Lesson 9: Internet of Things – Smart Clothing Design

Overview

This lesson guides students through an abbreviated design process. Students first brainstorm a list of potential users of smart clothing. As a class, they then group these ideas into broad categories and each group will choose one category of user. Groups repeat this process to brainstorm needs or concerns of their user, eventually categorizing these needs and choosing one to focus on. Finally, students design a piece of smart clothing, using the specific needs and concerns they brainstormed to guide their decision making. At the end of the class students quickly share their decision-making process and get feedback on how well their product addresses the user need they selected.

Purpose

This activity is a fast-paced introduction to the user- centered design process. Certain shortcuts are taken such as speculating as to their user's needs rather than confirming them directly. In this lesson the primary goal is to establish that design decisions will be made with the user's needs in mind.

The activity in this lesson is an adaptation of the Design Charrette from the University of Washington.

Agenda

Getting Started (1 min)

- Designing for Others

Activity (30 min)

- Introduce the Activity
- Define
- Prepare
- Try

Wrap-up (15 min)

- Reflect
- Career Discussion

Objectives

Students will be able to:

- Empathize with a user's needs to design an object
- Create meaningful categories from a collection of ideas, specifically in the context of a brainstorm

Preparation

- Ensure you have plenty of sticky notes, pens and large poster paper for students to work on
- Set up groups with preferably 3 students each

Links

Heads Up! Please make a copy of any documents you plan to share with students.

- **Problem Solving Process with Empathy – See Image**
- **User Centered Design – See Activity Guide**

pwc

Teaching guide

Warm Up (5 min)

Designing for others

Remarks

Designing for other people can be challenging for a lot of reasons, but one of the most important is that it challenges us to consider what another person values, likes, or is concerned about. In other words we need to have empathy for someone else. Today we're going to do a mini design activity to help us practice the entire process ourselves.

Discussion goal

Goal: This should be a very quick introduction to the lesson. You are looking to call out that designing for other people requires you to consider their needs instead of your own, which can often be challenging. You may wish to point to the Problem Solving Process with Empathy - Image and re-emphasize the importance of empathy when designing for others. Throughout the activity, you can use the steps of the Problem Solving Process to help frame what students are doing. In either case use this warm up as a quick hook for the lesson and then move to the main activity.

Activity (30 min)

Introduce the activity

To get hands on with writing HTML and some CSS, the building blocks of web development, students will be using Khan Academy's Hour of Code tutorial on Creating Webpages (https://www.khanacademy.org/computing/hour-of-code/hour-of- html). Encourage students to pair up to work together if they would like. You can either share the Khan Academy URL directly with students, or tell students to navigate to www.code.org/pwc and select Lesson #5 - Creating Webpages.

Teaching tip

Reducing Printed Materials

Online Option: The Activity Guide can be completed online. For the drawing, students can either draw their product online or submit a paper version of their product separately.

Journal Option: This activity can be completed as a journal entry. Students can use a digital version of the Activity Guide as a prompt, copying the headers or prompts into their journals.

Define

Brainstorm Users: Ask students to list on their activity guides as many different potential users of smart clothing as they can think of. Give students a couple of minutes to brainstorm independently.

Give students a minute to brainstorm as many different people as they can. Once they're done ask them to create a post-it for the two or three user types they think are most interesting.

Categorize Users: Invite students to discuss with their table at least one bigger category of users they see on the board. Eventually bubble up their ideas to a full class discussion. You should aim to create broad categories for every user on the board.

Choose Specific User: Ask groups to pick one of the categories you've created to design for. Do your best to ensure a good mix of users in the classroom but it's not a problem if some groups choose the same user.

Brainstorm Needs: Students will repeat the brainstorming process to identify a list of potential concerns, interests, and needs of the user they picked. Encourage students to think carefully about what might be important to those people.

Categorize Needs: Students should repeat the same process of creating scraps of paper for each need, interest, or concern of their user and then grouping them. Students can use the markers and poster paper to do this step if you have provided those materials.

Teaching tip

Why Smart Clothes?: This activity can easily be run with a different target product. This type of product was chosen because these are broad applications for combining computing technology with clothing that could benefit many types of users. An additional benefit is that the field is not yet well-defined and so it provides students more leeway to develop ideas of their own for how to solve people's problems rather than rely on more established solutions. Regardless of what product you use, the point is less that the product is feasible and more that students are thinking creatively about how to meet other people's needs rather than their own.

Teaching guide

Choose Specific Need:

Choose Specific Need: Ask groups to pick the specific need for their user that they want to address. They should try to pick a need they think could be addressed by smart clothing so in some cases they may need to be a little creative in thinking about these needs.

Teaching tip

Brainstorm - Categorize - Choose: In this activity students will use this process twice, first to identify a user, then to identify a user's need. The first time through you should model this process more carefully. During the brainstorm emphasize the fact that there are no right or wrong ideas. When creating categories emphasize that again there are no "right" categories. Remind students that the goal here is to Define the problem they will try to solve today and this process is a useful way to focus in on as specific problem.

Prepare

Brainstorm Solutions: Ask students to brainstorm potential ways smart clothing could be used to address the problem they've decided to solve.

Discuss Pros and Cons: Once students have brainstormed solutions invite groups to discuss pros and cons of the proposed solutions. Reinforce that they should be having this conversation from the standpoint of their user.

Either the specific needs they chose or the broader needs they've brainstormed should guide how they value each idea.

Teaching tip

Knowing User Needs: The best way to empathize with someone else is to talk to them. In this activity students are brainstorming potential needs of a user, but if they were doing this outside of the classroom setting they would want to hear directly from users so they don't make assumptions about their needs. For this lesson the goal is to develop a plausibly realistic set of needs and then think through how to design an object for those needs, rather than your own.

Try

Describe Your Product: Students should write a description of what their product is and how it addresses their user's need on their activity guide.

Draw Your Product: Students should draw and label a picture of their product. Specifically any "smart" features should be labeled with short descriptions. Students can also use poster paper and markers for this portion of the lesson.

Teaching tip

Empathizing with User's Needs: Reinforce the need to empathize with the user categories students chose. When weighing pros and cons here it should be from the standpoint of the user needs and concerns they identified.

Warm Up (10 min)

Reflect

Present Your Product: Groups should be given a couple of minutes to share what they created. You can structure presentations around the following steps

- Who your user is and what specific need you identified.
- The features of the product designed
- How the features addressed the need they chose
- At least one feature of their product they might not personally have included but have to meet the needs of their user.

Career Discussion

Introduce yourself and your career:

- What do you work, what do you do, and what do you love most about your job?
- What or who inspired you?
- How did you get interested in computer science?
- Did you have a mentor?
- Share a story about how tech affects everyone

Teaching guide

Show this inspirational video: What Most Schools Don't Teach
Ask the students questions and leave time for Q&A.

- What jobs are they interested in, what are their favorite tech gadgets or apps, and how do they think they are built?
- Do the students have any questions for you?