JUX Journal of User Experience

Vol. 17, Issue 4, August 2022 pp. 164-184

Program Stakeholders' Experience of a UX Graduate Training Program

Jin Kang
Postdoctoral Fellow
Carleton University
1125 Colonel By Drive
Ottawa, Ontario
Canada
jin.kang@carleton.ca

Audrey Girouard
Associate Professor
Carleton University
1125 Colonel By Drive
Ottawa, Ontario
Canada
audrey.girouard@carleton.ca

Abstract

Experiential learning techniques employed to teach human computer interaction and computing students about user experience (UX) fall into two categories: course-based project learning (industry/community research projects) or outside-of-course training (a UX consultancy). We sought to diversify the latter category by describing an independent UX training program called the Collaborative Learning of Usability Experiences (CLUE). CLUE has four training components: UX Internship, Workshops, Knowledge Transfer, and Short Courses. We evaluated the impact of CLUE on program graduate students, host organizations (industry/government partners who mentored students during UX Internships), and faculty. We conducted semi-structured interviews with 20 graduate students, 13 alumni, 20 industry/government partners, and 3 faculty. Responses were coded into themes; exemplar quotes are included in this article.

For graduate students and alumni, UX Internships advanced their career and skills, but successful internships required supportive program mentors and teams. For other training components, graduates wanted the program to balance topic breadth and relevance, build a community, and be flexible with program requirements. For industry and government partners, UX Internships had three benefits: tangible business gain, access to fresh ideas and energy, and access to skillful students to build a talent pipeline for future hiring. Industry/government partners wanted the program to engage in good communication and build personal connection with the program faculty. Faculty wanted the program to offer tangible benefits and opportunities to build professional networks. We provide practical recommendations on making a successful UX training program that can satisfy the needs of all program stakeholders.

Keywords

experiential learning, user experience, internship program, graduate students, human-computer interaction

Introduction

Many students in computing and Human-Computer Interaction (HCI) disciplines pursue careers in the field of user experience (UX) (Inal et al., 2020; Rosala & Krause, 2019). HCI researchers and practitioners build, design, and evaluate computer systems that support human activities by employing user-centered approaches (Hewett et al., 1992). Given the field's focus, students in HCI and computing disciplines receive fundamental training on UX and interaction design concepts, and they develop a natural curiosity towards careers in UX.

More and more HCI and computing educators are adopting experiential learning to equip students with UX skills and knowledge (Gray et al., 2020; Talone et al., 2017). There is a good reason behind its popularity. Some HCI and computing students, especially those who come from traditional computer science backgrounds, find HCI boring and commonsense (Edwards et al., 2006). Experiential learning can make learning engaging by placing students in an authentic learning environment. Popular types of experiential learning in HCI/UX education include applied research projects, industry/community partner research projects, and student-led UX consultancy (Kang et al., 2022).

In this study, we sought to diversify currently available experiential learning techniques by introducing an independent usability training program dedicated to HCI and computing graduate students, called the Collaborative Learning of Usability Experiences (CLUE). CLUE is unique. It has four training components, and each training component engages students as active (versus passive) participants following the assumptions of the experiential learning theory (Kolb, 2015). Training components are UX Internship, Workshops, Short Courses, and Knowledge Transfer; CLUE students are situated in their home degree program and simultaneously participate in the program over two years for master's students or four years for doctoral students.

Our research questions explored the impact of UX Internship components on industry and government partners and on graduates and alumni who participated as interns. Our questions also explored the impact of other program training components on students, and how the program can be improved for students, industry and government partners, and faculty. We conducted semi-structured interviews in the fall of 2021 with 20 current graduate students, 13 alumni, 20 industry and government partners, and 3 faculty. We analyzed their program experience through thematic analysis. Current graduate students and alumni who participated in the study completed the major components of CLUE at various time periods; 10 trainees completed remote UX Internships due to a global pandemic.

Our contributions include the following:

1. Our formal evaluation of a user experience training program involved major program stakeholders. To date, literature on UX education has examined the experience of students or industry and community partners (MacDonald & Rozaklis, 2017; Talone et al., 2017) but not faculty who are involved in student learning. Currently, the industry only provides a "how-to-guide" for creating a student-centric UX training program, as compared to a more desirable all stakeholder-centric UX training program.
2. The benefits and challenges of UX experiential learning are expanded upon specifically for a long-term usability training program. Prior work on UX experiential learning has focused on evaluating the experience of students' short-term involvement in UX experiential learning (Kabakova et al., 2021; MacDonald & Rozaklis, 2017).
3. Expectations are set for what usability practitioners should do to mentor HCI and computing graduate students for onsite and remote UX Internships. UX practitioners are involved in UX curriculum development and training in many ways (for instance, they serve as an industry board members) (Shalamova et al., 2021). Our work informs how practitioners can build and maintain positive industry-academic partnerships, as well as industry-student partnerships.
4. HCI educators are more empowered to choose to adopt the experiential learning technique that suits their needs and constraints if they must manage limited departmental support to create a standalone UX course.

Related Work

Experiential Learning Theory as a Pedagogical Framework

Experiential learning theory defines learning as the process transforming experience in a four-stage cycle (Kolb, 2015). This theory has been adopted by other HCI and computing educators to structure their courses (Chan, 2012; Leurs et al., 2011; Mahmoud & Nagy, 2009; Perera et al., 2009). The theory conceptualizes learning as the outcome of grasping and transforming experience in four learning stages: Concrete Experience, Abstract Conceptualization, Reflective Observation, and Active Experimentation.

During the Concrete Experience stage, students are exposed to new experiences felt through their senses. Experiences can be any hands-on activity or new information that engages students (new readings, problem sets, concrete examples, or videos) (Svinicki & Dixon, 1987). During the Reflective Observation stage, students process the new experience by reflecting on the experience. Some techniques to promote self-reflection include small group discussion and thought-provoking rhetorical questions. These reflective activities help students to take multiple perspectives on a given topic. During the Abstract Conceptualization stage, students deduce new hypotheses about the relationship between the new experience and existing concepts, with the goal of applying their hypotheses on solving new tasks (projects and case studies) during the Active Experimentation stage.

Need for Experiential Learning in HCI/UX Education

Experiential learning has several advantages over traditional teacher-centered teaching (Hui, 2020; Obrenović, 2012; Roldan et al., 2021; Talone et al., 2017). One indisputable advantage is its capacity to reduce the skill gap, which is a discrepancy between skills possessed or skills perceived important by new graduates versus the skills expected by employers in new graduates (Girouard & Kang, 2021; Radermacher & Walia, 2013).

Some evidence indicates a skill gap is apparent in HCI and computing students. Gonzalez et al. (2017) surveyed UX research professionals and graduate students who were interested in pursuing UX careers. The former group rated the frequency with which they had personally carried out 25 UX skills. The latter group rated the frequency with which they expected to be asked to carry out the same 25 skills. The researchers found that graduate students overestimated the skill frequency for more than half of the skills, including the frequency of conducting click testing, eye tracking, focus group, advanced programming, and basic statistics.

Experiential learning can reduce the skill gap. Students who go through experiential-based UX learning report that they developed UX employability skills, including people skills (project management, empathy, and communication) and technical skills (data management and management of messy real-world usability problems) (Girouard & Kang, 2021; MacDonald & Rozaklis, 2017; Talone et al., 2017; Vorvoreanu et al., 2017). As a result, such education improves the marketability of HCI and computing students (Talone et al., 2017).

Different Forms of Experiential Learning in HCI/UX Education

There are many forms of experiential learning. In this paper, we discuss forms of experiential learning that are highly immersive: applied research projects, industry/community partner projects, and work-integrated learning (Kang et al., 2022).

In applied research projects, students or instructors decide on a research topic and students are expected to produce minimally functional prototypes that adopt user-centered design principles. External partners or end-users may or may not be involved. In industry/community research projects, students collaborate with industry and community partners and seek to address the partners' needs. Kang et al. (2021) described an interdisciplinary accessibility training program in which graduate students collaborate with local communities (a hospital, a senior center, and a museum) to provide tangible insights on their accessibility challenges.

Under work-integrated learning, students participate in a UX consultancy. Talone et al. (2017) created a UX lab in which students offer low-cost UX services (digital analytics, content strategy, and website redesign) to local software businesses. Similarly, students who join the Center for Digital Experiences at Pratt University provided usability services to local organizations and companies (Center for Digital Experiences, 2021). Students can also take on UX Internships (Gray, 2014), which may or may not be offered as a part of their curriculum. Against this current state of experiential-based UX education, we describe CLUE.

The Collaborative Learning of Usability Experiences (CLUE)

The Collaborative Learning of Usability Experiences (CLUE) is primarily dedicated to graduate students in HCI and computing disciplines. It also supports the growth of undergraduate and postdoctoral students by giving them the opportunities to conduct usability research with program faculty. These student groups do not complete UX Internships and participate mainly in the other three training components. CLUE is led by Carleton University and supported by Queen's University and University of Ontario Institute of Technology. These universities are public research universities in Canada. There are three stakeholders—the student, the industry or government partner, and the faculty.

Students are active learners who participate in all four training components. Industry and government partners participate in the UX Internship component and mentor students at their organizations. Last, faculty develop the program activities (such as seminars). Outside of their program role, faculty also serve as thesis supervisors to students.

CLUE has four training components: UX Internship, Workshops, Short Courses, and Knowledge Transfer (Figure 1) (Girouard & Kang, 2021). In brief, students learn about fundamental UX methods and concepts through Short Courses, Workshops, and Knowledge Transfer.

Workshops teach professional and technical skills. Short Courses expose students to HCI topics that are outside of their major. Knowledge Transfer allows students to network and present their thesis-related research and internship experience. These non-UX training components bring together students, HCI communities, and the general public in one shared space.

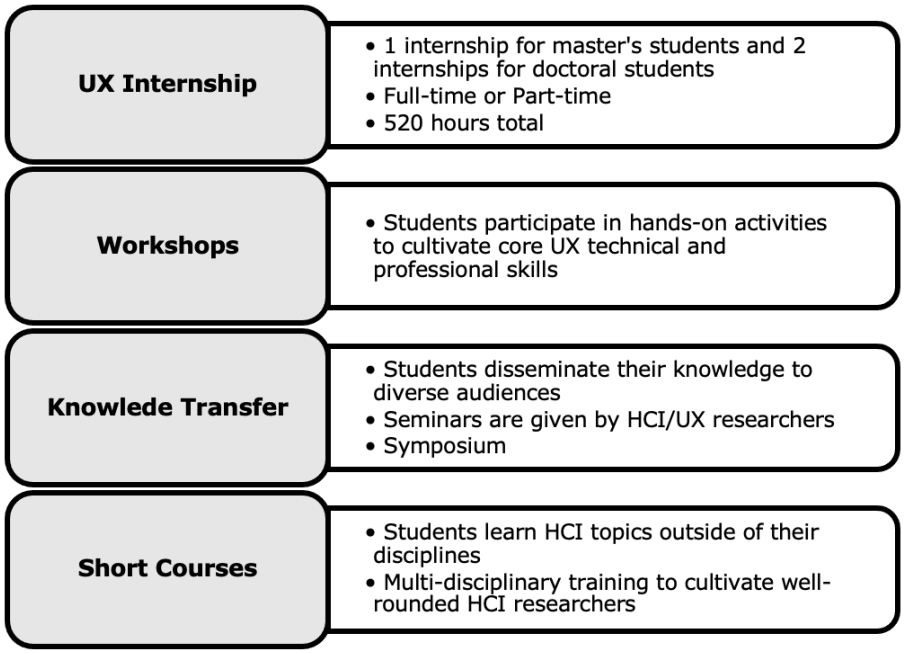


Figure 1. Four Major Training Components of CLUE.

Through UX Internship, students work with leading UX experts from industry and government to apply theories, methods, and technologies from classes to address real usability problems. CLUE has a program director and a coordinator who oversee the program. Over the past six years, CLUE has had 92 students of all levels (bachelor's, master's, doctoral, and postdoctoral) from diverse degree programs including cognitive science, computer science, information technology, HCI, serious games, and design. CLUE has established 33 industry and government partners and currently has 20 faculty involved in the program, as principal or co-principal investigators, or as collaborators. Table 1 shows critical program elements.

Table 1. Critical Program Elements in CLUE

Name of Program Element	Brief Description
UX Internship	
Learning Journey	Students are encouraged to document their internship experience.
Mid-Placement Interview	The program coordinator meets the student and the partner at the mid-point of their internship (two months after the start for full-time internships and four months after the start for part-time internships). They discuss any conflicts and the directions for the student.
End-of-Internship Report	The student writes a report that describes their learning experiences, accomplishments, and how their internships relate to their academic studies.
End-of-Internship Presentation	The student gives a presentation about lessons learned during their internship and relates their learning to classes.
Industry Partner Handbook	This handbook outlines placement procedures and tips to coach and mentor the student.
Internship Agreement	This agreement outlines the partner's responsibility as a mentor and their major program deadlines (for instance, the date of the mid-placement interview).
Workshops, Short Courses, and Knowledge Transfer	
Student Research Presentation	Students present their research projects at the symposium.
Group Discussions and Activities	Students participate in discussions and hands-on activities after seminars, workshops, and short courses.
Social Networking Events	Students are invited to build a professional network (at lunches after seminars, at the symposium, or on LinkedIn).
Industry/Government Partner Presentation	Partners present their research and UX practices at the symposium.
YouTube™ Videos	Recordings of seminars, workshops, and short courses are posted on the program YouTube channel. To date, there are 74 videos uploaded since 2016.
General	
Program Requirements	Students need to attend at least 10 seminars and three workshops during their tenure in the program.
Student Handbook	This handbook has a checklist that outlines the expected milestones to accomplish while in the program.
Research Support	Students are financially supported to attend and present their research at leading academic and UX conferences.

These program elements have been designed to facilitate students' progression from one learning stage to the next learning stage.

1. Concrete Experience (CE): The program uploads seminar and workshop videos on YouTube and enforces its Program Requirements to ensure students learn about new HCI and UX concepts. In illustrative examples, we offered a seminar on how to conduct inclusive UX survey research and a workshop on how to structure an elevator pitch to UX hiring managers. An Industry Partner Handbook and an Internship Agreement help industry and government partners understand their role as mentors. The industry and government partner presentation and social networking events inspire students with new ideas.

2. Reflective Observation (RO): Group discussions and activities facilitate student reflection. In the first example given above, the speaker prompted students to reflect on their experience in interacting with study participants with disabilities. In the second workshop example, students worked on their elevator pitch in groups and shared the pitch. Through the student handbook, mid-placement interview, and learning journey, students can reflect on their strengths/weaknesses and overall learning goals.
3. Abstract Conceptualization (AC): Through group discussions, activities, and end-of-internship reports and presentations, students relate what they have learned in the program to previous knowledge and class learning. In the first seminar example, students relate the topic to what they have learned from their graduate course on accessibility research.
4. Active Experimentation (AE): Through group discussions and activities, research support, student research presentation, and mid-placement interview, students are encouraged to apply their new knowledge to new classes and internship projects and elaborate on their knowledge through presentation.

The design of a training program should be followed by the proper program evaluation. Our program evaluation shows how the impact of CLUE on students and host organizations is similar to UX education and general internship literatures. Our evaluation focused on examining the impact of the program components that mattered the most to each stakeholder. Our research questions explored the impact of UX Internships on industry and government partners who served as UX Internship mentors and on current and past graduate students who participated as interns. Our questions also explored the impact of other program training components (Workshops, Short Courses, and Knowledge Transfer) on students, and how the program can be improved for students, industry and government partners, and faculty.

Methods

Participants

We recruited 20 current graduate students, 13 alumni, 20 industry and government partners, and 3 faculty for CLUE. We sent a study invitation to each participant's university and work email address or their social media account. Current graduate students and alumni who participated in interviews received a $15 e-gift card of their choice. We invited four alumni who did not participate in interviews to complete a 20-minute survey hosted through Qualtrics.

For current graduate students, at the time of the data collection, 8 were doctoral students and 12 were master's students; 9 majored in Human-Computer Interaction, 5 in Information Technology, 3 in Computer Science, 1 in Cognitive Science, 1 in Design, and 1 in Serious Game. For alumni, 1 obtained a doctoral degree and 12 obtained a master's degree. They now work as UX instructors, UX researchers, engineers, and designers, with one being self-employed. Graduate students and alumni have completed internships from various industry and government sectors, including hospital, health care, real estate, computer software, and information technology and services. Table 2 provides further details of student and alumni background.

Table 2. An Overview of Graduate Students and Alumni

Student Level	***n****	**Year of Internship**	***n***+*	**Internship Status**	***n***	**Internship Location**	***n***
Doctoral	9	2020	10	Full-time	23	Onsite	23
Master's	24	2019	15	Part-time	9	Remote	6
-	-	2018	5	Hybrid**	1	Hybrid***	4
-	-	2015 - 2017	7	-		-	

Note: *Each *n* includes both current graduate students and alumni. +A total number of students does not add up to a total number of study participants because some doctoral trainees completed two internships. **Some doctoral trainees completed two internships and they did both full- and part-time internships. ***Some trainees completed two internships prior to and during the pandemic and thus they did both onsite and remote internships.

For industry and government partners, 6 federal government partners came from departments of immigration and citizenship, or aerospace research; and 14 industry partners came from sectors including design, computer software, real estate, and computer games. All faculty who participated in the study have been involved with CLUE since its inception.

The first author conducted all interviews via Zoom from August to November in 2020 and recorded interviews using the built-in Zoom recording feature. Ten current graduate students completed remote internships due to a global pandemic. Interviews were automatically transcribed using a built-in Zoom audio transcription feature; the first author went through each transcript to fix transcription errors. The first author was independent from the program and had never interacted with the study participants before the study.

Interview Questions

For current graduate students, interview questions centered on the following categories: (1) academic standing and internship information, (2) experience with UX Internships, (3) experience with Knowledge Transfer, Workshops, and Short Courses, including symposiums, and (4) overall program recommendation. We applied the same interview question categories to alumni with added questions that focused on advice to current program students and program recommendations given their career experience.

For industry and government partners, interview questions centered on the following categories: (1) organization information, (2) experience being a mentor, (3) overall program recommendations, (4) experience with Knowledge Transfer, Workshop, and Short Courses, and (5) impact of the program on business. For faculty, interview questions centered on experience as a thesis supervisor to the program students and overall program recommendations. Under each interview question category, the first author asked questions that probed participants for their evaluation of specific program elements. Her independence from the study could have made study participants feel comfortable to share their honest program experiences.

Typical interview sessions lasted about 45 minutes. The total interview duration was 15 hours and 45 minutes for current graduate students and alumni; 13 hours and 40 minutes for industry and government partners; and 1 hour and 30 minutes for faculty. The study received ethics approval from the authors' institution.

Data Analysis

We conducted inductive (versus deductive) thematic analysis, a method appropriate to find themes across a dataset in relation to our research questions. We followed Braun and Clarke's (2006) approach to thematic analysis, and we analyzed the data using ATLAS.ti® (Scientific Software Development GmbH, 1993). First, the first author read the interview transcripts multiple times. This process facilitated data immersion in which the researchers became deeply familiarized with the data and notice observations that are relevant to the research questions.

Second, the first author read through the entire dataset thoroughly and developed initial codes in discussion with the second author. With initial codes developed, the first author assigned codes to the contents relevant to the research question and then reviewed and redefined these codes in collaboration with the second author. Both semantic and latent aspects of the data were coded. Initial codes and themes were then grouped into broader themes based on their similarities. The first author refined these initial themes in terms of the degree to which they were the central organizing concepts that captured the three key stakeholders' program experience.

Given the interpretive nature of our data, the first and the second authors engaged in group discussion to reach agreement on codes and themes (versus computing an inter-rater reliability statistic) (Saldaña, 2016).

Results

We present our findings grouped by each program stakeholder: current students and alumni, industry and government partners, and faculty. Exemplar quotes from current graduate

students and alumni are represented by "S" and "A," respectively, followed by a random number and information indicating whether they completed an onsite or remote internship. Exemplar quotes from industry and government partners and faculty are represented by "P" with a random number and information indicating whether they mentored an onsite or remote internship. Exemplar quotes from faculty are represented by "F" with a random number. For all quotes, we removed filter words ("I think," "um," "like") and other inessential parts for the ease of reading.

Table 3 provides an overview of themes in response to our research questions. We organized the themes related to graduate students and alumni into two categories, 1) UX Internships and 2) Knowledge Transfer, Workshops, and Short Courses, because the experience and impact of UX Internships and the other three training components are different.

Table 3. An Overview of Themes

Program Stakeholder	Themes
Graduate Students and Alumni in UX Internships	Theme 1: Opportunity for Career Advancement Theme 2: (Un)Supportive Mentors & Team Theme 3: Opportunity for Knowledge Expansion Theme 4: Concerns over Internship Logistics
Graduate Students and Alumni in Workshops, Short Courses, and Knowledge Transfer	Theme 1: Appreciation for Breadth but Need for Relevance Theme 2: Appreciation for Social Connection but Desire for Community Theme 3: Desire for Flexibility in Program Requirements
Industry and Government Partners	Theme 1: Positive Impact of Internships Theme 2: Desire for Better Communication Theme 3: Desire for Personal Connection
Faculty	Theme 1: Desire for Tangible Benefits Theme 2: Desire for Professional Network

Stakeholder 1: Graduate Students and Alumni in UX Internships

Four themes reveal current graduate students' and alumni's UX Internship experience.

Theme 1: Career Advancement

Internships advanced students' career in two ways: It allowed students to get a taste of a life as UX professionals (career exploration), and it helped them build a professional network. First, internships clarified what students wanted to do after graduation (n = 19). For some participants, internships resolved the question "do I stay in academia or not?" S6 (remote) realized, "working in straight-up industry is not for me" because they valued the freedom to explore different ideas in academia. In contrast, S19 (remote) indicated their plan on pursuing industry positions after graduation. They liked a structured working environment present in industry: "It definitely gave a sense of nine-to-five proper working hours because as a student—as a master's or PhD student—your hours are everywhere all the time."

Second, internships helped students build a professional network (n = 12). For some students, this professional network led to an immediate job offer after internships. Of 12 alumni interviewed and surveyed, a total of seven received a job offer. Two received a part-time offer immediately after completing internships, and five are now working full-time at the CLUE affiliated host organization. Of 21 current graduates interviewed, four continued to work for the host organization after the internship on a part-time basis; one received a full-time position at the CLUE affiliated host organization. Among those who did not receive an immediate offer, internships still had a positive impact. Their mentors became their referees for other job positions that they had applied to and kept students in mind for future job openings. This professional contact brought "comfort to me as a grad student because oftentimes you're worried about what the heck am I going to do after my graduation" (S4, onsite).

Theme 2: (Un)Supportive Mentors and Teams

Mentors and team members significantly influenced students' learning experience. There were two groups of students: those who said their mentors and teams were the best part of their internships versus those who said the opposite. The former group (*n* = 10) mentioned that their mentors and teams "made me feel like I was a part of a team [by] checking in on Slack every day and, you know, a good morning and stuff like that" (S6, remote), that they gave students the "freedom to approach problems in my own way" (S11, onsite), and they were "conscientious about giving students a lot of guidance and space to learn, flexibility on the kind of projects that they wanted to do, and sort of being willing to take a lot of questions" (A9, onsite).

The latter group (*n* = 11) was not happy with their mentors and teams who "look at you like a student" (A3, onsite), who made them feel "somewhat isolated" (S8, remote), or who "was a little bit less hands on and had just so much more work to handle that I sometimes felt that I was burdening a little bit when I asked questions about my work" (A9, onsite). As a result, students wanted the program to put "more resources to vetting them or getting to know them better" (S4, onsite) and to help mentors to establish clear learning goals in the beginning. S10 (onsite) joined the team when their mentor was being demoted, and the student got "stuck in the middle of something I didn't know was happening." As a result, the student was the mentor's last priority, who made them "find other priorities" by themselves.

Students who completed remote internships (*n* = 4) expressed concerns uniquely tied to the remote nature of internships: They worried their mentors would know them professionally but not personally, they constantly asked, "am I doing this correctly?" (S6, remote) because mentors did not observe their progress in person, and they experienced delays in getting immediate feedback because they could not simply step into mentors' offices for an answer.

When asked about the role of the mid-placement interview in solving conflicts, there were two groups of students: those with positive experiences versus those with negative experiences. The former group (*n* = 11) felt safe knowing "they are taking care of us, and they're not interfering a lot" (S1, remote), even if they did not have any issues. A few students observed the immediate effect of the mid-placement interview in resolving issues around delayed security clearance, assignment of non-meaningful tasks, and poor social interaction. The latter group (*n* = 5) expressed that the interview put them in a tough spot. S4 (onsite) had some conflicts with the mentor, and they had planned to discuss them on their own. During the interview, they shared the concern with the coordinator who, in turn, relayed the concern to the mentor. While it was "not a huge deal, the way she talked about it wasn't really the way I wanted to approach it." A23 (onsite) expressed that the mid-placement interview was just a matter of formality in which the mentor and the student did not truly express how they felt the internship was progressing to each other.

Theme 3: Opportunity for Skill Expansion

Students developed and refined their UX skills, including those that "I knew nothing about that I know today" (S1, remote), and they learned more about "what a teacher can teach them in a class" (S18, onsite). International students especially appreciated the opportunity to expand their skills. S27 (remote) came from a country that bans the use of programming tools such as Google and GitHub. For them the opportunity to use industry standard programming tools added value, and they did not "have to worry about Google or someone else locking me from using their development tools and their CLUE."

Students who observed their mentor's problem-solving approach learned how to think like a UX professional. One student was inspired by their mentors who would "just paint something to the whiteboard" and show them "the whole process of how to come up with [customer journey]… blueprints and… [customer] pain points" (A28, onsite).

Beyond helping students to acquire skills, several alumni expressed that students in the program also need to learn how to present themselves as a UX practitioner through a portfolio. A UX portfolio can be an important piece of evidence demonstrating their UX competencies.

Theme 4. Concerns over Internship Logistics

Some students expressed challenges associated with equipment and the onboarding process (*n* = 10). An excerpt from S7 (onsite) illustrates their frustration in being assigned to less than stellar equipment and workspace: "the computer they give me was awful. The desk was awful. The chair was horrible." Another participant was frustrated that the host organization did not provide equipment and software to facilitate design work, despite being "billion-dollar company" (S10, onsite). They resorted to using their own laptop, which slowed down their work.

For students who completed remote internships (*n* = 3), they had a different set of expectations surrounding equipment like laptops. They wanted the host organization to be empathetic of students' situation during a global pandemic and mail over the equipment: "But I expected [the host organization] to send [equipment] to me because I don't have a car and don't want to go with public transportation" (S1, remote). S6 (remote) explained they had a limited Internet data plan at home and their project meetings were sometimes abruptly ended because other household members who were using the Internet slowed down the connection.

A few students were frustrated over the process of inadequate onboarding experience. For students to complete internships in government, they needed to receive a security clearance and often this clearance took longer to get than expected. As a result, S20 (onsite) spent a half of their internship separated from other colleagues and worked on literature reviews because of the delay, and subsequently they recalled their overall program experience in a negative light. A23 (onsite), an international participant, shared their perception that government partners seemed reluctant to hire international students because it was more difficult to issue a security clearance for them than domestic students, and the student wished the program could expand the internship placements to less government-oriented positions.

Stakeholder 1: Graduate Students and Alumni in Knowledge Transfer, Workshops, and Short Courses

Three themes uncover graduate student and alumni experience within Workshops, Short Courses, and Knowledge Transfer. We use the term "events" to refer to these components.

Theme 1. Appreciation for Breadth but Need for Relevance

Most students liked the breadth of topics that were covered in these events (*n* = 20). However, S2 (remote) shared an insight that the presentation of various topics at each event did not necessarily translate into developing in-depth knowledge on a given topic: "there are so many different things the student can learn, and it is hard to learn about different things in-depth" (S2, remote). These events exposed participants to different HCI research, and they were an added bonus if they overlapped with thesis and lab projects. An excerpt from S6 (remote) illustrates the diversity in topics presented: "I think just being exposed to a lot of different ideas [was] different because I remember last year, we had someone come in from the US. And then he's a professor looking at autonomous vehicles, and I thought that it was something I never even thought about. We had someone from Samsung just talk… And just hearing both the academic and industry experiences and research is really cool, too."

However, it was important to balance the breadth and the relevance. When the event topics were unfamiliar, students did not enjoy the events and had no idea what the talk was about: "I couldn't really read an abstract and really understand if it's [sic] gonna be something that I'd be interested in or not. I was trying to figure [it] out" (S8, remote). Some students explicitly mentioned that they preferred workshops among the three. A5 said, "I actually liked the workshops more than the seminars, because it was a little more interactive and hands on, and that's the kind of work I prefer myself." Workshops gave participants the opportunity to develop practical skills and the opportunity to "apply what you've been learning" (S12, onsite) outside of the classroom. Some graduate students and alumni expressed students can benefit from learning about practical topics that they can readily apply to internships or in jobs, including the lifespan of UX process, design thinking framework, agile methodologies, product management, and portfolio creation.

Theme 2. Appreciation for Social Connection but Desire for Community

Many students liked the social aspect embedded in these events, and they were motivated to attend them even after satisfying the program requirement (of 10 seminars and three workshops (n = 20). Some were situated in graduate programs where they were isolated from their supervisor, cohort, or colleagues. S14 (onsite) described, "we were all very scattered. So not every lab is set up like [the internship director's lab] where the students have the same working space. A lot of the other labs are the sort of thing where the student gets office space somewhere maybe, but it's not necessarily with the other students who are supervised by that professor." These events offered a rare occasion to "get to the same room with them, the other CLUE students, maybe not as [to] sort of socialize with some of the students, but even I found it to be nice to kind of all gather together" (S7, onsite).

However, students and alumni wanted more than simple social interactions at events and wanted to be a part of a community. Students mentioned the program could step up to "keep us connected with each other because, sometimes I know when you go on internship, you [are] kind of losing count, you've stopped talking to your friends, and all because you're just thinking about work and all" (S6, remote). Graduate students who were not from Carleton University felt even greater distance from the program and strongly endorsed the idea of incorporating community via Discord or Slack. They saw students from Carleton University at the annual symposium, but their interaction was limited to simple greetings. A community was a hub to "help out one another, exchange information, and make friends" (S1, remote) in an entity that they can improve together.

Theme 3. Desire for Flexibility in Program Requirement

Most graduate students and alumni found meeting program requirements "very easy to accomplish" (A28, onsite), and "for a student that is participating in a two-years master is pretty much so easy" (A3, onsite) (n = 10). However, current graduate students said they did not understand the reasoning behind the requirement number (n = 6). Some questioned, "why 10 [seminars]?" and explained they did not understand "how they came from, where they came from" (S1, remote). This random number made them question, "Am I going to learn something after 10 conferences [workshops/seminars]?" S20 (onsite) voiced their frustration: "I kind of resented them in the sense I would have preferred if I only had to attend maybe six seminars mandatory and then had the option to attend other ones."

While showing appreciation for hosting these events, students brought up their stress over attending and meeting the program requirement (n = 4). Some expressed these events became a hassle; the events were an additional task to complete alongside internships and classes. While they could choose to attend those that worked with their schedule, S4 (onsite) mentioned, "but there is sort of a pressure to participate because if you don't, then you're not necessarily participating in the program. You should be attending seminars because that's part of the program."

Stakeholder 2: Industry and Government Partners

Four themes reveal industry and government partners' program experiences.

Theme 1. Positive Impact of Internships

There were three benefits of internships: (1) tangible business gain, (2) access to fresh ideas and energy, and (3) access to skillful students to build a talent pipeline, a pool from which to hire future employees. First, partners (n = 9) cited students' project outcomes to serve the business needs as one tangible internship outcome: "I mean 520 hours is not a small amount of hours. So regardless of their skill set, they are going to produce something that's reusable" (P2, remote). These partners were satisfied that the program sent good quality students to their workplace: "I think the program itself seems to be solid in terms of the skills … the knowledge and the skills that they're learning. I think that's super important" (P11).

Second, partners (n = 8) said students were fresh because they brought new perspectives and ideas to the team. Students brought "new methods that I may not have been aware of and kind of like shared a little bit, you know, symbiotic" (P2, remote). At work, partners expressed how their team was influenced by their past, which restricted their creativity. The appreciation for

the student's perspective was evident in the advice P11 (onsite) gave to their mentee, "don't try to confirm, right? Speak up if you think it doesn't sound right" as the government is highly bureaucratic. Students were also fresh because they brought different energy to the office: "students are the one when we've done sort of group company things, like we're all going to play pool on a Thursday night, to build teams" (P1, remote) and partners were entertained when students joked around.

Third, partners (n = 7) saw internships as gaining access to talents and having the chance to test-drive if a potential employee fit in their team. Partners always wanted someone who was talented, but they "can't necessarily tell how people are going to work within your own environment without actually having them in your environment and working" (P13, onsite). Just as internships were the chance to test-drive for students, it was the same for the partners: "We have this four-month period of time where we're slowly introducing them to the system without any downside" (P16, onsite). P8 (onsite) described, "I've been a consumer of [University A] grads in terms of talent acquisition which is a huge benefit," and indicated their view of internships as the opportunity to recruit future hires.

Theme 2. Desire for Better Communication

A few partners commented the program has engaged in good communication with partners (n = 4). P4 (onsite) said, "all the communications were just really clear. Everything was really organized." Similarly, P16 (onsite) commented, "I think the instructions on steps, step by step, for example, [helped]. I always knew when deadlines were, what I had to submit, our follow-ups, so I never really had to wait for an answer a long period of time. That was really good."

However, some partners (n = 10) mentioned they wanted better communication with the program in other ways. First, some partners wanted to receive feedback on why they were not matched with students. One partner felt conflicted when they did not receive a student for their company's position. On one hand, they were happy for the intern to get the job they really wanted. On the other hand, they were disappointed after going through all the laborious work: "you have to submit things, it has to go through a certain process of approval, you have to get different people to approve different things, and then when you do all that and then nobody comes. Just like you spend a lot of time and energy upfront that you're hoping is going to get back to you like as a return on investment by having a student that you're going to be able to work with" (P12, onsite). When this happened, P12 expressed their motivation to participate in the next cycle of internship decreased.

Relatedly, partners wanted feedback on "how they did as a company in terms of working with the student" (P5, onsite). This feedback was desired so that they can improve their mentorship approach for the next rounds of students. Beyond the desire to receive feedback on students' internships, a few partners wanted to be updated with major changes that happen in the program and receive a better communication method for new mentors who had just joined the program.

Theme 3. Desire for Personal Connection

Partners shared their thoughts on what the program can do to increase their program participation beyond internships. Some partners (n = 10) proposed the idea that the program can build personal connections with each partner. One way to achieve this personal connection is through building relationships with personnel in the program, including the program director, the faculty, and the student. P12 (onsite) was one of the rare partners who showed a high level of program participation: They gave a lecture in the program director's classes, provided a CLUE seminar, joined in lunch, and more. They participated in the activities because they have maintained a good relationship with the program director and the CLUE student they mentored.

Another way to achieve personal connection is understanding each partner's interests. P12 (onsite) said they always received emails about the program events but "I have to understand what it's about" and urged the program to understand their partners more and provide personally relevant topics. For instance, instead of getting a mass email, they'd like a "personal email that said, 'Hey I know you're interested in this or like when we came and did the last meeting, we saw this in your office and then I think, you know, this one would be good for you'." Industry and government partners dealt with busy schedules, and they did not attend the

events because the topics weren't relevant for them to take time out of their busy day. Event topics should "add a lot of value for myself" (P5, remote).

Stakeholder 3: Program Faculty

Three themes uncover the faculty's experiences with the program.

Theme 1. Desire for Tangible Benefits

All three faculty recognized the immediate educational benefits of the program to students, and they all agreed CLUE helped students to apply their learning in the real world. It helped students to develop skills in their area of expertise. F3 responded: "Everything they [the students] do in school up to this point is sort of theoretical or sort of toy examples and things, and they come back with examples of 'Hey here's how this works in real life, and they actually do this for real'." F1 stated, "They are gaining experience in VR and ultimately what they specialize in their study. I think it's the industry experiences first and foremost and the skills they are developing and building and gaining—that real-world industry experience." They met with CLUE students regularly and offered guidance related to their successful program participation.

However, there was a division in how three faculty responded to the impact of the program on them. F2 appreciated the program for opening "the door of possibility for me to work with exceptional students." They funded their graduate students through the program. F2 elaborated the program's events were the perfect way to persuade their undergraduate research assistants to pursue a graduate degree, and events allowed these students to visualize what they can achieve intellectually and professionally.

In contrast, F3 mentioned their involvement in the program "gives us no research money" and "it takes away our students from research for, you know, four months or whatever amount of time, and so from a selfish researcher perspective there's absolutely no incentive for me to be part of this." F1 also said "there was nothing in it" for the faculty. From a supervisor perspective, they were thrilled the students were getting good experience and "it gives them some money, some experience" but "from a researcher perspective, this gives me nothing" (F3).

Theme 2. Desire for Professional Network

On top of their existing time commitment, faculty shared their own program participation was not ideal: F3 said that these events, including seminars and symposiums, were important if "I had infinite time, but I don't." F1 also recognized the lack of faculty program participation: "Some faculty members didn't really contribute even if they were on the grant." When asked how the program can increase faculty participation, F3 replied, "Good luck." They implied the program had indirect benefits to faculty who have students being funded through the program but zero benefits to faculty who did not have students participating in the program. Hence, maybe what is needed is "something that motivates the faculty members, and maybe it is covering a conference for them [faculty] to go. I don't know, but something along those lines" (F1).

Faculty provided several recommendations. For one, they wanted the program to better connect faculty with industry and government partners. Two participants indulged at the idea of establishing new industry connections. At the symposium, they did not really interact with partners because "they were busy running around and making sure everything was organized" (F3). For them, the symposium went "very quickly" and organizing a faculty-industry meet-up was not a huge part of symposiums as it was more about "students are the key" (F1). F2 discussed the idea of doing actual projects in class not necessarily through the program, for instance, fourth-year capstone projects. There were projects the student and the faculty could benefit from industry partner's perspective, but they did not have the necessary network to reach out.

Discussion

We described and evaluated an independent UX training program primarily dedicated to graduate students in HCI and computing disciplines.

Experiential Learning

Some of our findings confirm prior work that demonstrates positive experiential learning outcomes. Participation in experiential learning advances students' careers (Coco, 2000; Gault et al., 2000) and helps them develop a "designerly" identity (Gray, 2014), UX and non-UX skills (such as management of messy real-world projects, teamwork, project management, storytelling, empathy, and collaboration), and user-centered design technical skills (such as communication with stakeholders, data management, and comfort with complex problems) (Kabakova et al., 2021; MacDonald & Rozaklis, 2017). UX Internships helped some students to obtain a UX position, and this line of finding suggests the powerful impact of UX work-integrated learning to increase the employability of students (MacDonald & Rozaklis, 2017; Talone et al., 2017).

UX Internships

Mentorship

Our results underscore the importance of assigning students with supportive mentors and teams. Based on our graduate students and alumni, supportive mentors and teams did not see them as "someone who makes photocopies" (S22, onsite) but as invaluable employees to their business's success. Supportive mentors and teams lead to job satisfaction (Jyoti & Sharma, 2017). Our results suggest an Industry Partner Handbook and Internship Agreement might not be enough to help industry and government partners effectively mentor students. UX training programs should also adopt rigorous screening processes to find partners who can be good mentors and include an orientation session to help partners become good mentors.

Communication

Our results suggest UX training programs and mentors can allocate extra effort to maintain an active line of communication with students who participate in remote internships. They should be mindful that these students may be concerned about not making personal connections with the team and about not performing correctly on tasks. These concerns are understandable considering the lack of in-person access to mentors when students are working from home independently. Kang and Girouard (2022) found students are afraid to actively seek out help from their internship mentors, and it is important for mentors to first reach out to students to offer a time to get to know them as a person and provide them with performance feedback.

Logistical Concerns

We found that students' internship logistical concerns centered about the issues occurring in the beginning of internships (adequate onboarding processes). Students who completed remote internships shared a unique set of concerns related to access to fast Internet and equipment shipping. Some of these concerns were out of the control of the program and the host organization (such as the time it takes for a student to get their security clearance) whereas other concerns are within the control (such as the time it takes to get students a good office space or offer to upgrade a student's Internet data plan). An effective UX training program should eliminate logistical concerns or at least help students understand the issues that they can expect in the beginning. In addition to a mid-placement interview, have an initial-placement optional interview to communicate about initial issues or how a program could reduce students' anxieties. Taking care of internship logistics could help students to become fully immersed on their internship projects.

Knowledge Transfer, Workshops, and Short Courses

When it comes to Knowledge Transfer, Workshops, and Short Courses, the program's effort to provide multi-disciplinary training may have decreased some students' interests. For some students, the easiness of meeting the program requirement did not translate into positive emotions. Affording students with greater freedom to meet the program requirement could be one way to reduce these negative emotions, for instance, by offering flexibility in the ratio of seminars and workshops that they wish to attend. Our graduate students and alumni wanted the program to put more effort to build a community that fosters the positive interaction between student-student.

Our attendance record of these events indicates 20 graduate students attended over 15 workshops, including one doctoral student who attended 47, a number that far exceeds the requirement of 3. This high attendance rate for workshops, combined with our finding, implies the interactive nature of workshops may be more effective in making UX learning fun, facilitating social interaction, and building a community than seminars, symposiums, and short courses. An ideal UX training program might build a community that includes elements to cultivate positive student-faculty and student-partner interaction (Luo et al., 2017).

Our findings also confirm prior literatures on the internship benefits on the host organization (Coco, 2000; Divine et al., 2007; Scott & Richardson, 2011; Swanson & Tomkovick, 2012; Toncar & Cudmore, 2000). This confirmation gives us confidence that our internship elements have been well designed to bring about the same benefits. Other educators might incorporate program elements to give feedback to our partners and build personal connection. Our program elements that focused on partners (such as the Internship Agreement and Industry Partner Handbook) mainly communicated deadlines and mentor responsibilities. Others might include end-of-internship student feedback in which students anonymously provide feedback that they chose not to directly give the organization. They can also distribute a partner survey to understand what their partners' research and design interests are, which would facilitate building personal connection.

Faculty

Our study stands apart from prior work that has largely focused on the impact of internship programs on the administrative staff and the department at higher levels (Divine et al., 2007; Weible & McClure, 2011). The nature of the relationship between the student-department/administrative staff and the student-thesis supervisor is vastly different, and prior work cannot accurately capture the needs of faculty who supervise program students' thesis and program participation. Although all readily recognize the benefits of the program on their students, our program faculty expressed there were no tangible benefits for them. We had various program elements (social networking events and especially the symposium) designed to provide one benefit that faculty mentioned—building a professional network. However, the result indicates these elements did not achieve that objective. If a program can help faculty build a professional network, other tangible benefits may naturally follow (research funds).

As HCI educators consider which forms of experiential learning to adopt, they need to ask, "does faculty have sufficient industry experience to teach central UX competencies?" Faculty with limited industry experience may design a course, curriculum, or training program that does not meet practitioners' needs, which contributes to the continuation of skill gap. If a department cannot find faculty with sufficient industry experience, adopting work-integrated learning or developing a program structure that is similar to our own might be ideal. In applied research projects and industry/community partner research projects, which generally occur in courses, students learn about UX competencies from their instructors. Faculty who feel uncertain about their capacity to teach UX competencies can consider building partnerships with UX practitioners. In UX Internships, UX practitioners hold significant power in the teaching of UX competencies, which can lessen the pressure on faculty as the sole knowledge source.

Recommendations

Based on our findings, we provide design recommendations to create an effective UX training program geared towards fostering positive tripartite relationships.

1. **Survey for Student Interests and Establish Learning Goals:** Offer workshops and seminars tailored to students' interests. This approach may reduce students' perception of seeing these events as a hassle. In CLUE, we asked students to indicate event topics that they would like to learn about in an anonymous survey at the beginning of each year. However, we received low participation. Other educators can offer a small incentive to participate in the survey (allowing students to attend 9 seminars, not 10, as part of program requirements). Moreover, a UX training program can explicitly emphasize what students will gain from attending these events. This approach may benefit some students who question 'the why' behind a number of events they need to attend as program requirements.

2. **Organize Meet-Ups:** In addition to hosting an annual symposium attended by all three program stakeholders, programs can create remote or physical meet-ups for 1) faculty and industry partners and 2) students and industry partners to network and discuss collaborative research projects. Organizing meet-ups that host two stakeholders at a time can help each stakeholder to focus on shared interests (faculty and industry partners can discuss more about collaborative research projects and student and industry partners can discuss more about career opportunities).
3. **Provide Mentorship Education:** While a program can give autonomy to mentors, it should hold a formal mentorship training to all partners on how they can be a good mentor. This training should help partners understand students are still students. That is, they need careful guidance at every step of their learning journey.
4. **Make Use of Technologies:** As suggested by students in the current study, programs can start informal online chat channels for all program students to build community (via Slack or Discord).
5. **Survey for Stakeholders' Interests:** Programs can send out a survey to ask partners about their general research interests. This would facilitate making event topics personally relevant, which increases the chance that partners would participate in the event and thereby use the opportunity to network.
6. **Create a Commitment Contract:** Programs can sign a contract with program faculty to ensure their commitment to sustain the program. This can increase faculty's program participation.

Study Limitations

There are several limitations in our study. First, our participants self-selected to participate in our study, and this self-selection limits the generalizability of our results to those who did not participate in the study. In total, we invited 31 current students, 36 alumni, 43 industry and government partners, and 16 faculty. We recruited about a half from each stakeholder group. Would stakeholders who did not choose to participate in the study have different experiences? Those who did not participate in the study may have different or more difficult program experiences from those who participated in the study. Future researchers can try to adopt different recruitment methods to interview as many internship stakeholders as possible.

Second, while we observed positive tangible and learning outcomes for students, an ideal research method to understand the effect of experiential learning techniques would be to make an experimental comparison between a group of students who completed the program versus a group of students who did not complete the program. Hence, HCI and computing educators who plan to assess UX training programs can adopt this comparison method. Third, our study only highlights the short-term impact of internship on the student; one interesting future venue would be to follow through with program students and document the long-term effect of internship programs on their professional and personal growth.

Third, one important question related to data analysis is to what extent can we treat our data as a single entity; do program experiences of students and industry and government partners who participated in CLUE at various years differ? Given the rapid advancement of technology, it is assumed that the UX field should change along with it. Yet available evidence indicates the fundamental design and research principles has remained constant over the years. For instance, top 10 UX activities rated as important by UX practitioners has remained the same for eight activities across 2013 and 2019 (Farrell & Nielsen, 2014; Rosala & Krause, 2019). Considering this line of evidence, we remain confident in the appropriateness of our data analytical approach.

Last, many of CLUE's program elements were designed to guide students through each of the four learning stages identified in the experiential learning. Yet our results do not inform us whether students went through all four learning stages. Other HCI and computing educators can consider incorporating creative ways to measure students' progress through each learning stage (Baker & Robinson, 2016; Konak et al., 2014; Mahmoud & Nagy, 2009).

Conclusion

We described and evaluated an independent UX training program for HCI graduate students. For the student, a successful UX Internship should include program elements that ensure career advancement, access to good mentors and teams, skill training, and good quality equipment and workspace. A program can include the breadth of educational topics that attract the student's attention while making sure ample social opportunities are provided. For the industry and government partner, such a program needs to incorporate program elements that facilitate good communication and build personal connection. For the faculty, such a program should adopt elements that bring tangible benefits to faculty (such as the opportunity to establish professional contacts). We invite educators to adopt and examine the effectiveness of our recommendations in the context of UX training programs.

Tips for Usability Practitioners

Based on our synthesis of the data across all three program stakeholders, we have developed a set of tips for practitioners. These tips are geared towards assisting UX practitioners when they become a mentor to HCI and computing students or when they become partners with a UX training program:

- Find time to socialize with the trainees. Our results indicate students who completed remote internships wanted to form personal and professional relationships with mentors and their team. Offer virtual hang-out time to converse about non-work topics. If possible, invite these students to experience the working culture in person.
- Provide career-focused mentorship to students. Help them develop and refine a UX portfolio and resume. Our results indicate students value how UX Internships can advance their career.
- Be active and articulate your needs to a UX training program personnel. Our results revealed some important needs of UX mentors: getting feedback on the quality of mentorship provided and why students did not choose the organization. Create your own system to get feedback from students after an internship is over. Share which UX topics are of your interests with a program personnel to develop personal connection with a program. Ask why some students were not matched with the organization.
- Contribute towards building a UX community alongside a UX training program. As the students in the current study indicated they valued a community, practitioners can contribute to achieve this goal. Offer to provide a seminar and workshop series that involves local UX chapters and people in different teams in an organization.
- Provide students with a good working environment. As indicated in the current study, poor working equipment can result in student frustrations. For remote internships, discuss with a UX training program if some budget can be allocated to help students to set up a good Internet connection or mail equipment to students.

Acknowledgements

This work was supported and funded by the National Sciences and Engineering Research Council of Canada (NSERC) through the Collaborative Learning in Usability Experiences (CLUE) CREATE grant (2015-465639).

References

Baker, M., & Robinson, S. (2016). The effects of Kolb's experiential learning model on successful intelligence in secondary agriculture students. *Journal of Agricultural Education*, *57*(3), 129–144. https://doi.org/10.5032/jae.2016.03129

Center for Digital Experiences. (2021). *Center for Digital Experiences*. https://prattdx.org

Chan, C. K. Y. (2012). Exploring an experiential learning project through Kolb's learning theory using a qualitative research method. *European Journal of Engineering Education*, *37*(4), 405–415. https://doi.org/10.1080/03043797.2012.706596

Coco, M. (2000). Internships: A try before you buy arrangement. *SAM Advanced Management Journal*, *65*(2), 41–43.

Divine, R. L., Linrud, J. K., Miller, R. H., & Wilson, J. H. (2007). Required internship programs in marketing: Benefits, challenges and determinants of fit. *Marketing Education Review*, *17*(2), 45–52. https://doi.org/10.1080/10528008.2007.11489003

Edwards, A. D. N., Wright, P., & Petrie, H. (2006). HCI education: We are failing—why? *Proceedings of HCI Educators Workshops*, *Limerick, Ireland*.

Farrell, S., & Nielsen, J. (2014). *User experience careers: How to become a UX pro, and how to hire one*. Nielsen Norman Group. https://media.nngroup.com/media/reports/free/User_Experience_Careers.pdf

Gault, J., Redington, J., & Schlager, T. (2000). Undergraduate business internships and career success: Are they related? *Journal of Marketing Education*, *22*(1), 45–53. https://doi.org/10.1177/0273475300221006

Girouard, A., & Kang, J. (2021). Reducing the UX skill gap through experiential learning: Description and initial assessment of collaborative learning of usability experiences program. *Proceedings of the 18th IFIP TC13 International Conference on Human-Computer Interaction (INTERACT2021)*, *Bari, Italy*, 481–500. https://doi.org/10.1007/978-3-030-85616-8

Gonzalez, C. A., Smith, M. A., & Youmans, R. J. (2017). Are human factors students prepared for careers in user experience research? A survey of predicted and actual skill utilization. *Proceedings of the Human Factors and Ergonomics Society*, *College Station, Texas*, 1101–1105. https://doi.org/10.1177/1541931213601879

Gray, C. M. (2014). Evolution of design competence in UX practice. *Proceedings of the Conference on Human Factors in Computing Systems*, *Toronto, Canada*, 1645–1654. https://doi.org/10.1145/2556288.2557264

Gray, C. M., Parsons, P., Toombs, A. L., Rasche, N., & Vorvoreanu, M. (2020). Designing an aesthetic learner experience: UX, instructional design, and design pedagogy. *International Journal of Designs for Learning*, *11*(1), 41–58. https://doi.org/https://doi.org/10.14434/ijdl.v11i1.26065

Hewett, T., Baecker, R., Card, S., Carey, T., Gasen, J., Mantei, M., Perlman, G., Strong, G., & Verplank, W. (1992). ACM SIGCHI curricula for human-computer interaction. *ACM*. https://doi.org/10.1145/2594128

Hui, B. (2020). Lessons from teaching HCI for a diverse student population. *Proceedings of the 20th Koli Calling International Conference on Computing Education Research*, *Koli Finland*, 1–15. https://doi.org/10.1145/3428029.3428054

Inal, Y., Clemmensen, T., Rajanen, D., Iivari, N., Rizvanoglu, K., & Sivaji, A. (2020). Positive developments but challenges still ahead: A survey study on UX professionals' work practices. *Journal of Usability Studies*, *15*(4). https://uxpajournal.org/ux-professionals-work-practices/

Jyoti, J., & Sharma, P. (2017). Empirical investigation of a moderating and mediating variable in between mentoring and job performance: A structural model. *Revista de Psicología Del Trabajo y de Las Organizaciones*, *33*(1), 55–67. https://doi.org/10.1016/j.rpto.2017.01.002

Kabakova, P., St-Cyr, O., & Furness, C. D. (2021). Monitoring the short-term outcomes of community-engaged, project-based user experience design courses. *International Journal of Research on Service-Learning and Community Engagement*, *8*(1). https://doi.org/10.37333/001c.18720

Kang, J., Chan, A., Trudel, C., Vukovic, B., & Girouard, A. (2021). Diversifying accessibility education: Presenting and evaluating an interdisciplinary accessibility training program. *Proceedings of 21st Koli Calling International Conference on Computing Education Research*, Joensuu Finland, 1–6. https://doi.org/https://doi.org/10.1145/3488042.3490021

Kang, J., & Girouard, A. (2022). Impact of UX internships on human computer interaction graduate students: A qualitative analysis of internship reports. *ACM Transactions on Computing Education*. https://doi.org/https://doi.org/10.1145/3517132

Kang, J., Roestel, N., & Girouard, A. (2022). Experiential learning to teach user experience in higher education in past 20 years: A scoping review. *Frontiers in Computer Science*. https://doi.org/https://doi.org/10.3389/fcomp.2022.812907

Kolb, D. A. (2015). *Experiential learning: Experience as the source of learning and development*. Pearson Publishing.

Konak, A., Clark, T. K., & Nasereddin, M. (2014). Using Kolb's experiential learning cycle to improve student learning in virtual computer laboratories. *Computers and Education*, *72*, 11–22. https://doi.org/10.1016/j.compedu.2013.10.013

Leurs, B., Mulder, I. J., & van Waart, P. (2011). Developing a human-centered attitude through experiential learning. *Proceedings of the IASDR 2011, the 4th World Conference on Design Research*, *Delft, The Netherlands*, 1-7.

Luo, N., Zhang, M., & Qi, D. (2017). Effects of different interactions on students' sense of community in e-learning environment. *Computers and Education*, *115*, 153–160. https://doi.org/10.1016/j.compedu.2017.08.006

MacDonald, C. M., & Rozaklis, L. (2017). Assessing the implementation of authentic, client-facing student projects in user experience (UX) education: Insights from multiple stakeholders. *Proceedings of the Association for Information Science and Technology*, *Washington, DC*, *54*(1), 268–278. https://doi.org/10.1002/pra2.2017.14505401030

Mahmoud, A., & Nagy, Z. K. (2009). Applying Kolb's experiential learning cycle for laboratory education. *Journal of Engineering Education*, *98*(3), 283–294. https://doi.org/10.1002/j.2168-9830.2009.tb01025.x

Obrenović, Ž. (2012). Rethinking HCI education: Teaching interactive computing concepts based on the experiential learning paradigm. *Interactions*, *19*(3). https://doi.org/10.1145/2168931.2168945

Perera, I., Allison, C., Ross Nicoll, J., & Sturgeon, T. (2009). Towards successful 3D virtual learning - A case study on teaching human computer interaction. *Proceedings of International Conference for Internet Technology and Secured Transactions*, *London, UK*, 1–6. https://doi.org/10.1109/ICITST.2009.5435085

Radermacher, A., & Walia, G. (2013). Gaps between industry expectations and the abilities of graduates. *Proceedings of the 44th ACM Technical Symposium on Computer Science Education*, *Denver, Colorado*, 525–530. https://doi.org/10.1145/2445196.2445351

Roldan, W., Li, Z., Gao, X., Strickler, S. K., Hishikawa, A. M., Froehlich, J. E., & Yip, J. (2021). Pedagogical strategies for reflection in project-based HCI education with end users. *Proceedings of the Designing Interactive Systems Conference*, *(virtual)*, 1846–1860. https://doi.org/10.1145/3461778.3462113

Rosala, M., & Krause, R. (2019). *User experience careers: What a Career in UX looks like today*. Nielsen Norman Group. https://www.nngroup.com/reports/user-experience-careers

Saldaña, J. (2016). *The coding manual for qualitative researchers* (3rd ed.). SAGE Publications Ltd.

Scientific Software Development GmbH. (1993). ATLAS.ti. https://atlasti.com

Scott, M., & Richardson, S. (2011). Preparing for practice: How internships and other practice-based learning exchanges benefit students, industry hosts and universities. *AICCM Bulletin*, *32*(1), 73–79. https://doi.org/10.1179/bac.2011.32.1.010

Shalamova, N. N., LaPointe, A. A., Nero, R., & Delgaudio, M. (2021). *Shaping UX academia-industry alignment: A strategic partnership through an industrial advisory board* [Paper presentation]. EduCHI 2021: 3rd Annual Symposium on HCI Education, New York.

Svinicki, M. D., & Dixon, N. M. (1987). The Kolb model modified for classroom activities. *College Teaching*, *35*(4), 141–146. https://doi.org/10.1080/87567555.1987.9925469

Swanson, S. R., & Tomkovick, C. (2012). Marketing internships: How values and search strategies differ across the student-employer dyad. *Marketing Education Review*, *22*(3), 251–262. https://doi.org/10.2753/mer1052-8008220305

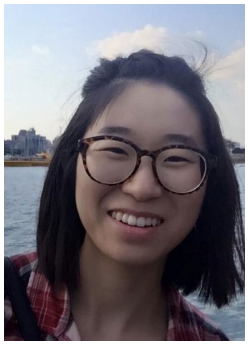
Talone, A. B., Basavaraj, P., & Wisniewski, P. J. (2017). Enhancing human-computer interaction and user experience education through a hybrid approach to experiential learning. *Proceedings of the 18th Annual Conference on Information Technology Education*, *Wuhan, China*, 83–88. https://doi.org/10.1145/3125659.3125685

Toncar, M. F., & Cudmore, B. V. (2000). The overseas internship experience. *Journal of Marketing Education*, *22*(1), 54–63. https://doi.org/10.1177/0273475300221007

Vorvoreanu, M., Gray, C. M., Parsons, P., & Rasche, N. (2017). Advancing UX education: A model for integrated studio pedagogy. *Proceedings of the Conference on Human Factors in Computing Systems*, *Denver, Colorado*, 1441–1446. https://doi.org/10.1145/3025453.3025726

Weible, R., & McClure, R. (2011). An exploration of the benefits of student internships to marketing departments. *Marketing Education Review*, *21*(3), 229–240. https://doi.org/10.2753/mer1052-8008210303

About the Authors



Jin Kang
Dr. Jin Kang is a postdoctoral fellow in the School of Information Technology at Carleton University. She studies how emerging technologies (chatbots, social media, and wearable trackers) can be used and designed to promote positive user psychology.

Audrey Girouard
Dr. Audrey Girouard is an Associate Professor in the School of Information Technology at Carleton University and director of the Creative Interactions Lab and of the Collaborative Learning of Usability Experiences training program. Specializing in next generation interactions, her current research focuses mainly on deformable devices and wearables.