
Developing an Adaptable K-12 HCI Curriculum

Elena Agapie

University of Washington
Human Centered Design and
Engineering
Seattle, WA, USA
eagapie@uw.edu

Andrew Davidson

University of Washington
Human Centered Design and
Engineering
Seattle, WA, USA
adavid7@uw.edu

Paste the appropriate copyright/license statement here. ACM now supports three different publication options:

- ACM copyright: ACM holds the copyright on the work. This is the historical approach.
- License: The author(s) retain copyright, but ACM receives an exclusive publication license.
- Open Access: The author(s) wish to pay for the work to be open access. The additional fee must be paid to ACM.

This text field is large enough to hold the appropriate release statement assuming it is single-spaced in Verdana 7 point font. Please do not change the size of this text box.

Each submission will be assigned a unique DOI string to be included here.

Abstract

To introduce K-12 students to the user-centered design process, our team has created a flexible curriculum for design thinking workshops adaptable to various classroom settings, age groups, and communities. This curriculum was used and adapted for over 17 schools, 10 conferences, and various after-school groups, and has touched over 1100 students from across Washington State. Our team has been developing early stage workshop materials and curriculum in a level of detail that enables educators to adopt and adapt the workshop to their educational setting, even if they have minimal experience in User Centered Design.

Author Keywords

K-12 education; curriculum development.

Introduction

The Human Centered Design Department (HCDE) at University of Washington has been using design thinking activities to introduce students to the user-centered design (UCD) process. In the UCD workshops, students are given a design space to explore (such as user interfaces for a website, mobile app, or a physical device). In a variable period of time (one to five hours),

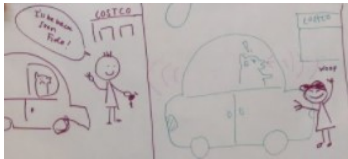


Figure 1: From top to bottom –
1) high school student brainstorming users,
2) storyboard by student,
3) students drawing user interface prototypes,
4) presentation of design process and outcome.

working in small groups, students brainstorm user needs, develop use-case scenarios, and create interaction designs for an application. HCDE has run these participatory workshops with students at various educational levels—elementary school, middle school, high school, and with K-12 teachers.

The workshops are taught by college students who have had a minimum of one course in Human Centered Design. We have found that K-12 students respond to this activity favorably [1], not just for the style and content of the workshop (“I designed an app!”), but also for the chance to have natural interactions with college students, who can be wonderful ambassadors and mentors.

Description of K-12 curriculum

The UCD K-12 workshops were developed iteratively [1] starting from the concept of a UCD Charrette, a fast-paced design activity. The second author developed a workshop for a four-hour summer program across several days. This workshop was later adapted to different settings. The UCD workshop gives students hands on experiences with processes commonly used in UCD: ideating, understanding users, identifying user needs, writing scenarios, storyboarding, creating user flows, prototyping on paper and digitally, presenting results (Fig 1).

The UCD curriculum was designed to be easily adapted to different educational environments. The curriculum was used in traditional classroom setting, during one classroom period of a subject, but also in after school programs or at conferences. The curriculum is adaptable to students of different age groups, from elementary school all the way to high school, or mixed

groups of students. The curriculum is adaptable to different lengths, as short as 50 minutes, and up to five hours. The curriculum was used in a variety of schools, some with a strong culture in technology and fabrication, to others that have no computing curriculum, some in urban settings across Seattle, others in rural areas of Washington.

Adapting the curriculum to different settings

To make the curriculum adaptable to the different settings, several components can be modified, such as the topic or design challenge of the workshops, which UCD processes are used in the workshop, or what examples are presented. In the context of the HCDE workshops, college students serve as teachers under the supervision of more experienced faculty and graduate students. They adapt this curriculum to the setting they will later visit.

Adapting workshop to classroom setting The workshops are frequently conducted during one class period of a K-12 classroom. To understand the constraints and needs of that setting, the workshop leaders interview the teacher about information specific to the classroom: learning objectives, time, room layout, student demographics and interests. In the past the workshop was customized for different time periods by designing activities that shortened certain design steps (e.g. choosing predefined users instead of brainstorming users, prototyping an app on paper instead of using a digital UI prototyping app such as Marvel).

Adapting workshop to student interests

The workshop is adapted to student interest based on teacher feedback, age group and understanding of the community. The topic and design challenge is chosen

collaboratively by workshop leaders and the teachers. This can vary based on community interests (e.g. designing smart cars, designing apps that serve a community need). The examples used in the workshop have been tailored to the student age level.

Making curriculum accessible to other educators

The authors have developed an initial draft of a toolkit with the materials and procedures used in the workshops. The toolkit aims to enable an educator to run the workshop with minimal User Centered Design experience.

The toolkit developed will be evaluated and iterated on with feedback from a group of undergraduate students who will use it to plan upcoming workshops. They will not have prior knowledge of the workshop. We plan to make the toolkit available to a broader community to maintain it as a community resource.

Interest in participating in the workshop

The authors want the opportunity to attend the HCI education workshop to share their experience in creating a flexible and adaptable curriculum. The authors plan to use the workshop to generate ideas for how this toolkit can become a shared resource for the broad HCI community. The authors are interested in learning how to create effective infrastructures that enable open sharing of educational materials.

Bios

Elena Agapie is a PhD candidate in Human Centered Design and Engineering, at University of Washington. Elena has conducted several seminars in which students develop, and adapt curriculum for K-12 design thinking and computing workshops that have reached over 1000 students in Washington state. Elena has conducted research in several industry settings, at Microsoft Research, Fuji Xerox Palo Alto Research Lab, and NASA's Jet Propulsion Lab.

Andrew Davidson is a Senior Lecturer, Human-Centered Design & Engineering, Director of the HCDE Undergraduate Program, Adjunct Senior Lecturer, Division of Design, School of Art, at University of Washington. Andrew Davidson is a technologist and designer specializing in interaction design and physical computing, working in a wide variety of professional and educational contexts. Over the last 30 years, he has developed, managed, and communicated about innovative technology projects in human-centered interactive systems. As an educator, Davidson has taught in and overseen leading international research-oriented design technology programs (Art Center College of Design, Interaction Design Institute Ivrea), and taught high school computer science (Roosevelt HS, Seattle Public Schools).

References

1. Emma Rose, Andrew Davidson, Elena Agapie, and Kiley Sobel. 2016. Designing our future students: Introducing User Experience to teens through a UCD Charette. (SIGDOC '16). ACM, New York, NY, USA, Article 22, [zttps://doi.org/10.1145/2987592.2987618](https://doi.org/10.1145/2987592.2987618)