Usability/User-Centered Design in the iSchools: Justifying a Teaching Philosophy

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Researchers from two universities surveyed a decade's worth of iSchool graduates who had taken and passed at least one master's level course in usability and user-centered design (UCD). The purpose of the survey was to assess the value of a teaching philosophy that considered usability skills to be of value to future information professionals, even when they are not pursuing careers as usability engineers. The survey results strongly validated this teaching philosophy, with 94% of respondents reporting that they use the general principles of usability on the job regularly, despite only 20% stating that they were hired to perform UCD. The researchers argue that these results justify a teaching philosophy that emphasizes the value of usability for all LIS students, regardless of their career goals, and make a strong case for including usability / UCD as a core course in the iSchools and the LIS curriculum.

Keywords: usability, user-centered design, LIS education, iSchools, survey methods

Introduction

The iSchools movement represents a response to a variety of perceived needs, including the need for Library and Information Studies (LIS) pedagogy to embrace new technologies, and the need for an integrated approach to the study and practice of information use by human beings. The 33 member institutions that comprise the iSchools recognize that building successful relationships between people, information, and technology requires an "understanding of the use and users of information" (http://ischools.org/). This recognition has led many iSchools to include courses on usability and user-centered design (UCD) in their curricula.

The LIS programs at the University of Texas at Austin and Florida State University (both members of the iSchools consortium) teach graduate level courses in usability/UCD, and have done so for about a decade. These courses are offered based on an implicit belief that the topics covered are valuable for LIS students, despite the fact that neither usability nor UCD appears anywhere in the American Library Association's Core Competencies of Librarianship (ALA, 2009). The decision to offer courses on usability and UCD as electives for students pursuing master's degrees in LIS, therefore, represents an ideal case study of the impact of the iSchools movement on the evolution of the LIS curriculum in the 21st century. Does it make sense for LIS students, the vast majority of whom will never work as usability engineers, to take courses on usability and UCD?

To answer this question, this study presents results from an online survey designed to explore the following research questions: Are usability / user-centered design courses of value to LIS students in terms of the skills they need in the workplace? What aspects of these courses are LIS students most likely to use as practicing information professionals upon graduation? Exploring these questions will help educators and students better understand the role of usability and UCD in the LIS curriculum, and shed light on how the iSchools movement, with its focus on the use and users of information, has influenced teaching and learning for LIS students and faculty.

Background

The evolution of the iSchools movement has taken place in parallel with an increased need for usability and user-centered design in education and practice. While it is still possible to earn an undergraduate or graduate degree in computer science or electrical engineering without taking a single course in usability, and UCD practitioners still struggle to demonstrate their value to the developers of information systems, there has been an increased appreciation for the value of usability and UCD in the development of all human-machine systems (Vredenburg, Righi, & Isensee, 2002). The clearly quantifiable benefits of integrating usability analysis into systems design (Bias & Mayhew, 2005), combined with the demonstrated need for usability expertise given the dramatic growth of the number and types of tasks people carry out online everyday (Nielsen, 2005), has not only increased the number of practicing usability professionals, but also driven the inclusion of usability and UCD courses in educational programs. Usability is a now a global phenomenon (Douglas & Liu, 2011).

Usability: Definitions and Context

It is scarcely surprising that information

seeking has become one of the major subfields of human-computer interaction. [...] One area of research in human-computer interaction is the development of methods for doing human-centered design of information systems. [...] A number of these methods have much in common with how librarians attempt to understand what kind of information a patron is seeking. (Olson & Olson, 1998, p.88)

The term "usability" has been used in different contexts by different disciplines, which place slightly different perspectives on its meaning and scope. It can refer to a process (e.g., usability as a form of evaluation) as well as a characteristic (e.g., the degree to which something is usable). A general definition can be found in the International Standards Organization's "Ergonomics of Human System Interaction Part 11: Guidance on Usability" (ISO 9241-11, 1998), which defines usability as the "extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use."

The classic definition of usability is relative rather than absolute (Nielsen, 1993); we cannot say with absolute certainty that any one design has good usability. Instead, we tend to say that design A is relatively more usable than design B based on some measure of effectiveness (e.g., task completion or number of errors), efficiency (e.g., time taken to complete the task), satisfaction (e.g., users' rating of experience), or learnability (e.g., amount of instruction required). These characteristics must be evaluated for a range of tasks in realistic use environments, and numerous usability evaluation techniques have emerged to measure these factors (Nielsen & Mack, 1994).

Some researchers have gone beyond mechanical measures to focus on the emotional impacts of design (Norman, 2003). Many would now prefer to focus on what is termed the "user experience," rather than the more historical term "usability."

This shift in focus recognizes that while usability is an important and often-neglected part of design, the holistic nature of design is such that a successful design requires balancing many different aspects (e.g., usability, functionality, aesthetics) and not just concentrating on one to the neglect of the others. A finished design is a gestalt, where the whole is greater than the sum of its parts.

One of the earliest communities to consider usability as a general design issue was ergonomics (Meister, 1999). While ergonomists were initially concerned with physical interaction design, the development of cognitive ergonomics (Falzon, Gaines, & Monk, 1990) has influenced education in industrial engineering departments, as well as more specialized human factors engineering departments. Usability also figures prominently in the field of Human-Computer Interaction (HCI), which has a strong, but not exclusive relationship with computer science departments. While HCI initially focused on developing new methods of interaction with desktop computers, it has since branched out into other areas of design and other technological products (e.g., mobile phones, ubiquitous computing), and recent studies focus more on understanding user behavior than developing a specific instance of a technology (Rode, 2011).

Researchers and practitioners interested in psychology, information architecture, web science (Hendler et al., 2008) and the science of design (Purao et al., 2008) also view usability as a common thread that runs through all their work, although their understanding may be different based on their experiences and the fact that different groups tend to be insulated from one another with their own journals, conferences, and academic departments. For example, while some in the HCI community may see usability as synonymous with HCI, others have a sense that usability is a general design attribute of just about anything humans design (Norman, 1988). Any discipline that involves any type of design

will (or should) have an essential interest in usability.

This evolution from ergonomics to human factors to usability to UCD to interaction design to user experience is part meaningful distinction and part semantic convenience. As opposed to the historical, more constrained definition, this study uses the term usability as a shorthand for the full expanse of UCD as an interactive process incorporating requirements gathering, information architecture, iterative design, and user interface evaluation (including inspection methods and end-user testing). In this paper, therefore, the term usability refers to the full gamut of user experience design and evaluation; usability is not merely concerned with the design and testing of software or web site interfaces.

Usability in LIS Programs: A Teaching Philosophy

Most librarians would agree that their website is an important, and in many cases the most important, point of interaction with their patrons. (Cervone, 2005, p. 244)

Usability courses are commonly taught in a variety of degree programs—including psychology, engineering, computer science, and instructional systems—but there can be great variation in terms of the appropriateness of the course for the average student pursuing any particular degree. Many of these courses are taught with the philosophy that students should be trained to conduct formal usability evaluations in formal usability laboratories. While this may be acceptable if a high percentage of students intend to pursue such a career, what should the instructor do when the majority of students do not intend to be usability engineers but do intend to enter the general workforce as information professionals?

This question is keenly important for the iSchools movement, which encourages faculty and students to research, teach, and

learn about all aspects of human interaction with information, including how information is organized, categorized, indexed, catalogued, archived, mined, retrieved, curated, preserved, conserved, consumed, evaluated, and more. All of this energy is worthless if the human user cannot gain access to, perceive, and process the information he or she needs. This information access, perception, and processing is the fundamental purview of usability.

From this perspective, there is clearly a place for usability courses in the iSchools, but the role of these courses may not be to prepare students to work in usability testing labs. Usability courses should, at least according to our shared teaching philosophy, produce students capable of thinking "outside the lab" and evaluating the usability of interfaces using many different methods. Students should learn the principles of UCD, understand the importance of usability in practice, know how to apply multiple evaluation methods throughout the product design lifecycle, and understand how to advocate for such efforts in a business or other professional setting, regardless of whether they are working as practicing usability engineers. While few LIS students will end up pursuing usability careers, it is highly likely that they will find themselves in positions where an understanding of how the principles of usability can be employed to effect change will be extremely useful.

It is this focus on principles that guides the teaching philosophies of the faculty who teach usability at the University of Texas at Austin (UT-Austin) and Florida State University (FSU). UT-Austin offers an Introduction to Usability course for its graduate students, as well as courses in information architecture, design of digital media, digital libraries, digital archiving and preservation, and human information processing. FSU offers a usability analysis course for its graduate students, as well as courses on digital media, digital libraries, and information architecture. Students in both programs who are interested in us-

ability may take advanced versions of these courses in special topics seminars, and will likely conduct an independent study or pursue an internship in the field with a private company, library, or government agency, performing work that will have pedagogic value to the student and real value to the sponsoring agency.

The vast majority of the LIS students at FSU and UT-Austin, however, are not pursuing careers as future usability engineers; the introductory courses on usability offered at each program will likely be their only introduction to the field. By focusing on the principles of usability over the practice of usability, we have come to believe in the value of usability in the curriculum not only for the student who wants to become a usability professional (broadly defined), but also for the much larger number of students whose careers as information professionals will benefit from an awareness of usability methods and arguments—which is to say, everyone.

All students can benefit enormously from having the proper foundation in usability analysis and UCD. There are benefits to a pedagogical approach designed to convey the principles and methods of usability analysis to students writ large, independent of their career goals and aspirations. No matter where they end up working, LIS students tend to pursue careers where it is likely that they will find it helpful to be able to evaluate interfaces of existing information systems and inform the design of new information systems being developed.

Over the past decade, we have received numerous emails providing anecdotal evidence supporting this philosophy. Students who find themselves designing websites, working a reference desk, teaching someone how to use an online search engine, or setting up workflows designed to provide access to information have all sent unsolicited emails explaining how a basic understanding of the principles of usability has paid off time and time again. There is a clear need, therefore, for a rigorous ex-

amination of this teaching philosophy: are the principles of usability analysis valuable to LIS students, even those who are not pursuing usability careers?

Methods

To meet this need, the researchers developed an online survey that invited former LIS students to answer questions about the value of usability / UCD courses to LIS students in terms of the skills they need in the workplace, and the aspects of those courses that LIS students are most likely to use as practicing information professionals upon graduation.

To reach as many potential participants as possible, the researchers assembled a list of all graduate students at FSU and the UT-Austin who earned a master's degree in LIS between 2003 and 2011, and who enrolled in (and passed) at least one graduate level usability course at either university. The initial list included a total of 508 graduate students (327 from FSU, and 181 from UT-Austin), but working email addresses were available for only 289 students (150 from FSU, and 139 from UT-Austin). Emails were sent to each of these students from their usability professors (i.e., one of the co-authors of this paper) inviting them to participate in the study; all survey responses were anonymous.

Participants who followed the link embedded in the email were taken to an online survey instrument that explained the goals of the research, and asked several questions to determine the eligibility of the potential research participant. Respondents were asked to enter the year they graduated from the program, the year they took their usability course (if they could recall it), and their current employment status. Respondents who had not graduated, had not taken a usability course, or were not employed as information professionals were not included in the study.

Respondents were then asked to indicate the extent to which they agreed with a list of statements about the relative value

of their usability courses on the job, and the degree to which their job requires them to engage in usability activities. This question employed a five-point Likert scale ranging from "strongly disagree" to "strongly agree," and listed the following statements:

- The concepts I learned in my usability/user-centered design course have helped me on the job.
- I use the specific methods and techniques I learned in my usability/user-centered design course regularly.
- I use the general theories and principles I learned in my usability/user-centered design course regularly.
- My job requires me to work as a usability engineer/user interface designer.
- I was explicitly hired to perform usability/user-centered design work.
- My usability/user-centered design skills are valued at my place of work.

Respondents were then asked to indicate how likely they were to use specific usability skills, knowledge, or abilities on the job. This question employed a five-point Likert scale ranging from "very unlikely" to "very likely," and listed the following statements:

- General principles of usability and user-centered design
- Understanding of human perception and cognition
- User-requirements gathering techniques
- End-user testing methods
- Inspection methods (e.g., heuristic evaluation)
- Understanding the iterative design process
- Human subjects research
- Survey methods
- Field testing
- The business aspects of usability (e.g., cost-justification)
- The role of usability in the design and development process

Finally, the respondents were asked to answer four open-ended questions:

- What aspects of the usability/user-centered design course you took as an LIS student have been most valuable to you on the job?
- What aspects of the usability/user-centered design course you took as an LIS student have been least valuable to you on the job?
- What do you wish you had learned in your usability/user-centered design course that you did not?
- Please share with us any additional comments you might have related to the role of usability/user-centered design in your LIS education and career path.

The quantitative results from the survey were processed through Excel, which was used to generate descriptive statistics for each of the close-ended survey questions. The responses to open-ended questions were analyzed by the researchers using qualitative analysis techniques, including the process of coding and memoing as outlined by Strauss and Corbin (1998), to identify common themes among the responses. Quotes are included in the findings section below as representative examples of these themes, but may have been edited to ensure participant anonymity.

Limitations

One of the limitations of using email to send invitations to participate in an online survey is that it is impossible to know whether any given individual actually reads the email. In addition, the choice to participate is up to the individual, so the sample is self-selected, and biased toward students who want to answer questions about usability and their jobs. This research method, therefore, is restricted to people who a) have working email addresses that they read and that are available to their respective universities; and b) choose to answer a survey about the rela-

tionship of their usability courses to their current jobs. Despite these limitations, the results of this survey provide insight into the impact of usability courses on a key segment of LIS students: specifically, those who keep in touch with their alma mater, and those who are currently employed in the information profession. It is precisely these students who are most likely to share information relevant to LIS educators as they seek to integrate usability courses into their curricula, and work to shape the future of education and practice in the iSchools.

Findings

The survey was open for two weeks in early December 2011; initial email invitations were followed by reminder emails one week later. The 289 invitations yielded 91 responses (53 from UT-Austin, and 38 from FSU), for a response rate of 31%. Six of the responses from UT-Austin, and one response from FSU, were eliminated because the survey respondents did not provide any information about their current employment. The results presented below, therefore, represent 84 former LIS students, each of whom has a master's degree in LIS from either FSU or UT-Austin, passed a graduate course in usability from either institution, and is currently employed in the information profession, broadly defined.

Participant Demographics

The former LIS students who participated in this study graduated from FSU or UT-Austin between 2003 and 2011, with relatively few graduating before 2005, and a fairly even distribution of graduates from 2006 through 2011 (see Table 1). Functioning email addresses were more likely to be available for the more recent graduates, but those students were also less likely to have graduated and found work. Students were also asked when they took their usability classes, a question that yielded

Table 1: Year of Graduation.

Year of Graduation	FSU (n = 37)	UT-Austin (n = 47)	Total (n = 84)
2003	0.0% (0)	6.3% (3)	3.6% (3)
2004	2.7% (1)	4.2% (2)	3.6% (3)
2005	2.7% (1)	10.6% (5)	7.1% (6)
2006	21.6% (8)	10.6% (5)	15.5% (13)
2007	32.4% (12)	8.5% (4)	19.0% (16)
2008	13.5% (5)	10.6% (5)	11.9% (10)
2009	13.5% (5)	14.9% (7)	14.3% (12)
2010	5.4% (2)	17.0% (8)	11.9% (10)
2011	8.1% (3)	12.7% (6)	10.7% (9)
N/A	0.0% (0)	4.2% (2)	2.4% (2)

answers ranging from 2002 to 2011; these data are not presented here since they are primarily valuable internally for correlating specific comments with specific iterations of any given course.

The individuals who participated in this study held a wide range of jobs; even considering that this particular survey question was open-ended, the breadth of responses was dizzying (see Table 2). Survey respondents identified themselves as web developers, system administrators, interaction designers, instructional designers, research analysts, research assistants, and librarians of all types. While there were several individuals who self-identified as "user experience researchers," zero respondents listed a job title that included the word "usability."

Survey Results (Quantitative)

When asked about the value of usability/UCD courses to LIS students in terms of the skills they need in the workplace (see Table 3), the survey respondents were adamant that the concepts they learned in their usability courses have helped them on the job, with 93% agreeing or strongly agreeing with that statement. Survey respondents were more likely to use regularly the general theories and principles of usability (83% agreeing or strongly agreeing) than the specific methods and techniques they

Table 2: Job Types.

Job Type	FSU (n = 37)	UT-Austin (n = 47)	Total (n = 84)	Examples
Applications Development/ System Administrators	16.2% (6)	12.8% (6)	14.3% (12)	Web Administrator, Coldfusion Developer, Systems Administrator
Interaction Designers	0.0% (0)	12.8% (6)	7.1% (6)	User Experience Researcher, Senior Interaction Designer, Information Architect
Teaching/Instructional Services	21.6% (8)	12.8% (6)	16.7% (14)	Professor, Course Director, Instructional Designer
Analysts/Consultants/ Project Managers	18.9% (7)	36.2% (17)	28.6% (24)	Research Analyst, Management Consultant, Creative Director
Librarians	32.4% (12)	12.8% (6)	21.4% (18)	Public Librarian, Reference Librarian, Electronic Resources Librarian
Doctoral Students/Graduate Research Assistants	8.1% (3)	4.2% (2)	6.0% (5)	Doctoral Student, Research Assistant
Other	2.7% (1)	8.5% (4)	6.0% (5)	Freelance Photographer, Technical Writer, Bookkeeper

learned in their courses (67% agreeing or strongly agreeing).

These findings are all the more astonishing when one considers that the vast majority of these students were not explicitly hired to perform usability / UCD work (only 20% agreeing or strongly agreeing with that statement), and that only 44% agreed or strongly agreed that their job requires them to work as a usability engineer or user interface designer. Finally, 66% agreed or strongly agreed with the statement that their usability/UCD skills are valued at their place of work. As can be seen in Table 3, the responses from FSU and UT-Austin were uniform, supporting the idea that a common teaching philosophy produces similar results even at different universities.

When asked how likely they were to use specific skills, knowledge, or abilities related to usability and UCD on the job, the survey respondents consistently emphasized the importance of general usability principles over specific practical methods, a trend that held true for both FSU and UT-Austin students (see Table 4). An overwhelming 94% of the survey respondents said they were likely or very likely to use the general principles of usability and UCD on the job, reinforcing the belief that the principles of usability are applicable across the information profession. Approximately three quarters of the survey respondents claimed they were likely or very likely to use skills, knowledge, or abilities that help them better understand the use and users of information on the job: 81% were likely or very likely to use an understanding of human perception and cognition; 79% were likely or very likely to use an understanding of the

Table 3: Relationship between Usability and Work
(FSU, n = 37; UT-Austin, n = 47; Total, n = 84).

Please indicate the extent to which you agree with each of the following statements:		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The concepts I learned in my usability/user-centered design course have helped me on the job.	FSU	0.0% (0)	2.7% (1)	2.7% (1)	48.6% (18)	45.9% (17)
	UT	0.0% (0)	0.0% (0)	8.5% (4)	29.8% (14)	61.7% (29)
	Total	**0.0% (0)**	**1.2% (1)**	**6.0% (5)**	**38.1% (32)**	**54.8% (46)**
I use the specific methods and techniques I learned in my usability/user-centered design course regularly.	FSU	2.7% (1)	5.4% (2)	24.3% (9)	45.9% (17)	21.6% (8)
	UT	4.2% (2)	12.8% (6)	17.0% (8)	44.7% (21)	21.3% (10)
	Total	**3.6% (3)**	**9.5% (8)**	**20.2% (17)**	**45.2% (38)**	**21.4% (18)**
I use the general theories and principles I learned in my usability/user-centered design course regularly.	FSU	2.7% (1)	0.0% (0)	13.5% (5)	37.8% (14)	45.9% (17)
	UT	0.0% (0)	6.4% (3)	10.6% (5)	23.4% (11)	60.0% (28)
	Total	**1.2% (1)**	**3.6% (3)**	**11.9% (10)**	**29.8% (25)**	**53.6% (45)**
My job requires me to work as a usability engineer/user interface designer.	FSU	13.5% (5)	32.4% (12)	10.8% (4)	35.1% (13)	8.1% (3)
	UT	19.1% (10)	23.4% (11)	12.8% (6)	25.5% (12)	19.1% (9)
	Total	**16.7% (14)**	**27.4% (23)**	**11.9% (10)**	**29.8% (25)**	**14.3% (12)**
I was explicitly hired to perform usability/user-centered design work.	FSU	32.4% (12)	32.4% (12)	21.6% (8)	8.1% (3)	5.4% (2)
	UT	36.2% (17)	25.5% (12)	12.8% (6)	10.6% (5)	14.9% (7)
	Total	**34.5% (29)**	**28.6% (24)**	**16.7% (14)**	**9.5% (8)**	**10.7% (9)**
My usability/user-centered design skills are valued at my place of work.	FSU	2.7% (1)	5.4% (2)	35.1% (13)	43.2% (16)	13.5% (5)
	UT	2.1% (1)	6.4% (3)	14.9% (7)	34.0% (16)	42.6% (20)
	Total	**2.4% (2)**	**6.0% (5)**	**23.8% (20)**	**38.1% (32)**	**27.8% (25)**

Table 4: Usability Skills on the Job
(FSU, n = 37; UT-Austin, n = 47; Total, n = 84)

Please indicate how likely you are to use each of the following skills, knowledge, or abilities on the job:		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
General principles of usability and user-centered design	FSU	0.0% (0)	2.7% (1)	0.0% (0)	54.1% (20)	43.2% (16)
	UT	0.0% (0)	4.2% (2)	4.2% (2)	10.6% (5)	80.8% (38)
	Total	**0.0% (0)**	**3.6% (3)**	**2.4% (2)**	**29.8 (25)**	**64.3% (54)**
Understanding of human perception and cognition	FSU	0.0% (0)	2.7% (1)	8.1% (3)	51.4% (19)	37.8% (14)
	UT	0.0% (0)	6.4% (3)	19.1% (9)	36.2% (17)	38.3% (18)
	Total	**0.0% (0)**	**4.8% (4)**	**14.3% (12)**	**42.8% (36)**	**38.1% (32)**
User-requirements gathering techniques	FSU	2.7% (1)	2.7% (1)	16.2% (6)	51.4% (19)	27.0% (10)
	UT	10.6% (5)	8.5% (4)	4.2% (2)	31.9% (15)	44.7% (21)
	Total	**7.1% (6)**	**6.0% (5)**	**9.5% (8)**	**40.5% (34)**	**36.9% (31)**
End-user testing methods	FSU	10.8% (4)	13.5% (5)	27.0% (10)	32.4% (12)	16.2% (6)
	UT	12.8% (6)	14.9% (7)	10.6% (5)	25.5% (12)	36.2% (17)
	Total	**11.9% (10)**	**14.3% (12)**	**17.8% (15)**	**28.6% (24)**	**27.4% (23)**
Inspection methods (e.g., heuristic evaluation)	FSU	2.7% (1)	24.3% (9)	18.9% (7)	37.8% (14)	16.2% (6)
	UT	4.2% (2)	10.6% (5)	19.1% (9)	34.0% (16)	31.9% (15)
	Total	**3.6% (3)**	**16.7% (14)**	**19.0% (16)**	**35.7% (30)**	**25.0% (21)**
Understanding the iterative design process	FSU	0.0% (0)	8.1% (3)	18.9% (7)	45.9% (17)	27.0% (10)
	UT	4.2% (2)	6.4% (3)	6.4% (3)	36.2% (17)	46.8% (22)
	Total	**2.4% (2)**	**7.1% (6)**	**11.9% (10)**	**40.5% (34)**	**38.1% (32)**
Human subjects research	FSU	8.1% (3)	29.7% (11)	21.6% (8)	18.9% (7)	21.6% (8)
	UT	12.8% (6)	23.4% (11)	19.1% (9)	14.9% (7)	29.8% (14)
	Total	**10.7% (9)**	**26.2% (22)**	**20.2% (17)**	**16.7% (14)**	**26.2% (22)**
Survey methods	FSU	2.7% (1)	16.2% (6)	21.6% (8)	32.4% (12)	27.0% (10)
	UT	4.3% (2)	10.9% (5)	23.9% (11)	30.4% (14)	30.4% (14)
	Total	**3.6% (3)**	**12.2% (11)**	**22.9% (19)**	**31.3% (26)**	**28.9% (24)**
Field testing	FSU	10.8% (4)	18.9% (7)	24.3% (9)	27.0% (10)	18.9% (7)
	UT	12.8% (6)	19.1% (9)	23.4% (11)	17.0% (8)	27.6% (13)
	Total	**11.9% (10)**	**19.0% (16)**	**23.8% (20)**	**21.4% (18)**	**23.8% (20)**
The business aspects of usability (e.g., cost-justification)	FSU	8.1% (3)	18.9% (7)	18.9% (7)	37.8% (14)	16.2% (6)
	UT	10.6% (5)	17.0% (8)	27.6% (13)	29.8% (14)	14.9% (7)
	Total	**9.5% (8)**	**17.8% (15)**	**23.8% (20)**	**33.8% (28)**	**15.5% (13)**
The role of usability in the design and development process	FSU	2.7% (1)	5.4% (2)	16.2% (6)	45.9% (17)	29.7% (11)
	UT	6.4% (3)	8.5% (4)	8.5% (4)	36.2% (17)	40.4% (19)
	Total	**4.8% (4)**	**7.1% (6)**	**11.9% (10)**	**40.5% (34)**	**35.7% (30)**

iterative design process; 77% were likely or very likely to use an understanding of user-requirements gathering techniques; and 76% were likely or very likely to use an understanding of the role of usability in the design and development process.

Survey respondents were less likely to use skills, knowledge, or abilities related to specific usability evaluation methods on the job: 61% were likely or very likely to use inspection methods; 60% were likely or very likely to use survey methods; 56%

were likely or very likely to use end-user testing methods; and 45% were likely or very likely to use field testing methods. An understanding of the business aspects of usability (e.g., cost-justification) proved to be important to approximately half the survey respondents, with 49% likely or very likely to use those skills on the job. Finally, the aspect of usability students were least likely to use on the job was their knowledge of human subjects research, with only 43% of respondents likely or very likely to use this skill on the job.

Survey Results (Qualitative)

Analysis of the four open-ended questions on the survey revealed a number of themes common to former students from UT-Austin and FSU. For example, when asked what aspects of the usability courses they took as an LIS student have been *most* valuable on the job, survey respondents from both programs emphasized the value of having a strong understanding of the principles of usability and UCD:

"General principles of usability and user-centered design, Understanding of human perception and cognition" (FSU)

"Usability principles, how usability fits into the design and development process, user-centered design practices/techniques" (UT-Austin)

Many survey respondents explained that a general understanding of these principles was important specifically because of the ability to look at things from the user's perspective. This shift in mindset, from a system-centered to a person-centered perspective, was very important:

"The overall thought process and feeling that the focus of any software is the user. It's a different way of thinking." (UT-Austin)

"Understanding how users view our website, social media, and other library resources." (FSU)

The survey respondents also stressed that the principles of usability are valuable even when one is not working as a usability engineer:

"The concepts of usability can be applied to most everything in the workplace. While I don't do actual usability testing, I do use the concepts in content management and research." (FSU)

"Knowing the general principles of Web site design, usability and user-centered design assist me hourly as I search 100s of Web sites daily in search of specific information." (UT-Austin)

Understanding the basic principles of usability provided survey respondents with the ability to discuss usability analysis with their peers, and argue for the importance of usability on the job:

"General principles of usability and user-center design as it relates to libraries and academia. Understanding it from a theoretical perspective. Having the tools (knowledge, vocabulary) to critically discuss usability issues with peers." (FSU)

"Probably the theoretical basis of user centered design much more than the actual mechanics. I'm not in a position to design many systems here, but it is nice to be able to apply concepts if and when my opinion is sought." (UT-Austin)

While the quantitative survey results (above) showed that students were more likely to use the principles of usability than specific evaluation methods on the job, being able to apply specific evaluation methods emerged as an important theme in the qualitative responses, and still yielded an Agree or Strongly Agree response from between 49% and 61% of our respondents:

"The ability to evaluate the usability of a user interface and clearly articulate its strengths/weakness has been quite valuable." (FSU)

"The fact that my classmates and I went

through a usability test and could share experiences and exchange ideas. It was a real preparation for the actual experience in the workplace." (UT-Austin)

Many survey respondents stressed that their knowledge of specific evaluation methods helped them apply the principles of usability on the job:

"Right out of library school, I was in charge of my library's website and did a usability study to determine issues students had with the way the site was organized. I directly applied what I learned in that class about usability research techniques to do that study." (FSU)

"Heuristic eval, white papers, usability evaluation project. My first week on the job, I was actually assigned both an heuristic eval and a white paper. I hadn't heard of either of those deliverables before Usability, so that paid off immediately." (UT-Austin)

Survey respondents also stressed the importance of being able to argue for implementing usability analysis on the job, particularly from a cost-justification perspective:

"Importance of early usability analysis in the software design process." (UT-Austin)

"Time/cost/design justification." (UT-Austin)

When asked what aspects of the usability courses they took as students have been least valuable on the job, survey respondents from FSU and UT-Austin were much less vocal, frequently responding that they "can't recall any" least valuable aspects. In general, when they did comment, survey respondents often listed those aspects of usability that they are not required to use in their current job (usually by way of an explanation for their answers):

"Business / economic concerns (mostly because I have not had to justify user-centered design to a manager)." (FSU)

"Field testing has not been specifically useful because that is not an aspect of my job." (UT-Austin)

One common theme was the need for usability courses to provide a greater emphasis on informal evaluation methods than on formal user testing methods; several students mentioned the relative value of different evaluation methods in their comments:

"Knowing how to put together a full-scale formal usability test is useful background knowledge, although not very practical in my day-to-day work. I tend to use lightweight user testing and heuristic evaluation to a much larger degree." (UT-Austin)

"Our development cycle is extremely rapid—we roll out new features to our software platform almost every day. [...] In that kind of environment, there really isn't much opportunity to apply some of the more expensive, formal, and time-consuming methods of analysis and design that are used in some organizations. All usability analysis is 'quick and dirty' at my job. . . ." (FSU)

Another common theme that emerged in the answers to this question was the desire to have more control over usability analysis in their organizations; for some survey respondents, the least valuable aspects of the course were those they have not been allowed to do:

"I am not in a position to stress the importance of testing methods (to the detriment of the latest iteration of our library's website)." (FSU)

"Unfortunately, the user testing aspect has been least valuable. But that has more to do with my job (and the inability to get approval to conduct user testing) than the course." (UT-Austin)

When asked what they wish they had learned in their usability course that they did not, survey respondents listed a wide variety of different topics. The vast major-

ity of these were topics that were already covered in the courses, but that the students wished were covered in greater detail:

> "More guerilla/remote testing tactics and resources." (UT-Austin)

> "More about universal design/accessibility." (UT-Austin)

Some of the responses to this question came in the form of pedagogical suggestions:

> "A blog where there are projects and best practices learned by students in a school." (UT-Austin)

> "I wish I had taken usability in concert with another course that required me to design and build a system for users, i.e., that I had learned about usability within the context of real-world systems design." (UT-Austin)

Other students suggested a greater focus on libraries in the course:

> "A lot of information taught was focused on non library/academia issues. Although such activities and learning projects may have helped students develop a better understanding of general usability issues, I think it would have been more beneficial to LIS students to focus projects on library usability issues." (FSU)

> "I would have more of an emphasis on library-specific products, such as OPACs." (FSU)

One important theme centered on the importance of being able to advocate for usability, especially in environments where usability analysis is not the norm:

> "I find that many usability battles at my job are won or lost in the very early stages or the design process. It's that first development meeting where the usability 'expert' in the room can have the most influence. I wish that I'd had a little more practice at being that expert in the room in the very first development spec meeting—especial-

ly how to present usability concepts (and on-the-spot cogent arguments) to others (designers, developers, end-users, managers) who don't share the same usability knowledge base." (FSU)

> "As a UI developer & designer, knowing how to apply user-centered design has helped me tremendously on the job. Unfortunately however, there are always some people (in my team or upper-management) who don't take user-centered design very seriously. I wish I had the chance to learn more about the business aspects of usability so I can equip myself with more persuasive arguments." (UT-Austin)

Several additional key themes emerged when the survey respondents were asked to share any additional comments they might have related to the role of usability/UCD in their LIS education and career path. One common theme stressed by many students was how taking a course on usability opened their eyes to a new, and extremely valuable, world-view:

> "My world-view changed after taking Usability. I can no longer look at a poorly designed website without cringing. I don't blame myself when I can't figure out the path (or use of an object) that a designer intended that just doesn't work." (UT-Austin)

> "This class changed my way of looking at the world more than any other class I took at FSU. It was actually my favorite class, because it gave me a deep understanding of why usability is so important and how it can improve people's lives. Because of this class, I am better able to empathize with library users who are frustrated because of usability issues, and I am better able to recognize and remedy usability problems at the library where I work. This class asked a lot of me, and gave a lot in return. I would recommend it to any LIS student, not just those interested in technology / web design." (FSU)

Many of the former LIS students em-

phasized how taking a course on usability was an important educational investment:

"Having experience and training in usability and UCD has been a great benefit to my career. I have been able to bring expertise to development projects that others just don't have. My education gave me a true understanding and the skills to apply UCD, rather than just toss around buzz words." (UT-Austin)

"This course, probably more than any other MLIS course, separates me from my wonderful colleagues, in the positive sense. I think I am the only Librarian in my system who has had this course, and therefore I have a voice in matters that I would not have otherwise had." (FSU)

Another common theme was the need for LIS programs to offer more courses on usability, UCD, and related topics:

"As technology becomes more and more important, courses such as this one need to play a more prominent role. For instance, as libraries convert to becoming digital libraries more tech skills are required, as well as being able to think about the end product and the users experience." (FSU)

"The iSchool should have a User-centered Design course that complements Usability by giving students a hands-on approach to designing websites and mobile apps with usability in mind. [...] Many job postings that I see are for 'Usability Designers,' so a more technical/hands-on iSchool course would be useful." (UT-Austin)

Finally, the survey respondents stressed throughout that an understanding of the principles of usability was relevant to all, and important enough to be considered foundational in LIS:

"Usability should be a foundation course that every LIS student should be required to take. It is relevant to the profession and should not be taken for granted." (FSU)

"I have used every aspect of the design

course at some point during my career since graduating from the iSchool." (UT-Austin)

Discussion

"Last year we launched an upgraded Drupal-based website. This was a long term effort that required creating a separate team from within the staff of our library district. I volunteered to be a member of the team specifically because of the training I received from FSU's Usability course. [...] Usability testing was at the center of every stage of this development from early staff and user surveys to extensive staff and user testing and everything in between. [...] Although it's hard to quantify, the knowledge I gained from this course certainly saved our library many thousands of dollars that would have gone to outside consultants, and more importantly, has provided our extensive user community with an easy to use website. This was, without doubt, the best course I took from FSU." (FSU)

The above results demonstrate conclusively that LIS students, even those not hired to work as usability engineers, use the general principles of usability and UCD regularly in their jobs as information professionals. While only 20% of the respondents agreed or strongly agreed that they were "explicitly hired to perform usability/user-centered design work," the vast majority agreed or strongly agreed that the concepts learned in their usability course helped them on the job (93%), that they use the general theories and principles learned in their usability course regularly (83%), and that their usability skills are valued at their place of work (66%). While we acknowledge the possibility of selection bias in this (as in any) survey, the relatively high (31%) response rate—combined with the striking differences between the 93% who voiced value in learning usability concepts vs. the 20% who were explicitly hired to perform usability work—encourages confidence in

our conclusions. It is extremely unlikely that all non-respondents did not find value in their usability instruction, and there is no question in our minds that these results reinforce the importance of a common teaching philosophy that stresses the value of usability for all LIS students, and argue for the inclusion of usability / UCD as a core course in the LIS curriculum.

User-Centered Design as a Common Teaching Philosophy

These results were obtained, with remarkable similarity, from a wide sample of respondents who graduated from two different universities over the past ten years. While the authors have known each other for many years, they have never explicitly coordinated their usability-oriented course offerings across the two universities. Specific course syllabi, outlines, readings, and assignments not only vary from university to university and professor to professor, but from semester to semester, as each course has evolved significantly over the years in terms of topics and material covered.

At UT-Austin, the "Introduction to Usability" course is divided into thirds. The first third of the course covers the scientific underpinnings of usability (including human perception, cognition, memory, and mental models). The middle third is devoted to different UCD methods (often entailing guest presentations from a variety of usability professionals, and from companies such as AT&T, IBM, projekt202, OpenText, and Design for Use). In the final third, students conduct formal usability evaluations where they build upon lessons learned in the rest of the course. The class is taught as an on-campus course in a town with a relatively high density of software development companies, and a large number of interaction designers.

At FSU, the "Usability Analysis" course begins by covering the scientific underpinnings of usability engineering and human information processing, followed by hands-on assignments and activities that provide a more practical emphasis. It includes coverage of the design principles and guidelines that have resulted from research and practice, as well as presentations from industry. Course assignments focus on acquiring an understanding of UCD and mastering evaluation methods such as inspection methods, representative user testing, and performance metrics. The final portion of the course is spent on an iterative, UCD project featuring formal usability evaluations. This course is typically taught as an online course to distance students pursuing the master's in LIS from across Florida and the nation.

Despite differences in emphasis and sequencing, the common course philosophy—that the general principles and specific skills of usability and UCD are important to all LIS students, regardless of career goals—has stayed the same from university to university, from course to course, and from year to year. This underlying philosophy resulted in remarkably consistent survey results. The median score for four out of six questions in Table 3, for example, was the same for UT-Austin and FSU respondents, with the two differing questions separated by only one response category. Similarly, out of the 11 questions in Table 4, five yielded the same median score for FSU and UT-Austin respondents, while the other six yielded medians that again differed by only one category. This similarity in responses—despite differences in course content, structure, and location—reinforces our belief in our teaching philosophy and motivates us to advocate making a course on usability a required component of the LIS curriculum.

Usability as a Core LIS Course

Making usability or UCD a core or foundational course in the LIS curriculum would be a somewhat radical move; usability analysis is not considered one of the core competencies of librarianship

(ALA, 2009). Such a proposal, however, is strongly supported by the results presented above. While it might take some fine-tuning in terms of content and assignments, there is no reason why a course on usability could not successfully transition from an elective course pursued by some, to a required course taken by all LIS students.

An important step in this process would be to refine the course to make it more applicable for all LIS students, with a greater emphasis on the breadth of application and less on specific methods. The above survey responses provide critical baseline data for making this change, and follow-up conversations with former students could provide even more data. For instance, while end-user testing is an important part of usability analysis, and many respondents voiced an appreciation for having had the experience of carrying out a lab-based study, it is clear that most practicing information professionals emphasized the value of discount, "quick-and-perhaps-not-so-dirty," guerilla usability evaluation methods. With the help of former students who are working as information professionals, we can expand our offerings, or at least rework our examples, to drive home more explicitly the importance of UCD in non-software-development work environments. Similarly, we will need to bolster our modules on advocacy and the integration of usability methods into the day-to-day job of the traditional information professional.

It is our belief, however, that the general principles of usability are already perfectly applicable to all LIS students, particularly in the iSchools. A usability course is not a programming course, or a computer interface design course, or even an HCI course. A course on usability teaches students that usability problems stem from the difficulty of thinking about information systems from the user's perspective; that usability analysis is a critical part of the design lifecycle for all products and essential to meeting the needs of end users; and that system designers must distance themselves from their designs, and

systematically evaluate interfaces for usability problems using various methods, with and without representative users.

These general principles of UCD are big picture concepts applicable to all LIS students, regardless of career goals. As LIS programs and the iSchools movement prepare students for the "new librarianship" (Lankes, 2011), it is critical that all future information professionals have a solid understanding of why it is important to involve users in the development of information systems of all types, and how these systems are improved when designed, assessed, and approached with the users' perspective in mind.

Conclusion

"One of the most important tools I have as a librarian is my ability to understand how users work with a system—both physical and virtual. I use the methods I learned in my usability course work all the time in my job." (UT-Austin)

The results of this study demonstrate that LIS master's students can benefit from instruction in usability and UCD. Even those who are not explicitly hired to perform usability or UCD work find, once in the workplace, that their awareness of the concepts, theories, and methods of usability serves them well and tends to be valued by their co-workers and employers. Despite differences in curricula, teaching styles, geographic locations, and career paths, a firm grounding in the principles, theories, and methods of usability UCD is of considerable value to information professionals throughout their careers. LIS faculty—in the iSchools and beyond—would serve their students well by including courses on usability in the LIS curriculum, and by considering making usability a core course requirement.

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