

Teaching With, About, and Through Human-Centered Design

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Human-Centered Design (HCD) is a problem solving approach that identifies the unmet needs of a population in order to collaboratively develop solutions (Brown, 2008) . HCD involves implementing design thinking processes such as exploring the problem, empathizing with the user, reflecting on biases, developing themes and frameworks, brainstorming ideas, proposing concepts, building and evaluating prototypes, and developing and implementing marketing and sustainability plans (Brown & Katz, 2011; Dorst, 2011; Zhang & Dong, 2008). HCD can result in concepts, products, and services that are innovative, genuine, and most importantly, useful to people (Meinel et al., 2020).

Bringing HCD to educational settings has the potential to help students develop human-centeredness, metacognitive, experimental, collaborative, communicative, and creative mindsets (Goldman et al., 2012; Razzouk & Shute, 2012; Royalty et al., 2019). These mindsets align with the 21st century skills that were emphasized by many educational reform documents at the K-12 and higher education levels (e.g. NGSS and ABET). These mindsets are critical for solving 21st century life and work problems. Nevertheless, it is still unclear how to bring HCD to educational settings; specifically, how teachers can integrate HCD in their instruction. The purpose of this paper is to propose three ways that teachers can use to integrate HCD in their instruction.

The first way is teaching *with* HCD. Here, teachers think and act like designers (Henriksen & Richardson, 2017). To do so, teachers have to value empathy, iterate on activities through the design, implement and reflect cycle, and be open to uncertainty and failure. When teachers value empathy, they put aside familiar perspectives and try to see the problem from the students' viewpoints. They communicate with students to better understand their backgrounds, learning preferences, and learning difficulties. They try to utilize what they learn from students in designing their instruction and materials. When teachers iterate on activities, they first design an activity that matches their students' preferences, implement it with them, and reflect on the design and implementation processes by collecting feedback from students and using it to modify the activity and reimplement it. As they iterate on activities, teachers must be open to uncertainty and failure. They must learn from failed idea or prototype as much as they learn from a successful one. Teaching *with* HCD engages students not only cognitively but also emotionally in the subject which in turn can result in higher motivation and performance.

The second way is teaching *about* HCD. Here, teachers facilitate students' implementation of HCD processes as they work in interdisciplinary/multidisciplinary teams to overcome a design challenge. To do so, teachers give examples of successful HCD projects, set topic and scope of design challenges, and facilitate students' engagement in activities that provide them with opportunities to understand, implement and practice different HCD processes such as empathizing with the users, synthesizing how might we questions, brainstorming ideas, prototyping concepts, and planning for their actual implementation in the

market or community. Teaching *about* HCD gives students the opportunity to work in teams to understand and solve ill-structured, authentic problems that are similar to real-life problems. It can also equip students with a problem-solving approach that can help them define the problem-solving spaces, engage in rich and constructive dialogues within these spaces, and trace their problem-solving processes in order to easily troubleshoot issues and identify possible solution routes.

The third way is teaching *through* HCD. Here, teachers facilitate students' implementation of HCD processes as they work on a design challenge that has opportunities for students to learn about and apply concepts of a certain discipline. To do so, teachers facilitate students' engagement in activities that provide them with opportunities to acquire and apply the concepts of a discipline in order to make justified design decisions. These decisions will impact students' implementation of HCD processes as well as their design outcomes. Teaching *through* HCD uses it as means to an end; however, HCD means can make the discipline's concepts more relevant, meaningful, applicable and transferable to contexts other than formal educational settings.

Despite the potential benefits of teaching *with*, *about* and *through* HCD, integrating these ways in instruction, all at once, is definitely challenging. Nevertheless, teachers can always start by integrating at least one of the three ways in at least one of many possible opportunities that align with their existing instructional objectives and activities. For example, in the very first session with the students, one teacher can teach *with* HCD by asking them about their learning preferences followed by considering these preferences when designing or implementing activities. Another teacher can teach *about* HCD by briefly introducing it to students and explicitly urging them to implement one or more of its processes in completing a project or an activity. A third teacher can teach *through* HCD by adding specific discipline-related activities to an end-of-unit project that engage students in using the knowledge they acquire in these activities to make progress on the project from an HCD perspective.

As teachers start injecting their existing instruction with teaching *with*, *about*, and *through* HCD activities, it will be a matter of a short time before they start realizing the potential of this approach in helping students enjoy learning, acquire content, and develop 21st century mindsets. This can inspire teachers to design and integrate more HCD activities in their instruction triggering a snowball effect that results in teaching *with*, *about*, and *through* HCD all at once.

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