

Code for America as an Instructional Resource for Teaching User Centered Design and Accessibility

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Abstract. One of the key challenges in user centered design instruction is how to replicate the professional climate. Code for America is a group of volunteers who work on civic problems from a technology standpoint. The group is ideal for helping to training students in design thinking, civic entrepreneurship, and collaboration with the hope that they will continue after graduation. Within the group, there are several development teams. The teams consist of experienced developers, writers, and visual designers. Often, the development teams lack interaction designers or user experience researchers to help them understand the user, understand accessibility and W3 standards. This article illustrates best practices in our experience. It is a starting point for incorporating open source volunteer development projects into a user centered design curriculum.

Keywords: User Centered Design Curriculum · User Centered Design Teaching · Code for America · Accessibility

1 Introduction

One of the key challenges in user centered design instruction is how to replicate the professional climate of development teams. Several recent surveys indicate the importance of realistic projects which require a student to interact with developers or a development team [1].

An instructor could use previous projects that she or he experienced in the past as a basis for student practice; however, these projects may be stale. The projects may lack external validity or unintentionally teach students inefficient or outdated practices. Over and above these issues, previous projects lack potential users for the students to interview, observe, and test. Hence, a lack of external validity in teaching user centered design.

An instructor could use textbook activities, however these activities also lack the interaction with the users or a development team. While textbook activities teach standard approaches, students may fail to understand how user centered design iterates in response to the dynamism of users and the development environment. In addi-

tion, divorcing the interface from the back end of the application also ignores a common development problem, adjusting for dependencies and unexpected contingencies.

The third best option is for the instructor to engage an actual development team through collaborating with a business partner. This approach is the most tenuous as the deadlines may not match up with the academic deadlines. Student work may be unusable as they are learning. There have been more than a few occasions where I have been surprised by misinterpretations. Finally, there may be non-disclosure agreements. These may require that the students cannot use the work as a sample.

For these reasons, volunteer development teams, which create open source applications, provide an ample supply of developers, real projects, and real development environments. Deadlines can be adjusted, students work with actual developers who are employed in outside organizations, and as the code is open source, there are few restrictions on how the student work can be used for samples. One organization that we have used is the local Code for America chapter.

2 Code for America

Code for America is a group of volunteers who work in technology. Typically, they meet once a week to discuss fixing nonprofit and city government problems with technology. Jennifer Pahlka [2] founded code for America in 2011. The organization has grown to exist in most major cities. They take on some of the most complex design problems that combine the resources of data analytics and technology in city government.

Code for Kansas City is a local affiliate of the Code for America movement. The group has weekly regular development meetings to work on several projects at different stages in the development process. These projects are open source so that the students may begin to understand the development process and how it is implemented. Each project is started with the goal of a real, living and breathing final product. The teams consist of experienced developers who present the same challenges as true development teams. Often, the development teams need interaction designers and user experience researchers. As an instructional resource, it is ideal for training students in design thinking, civic entrepreneurship, and collaboration.

The group that we are affiliated with has a regular structure with a weekly meeting in which each development team introduces themselves and talks about what skills or resources they need to move the project to the next stage. There are several standing projects, which may last through several months or years. Then, there are several short projects, which can be finished within a semester. An instructor can select components of a project to accomplish the course's goals. In our case, we chose to do user testing over the course of several semesters and provide education in usability, interaction design, and accessibility to the group.

A nearby institution has also used the group as a resource for projects. The faculty at this institution chooses to select portions of large projects that fit within the scope of their discipline. At the beginning of the semester, the faculty invite the selected project owners to present their projects to the class. The class then organizes into teams and selects the projects that they would like to work on. The team assigns a project leader who is responsible for keeping abreast of project changes, updating the

team, and working with various city officials to access the resources needed for the project. The faculty define discreet outcomes and deliverables due at the end of the semester. The project leader or a faculty member attend every Code for Kansas City meeting to communicate information back to the class.

This works well for discreet projects that encompass a semester's work. For portions of larger projects, students may lack the resources or time to attend each weekly meeting. Students may misunderstand and not gather the right information. Students must progress in their education and careers. Thus, a faculty member or assigned administrative member needs to manage the relationship with the organization and act as an institutional knowledge resource for current and prior projects. In our case, a faculty member attends each weekly meeting and then distributes discreet tasks to the class. The class as a whole will participate in large events like prototype jams or group activities where there will be enough work for several interaction design or user testing projects.

Within the three-year span of our work, we found the development teams requested the following types of activities: 1. user testing, 2. wireframing, 3. ethnography/requirements gathering. We also found that while the development teams were professional developers during the day at organizations that had professional user experience or interaction designers on staff, their role within their organization may not allow them the opportunity to interact with these professionals. As a result, developers were not always aware of the return on investment that an interaction designer or usability researcher could provide the group in time savings and reduction in frustration. The supportive, friendly, and welcoming spirit enables a good introduction to the real development world. Students in the program have experienced a great affinity for the group and have contributed positively to the projects.

3 Our activities

Requirements and field work. Many user centered design professionals feel that this is the most important category of activity. Industry often invests the least amount of effort or money as it seems to provide the least tangible return on investment. Ethnography, contextual inquiry, task analysis, critical decision method, and interviewing can be difficult to teach as real problems are necessary for students to understand the right constraints and for the process to make sense. I found that the development teams embrace field work as it helped them understand the users. Often, the user populations are easy to study and the city government can provide immediate access.

User testing. Several of the projects in the semester in which this article was written required user testing. If a project was not mature enough to be tested, the students created prototypes and then tested at either our institution or at a public place. I worked out an arrangement with the local library to provide a meeting space. The wide range of projects needing testing contributed well. Students gained experience working with specific user groups, business to business applications, applications for the general public, A/B testing, and iterations.

Many institutions use the participant pool if the project will meet the scientific requirements for institutional review board approval. If you are affiliated with an institution that requires review for work with human participants, you will need to follow their approval procedure. Different institutions have different requirements and standards. Some institutions require that user testing be part of a broader scientific project. In this case, you might intend to develop new metrics and compare these to standard metrics such as the system usability scale [3]. Or, the work may contribute to examining mental models or best practices within a particular genre of applications. At the time of this article submission, several research funding opportunities exist throughout industry (i.e., Google).

User centered design presentations. There have been several opportunities to present on user centered design methodologies and benefits to the organization. In addition, Code for America provides Fellows to the local organizations on a short term basis of several weeks or months. The Fellows are available to speak to the class or give the students a broader sense of where user centered design fits into the organization and its mission. Often, the opportunities to champion user-centered design are on a person-to-person level. We check in weekly with the development teams to find out who is doing what and how we can help. Developing a good rapport with the development teams is another opportunity for students to practice communication and collaboration skills.

Collaborating with others. Sometimes it is difficult to determine the existing strengths of the group and how to best contribute to the resources of the group. We chose to coordinate our efforts with the other institutions who also participated in the group projects. Through this approach, we were invited to speak at several classrooms and local conferences. Sometimes these talks were difficult. A diversity of institutions and a diversity of disciplines benefits the conversation. In our program, we invite a diversity of students. This has led to the strongest student team with the widest variety of skills yet. One of our strongest students has an interest in accessibility and compliance.

4 Addressing accessibility and compliance

Because Code for Kansas City creates assets for local governments and other civic groups, accessibility is especially important. Code for American also has an expressed interest in diversity and inclusion. A student currently enrolled in the program, who was born with a visual impairment, is preparing for a career in accessibility. Working with Code for Kansas City allows this student to act a consultant, teach other students about accessibility, and help Code for Kansas City create assets that are built with accessibility in mind from the inception of each project.

The student performed the role of consultant to Code for Kansas City. During the course of a semester, she completed several projects to assist the organization in mov-

ing towards “baking accessibility” into every project from the start. She also shared the projects with classmates to further their knowledge of accessibility. The projects included writing guidelines for user testing for users with disabilities and reports evaluating the accessibility of completed projects.

4.1 Accessibility best practices

In the U. S. A., the W3C and WCAG standards <insert links here> are the most frequently used criteria for determining whether or not content is accessible to users with disabilities. These criteria are often applied, checklist fashion, when a project is nearing completion. This has the potential to create problems that need to be addressed at a late stage of development when they are more costly and difficult to address. The standards do not suggest user testing with people who have disabilities or use adaptive technology. Just as it is impossible to know how users will react to an asset without user testing, it is not possible to know if an asset is actually accessible without testing by users with disabilities. One of the graduate students currently enrolled in the program was born with a visual impairment and is very interested in improving accessibility, so she pursued projects related to that goal.

The three main goals of the consulting were to create more comprehensive accessibility audits for government and non-profits, to establish more robust accessibility guidelines to help Code for Kansas city “bake in” accessibility in from the beginning of future projects teach future UX practitioners about accessibility beyond the checklist through in-class presentations on projects.

A comprehensive accessibility plan for Code for Kansas City needed to include factors not included in standard tools, so recommendations were made to change language on their website, such as their code of conduct to indicate that accessibility was a priority. The website, and other materials welcoming new participants, should indicate accessible routes into the meeting spaces. Kansas City is a car dependent city with inadequate public transportation. Because of this and the fact that even a moderate visual impairment can prohibit a person from driving, it is essential that the group be willing to assist with transportation to facilitate the participation of development team members and testers with disabilities. Development and testing team members should be familiar with free adaptive technology so they can do initial testing and so testers with disabilities can access prototypes from provided equipment.

An accessibility audit of a government website revealed several areas where accessibility could be improved. Some of these should have been spotted with a thorough WCAG compliance check. However, other problem areas were less obvious. Issues with color and contrast and screen reader compliance could have been spotted by thoroughly checking against WCAG standards. The information architecture of this website also presented substantial challenges to people with disabilities, specifically people with visual impairments. Many stories on the website began on one page and continued on another. However, the continuation actually contained minimal new content. This is problematic for people who use screen readers because they would hear the story twice with very little additional content upon the second reading. Find-

ing information on this site was especially problematic for people using screen readers for two reasons. The top search box on the site is not very prominent and was skipped over by screen readers. The site did not have a site map, a-z index or other way to navigate quickly to specific information, rather a user would have to click through menus and submenus to find information. Combined with the number of stories that required users to follow links for little pay off, this would cause frustration for people who use screen readers that is substantial enough to create barriers to accessibility. Improving the search function and offering a site map would also be beneficial to people without disabilities.

While most students in human factors graduate programs will be exposed to the WCAG and other standards for accessibility, they are less likely to be exposed to the more nuanced aspects of accessibility. The student presented her projects to her classmates in order to introduce them to some of the barriers experienced frequently by people with disabilities and show them how the designs could be improved in order to reduce these barriers to access. The student specializing in accessibility presented the guidelines she wrote for Code for Kansas City and her audit of the government website to her fellow students. She demonstrated her preferred adaptive technology along with other freely available adaptive technology. Students were able to experience the frustration of a person who uses adaptive technology first hand rather than as an abstract academic concept.

The most common accessibility problems encountered in this process were:

1. Text that magnified poorly, either overflowing boxes or overlapping other pieces of text.
2. Poor contrast or color combinations that became unreadable when viewed reverse color settings.
3. Lack of a clear screen reader friendly search or site map features.
4. A general lack of awareness among students and practitioners about adaptive technology and adaptive settings built into all modern Operating Systems.

4.2 Conclusion

We found that if you work closely with the team captain to learn how your students can provide the most value the team will be more accepting of the student involvement. We are continually outlining what can be expected of the students' participation, the deliverables, and the timelines.

4.3 Citations

For citations in the text please use square brackets and consecutive numbers: [1], [2], [3], etc.

References

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