Evolution of Design Competence in UX Practice

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ABSTRACT

There has been increasing interest in the adoption of UX within corporate environments, and what competencies translate into effective UX design. This paper addresses the space between pedagogy and UX practice through the lens of competence, with the goal of understanding how students are initiated into the practice community, how their perception of competence shifts over time, and what factors influence this shift. A 12-week longitudinal data collection, including surveys and interviews, documents this shift, with participants beginning internships and full-time positions in UX. Students and early professionals were asked to assess their level of competence and factors that influenced competence. A co-construction of identity between the designer and their environment is proposed, with a variety of factors relating to tool and representational knowledge, complexity, and corporate culture influencing perceptions of competence in UX over time. Opportunities for future research, particularly in building an understanding of competency in UX based on this preliminary framing of early UX practice are addressed.

Author Keywords

Competence; UX practice; design capability; expertise; identity.

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION

In the past decade, there has been a dramatic shift in the adoption of UX practices in a variety of industries, an increasing need for qualified job candidates, and an expansion of programs to train interaction designers and user researchers. In parallel, curricula in interaction design has changed to a studio model of education in a number of in-

stitutions in order to accurately reflect the workplace where students will practice. This study presents the complexity of this expanding space as UX students are initiated into the professional design community as a rich area for future HCI research. The contributions of this work address how interaction design students translate their educational experience into the workplace; and more broadly, how the competencies of a UX designer change or adapt over time in relation to a specific design environment.

While there has been some attempt to document competencies of usability engineers and other practitioners within the HCI domain over the past two decades, these have been limited to documentations of specific practices, and have often been constrained to one or two companies [e.g., 2, 4, 7, 14, 22]. In this exploratory work, a broader range of companies are included in a 12-week longitudinal study, with the goal of understanding the critical first three months of practice as interaction design students transition into jobs or internships in the UX field. Over these three months, we asked interns and early practitioners (EPs) to document perceptions of their competence, both individually and in relation to their work environment. Through this study, we begin to address the issue of competence in UX, both as a concept that spans the discipline and is related to professional practice and preparatory pedagogy, and as a personally situated construct that is co-constructed over time through the relationship of a UX designer to their organization.

Within this framing, the contribution of this work includes three primary elements: 1) Documenting the shifts in competence as interaction design students take their first jobs or internships in a variety of corporate settings; 2) Understanding more fully how a beginning designer co-constructs their identity in reaction to the organization they work for, especially in regard to their competence; and 3) Beginning an exploration into the factors that affect the development of competence for UX practitioners, which may eventually lead to a fuller understanding of what UX competence should include in a more general sense.

REVIEW OF LITERATURE

To address the issue of competence, both in the framing of UX and as it exists as a concept within the broader design literature, several main issues will be introduced in this review of literature. These include nascent definitions of competence that already exist in the HCI literature linked to

broader constructions of competence in the workplace; a linkage of competence with an overall development of design capability or ability to engage in design thinking; and how a deeper look at practical knowledge helps us understand how academic notions of competence might be translated into the everyday work of a UX practitioner. While significant research has occurred in this area, there are fragments of knowledge across a wide range of fields, complicating the process of synthesis and extension into UX; this review of literature seeks to address the range of research being carried out in this area, with implications for how we view competence in an emergent sense in HCI.

What is competence?

There are a wide range of views on what competence is or should be, and how this concept might apply to educational and professional settings. In this review, literature is synthesized across multiple domains of research and theory, including practical knowledge, expertise, learning and increase in ability, and as a complex system of ability or skills enacted in a performative sense.

As a System of Abilities Applied in Context

In a general sense, competence is defined as "a roughly specialized system of abilities, proficiencies, or skills that are necessary or sufficient to reach a specific goal [that] can be applied to individual dispositions or to the distribution of such dispositions within a social group or an institution" [33]. Expanding on the role of place and context, Rychen and Salganik [25] define competence as "the ability to successfully meet complex demands in a particular context through the mobilization of psychosocial prerequisites [... where the] primary focus is on the results the individual achieves through an action, choice, or way of behaving, with respect to the demands [... of] a particular professional position, social role, or personal project." In these broad definitions we see the relationship of an individual to a specific context in which the individual *performs* using cognitive and non-cognitive skills, abilities, or judgments.

As a Designer

When viewing competence in this systemic way, there are important linkages between a holistic sense of competence, a cataloguing of *key competence* that might be desirable in a given discipline, and an overarching *metacompetence* that allows for awareness of one's own actions and the ability to introspect. *Metacompetence* appears to link most strongly with literature on design competence, including a focus on reflection [26] and active internalized and externalized communication. Donald Schön's [26] seminal work on reflective practice has been adopted widely in design education and practice, with an emphasis on reflecting in a dialogic way with specific design situations ("reflection-in-action") as well as reflecting in an intentional, metacognitive way after designing ("reflection-on-action").

In engineering design, a number of taxonomies of competence have been proposed, including: broad multidisciplinary frameworks comprised of skills, abilities, and metacognitive dimensions of behavior (visions and concepts, design methods, tools and materials, user and actor perspectives, versatility, design theory and research, and continuous competence development) [13], holistic competencies around generic capacities (capabilities, attitude, knowledge, skills, and experiences) [14], and systemic views of design (analysis and interpretation of context, development of the system, representation and communication of the system) [19]. Arvola and Artman [1] have also taken preliminary steps to explore competencies of interaction designers in the context of an educational environment, concluding that communication is as important as technical skill in the development and expression of professional competence. This *digital design competence* moves beyond technical skill or use of specific methods or tools to "learning the communicative practices of design work by mastering the articulation of envisioned future use" [1].

As Expertise

In design, most attention is paid to the study of expertise either as conflated with competence in a theoretical sense [20], or as the development of design ability through increasing levels of expertise [8]. Cross [7] considers the application of expertise in the domain of design, noting several key elements of "expert" practitioners: 1) the use of problem decomposing strategies, 2) exposure to large numbers of exemplars in a particular domain (e.g., Schön's [26] repertoire, Lawson's [18] schemata, gambits, and precedent), and 3) a solution-focused rather than problem-focused orientation. Dorst [8] has also addressed the issue of competence in design through the lens of expertise, utilizing and extending the Dreyfus model of expertise [9] into a set of seven stages of expertise, moving from naïve to visionary.

As Learnable and Teachable

While some competencies, particularly those bound to intelligence or cognitive ability, are inborn, most competencies are "learnable and teachable" [25]. Trier [31] points out the importance of both formal education and the growth of the knowledge economy as factors in understanding the development of competence over time. This underscores the need for formal educational systems to build baseline competencies, often independent of a specific career path or domain of use [3,16,31], but also the need for "professional training and education [...] as a process that continues throughout life" [31]. This process is generally self-led within a domain of individual interest, and results in what we readily recognize as an experienced practitioner; these practitioners often seem to automatically draw on tacit knowledge to make quick, yet reasoned, judgments [7,18,20,23,32].

Competence in HCI

While competence has been addressed to some degree in the HCI literature, research has generally focused on highly

situated elements of UX practice in particular organizations, or through the lens of particular practices (e.g., participatory design). The CHI community has shown interest in this area through panels and workshops [e.g., 10,11,21,30], but relatively little formalized literature addressing design competence in UX exists. Most examples draw on competencies from an organizational lens, such as: Buur and Bødker [6] in a reframing of usability work, evaluation of design processes at B&O [3], cooperative design in a Scandinavian company [4], or management practices around UX adoption at Microsoft [29]. Despite this range of work, no definitive set of UX competencies has been proposed.

HCI Pedagogy

In positioning this paper, it is crucial to note the impact of the formal pedagogical process in preparing students for work in HCI-related disciplines, UX in particular. In the past two decades, changes to pedagogy have addressed the rigor and applicability of education in HCI to practice, most notably including use of the studio model of education [1,15,17,24]. The goal of these environments is to encourage the development of design thinking, introducing students to the reality of the discipline through active project work, collaboration, and use of HCI methods and technology. As Brandt, et al. [5] have theorized, the studio can be seen as a "bridge" that links the professional and academic communities of practice, and in this way, students are able to work in an environment that links them to their academic context, while also projecting their developing identities toward their eventual professional role. Additional work in this framing has addressed how students develop in a studio-based HCI program, including the kinds of barriers they have to address to reach competence [27], connections between technical skill and communication of concepts [1], and additional factors that affect their individual development of a designerly identity [12].

PURPOSE OF RESEARCH

The intent of this paper is to explore how students become UX practitioners, and the competencies that surround the success of this evolution in the identity of an individual designer. While students and practitioners have been studied in isolation, the transition between these two roles and the process of *becoming* that the student goes through in this transition have not been adequately discussed. While many studies have chosen to address competence from the lens of the workplace or through the perspective of a particular desirable method, this study focuses on assessments of competence by an individual designer. To target this perspective more powerfully, the participants for this study are recruited to represent the liminal space between formal educational preparation and UX practice, documenting the initiation of these participants into the UX community.

This process of *becoming* through the lens of competence is an especially important question to answer as we consider how we are currently preparing students for practice in UX settings. It is important to validate the education students are being provided, ensuring that it aligns with the realities of practice as UX adoption continues to spread. It is important to understand how designers are initiated into their work, and to assess whether the pedagogy is preparing them adequately to succeed.

RESEARCH APPROACH

This study relies on a longitudinal survey instrument with follow-up interviews for triangulation of data and increased thickness of detail. This method allowed the researchers to capture changes in the perceptions of competence over time in a relatively granular way, using the interviews to gain a greater understanding of the overall experience of the designer in relation to their perceptions of competence. This data collection was situated in a larger ethnographic study, which drew on a superset of this study population.

The 11 participants for this study were first (6) and second (5) year HCI students in a residential Master's program in a large Midwestern university. These students were recruited through an email solicitation, and both graduating students taking their first UX job and first year students completing an internship over the summer were solicited and recruited into the study. 10 of the 11 participants completed the data collection period.

Data Collection

Two primary methods of data collection were used in this study: weekly surveys and monthly interviews. All participants were requested to complete an online survey for 12 weeks, starting after the first week of their new job or internship. For internships, the data collection period covered the entire internship. The survey instrument included quantitative questions tracking their perceived level of competence, and asked the participants how that competence was applied in terms of design activity, critique, sharing of knowledge, and learning skills on the job through open ended questions. The following two ordinal questions were asked of the participants each week, with a 1 to 10 rating scale: 1) How competent do you feel as a UX designer? and 2) How competent do you feel as a UX designer as compared to your work colleagues?

In addition to the weekly surveys, an interview was requested at one-month intervals. This allowed the researchers to triangulate this thicker record with the survey results, resulting in a more complete picture of each student/practitioner's experience. These interviews also allowed for the researcher to identify potential causative agents in the overall rankings of competence, and check them with the student/practitioner for relevance. During the final interview, students were shown their survey results as a trend line and asked whether this agreed with their job or internship experience during the collection period.

Theme	Description
tool / representational knowledge	Use or description of tools that allow a designer to share their work with others. These could be digital or analog, created as deliverables or as representations of a design to generate a response.
dealing with complexity	Externalization of the amount of work expected in the designer's work environment—either in quantity or scope. Issues surrounding time management or processes relating to work practices.
vocabulary / language / communication	Reference to contextually-relevant vocabulary (e.g., jargon), talking to non-UX designers, developers, or managers, or facilitating the communication process about a design or project.
design leadership	Showing initiative and leadership in relation to design or design thinking. This includes broader views of problem scoping/framing, drawing on the [20] conception of being a design leader.
internal / external up-skilling	Learning new skills inside or outside of the organization, or the sharing of attained skills or knowledge with coworkers.
reconciling corporate reality/culture	Perception of the culture of the designer's work environment, and how that constrains or shapes their work practices, expectations of quality, or scope of projects.
designerly identity	The development and evolution of a personal identity in relation to design practice, including change/adaptation to a work environment, or a push/pull of identity from the corporate culture.

Table 1: Emergent themes used to analyze survey data.

ANALYSIS

Quantitative analysis of the measures of competence was performed to document shifts in competence over time, and then expanded through thematic analysis to explain the quantitative results more fully. A total of 111 survey responses were collected from 11 participants, and 23 interviews were conducted with 10 participants. Five participants completed all 12 surveys in a timely manner, while the remaining participants completed 7 to 11 surveys during the 12-week data collection period. Out of the 10 participants that completed the data collection period, six completed all three interviews, one participants participated in a two interview, and three participated in two interviews.

All ordinal data were plotted on a scatterplot to analyze how the trend for each individual changed over time. Because a clear definition of competence was not provided to the participants, analysis of an individual's trend line over time was the focus, rather than a comparison of quantitative rankings between participants.

Once the initial trend lines of competence rankings were completed, an analysis of the remaining open-ended survey results began. This process included a close reading of all survey data by two researchers. A set of emergent themes were identified, drawing from emergent themes in the close reading and elements of competence indicated by the literature. This emergent set of themes (Table 1) was then comprehensively applied to the entire corpus of survey data in a non-exclusive manner, yielding 628 excerpts with an average of 1.66 codes applied per excerpt.

After this analysis, a second researcher validated the theme application, reviewing all excerpts and code application. Any discrepancies were resolved through discussion with the primary researcher. Interview data was used to triangu-late responses and resolve any issues in ascertaining meaning or relevance.

RESULTS

We first overview the kinds of companies the participants work in, as either full time employees or interns, and the array of UX contexts these companies represent. We then discuss participant perceptions of competence over time, and the shifts that resulted.

Types of Participants/Companies

Participants represented a range of company size, from small to multinational, and with the exception of one company in Scandinavia, all jobs and internships were located in the United States. Sectors included technology, energy, travel services, healthcare, digital agency, and management consulting. All positions were the equivalent of an entry-level position, but there were a broad range of job expectations: from a UX leadership role in several internships and jobs to a more supportive relationship in existing departments. Two of the participants worked on NSF funded research with a UX component, spanning both product development and writing. A range of UX adoption existed in the 10 represented companies, with some hiring UX talent as interns in groups that did not have a history of UX presence—what we refer to as "low UX" environments. Most internships and jobs were in this context, with little mentoring or senior UX professionals available. There were also two positions where the existing management framework included individuals with significant UX competence.

Perceptions of Competence

The participant's perception of competence was not static over the reporting period. In contrast, the weekly surveys revealed a turbulent change over time with large dips and increases in ranking over a single week. This rapid change

in self-assessed competence was shared by both interns and EPs, although there was some difference in the kinds of shifts that took place and at what point in the reporting period. It is important to note that no definition of competence was provided to the participants to aid their self-assessment on a 1-10 scale. Therefore, no comparisons can directly be made between them, but because each trend line is completed by the same participant these trend lines can be compared as a whole, including analysis of shifts and the relative location of these shifts.

Interns
Many of the five participants interning at various organizations in a UX capacity shared a similar cycle of self-assessed competence: they began a moderate level of competence at the outset which grew over time as their comfort with the position and their responsibilities increased (Figure 1). While their assessment of individual competence leveled off near the end of the three-month reporting period, almost every intern experienced some "drop" or crisis between weeks five and nine. Compared to individual assessments of competence, the participants assessment of competence as compared to their colleagues and their assessment of the helpfulness of their education to everyday tasks were more stable overall, with steady gains over time in most cases. In almost every case, the participants ended with approximately the level of self-reported competence with which they began, although as revealed in the open-ended responses, this does not indicate that little or no growth in competence took place. This merely represented a "raising of the bar," where the participants gained a better sense of what competence in professional practice included.
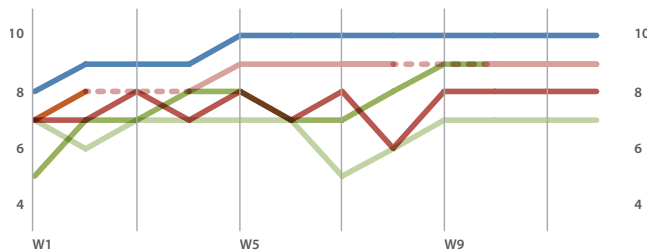

Figure 1: Individual competence of interns over time.

Early Practitioners
The five participants entering a full-time UX position generally shared a more chaotic path in their perception of individual competence, especially in the middle to end of the reporting period. Many of these participants ended the reporting period with roughly the same reported level of individual competence (Figure 2) and competence in relation to their colleagues, but the more chaotic transition period in the second month represents a promising area for further study. As with the interns, EPs had to rapidly adjust their expectations of what competence included in their position, even though all of these participants had taken part in internships similar to the other participants in this study.
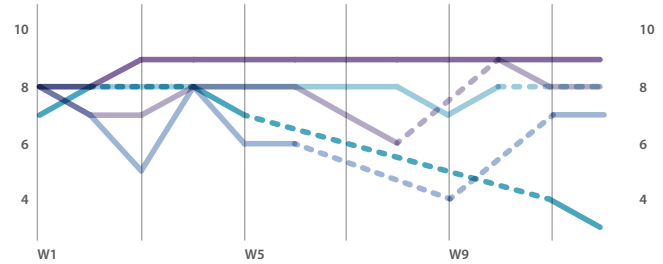

Figure 2: Individual competence of professionals over time.

Issues with Self-Reporting
Perceptions of competence are always grounded in a personal understanding of what competence includes. This perception was strongly influenced by the kind of UX environment the interns or EPs worked in, and reflected the relative amount of mentorship available in many cases. Interns were more likely to work in a "low UX" environment where they had little mentorship in matters relating to UX, and some of these participants consistently ranked themselves highly in terms of competence, while their peers in environments with higher UX competence seemed to rank themselves lower. Additional research is needed to ascertain whether the UX competence of an organization is a causal agent in personal assessment of competence.

Another issue in the reporting of competence is the directionality or object of comparison. Most participants ranked themselves against their immediate colleagues, interns or junior level UX designers, with only a minority mentioning higher management. This difference in level of comparison also affected the overall results. When asked in the exit interview to rank their competence against an experienced UX professional, most participants who had ranked themselves at the level of an 8-10 altered their assessment of individual competence to a 4 or 5. This indicates a more inclusive and consistent measurement of competence in relationship to others, which may be dependent on environmental, management, or educational factors.

Emergent Elements of Competence
Based on the thematic analysis of open-ended survey responses, guided by elements discussed in the literature, initial elements of competence addressed by participants in the context of UX practice can be constructed. Most of these themes are not unique to UX, but emerged in a categorical way as primary considerations for early career designers. Much of these themes revolve around the specificity of the individual corporate environment in which design is carried out. This environment serves as a demarcator of experience, so while some practices are common or valued in one organization (e.g., tool use, design processes, types of deliverables, scope of work), they are not universal to UX practice. These broad themes are helpful to begin to address the diversity of practice, and understand how students from a single HCI design program co-constructed their identity within their work environment.

Tool/Representational Knowledge

Interns and EPs each began their positions with the expectation that most of their work would rely on good software skills in prevailing wireframing and creative products; one EP noted "I think that getting a good proficiency in Photoshop, Balsamiq, and Axure will be necessary" (Week 1), while an intern expressed a need to gain skills wireframing, explaining "I have experience doing this, but I'd like to gain a lot more" (W1). These expectations of tool use grew in the early weeks of the job, and competence developed in a more integrative way, focusing more on depth than breadth. One EP reflected on the learning of tool skills on an as-needed basis, explaining: "we weren't ever really taught how to use 'this feature' or 'that feature' in the products that we used. This is something you just have to learn from day to day" (W3).

As interns and EPs were enculturated by their workplaces and their competence stabilized, an increasing focus was placed on analog skills for representation, rather than just software tools. One intern related her experience learning about "internal sketch style and research sharing formats" including "a technique for idea/sketch generation from the Basel School for Design [...] which involves creating many iterations of a highly constrained thing in order to come up with surprising stuff" (W6). Comparisons in tool and representational skill also developed over time, especially around representations by visual designers; one EP related: "I found that even though I have had adequate sketching skill, my visual design peers are really good at articulating ideas rapidly and with extreme depth" (W6).

Ultimately, these participants grew to think about tools and representational systems in a different way, not constrained by prevailing notions of "correct use." This included a much more substantial component of individual design judgment and pragmatism: "I've learned to stop worrying about what software I'm using and leverage what I know" (Intern, W7).

Dealing with Complexity

Virtually all participants reported a need to intellectually and experientially deal with the demands of their work environment, either in the scope of work expected, the deadlines or time pressures of design, or the problem space and requirements of projects. Early on, the common refrain from many participants was similar to this EP: "I felt a little more overwhelmed with the scope of this project" (W2). While some participants had to deal with complexity in relation to scope, others dealt with complexity in a more collaborative sense; another EP relates their first experience working with new designers: "It. Was. Utter. Chaos. Here I'm talking about collaborative design. I stupidly didn't step forward to be a lead, so these incredibly green designers did, and it was a huge waste of time. Next time, I will volunteer myself. Most of the problems stem from poor project/time management." (W4).

For others, managing the multiple projects and responsibilities was a bigger issue, with one intern reflecting that "time management is a big skill I have yet to master. I think the small deadlines will help me balance my tasks out more." (W4). For EPs, while time management was still reported, the balancing of complexity dealt more with the shaping and scope of the overall projects or tasks. For one EP, "[t]he main difference I encounter in my job is that the goal and problem is not clearly identified. In school, projects had a clear problem space defined in the form of a brief. Although school projects still required reframing and narrowing of the space, work projects aren't even at that point." (W5). For another EP, the need for domain-specific knowledge was challenging: "The domain expertise I need for each project, at least this first one and I assume every subsequent one, is slow to acquire." (W8). Finally, many EPs were dealing with the realities of complex systems for the first time, "solving for some of the cases that are not so 'happy path' [...] They sort of test the limit of what our 'nice' designs do once they get thrown into a more complex and outlier situation. It's a lot about making a judgment call and keeping up with consistency." (W8).

Vocabulary/Language/Communication

Communication with others in the organization was one of the big challenges facing many of these participants, with industry-specific jargon or unfamiliar work processes often standing in the way. Early on, this could be almost crippling, with one intern noting their need "to continue to find the proper vocabulary to express my ideas" (W2), and another intern admitting their unfamiliarity with "polished, corporate speak" (W2). An EP dealt with this lack of vocabulary in a more blunt manner: "I ask a lot of questions and won't let a question go until it is explained in a cut-the-crap-and-big-words-say-what-you-really-mean manner. If I don't understand, I keep asking questions until someone can give examples or paint a picture." (W1).

Over time, participants found strategies to increase communication with others, including honing presentation skills and building arguments that are convincing for developers or stakeholders. One EP explained: "I've learned and am learning how to present to a massive corporation in a way that resonates with them." (W6); while another intern used "sketches and mockups [to] drive the discussion" (W8) with their team. Communicating with developers was a common struggle, with one EP noting the barrier of "learning how to 'talk to developers'" (W9) and another intern describing their strategy of "draw[ing] insights quickly from research [to] build a convincing argument for developers to get onboard" (W5).

Design Leadership

A common theme among almost all of the participants was the lack of understanding about what UX could "do" for an organization. Many interns were placed in positions without substantial UX talent or mentoring, and several EPs were

similarly serving in roles where they had minimal control over applying UX on a broad scale. An intern explains this frustration early in their experience, reflecting: "I am not sure my team knows what to do with me. I feel they recognize the need for UX, but in a way I have to tell them where I can help." (W2). Another intern struggled with "justifying the value of HCI and design" in a more general sense (W4).

Despite the organizational pushback that many participants experienced, they attempted to implement design processes in their respective organizations. An EP was able to lead in this area, demonstrating his "ability to think about systems, articulate rationale, and lead project teams to success" with "numerous people com[ing] up to [him] asking for advice about leading teams, from interns to professionals" (W6). Although there were some stories of leadership around design processes, another EP was more constrained, "find[ing] himself making things and not knowing why other than 'he/she/it told me to do it'" (W9). Ultimately, leadership in design and UX on an organizational level was highly situated and politically charged, and participants had differing levels of success in producing change.

Internal/External Upskilling
Participants readily assumed roles of self-learning, drawing on the experiences of others in their team, while sharing their own skills. While these skills were often situated in UX, including sharing expertise around wireframing, presentation skills, or "func-specs," this also included knowledge specific to an individual, such as one intern's "engineering and knowledge of physical materials [in] a certain robotics-y project" (W2). There was also a nuance to how individual skills came to bear on a particular situation, with one EP evaluating their own presentation skills in relation to their colleagues: "It's not actually delivery that's their problem, it's that their contributions could be more insightful. I haven't actually said, 'hey, asshat, stop and think for a moment,' but I think people can learn by example, so I try to be thoughtful in my comments." (W2).

The participants appeared to be actively focused on acquiring skills they perceived would be of use, ranging from competitive analysis research to "soft skills" development to learning how to create an empathy map. One EP noted this acquisition process, explaining their need "to work toward absorbing more information from other teams as well as people on my team" (W9). Another EP projected their need for acquisition of skills in a more pragmatic sense, situated in their project development: "I need to NOT start from scratch as often [...] inventing only when absolutely necessary." (W11).

Reconciling Corporate Reality/Culture
This theme framed many of the participants' reflections on their development in competence and early experiences in a UX position. Their educational experience, in many cases, had not prepared them for the level of bureaucracy, limited control, and tight deadlines of practice, and participants had

to reconcile this with their personal approach to design. Two primary aspects of this reconciliation with corporate culture appeared to be evident: 1) learning about the corporate culture in order to engage it more effectively, and 2) adjusting their expectations to match reality.

Learning about the culture was an inevitable part of the transition process, and began in the first weeks, with one intern "starting to see the focus on the revenue" (W3) and an EP "adjusting to corporate hierarchy and learning the ladder of communication" (W4). Another intern dealt with specific issues in getting her user study approved: "I need to get acquainted with protocols and bureaucracy" (W3).

While most participants adapted to their new environment more willingly, others were more frustrated, like this intern: "The more I learn about the consulting business the less I like. My co-workers, namely those above me, guard their clients like bulldogs. I had to listen in on a client conversation and as a designer I felt I was coming into the project way too late. This seems to be typical." (W4). Others had to adjust to more menial parts of the process, such as the generally slower pace of work, or the movement from more "blue sky" to "laser focused" tasks. One EP explains this movement: "on a professional project, you get a list of requirements, try to follow *all* of them. In school, if you get a list of requirements, you can usually get away with following 1-2 of them really well. At work, you can attempt to do the same thing, but you have to show how the rest of the requirements fall into line. Also, if you pick the WRONG 1-2 requirements to follow, [...] it isn't a great move. The problem space isn't as wide open as it is at school." (W1).

Designerly Identity
As with the constant presence of the corporate culture, there was a constant sense in which the participants had to engage with their identity as a designer in a co-constructive manner with their environment. This played out in both positive and negative respects, with some participants struggling to adapt to their environments, and others deciding whether to or how to determine their value as a person through their work performance.

Some participants wrestled with basic work/life balance, such as: "will the bulk of my professional satisfaction [be located] in the workplace?" (EP, W2) or "want[ing] time to myself" (Intern, W6). Others noted the more positive aspects of their work: "It simply felt good to contribute to something." (EP, W2). One intern celebrated his individual skills in comparison to colleagues: "Some people are taken aback by my willingness to scrap and idea" (W11).

It seemed as if participants all had their own way of coping with their new work environment, with some worried about how others would see them—"I don't want to appear to not be a self-starter, and I don't want to eventually get overwhelmed if I take on too many projects." (EP, W2)—and others fighting for their approach: "We had a phone call with a client today. We were briefed before to only speak if

"teed" up to speak. That is such an abrasive thought for a HUMAN computer interaction designer. Where, the [Master's] program tells me to talk to all stakeholders." (Intern, W3).

DISCUSSION

The development and expression of competence by these participants over a relatively short period of time brings several issues relating to the development of competence to the foreground. Rather than being a static entity or documentable system, I propose that competence is more fluid and personally and organizationally situated, drawing on elements unique to the context of use [25,33], while also drawing equally on the unique contributions and life experiences of the individual designer. This fluidity appears to be especially relevant in a nascent discipline like UX.

Corporate Culture as the Center of Experience

[20] concludes that being a design leader involves being "in service"—exceeding the original expectations of the client or stakeholder. In these initiatory moves into UX practice, both interns and EPs were met with the realities of their own designerly identity and the culture of the organization in which they worked. In many cases, they were confronted with the question: Does being a good designer mean being or becoming a good design leader?

This leads us to a fuller discussion of identity development within an organization, and the role of the organization and underlying corporate culture—both as a push and pull—in shaping an individual's designerly identity. In this relatively brief reporting period, these participants—interns and EPs alike—demonstrated their ability to affect their organizational culture by introducing new UX practices, designerly ways of thinking, and design leadership. But at the same time, the organization and corporate culture also affected these designers in a deep way. They were forced to assess how their "blue sky" visions of design fit into complex, integrated systems, and how their effectiveness as a designer is situated within the larger bureaucracy. To succeed as a designer, most participants ended with the self-realization that they must understand the culture in which they work in order to produce lasting change.

Mentoring and upskilling as a UX designer is another dimension in which the corporate culture has a significant role. Based on the level of UX adoption and underlying mentoring resources, the culture can allow an individual designer to either expand their projected worth, or diminish their sense of designerly identity. The level of UX adoption is not deterministically bound to either condition, but is highly dependent on the co-construction of identity between the organization and the individual designer. For instance, a designer in an organization with high UX competence might feel diminished in their personal competence due to aspirational role models, while they might have an inflated sense of competence if they are the sole UX or designer force in the organization or working group. In contrast,

when a designer is out on their own, they must justify their existence in many cases, working to translate their work into empiricist or positivist arguments that can be accepted by developers or engineers. This requires great personal strength, and may result in greater competence than merely being mentored.

Descending Reliance on Tool Knowledge

As others have documented [28], tool knowledge is not bound to specific software, but rather to the judgment of the designer. While some participants innately knew this, they came into their work environments with the expectation that they would need specific software competencies in order to produce adequate representations for their projects. Many participants seemed surprised, however, by their ability to learn something new on the fly, often "picking up" a new skill in the course of a week. And as the weeks progressed, there was less stated reliance on knowing tools—especially software—and more focus on the ability to lead others in a communicative sense through representations to and understand the core of their design practice.

Many participants came into their organizations with the perception that they would need to know specific software, especially to produce digital wireframes or high fidelity prototypes. While some organizations relied on these representations, many UX positions relied more on analog or low fidelity methods of representation for buy-in, and in some instances, the creation of higher fidelity mockups using software diminished effectiveness and wasted time.

In a somewhat unusual turn, especially as dozens or hundreds of wireframing and visualization tools are available to designers, some organizations seemed more concerned with reinforcing the need for strong analog skills, particularly in sketching and rapid forms of representation. This competence was taught at a baseline level in the formal education of participants, but not to the level of proficiency some jobs required. These visual competencies, along with the related manual skills, were the most referenced skills needed on the job, yet the least addressed in formal curricula.

Self-Learning

The ability to direct self-learning appears to be a primary indicator for future growth in competence, yet it is only addressed by a few models of competence [13,31]. Participants addressed this need for increase in competence in a variety of ways—directed both on a holistic level (e.g., how UX should be addressed in this environment) and a highly tactical level (e.g., specific software tools, methods, or techniques). The literature does not substantially address how these individual acts of competence development fuel future growth, or the potential role of project work and practice experience.

Participants had to quickly make a transition from being "fed" content in a classroom setting to leading their own efforts to be a better or more competent UX practitioner.

While most participants came into their job with strong self-learning skills, others felt less confident and were surprised at how quickly they could "pick up" a new skill and execute with a relatively high degree of competence (e.g., patent drawings, marker sketches).

There is also a strong orientation among these participants towards taking on a variety of work, and learning along multiple dimensions at once. While some of this may be directed by the overarching corporate culture, some participants also took steps to increase the variety of their work on their own, pushing themselves to learn or execute in different ways (e.g., creation of podcasts, execution of a user study). There does seem to be some value in viewing proactive/reactive orientations in this regard, and additional work around the co-construction of competence is needed.

Implications for Pedagogy

The variety of experiences of these participants underscores the question for pedagogy: How do we prepare students for such a diversity of jobs? The role that the studio model of learning might play in developing this "studio bridge" between academic and practice communities has not been substantively explored, but must be addressed to understand not only what skills UX practitioners need, but also what types of identity formation *should* happen in education.

In particular, participants pointed out what an educational program "could not do." These included organizational skills, such as working with developers to execute on a design, types of professional communication around presenting and working with constraints, and the realities of both "blue sky" and more "laser focused" projects. Some participants seem to have been lured into thinking of their role in a strategic sense much too broadly and optimistically, and then were frustrated when they couldn't have as much impact as they desired. Thus, there seems to be an importance in building both optimism and pragmatism into a design curriculum: preparing students to be exceptional and aspirational, but also to embrace the culture and constraints of a particular organization. This also indicates the importance on the part of the pedagogy in directing students towards the kinds of UX jobs that match their personality and skillset—especially in a field as broad and diverse as HCI. This cannot be accomplished as only a technical match of competencies; an identity "fit" with an organization is equally important to the overall success of a new UX practitioner.

OPPORTUNITIES FOR FUTURE RESEARCH

This paper offers substantial contributions towards our understanding of competence in UX practice, but there are also limitations on generalizability relating to the population of students and EPs recruited as participants. Limitations include a relatively small sample size, somewhat mitigated through depth of data collection methods. There were also multiple instances of missing survey/interview data from some participants, which constrains our overall understanding of changes in competence over time for some in-

dividuals. Finally, there is a selection bias from students within this HCI Master's program—these 11 participants represent less than 15% of the student population, and are not necessarily fully representative of the entire student population. Additionally, these experiences are constrained to participants originating from a single HCI Master's program, which limits the generalizability of these findings to less design-focused HCI programs.

Despite these limitations, this study captured the responses of a wide range of individual experiences mediated by a substantial number of UX environments. Future work in this framing could increase our awareness of this diversity further, and as our expectations of what competence in UX includes solidifies, more consistent rankings could allow for a finer grained analysis of shifts in competence over time. There is a need for in-depth research on UX practice, which has not traditionally been a strong focus in the HCI community. This work allows us to address the diversity of UX practice through the framing of a developing UX designer's experience, allowing for additional understanding not only of work environments in which UX practice takes place, but also how individual competencies influence this role.

CONCLUSION

This exploratory research on the development and perception of competence by interns and EPs in UX underscores the importance of research on UX practice. The literature does not adequately address the competencies that result in successful UX practice, and the linkages between the academic and professional communities are not well explored.

This paper takes some first steps towards documenting how shifts in perception of competence take place as students are initiated into UX practice, including ways that these participants co-construct their identity in relation to the organization and corporate culture in which they work. A preliminary thematic analysis reveals some factors that might affect or contribute to this development and perception of competence over time, and points to promising areas for future research in the areas of tool development, the effect of corporate culture in shaping UX practice, the types of self-learning necessary for success, and the role of the pedagogy in developing students ideally suited for the diversity of UX practice. More research is needed in each of these areas to further frame activities in the practice community that lead to increasing levels of competence.

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