# An In-Class Activity for Recognizing and Practicing the Power of Iteration in Human-Centered Design

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**Course** CS1
**Programming Language** Python
**Knowledge Unit** Programming Concepts
**CS Topics** Functions, Data Types, Expressions, Mathematical Reasoning
**Resource Type** Assignment

## SYNOPSIS

Iteration is a central to HCI design. The learning objectives of this introductory HCI class activity is to experience and recognize the importance of iteration in the HCI design process, and to practice how small iterative design changes and consistent implementation and evaluation can have on the overall design.

In this class activity, HCI students practice the iterative design process in a rapid and engaging activity. The activity includes three iterations of playing a simple game (tic-tac-toe) in small groups of 2-3 students and changing the rules of the game from one iteration to the next. In the first iteration (baseline), students play the original tic-tac-toe game. Thereafter, in each iteration, students choose and make one change to one rule of the game in its current iteration, play the modified game, and evaluate the impact of the change on the game experience. By the end of the activity, the new game that underwent 3 changes may be substantially different from the original tic-tac-toe game.

After students complete the class activity, it is recommended to hold a class discussion in which students present the changes they made to the tic-tac-toe game throughout the iterations and reflect on the effects these iterative changes had on the game experience. The instructor facilitates this discussion, emphasizing the power of iteration in the HCI design process.

## KEYWORDS

Iteration, Tic-tac-toe, Design, Class activity, HCI education

## 1    ENGAGEMENT HIGHLIGHTS

This class activity applies the principle *Make it Matter* from the NCWIT Engagement Practices Framework by applying the engagement practices of incorporating student choice. Starting from a simple game, students decide what changes to apply in each iteration, and observe first-hand the effects of these changes. Allowing students to *apply their creativity* in changing the game makes the activity open-ended and fun and serves as an ice breaker in the learning process.

The activity also applies the principle *Grow an Inclusive Student Community* by applying the engagement practices of a well-structured collaborative learning activity and encouraging student interaction. It is likely that all students are familiar with tic-tac-toe (and otherwise the game is easy to learn: the rules are provided in the lecture and on the worksheet), and this allows students of all backgrounds to engage in the activity. At the class discussion that follows the activity, the instructor emphasizes the variety of games that were created in the different groups and the variety of different paths each group took toward their final game. This demonstrates the contribution of a *diversity of mindsets* to achieving a wide range of acceptable processes and outcomes.

## 2    RECOMMENDATIONS

### 2.1  Scope

The activity is designed for students in an *introductory HCI course*, where they learn the steps of HCI design, from user research, through scoping the design problem, generating design ideas, implementing the design as a prototype, and evaluating the design. Students learn through this activity that following the HCI design steps iteratively can help them improve the design toward a desirable user experience. It is therefore recommended to introduce this class activity early in the semester, when the HCD process is presented as a whole, and before deep diving into each specific stage.

Advanced students may also benefit from understanding the role of iteration to identify and redirect failure toward more creative outcomes [5]. Students who have software development skills may come with an idea for a solution and may be less open to changing it in response to feedback, or they might engage in confirmation bias. We hope to get students to see their first design idea as a starting point (*a* design idea, not *the* design idea) and iteratively apply changes based on feedback, instead of sticking to their original solution. In other words, this activity may help students shift

from the mindset of "getting the design right" to "getting the right design" [3].

This activity is appropriate for class size from 15 students to more than 200 students. Upon submitting the worksheet, students can receive attendance or in-class participation credit.

## 2.2 Logistics

Students work in groups of 2-3 students, all sharing a single worksheet that is distributed in the classroom. Students are given 15-20 minutes to complete the activity. The instructor and teaching assistants, if available, walk around the classroom to engage students in conversations about the current section of the activity on which they are working (each section corresponds to a single design iteration).

## 3    HCD PROCESS STAGES

The class activity follows a brief explanation, through lecture or readings (e.g., [2], [4] ch. 2, or a practitioner focused article such as [6]), about the iterative human-centered design (HCD) process and its stages [4]. The process is expanded in a tool handout that provides detailed information about each stage and potential changes and variations of the process.

In this version of the HCD process (based on [4]), the first stage involves *user research*, where the designer learns about the audience for whom they are designing. In the second stage, *design*, they come up with creative solutions that respond to users' needs. Third, *prototyping*, involves the construction of a prototype for the design. Fourth, in *evaluation*, the designer gets feedback about the design. This process repeats iteratively throughout the product design lifecycle toward better understanding the users' needs, improving the design to better respond to these needs, and developing more design details.

## 4    ACTIVITY STRUCTURE

At the outset of the activity, students are provided with instructions and learning objectives as specified in the handout accompanying this OER. They are also reminded of the community norms for collaborative learning in the classroom, based on a list of classroom group behaviors [7]. These rules include:

- Decide who is taking notes on the worksheet.
- Be nice: no derogatory comments about other students or their ideas.
- Make sure that everyone participates and gets chance to offer their thoughts.
- Make sure everyone gets listened to.
- Don't interrupt when another student is talking.
- Respect others by putting your devices away.

Next, students play a few rounds of the original tic-tac-toe game. This is called the baseline. They are asked to pay attention to the experience of the players, corresponding to the *user research* stage of the HCD process.

Next, students are asked to make one change to one rule of the baseline game to improve the game experience. These changes can include, for example, changing the number of players, what action can be taken in a turn, the winning conditions, or the grid size & shape. This corresponds to the *design* stage of the HCD process. They *implement* the change by playing the new game on the worksheet and *evaluate* its impact on the game experience.

Students repeat the previous step two more times, each time making a change to the previous version of the changed tic-tac-toe game. Each of these versions of the game corresponds to a single iteration in which students engage in design, implementation, and evaluation.

## 5    KNOWLEDGE TRANSFER

After students complete the class activity, they present their work to the entire class, and the instructor facilitates a discussion. The goal of the discussion is to surface and emphasize the following:

*The power of iteration:* similar to creating a new game that is substantially different from the original tic-tac-toe, when designing products, designers should expect their original design concept to change over time through iterative design.

*A multitude of possible design paths and outcomes:* each rule change that groups decided on during the activity is valid, as is the final game they designed. Similarly, when designing products, there isn't one single design path with one correct outcome, but a broad design space that students can confidently explore through iterating their designs.

*Real world iterative design is messy:* this exercise had simple guidelines about what to iterate and a fixed set of iterations. In real life, design situations, products, and organizations are complex, and designers need to make decisions about when to iterate, what changes to apply, when to stop iterating, and the demands that iterations put on developers and users – time, effort, and hope and patience for the product to be ready in the future [1].

## 6    MATERIALS

- Tic-tac-toe iteration exercise.pdf: In-class activity worksheet provides instructions to students, and a structure for completing the activity.
- Iterative HCD process slides.pdf: Slides that cover the iterative HCD process, introduce the activity, and offer discussion points.
- Tool: Human-Centered Design Process Chart.pdf: A handout to students about the HCD process.

## REFERENCES

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