentality, and use of certain methods and techniques that are applied through process management to produce cohesive, predictable, and desirable effects in a specific person, or persona (archetype comprised of target audience habits and characteristics). All so that the [effects] produced meet the user's own goals and measures of success and enjoyment, as well as the objectives of the providing organization.

In Cummings' definition, we see a focus on the user's own goals and measures and a focus on the contexts that users come from.

Though arguable, these differences are key to UX today. UX designers must now account for the increasingly diverse range of experiences that users have, including experiences with desktop [14], mobile [15], intranet [16], enterprise [17], and service-based [18] applications. Because of this complexity, UX designers must rethink how users navigate a complex digital environment, including how users define and measure successful task completion [19]. In other words, UX designers must understand applications through a focus on the user's "own goals and measures," rather than through a focus on the expert's. Such a contextualized, participatory approach is at the heart of the contemporary UX process.

Key Concept 2: The Four Pedagogical Components to UX Education   Though literature on UX pedagogy is scant, there are lessons to be learned from pedagogical models developed thus far, which largely come from the fields of technical and professional communication, and instructional design, though a few industry-based UX professionals have weighed in here. From this literature, combined with our own professional experiences teaching UX, we have developed four components of a UX pedagogy: orientation, observation, practice, and play.

Orientation involves introducing students to design methods through workshops or learning modules, methods that span the spectrum of UX practices (usability testing, information architecture, content strategy, user research, interaction design, and UI design). As Latzina and Rummel (2003) found, an understanding of the UX process and the ways to make use of organizational resources is important to attaining UX proficiency. Their study of web developers in a large technology company showed that these professionals were more likely to adopt core UX principles when they knew where UX-related resources existed in their own organization [20]. Orienting learners to the inner workings of the UX process and the ways that its central practices can be mobilized in specific workflows is thus essential for learners unfamiliar with these practices and workflows.

For the second component of UX pedagogy, observation, students watch experienced designers apply methods and have the opportunity to ask them about what they did and why. As Cooke and Mings (2005) found, observation of UX practitioners at work can yield important insights regarding the complexities of specific UX practices, such as usability testing. In their study of usability

analysts at Microsoft, these researchers found a variety of skill sets that were essential to the effective practice of usability testing, including methods for conducting tests, critical assessment and analysis of testing data, and communication skills [21]. Students come from varying backgrounds and most are unfamiliar with the specific methods UX designers use. Observation allows learners to experience methods as they are used in real-world scenarios.

Once students learn a method and observe it in practice, they are ready to practice using the method in a real or simulated project. As Breuch and colleagues (2001) found in their review of usability courses within technical and professional communication programs, experience with UX methods was a core component of all classes reviewed, despite varying degrees of available institutional support and resources, which are sometimes scant [22]. This finding speaks to the necessity of enabling students to practice UX methods even if this practice must be accomplished in a simulated situation.

The final component of UX pedagogy is play. Although practice allows learners to get a handle on the basics of a method, playing with that method in a safe environment allows them to make the method their own. Play is the final stage because it means that learners are ready to put their own spin on the method, not just practice what they have been taught. Play is where students begin to learn how the entire UX process fits together and how individual methods can be applied within this process in real situations.

In our experience, two of the most widely cited books at UX conferences in the context of introducing people to UX are Unger and Chandler's *A Project Guide to UX: For User Experience Designers in the Field or in the Making* [23] and Gray and colleagues' *Gamestorming: A Playbook for Innovators, Rulebreakers, and Changemakers* [24]. Each book posits experimentation and play as central to learning. Unger and Chandler provide learners with simple, fun exercises for trying out UX methods in low stakes situations. Gray and colleagues focus specifically on the linkages between fun and innovation by encouraging professionals of all stripes to "gamestorm" complex problems by turning the act of problem-solving into a game. A similar focus on play as a means of innovation is seen throughout industry-based literature on UX design [25]–[27].

To summarize: teaching UX means focusing on the UX process through the pedagogical components of orientation, observation, practice, and play. Next, we explore how to operationalize UX education through experiential education and apprenticeship.

Key Concept 3: Apprenticeship and the Importance of an Experiential Approach to UX Education   A clear focus on hands-on, experiential learning stands out within industry-based literature on UX education [23]–[27]. UX designers who train professionals in industry favor a workshop or boot camp model in which learners are introduced to key concepts and are then asked to put these concepts into practice [28]–[30]. Such a model makes sense in a context where professionals such as web developers, graphic designers, and marketing specialists wish to cross-train in UX to add new value to their organizational roles.

Experiential approaches to education are also nothing new to the field of technical and professional communication, however. Recently, the collection *Solving Problems in Technical Communication* codified a heuristic-based approach to problem solving in the field. As the editors of this collection claimed [31, p. 3]:

> Because there are always multiple ways to understand and solve problems in this field, technical communicators are constantly interpreting use situations and weighing possible responses. The solution to a problem in technical communication is never the only available solution, but one among several competing alternatives that balances issues on the development and use sides of the equation.

The claim that technical and professional communication is a heuristic-guided field dedicated to solving complex communication problems has been echoed in much of the literature on technical and professional communication education [32], [33]. Because of this focus on heuristic-guided problem solving, technical and professional communicators have differentiated a variety of approaches to experiential education, including role plays [35]; academic-industry partnerships [33], [36]; and service-learning [32], [34].

As a field similarly dedicated to solving complex communication problems, experiential education is also essential for learning UX. Within this context, we use the term "apprenticeship" to denote an important difference in our approach to UX

education, however. In academia, ensuring that students can learn actual UX design methods requires faculty who are knowledgeable in UX design methods, either because of their own research interests or because they have partnered with experienced designers in industry. It also requires assignments and courses solely devoted to UX design, and access to real-world design problems that students can use for practice.

It is also important to clarify the differences between experiential approaches to education, and apprenticeship, however. As Vihavainen and Luukkainen (2013) describe apprenticeship [37, p. 336],

> As learning happens in the context in which it takes place ... the students' activities should be organized around a set of realistic situations, where students are actively engaged with the knowledge they are constructing.

Apprenticeship means putting students in realistic situations—in other words, situations that at least mirror, if not replicate, the situations they will find beyond the classroom. In this way, an apprenticeship should:

- Involve actual problems that need to be solved that are common to UX
- Ask students to create actual UX deliverables
- Ask students to engage with best practices in UX

To put it simply: students must learn UX from someone who is versed in current UX best practices, a requirement that creates some complications for launching UX programs in higher education, where UX practitioners are scant. In our key lessons section, we explore means of deploying an experiential approach to UX education that introduces students to the UX process and encourages sound pedagogy, despite this apparent obstacle.

KEY LESSONS

This section will consider some of the practical lessons essential to developing UX education programs in academia. These key lessons are drawn from the understanding of UX education as grounded in the UX process, practice-based pedagogy, and apprenticeship that we have already defined. Our goal here is to explain how to justify UX education, to reflect on core competencies that UX education needs to address, to explore options for integrating UX education within academia, to provide tips for launching UX education programs,

and, finally, to reflect on barriers to launching such programs and ways that these barriers can be overcome.

Key Lesson 1: How to Justify the Addition of UX Education Though no industry-wide studies have been conducted that systematically describe the current need for UX designers, we know from existing industry-based research that UX designers who have been surveyed report high job satisfaction, say that they are diversely skilled and come from a wide array of professional backgrounds, and state that more design teams than ever before consider UX essential to what they do [1]–[3]. These claims are unsurprising because processes for creating digital products and services have grown increasingly complex as technologies and attendant user needs have also grown more complex. Also, many organizations, from businesses to hospitals, are now deploying digital access points for the products and services that they offer, access points that require optimal user experiences to function.

Within this environment, justifying the need for UX education in academia is a matter of demonstrating one or more of the following exigencies:

(1) The changing needs of employers
(2) New, attractive course offerings
(3) Improving the marketability of existing courses and programs

First, as the needs of employers change, programs in technical and professional communication and related fields must adapt or face obsolescence. If current market trends persist, candidates for positions ranging from IT manager to engineer will require familiarity with UX principles to land jobs. As more and more consumers look to digital products and services to perform everyday tasks, technical professionals of all stripes will need to support those experiences in myriad ways.

Next, course offerings in UX can be presented to department chairs and other administrators as a means to attract new students to existing programs. In our professional experience, many early-career professionals and students are hungry for training in UX. We have both been approached by scores of trainees and students who have heard about UX through blogs, trade journals, or professional associations, but have been unable to find course offerings in their universities. Though anecdotal, this experience indicates that courses in UX have good chances of filling if properly marketed (a strategy that we discuss in Key Lesson 3).

Finally, programs in technical and professional communication and related fields rely on their connections with industry realities. Our programs train new generations of usability specialists, technical writers, information architects, and other professionals. It is therefore important for our programs to stay current by growing as our industry counterparts grow. Our combined experience and research in UX indicate that this field will only grow in importance in the coming years as the use of mobile applications [15] and digital products that support the service economy [18] continue to grow.

Academic professionals would do well to use changing employer needs, the possibilities of attractive new courses, and the chance to improve the marketability of existing programs to justify the introduction of UX education. Such a move raises a new problem, however, as only academic professionals who have worked as UX practitioners in recent years will have direct experience in the UX process and all of the associated skill sets (though many academic professionals will have experience in one or more of these skill sets). Next, we discuss how academics can ensure that they are teaching core competencies important to contemporary UX design.

Key Lesson 2: The Core Competencies UX Education Needs to Address   As revealed through our literature review as well as our collective experience as UX practitioners and educators, the core competencies of UX today comprise all of the processes a product or service must go through to ensure that it meets the standards for a high-quality user experience [5, p. 47]. As also discussed before, however, the overall UX process is highly complex, and involves a range of older professional practices related to the design of effective digital products and services, including usability testing [7], information architecture [8], content strategy [9], user research [10], interaction design [11], and UI design [12].

Since the central outcome of the UX process is the design of a digital product or service, these practices can be thought of as subsets of the contemporary digital design process. Thus, the focus of UX is production. We therefore strongly encourage academic professionals invested in UX education to start with actual problems that their organizations are facing. Since it contains six technical skill sets, UX has a high competency threshold. Without the incentive of creating real impacts, it is difficult for students and other

stakeholders to understand its importance. Though theoretical approaches that introduce the core six skill sets associated with the UX process may help learners begin to conceptualize what UX is, to begin designing actual user experiences, rigorous practice must be at the center of all UX education endeavors.

And the need for UX is all around us. In academia, thousands of academic websites are unusable, have out-of-date content, and don't engage target audiences. In industry, thousands of digital products and services are rolled out each year without sufficient knowledge of user contexts and goals. Thus, there is often a necessity to build from the ground up. As long as UX learning and training opportunities meet the basic threshold for process, pedagogy, and apprenticeship, it is unlikely that leveraging such opportunities will harm organizations. More important, UX learning opportunities have the potential to help academic organizations improve customer satisfaction and business strategy, as well as to help them better fulfill their mission.

As mentioned in Key Lesson 1, however, academic professionals who lack direct experience in UX may struggle to meet these complex needs for students who want to learn UX. As a result, we recommend the following options for such professionals:

(1) Partner with UX professionals in industry
(2) Get involved in a UX professional association
(3) Dedicate a significant portion of their research and/or professional development time to practice in UX

First, academic professionals who lack direct experience in UX will benefit greatly from partnering with industry-based UX professionals. Such a partnership is the reason we are writing this tutorial, for example, but more important, it is the reason why Getto was able to teach his first full class in UX. Working with Beecher has revealed a wealth of best practices that Getto wouldn't have necessarily encountered through his own research into UX. Specifically, Beecher was willing to share his own pedagogy for a successful, industry-based UX apprenticeship program, a pedagogy Getto was able to successfully adapt to his own context within academia.

As for building such partnerships, we recommend that academic professionals reach out to UX professional associations to find a willing partner. Three such associations we recommend are the Interaction Design Association (IxDA, ixda.org), the

User Experience Professionals Association (UXPA, uxpa.org), and the Information Architecture Institute (iainstitute.org). These associations are populated with UX professionals, some of whom might be interested in partnerships with academic professionals. Their websites are also hubs for literature on best practices in UX. Many of these associations also include local chapters that are affordable to join and that host local events, such as meet ups, workshops, and conferences.

Finally, dedicated time researching and practicing UX skill sets can go a long way toward helping academic professionals become UX educators. Since time is often at a premium for such professionals, however, we don't see this option as a prerequisite for teaching UX. As long as academic professionals are prepared to partner with members of industry or get involved with UX professional associations, they should be able to develop curricula that reflect the knowledge gleaned through these experiences.

At the same time, such professionals will need a curricular space to deploy such knowledge. Below, we reflect on one such space: the development of UX education within an existing academic program. For this option, we provide reflections on how academic professionals can create UX educational experiences grounded in sound process, pedagogy, and apprenticeship, as well as how they can market these experiences to prospective students.

Key Lesson 3: Options for Integrating UX Education into an Existing Program As mentioned previously, technical and professional communication scholars invested in introducing sound problem-solving strategies to their students have developed pedagogies that focus on role plays [35]; academic-industry partnerships [33], [36]; and service-learning [32], [34]. We find these pedagogies to be significant building blocks for integrating UX education into existing programs. Specifically:

(1) Role plays can help simulate orientation to and observation of UX methods, while also providing students with a place to play.
(2) Academic-industry partnerships can provide students with apprenticeship in UX methods.
(3) Service-learning can provide students with actual practice in UX methods.
(4) Innovations such as these can be leveraged through existing university channels to recruit new students to programs.

First, we don't want to create such a high threshold for UX education that academic professionals are afraid to launch new assignments, courses, and even programs in UX. For their first experience teaching UX, we recommend role plays as a means of introducing UX to students. Role plays involve teachers and students in innovative, collaborative exercises in core professionalization experiences within a given field [35, p. 148]. Such a pedagogy can be used to introduce students to a particular UX skill set and its attendant methods. Instructors can act as a design client in need of improved information architecture for a simulated product or service, for instance. Or they can act as a UX lead or manager by asking students to perform usability testing on an existing website or mobile application. Such assignments are particularly useful at the beginning of a UX course, or in a course that informs UX, such as a course in web design, technical writing, or business communication.

Next, besides providing academic professionals with access to core knowledge in contemporary UX competencies, academic-industry partnerships provide students with opportunities for advanced apprenticeship [36, p. 254]. This apprenticeship can take the form of high-impact internships that give students actual experience in UX, informal mentorships, or full-blown apprenticeship programs in which the goal is to hire students at the end of the program.

It is thus no surprise that all three of the well-developed academic UX program websites we reviewed feature some form of an apprenticeship component. University of Washington's program in Human Centered Design & Engineering (HCDE, hcde.washington.edu), for instance, has developed a Corporate Affiliates Program (CAP). HCDE's CAP offers industry organizations the chance to partner with them by providing access to student and alumni resumes, by allowing partners to post job openings and internships for free on a program-affiliated job search website, and by displaying a company logo and short bio on their program's website, as well as additional services [38]. Kent State University's master of science in information architecture and knowledge management (iakm.kent.edu) provides students with a free webinar series called UXconnect that invites industry speakers to submit webinars on UX-related topics [39]. Bentley University's masters in human factors in information design (bentley.edu/graduate/ms-programs/hfid) has gone even further by building a user experience center in which industry-based practitioners do hands-on research with students for actual clients [40].

If high-impact academic-industry partnerships are not available or feasible, service-learning partnerships can provide students with actual practice in UX methods. In Getto's graduate course in UX design, for instance, students learn and practice UX methods by working to improve a university-based website or other internal application [41]. In this way, Getto has attempted to compensate for a financially austere climate at his own institution that prevents innovative industry partnerships by translating the knowledge gleaned from Beecher into actual UX projects that improve the digital presence of his institution.

Innovations such as these can be leveraged through existing university channels to recruit new students to programs. Events like open houses, career fairs, and faculty meet-and-greets can be utilized to advertise courses and apprenticeship opportunities in UX to prospective students. On the other hand, Getto has been successful at recruiting students to his courses by personally reaching out to existing MA and certificate students in his program who have demonstrated an interest in a topic related to UX (such as digital rhetoric, usability, or accessibility). He is also currently working to get his UX course cross-listed with other programs to ensure its sustainability.

Next, we reflect on the logical next step for UX education within academia: launching stand-alone programs. A thrilling but challenging endeavor, creating stand-alone programs in UX carries with it a variety of risks and rewards, including the risk of launching a program prematurely and the reward of developing an innovative UX education program that trains future generations of designers.

Key Lesson 4: Options for Launching Stand-Alone UX Education Programs   Since we were unable to locate any literature on launching stand-alone academic UX programs, we rely here solely on our professional experiences as UX educators, but also use our developing model for UX education as a lens, including information gleaned from the three UX program websites we reviewed. In this way, we see three possibilities for UX programs in higher education:

(1) Undergraduate majors and minors
(2) Master's degrees
(3) Postgraduate certificates

Next, we weigh the risks and rewards of each type of program based on our developing model for UX education.

First, undergraduate programs in UX promise to provide students with exposure to UX best practices at an early stage of career development. Anecdotally, the overwhelming majority of UX practitioners we personally know don't have degrees in UX. Many of them were educated before UX emerged as a stand-alone field, but this fact also indicates that academia has an opportunity to provide a new generation of professionals with experience in this emerging field. At the same time, as an emerging field, UX can be difficult to translate into existing disciplines. It doesn't lie wholly within technical and professional communication, information technology, business, engineering, or any other single discipline. As a matter of fact, it tends to span many of these disciplines holistically, drawing strengths from each of them.

Drawing on our reviews of three UX programs, we see this interdisciplinary focus clearly. In contrast, however, all of these programs seem to also anchor themselves within a cluster of specific disciplines. University of Washington's HCDE is clearly linked to several engineering disciplines, as it is located within a college of engineering [41]. Bentley's program "emphasizes the strategic role of UX in business by enhancing an organization's competitive advantage," as it is located in a graduate-level business program [42]. Upon close inspection, we can see that Kent State's MS in information architecture and knowledge management features a concentration in user experience design but is closely linked to the discipline of library science [43].

The lesson from this limited sample seems to be that interdisciplinarity *and* a solid anchoring in one or more home disciplines is key to launching a stand-alone UX program. Returning to our earlier point regarding undergraduate degrees in UX, this phenomenon could be a possible explanation for why two out of the three programs we reviewed feature UX programs only at the graduate level. Interdisciplinary undergraduate programs can be difficult to sustain, but graduate programs can often draw from a wide variety of disciplines at the same time that they are anchored to one specific discipline.

In academia, this point is largely a result of institutional structure: graduate programs can be housed almost anywhere within the graduate school or college they are part of, while undergraduate programs are almost always housed in a specific department. These limited findings certainly don't indicate that undergraduate UX programs are unworkable structures but simply

that there may be more challenges to developing such programs.

Finally, postgraduate certificates seem like the low-hanging fruit within the three programs we reviewed: all three have such a certificate. Bentley's is even offered in tandem with a week-long summer boot camp that can be counted toward coursework in the certificate [44]. Within academic settings, postgraduate certificates essentially function as minors do in the undergraduate realm: they provide in-depth experience in a particular topic area while not committing an institution to a full program in that area. In this sense, they seem like an ideal starting place for developing a UX program at the graduate level.

As mentioned previously, our review of three well-developed academic UX programs clearly reveals that they keep close ties with their industry counterparts. Is this a necessity for developing a UX program? Based on our model of UX education, we would say that it is. At the core of our model is a pedagogy that provides students with actual practice in UX, practice that must align with core competencies used by actual UX practitioners in industry. We know of no way to build a program centered on such an industry-focused field without developing close partnerships with members of industry.

As we explore next in our final key lesson, these partnerships are simply too valuable for UX educators to attempt the educational endeavor without them. More so, they help mitigate several of the barriers to UX education in academia, which are significant.

Key Lesson 5: Barriers to UX Education and How to Overcome Them   In academic settings, where institutional structures tend to place knowledge into disciplines, departments, and other units, UX education must fit into existing structures if it is to get a foothold. Fitting in might include developing one or more curricular spaces in which UX education programs can flourish. These spaces might include developing assignments within existing classes, developing new courses, or developing new majors, minors, postgraduate certificates, or master's degrees.

The main barriers to developing such spaces in higher education are topics we have already touched on:

(1) Lack of sufficient expertise in core UX competencies
(2) The risks associated with launching any new curricular endeavor within academia
(3) The difficulty of finding a disciplinary home for an inherently interdisciplinary field

Next, we reflect on some ways to overcome these barriers.

First, lack of sufficient expertise can be overcome through developing partnerships with industry. As we have already mentioned, such partnerships are a must for UX to flourish in academia, where disciplinary structures can make launching new programs difficult. This is not to say that sufficient training in UX competencies is always easy to come by, nor that partnerships with UX professionals are available to all academic professionals. The largest concentrations of UX jobs tend to follow technology hubs, many of which are located in major metropolitan areas. Academic professionals at rural campuses or sparsely populated areas might struggle to find local chapters of UX associations. In this case, academic professionals will need to rely on their own ingenuity and will have to acquire skills in UX if they want to create such a program. However, it is also possible to utilize social media and forums on UX professional association websites to build partnerships. Neither Getto nor Beecher have ever lived in the same region, though they have met up at UX conferences and have corresponded often using social media and email.

Partnerships with industry can also go beyond apprenticeship and service-learning models into deeper collaboration between these realms. Industry advisory boards are becoming a must for academic programs that want to keep close ties to industry. Some institutions, such as Bentley University, have even gone so far as to hire industry-based UX professionals as teachers for their courses.

This trend also ties into what we mentioned earlier regarding justifying UX education. In programs that are clearly tied to industry outcomes, as programs in technical and professional communication and related fields clearly are, the dual promise of preparing students for in-demand jobs and increasing the marketability of degrees can be leveraged to overcome this hurdle. Some institutions, such as Getto's, may simply be averse to the associated risks of launching a new program. For them, demonstrations of job demand and marketability might be insufficient justifications for

launching a stand-alone program. In this case, we recommend creating individual courses in UX. If even that is impossible, special topics courses or even individual assignments within existing courses can be leveraged to teach elements of UX. Given the apparent demand for UX, some training in its associated skill sets is no doubt better than no training at all.

Finally, it can be difficult to identify a specific location for UX within the modern university, an institution that tends to break skill sets into distinct disciplines. To deal with this obstacle, we recommend following the best practice of the UX programs that we reviewed: locating UX within a home discipline or cluster of disciplines that are already supported within the institution. Because UX is inherently multidisciplinary, it can be adapted to fit almost any discipline that deals with communication, technology, design, or psychology. Courses cross-listed with other majors can also be leveraged to help fill gaps in a burgeoning UX curriculum.

Finally, we close our argument by reflecting on implications for practice for developing UX education programs in academia. Essentially, UX education is at a critical juncture in its development within academia: though we are seeing stand-alone programs begin to arise, such as the three we reviewed, there simply aren't enough programs to meet existing student demand. As a result, there is an enormous opportunity for academic professionals within technical and professional communication and related fields to become leaders in developing UX education programs.

IMPLICATIONS FOR PRACTICE

UX education within academia is a difficult endeavor to undertake, but a necessary one. The market for UX professionals is very large right now and shows no signs of slowing anytime soon. If anything, influencers in UX are predicting an increase in demand for designers who are user-centered, creative, and able to work with a wide variety of people and cultures. If this demand is legitimate, and we believe that it is, then academic professionals of all stripes have an obligation to contribute to the training of students in this emerging field.

We consider this tutorial the start of a necessary conversation about how scholars and practitioners of UX can respond to this need. We hope that we have provided some resources and tools, and sparked interest in creating UX education programs. From developing full-fledged, apprentice-style partnerships with industry professionals, to role playing UX relationships within existing courses, opportunities abound for academics in technical and professional communication and related fields to take the lead in efforts to train new UX designers.

Though several programs in technical and professional communication and related fields feature learning modules, entire classes, or even certificates in UX or usability, little to no pedagogical literature exists to guide instructors in how to teach this subject matter. Industry professionals are similarly left to fend for themselves when it comes to designing apprenticeship programs and other learning opportunities that successfully train new UX designers. Additional pedagogical literature on UX education stands to serve both these audiences, then: such literature can help academic professionals develop new programs in UX and can help industry professionals develop new learning opportunities for training apprentices.

Besides encouraging those who are already teaching and training UX designers to contribute more literature on this topic, we also encourage those interested in UX to take the leap into education in this field. As we hope that we have demonstrated, the necessary elements of a successful UX education—attention to the UX process, sound UX pedagogy, apprenticeship, and curriculum planning—necessitate a willingness to try new things and even to fail. Neither of the authors of this tutorial became proficient UX educators overnight. We have both created many iterations of UX learning opportunities over the years, some more successful than others. We have learned as much from our failures at UX education as we have from our successes.

Partnering with members of industry is also not without its challenges. The goals and priorities of academic and industry-based organizations often strongly diverge. Academia's main mission is education and societal contribution, while industry must generate revenue to survive. At the same time, there is much common ground between these two endeavors. Industry suffers when it has to train its own workforce. By partnering with academics, UX designers assure that they will not have to train the next generation of UX professionals on their own.

Academic institutions also often have very different policies than industry-based organizations. Protections against disclosing student information within academia can make it difficult to involve third-party organizations. The development of patentable designs and other forms of proprietary intellectual property can make it difficult to apprentice students within industry-based organizations. As a result, academic organizations need to form sustainable, mutually beneficial relationships with industry. Both parties need to reach a common ground that protects students and stakeholders from harm in their development of service-learning opportunities, industry advisory boards, and recruitment networks.

More than anything, we wish to encourage additional collaboration between academia and industry around UX education. For those in academia, thousands of UX practitioners in industry exist who might lend a hand to the design of new assignments, courses, and stand-alone programs in UX. For those in industry, thousands of academics in technical and professional communication and related fields could bring a wealth of educational knowledge to the design of new industry training programs. There is thus great opportunity—opportunity that far outweighs associated risks—for working together to help train the next UX generation.

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