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Merging Coursework with Real World Experience: Testing User Experience in a Science Agency

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ABSTRACT

Partnerships between industry and universities can provide opportunities for students to engage in real-world experiences and when done well, can deepen collaborations, creating mutually beneficial experiences for all stakeholders. One such partnership between the University of Tennessee, School of Information Sciences Master of Information Science program and the U.S. Department of Energy's Oak Ridge National Laboratory Neutron Science Directorate (NScD) supported a student experiential learning project to put theory into practice. In spring and summer 2017, students participating in the Institute of Museum and Library Services "Experience Assessment" (UX-A) program completed a multi-pronged assessment of the usability and user experience of the NScD website. UX-A combines coursework, training, and hands-on experience to prepare future information professionals with assessment and user experience expertise. The UX-A research project presented the students with a real-world problem that tested their knowledge, skills, and creativity to find a solution, work through it, and contribute to an organization.

KEYWORDS: user experience, experiential learning, workforce development, curriculum development

Introduction

"Experience Assessment" (UX-A) is a University of Tennessee, School of Information Sciences Master of Information Science program, funded by the Institute for Museum and Library Services (IMLS) Laura Bush 21st Century Librarians program. UX-A prepares information professionals with assessment and user experience expertise by combining coursework, co-curricular educational content, mentoring, and experiential learning in various workplaces. The UX-A University of Tennessee team worked with practitioner partners from academic libraries and government information agencies to design an innovative program of focused course content, workplace experiences, and intensive mentoring. This case study describes the process of team building with a government agency and how intense cross-

agency mentoring and coursework, including a course focused on Human Computer Interaction, were applied to provide experiential learning in a workplace project in collaboration with the Oak Ridge National Laboratory (ORNL), located in Oak Ridge, Tennessee. A team of six students, with guidance from UTK faculty and agency mentors, put their coursework and mentoring into practice to assess the usability and user experience of the U.S. Department of Energy's Oak Ridge National Laboratory Neutron Sciences website.

Background

Experiential Learning (EL) is a pedagogical approach in which knowledge is created through participating in practical activities and engaging in a process of experience, thought, reflection, and action (Kolb & Kolb, 2005). EL is an active and learner-centric approach whereby students respond to a real-world problem with minimal influence from the educator (Lee, McGuigan & Holland, 2010; Dali, 2017). Research concludes that EL is an effective educational approach that supports students' self-direction and creativity, increases their meta-cognitive abilities, and improves their ability to apply information to professional situations (Kolb & Kolb, 2005; Dali, 2017). Academic programs implement EL through practica, internships, field work, and applied research projects (Smith, Hallam, & Ghosh, 2012). Experiential learning plays a key role in library and information science (LIS) education and helps prepare students for professional success (Ball, 2008; Berg, Hoffmann, & Dawson, 2009; Hoffmann & Berg, 2014; Saunders, 2015). Berg, Hoffman, & Dawson (2009) point out the importance of including research elements and evidence-based practice in EL to provide students with a strong understanding of the impact of research and its importance. One of the requirements for all students in the UX-A program is to conduct a research project where they meet with a client (in this case the ORNL Neutron Sciences Directorate key staff) to gather requirements and identify appropriate methods for assessing the website usability.

The UX-A research project presented the students with a real-world problem that required them to interact with a Federal agency and put theory to practice. Our goal was for the students to test their knowledge and skills to identify usability problems with the website, find solutions, work through them, and contribute to the organization.

Working with external organizations is helpful for a successful experiential learning project. The challenge is creating an experience that is mutually beneficial to the students, external partner, and the university (Gilbert, 2012). For students, the opportunity to engage with real-world professionals in an education-industry partnership can enhance work-relevant knowledge and practical skills, increase their employability, and illustrate a focus on issues or problems of importance to industry (Boersmaa, Reinecke, & Gibbons, 2008; Thune, 2011; Tymon & Mackay, 2016). There can be drawbacks to such a partnership, however; Lucia, et al. (2012) describe including increased workload and heavy focus on a single subject as a downside to a university-industry partnership for engineering students

Partnerships between industry and universities can include many different initiatives and activities, and when done well, can deepen collaborations and create mutually beneficial experiences for all stakeholders. Industry partners benefit by students generating an influx of creative ideas as well as the future advantage afforded by helping to develop a new workforce and influence academic programs' content to match their industry's needs (Thune, 2011; Lucia et al., 2012; Tymon & Mackay, 2016). Similarly, through education-industry collaboration, academic programs can assess and align their curricula closer to industry practices creating high quality and relevant study programs that are attractive to prospective students and additionally, might positively impact the university's ability to gain funding (Thune, 2011; Lucia et al., 2012; Bird, Chu, & Oguz, 2015).

UX & Information Sciences

Although still lacking a precise consensus on definition, the term “user experience” (UX) was first used by Norman et al. in 1995 to describe all aspects of a person’s experience with a system. This definition has expanded to include the emotional factors that influence determinants of system quality and use (Hassenzahl & Tractinsky, 2006; Law et al., 2009; Bargas-Avila & Hornbaek, 2011; Lallemand, Gronier, & Koenig, 2015). The goal of UX research and testing is to create better products and services by studying the inter-relationship between a user’s internal state, the characteristics of the designed system, and the context of the interaction, while creating a positive experience (Hassenzahl & Tractinsky, 2006).

A longitudinal study (2004 and 2010) of the Australian job market for Library and Information Professionals had to reassess the job categories for 2010 to include user-centered information design skills (e.g., information design, usability, wireframe, HTML) which were required by 27% of the jobs (Wise, Henninger, & Kennan, 2011). Exploring 2014 job listings culled from the Code4lib website, Maceli (2015) analyzed the most common technology skills associated with the LIS positions. The study showed a preference for job candidates skilled in HTML, CSS, JavaScript, and PHP with developer-oriented proficiencies, including interface design.

Farrell & Nielsen (2013) of the Nielsen Norman Group surveyed almost 1,000 UX professionals about their UX careers. They reported that 52% had at least one master’s degree and of those, MLIS degrees ranked third along with psychology and information design (HCI and MBA graduates ranked one and two, respectively). Additionally, Bias et al. (2012) reported that 94% of surveyed MLIS graduates use the general principles of usability and user-centered design despite that 80% were not explicitly hired to perform that work.

The UX-A Program

A diverse cohort of twelve Information Sciences master’s students was recruited for this two-year program focused on educating future leaders in assessment and user experience. The full program structure is comprised of 42 graduate credit hours of curriculum supplemented and enhanced by a structured set of experiences and learning opportunities. These co-curricular elements include meetings and workshops, graduate research assistantships, practica and mentoring, and applied research projects.

Students began working on research projects in the second semester of their first year in the program. Prior to beginning the research project, students participated in in-person workshops on specific tools relevant to assessment and user experience work, e.g., technology in the College of Communication and Information (CCI) User-eXperience Lab (UXL), Qualtrics, and NVIVO. Each UX-A student is also required to carry out graduate research work assignments. As part of their weekly hours, the students completed a 22-hour series of online training via Lynda.com covering topics such as UX design techniques, usability testing, assessment, and soft skills (e.g., time management, communication, and project management). In the first year of their two-year program, students took classes in Human-Computer Interaction and Statistics, as part of their nine credit hours per semester requirements.

Human-Computer Interaction (HCI) Course Content

Professor Dania Bilal taught the HCI course in spring semester 2017. HCI is an introductory course that focuses on the design and evaluation of system interfaces and user experience. It covers topics such as interaction design, system attributes, user characteristics, user

information behavior, gathering user requirements, data collection methods, usability methods, measuring user interaction/experience, as well software and tools for product development and for capturing user interaction. This course is grounded in concepts, theories, and principles for designing user-centered interfaces and for evaluating the user experience. The projects and assignments are designed for real-world situations, including observing user interaction, collecting data, interviewing, developing persona, assessing the usability of system interfaces, as well as redesigning interfaces based on actual user interaction and experience. Most projects are team-based, allowing students to communicate and collaborate with one another virtually and face-to-face as appropriate. Students presented their team final project (usability assessment) in class. The instructor gave permission to students who were working on the UX-A research project (see description next) to choose the ORNL Neutron Sciences website for the team project and to present it in class. The instructor provided constructive feedback to the students to improve the usability study of the website.

The instructor used a rubric for evaluating the team project and provided quantitative and qualitative assessments of the students' work. Students self-reflected on their knowledge, skills, and experience gained in this course. Some felt there should be an additional advanced HCI course in the curriculum for those interested in gaining a higher level of knowledge and skills in UX.

Industry Partner

Oak Ridge National Laboratory (ORNL) is the largest U.S. Department of Energy multi-program energy research laboratory (ORNL, n.d.). The University of Tennessee has a longstanding relationship with ORNL that benefits both individual academic and research interests and aids economic development in East Tennessee (The University of Tennessee, n.d.). Professor Suzie Allard, Director of the UT Center for Information and Communication Studies, and Mike Frame, Deputy Director of the USGS Core Science Analytics, Synthesis, and Libraries division, worked together to build this opportunity for students to put their skills and classroom knowledge of user experience testing into practice at the ORNL Neutron Sciences Division.

Through the Neutron Sciences Directorate (NScD), ORNL manages and operates two neutron scattering facilities, the High Flux Isotope Reactor (HFIR) and Spallation Neutron Source (SNS). The UT-ORNL Joint Institute for Neutron Sciences was established to promote neutron research and support scientists conducting research with HFIR and SNS. The ORNL Neutron Sciences website provides public information about the instruments and facilities and is the site for user access to submitting research proposals for instrument use.

The Research Project

This government agency partnership led to an opportunity for students to assess the Neutron Sciences website in terms of usability and user experience, focusing on first time users of the site who are using the web site to apply for instrument use. The students and mentors met with the NScD clients in February 2017 to identify their project requirements and develop a project plan that included constructing personas, completing a heuristic evaluation of the website, and conducting a usability study of the website at the CCI User-Experience Laboratory. The students delivered a written report and client presentation at the end of July 2017.

The experience was meant to be as realistic as possible, so there were few format requirements or other parameters imposed, but mentors were available for meetings,

questions, and support. Preliminary meetings between the students and mentors provided a high-level overview of project management concepts and principles. The students were encouraged to apply basic project management methods to 1) manage expectations, 2) provide a structured approach for communications with the NScD, 3) ensure all parties agreed and understood major milestones, and 4) to document anticipated deliverables. This approach proved very successful for both the students and all the stakeholders involved in the project.

The objective of this experiential learning requirement was for students to practice problem solving, project management, and critical thinking. Working in a group environment taught them to succeed in an intensive team environment. The mentoring team wanted students to be able to apply and reflect upon skills and knowledge gained during their UX-A program, as well as experience the technological, social, and ethical issues they will face in professional settings.

Results

Students created a detailed final report for the clients and made a formal presentation of their findings at ORNL Neutron Sciences. The tasks undertaken by the team included:

- Heuristic analysis performed on the Neutron Sciences website and the Integrated Proposal Tracking System (IPTS).
- Development of original user personas created to assist with both task development and participant recruitment for the usability testing study.
- Usability testing of first-time users of NScD system

NScD staff feedback to the student presentation showed the value of partnership building that emphasizes the learning nature of the process. Most feedback was positive, yet provided constructive criticism, including comments such as: “I found the students very prepared and professional. Their presentation was good, but a bit scripted. When they transition from school to business, they will need to develop a relaxed, conversational approach. Some of the students have already developed such a style, but some extra time with those that have not may be beneficial to them. NScD partners expressed interest in working with students again and reaffirmed the belief that “experiences working with organizations on real problems is the best training for students.”

Students expressed a sense of accomplishment and increased confidence at the end of the process, however, they also had to overcome issues of working in a diverse team and sometimes exhibiting stress as the project was being scoped and formulated. Students stated, “I would love things to have been mapped out very clearly for us. However, [by] us working to figure everything out we were able to make mistakes and learn. So I think that this was a great experience” and “Indisputably there is real value to a situation where students must make executive decisions among their peer group. However, this experience may have been more rewarding and less emotionally draining if this team had been prepared for such an autonomous learning environment.” Project mentors Allard and Frame suggested that in the future the program include conflict management and leadership training earlier in the process, in addition to UX skills and concepts.

Next Steps

This government partnership experiential learning project was purposely designed at the mid-point of the students’ degree, so they could put into practice what they had learned to that point. Successful completion of a real project and working with agency clients gave them a sense of accomplishment and confidence that they could make the transition from classroom

to workplace. It also will guide their second year as they gain additional skills and refine what they learned in year 1.

In year 2 the students will complete coursework, including a required course in Planning & Assessment and electives. In addition, each student will complete two workplace practica, each of which requires 150 hours per semester working with a mentor in an agency. These workplaces include other divisions of ORNL, other government agencies such as the Office of Scientific and Technical Information, U.S Geological Survey Library, industry sites, and academic libraries. Students will graduate with a specialty in UX and Assessment in Spring 2018.

The research component of the UX-A program has several positive outcomes in addition to providing the students with confidence and real-world experience. The research project allowed us to build closer collaboration with a local industry partner that will advance the development of future student projects and increase our pool of potential workplace mentors. The partnership has also provided us with feedback on our current curriculum and classroom experiences. These relationships are significant to SIS program improvements and specifically to enhance the experience of new students who specialize in usability and assessment.

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