Incluso!: Introducing Universal Design Through Play

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Course HCI
Programming Language None
Knowledge Unit Software development methods
CS Topics Human-Computer Interaction (HCI)

SYNOPSIS

Incluso! is a card game designed for groups of 3–5 players that introduces and explores the concept of universal design in digital products through collaborative play. Its goal is not only to educate but also to cultivate empathy, something that is often underdeveloped in students who are encountering accessible design principles for the first time. The game encourages players to consider real-world barriers that individuals with disabilities face, all within an engaging, conversation-driven format.

KEYWORDS

Digital accessibility, universal design, inclusive design, HCI, discussion, empathy

ACM Reference Format:
Devorah Kletenik, Elizabeth Lodvikov, and Rachel F. Adler. December 2025. Incluso!: Introducing Universal Design Through Play. In *ACM EngageCSEdu*. ACM, New York, NY, USA, 5 pages. https://doi.org/10.1145/3786357

1 INTRODUCTION AND BACKGROUND

Software applications should be designed in an accessible fashion, since inaccessible software can lead to experiencing frustration and difficulties in accomplishing tasks or the complete inability to do so. Inaccessible images and text present challenges to anyone with limited visibility or viewing conditions and also to those with a slow Internet connection or limited bandwidth; software relying only on mouse movements may be difficult for anyone who relies on keyboard navigation or has limited motor control; and densely written text or confusing instructions may present comprehension difficulties to anyone with reading difficulties or who is not a native language speaker. The lack of accessible design can have a staggering impact on software use and might even discourage their use all together.

Teaching accessibility in an engaging way presents a particular challenge, and research emphasizes the role that empathy plays in educating students about accessibility to help them understand how people with disabilities encounter and use technology [3, 7, 18, 21]. Accessibility is often introduced through lectures and written assignments [1, 2, 4, 6, 9–11, 14, 17], but these traditional methods may fall short in capturing students' attention, fostering active engagement, or encouraging critical thinking about real-world accessibility issues. Other approaches, such as service learning with people with disabilities [8, 13], videos [18, 19], or guest lectures [8, 22], can enrich accessibility education and increase student empathy, but they may be difficult to implement consistently. These methods often require significant coordination, time, or resources, which can limit their feasibility in typical classroom settings.

A number of digital games to teach about accessibility have been developed [7, 12]. However, there is also a growing need for non-digital games, particularly in classroom settings where access to devices, reliable internet, or sufficient technical support may be limited. Non-digital games can be easier to implement in a wider range of educational environments and can encourage more direct, collaborative engagement among students. This observation led us to create Incluso!: a card game to teach about accessibility.

2 GAME STRUCTURE AND OBJECTIVES

Incluso! consists of three types of cards:

- **Challenges:** These cards present barriers or flaws in a software or product design. For example: "Audio from a website is very quiet."
- **Personas:** These cards describe fictional users who represent various types of permanent, temporary, or situational impairments. For example: "Richard – A 68-year-old man who just retired from his cameraman job. He has difficulty hearing after years of working at loud shows."
- **Solutions:** These propose possible redesigns or accommodations to address the challenge. For example: "The volume of audio can be increased."

ACM EngageCSEdu, December 2025.

ACM ISBN 979-8-4007-2427-5/2025/12
https://doi.org/10.1145/3786357

Players aim to create tripartite sets that consist of a Challenge, a relevant Persona, and an appropriate Solution. These sets are used to accumulate points. Partial sets (that pair a Challenge + Persona or Challenge + Solutions) earn fewer points as part of the creation of complete sets. Players are not limited to completing sets that they have started. For example, if Alice plays a Persona in response to a Challenge and then Bob has a Solution that completes the set, Bob will claim the set and Alice will get a point. As cards are played, Challenge cards are added to the center of the table to open up additional potential sets.

A typical round begins with a player examining the Challenge cards on the table and trying to match them with any Personas or Solutions in their hand. If a valid pair or trio is found, it's played and scored; the player then draws new cards. The game continues until all Challenge cards have been matched or players are out of moves. The player with the highest score at the end wins, but the real win is the growth in awareness and empathy sparked through discussion and reflection.

Incluso!'s Personas are fictional, but they're grounded in real-world data and guided by inclusive design methodologies. The team drew inspiration from Microsoft Design's inclusive persona framework [15], which categorizes disabilities into three overlapping types:

- Permanent: such as blindness or a missing limb
- Temporary: such as a broken arm or a cataract
- Situational: such as trying to watch a video in a loud environment or read a screen in bright sunlight

This spectrum invites players to think beyond stereotypical notions of disability and aligns with the social model, which highlights how design and environmental barriers, rather than impairments alone, create disability [20]. It also emphasizes that accessibility isn't just about "others," since all users may experience impairment at some point.

One of the most powerful aspects of Incluso! is its ability to spark "aha!" moments during gameplay. For instance, a Challenge card might state: "A video game has allies highlighted in green and enemies in red." At first glance, players might not see the issue. But upon drawing a Persona with red-green color blindness, the barrier becomes obvious. The game allows players to uncover these insights organically, rather than being told what to think.

Discussions often follow a surprising arc, from confusion to recognition to empathy. These are not forced conversations but natural outcomes of matching cards and exploring how users interact with design. Humor, insight, and creativity arise organically, making the learning experience both memorable and meaningful.

3 ENGAGEMENT HIGHLIGHTS

Incluso! generates enthusiastic, thoughtful engagement. Players interact playfully with the material, but also critically, by offering alternative solutions, debating card combinations, and reflecting on their own assumptions about users and design. These organic discussions are not only intellectually stimulating but also emotionally resonant, as players begin to see accessibility challenges through a human-centered lens.

The game is particularly well-suited for use at the start of a course module on universal design or accessible computing. It functions as both an icebreaker and a foundational learning tool, helping students internalize that inclusive design is not simply a checklist of requirements, but a way of thinking, a mindset grounded in empathy, equity, and awareness.

Incluso! is explicitly designed to incorporate evidence-based teaching practices known to broaden participation and deepen student learning:

- **Use of meaningful and relevant content:** The game presents real-world accessibility challenges faced by diverse users, making content relevant and personally meaningful to students.
- **Addressing misconceptions about CS:** Students often perceive computing as technical and impersonal; Incluso! challenges this by showing how software design decisions impact human lives.
- **Encouraging student interaction and collaborative learning:** The game's mechanics require students to discuss, negotiate, and justify their card combinations, fostering peer learning in a low-stakes environment.
- **Universal Design for Learning (UDL):** The game accommodates varied learning styles through visual, textual, and narrative engagement, and it encourages multiple means of expression and participation.

Facilitators can further enhance the experience by incorporating reflective prompts that support metacognition and inclusive thinking:

- What assumptions did you make about this user?
- Who else might benefit from this solution?
- What did you learn about inclusive design that you hadn't considered before?

Instructors may also align gameplay with written reflections, small group presentations, or journaling assignments that promote individual accountability and insight.

By integrating well-structured collaborative learning and culturally relevant scenarios, Incluso! not only teaches accessibility but models it as a pedagogic practice, helping students see themselves, and others, as legitimate users, designers, and stakeholders in the technology they create.

4 STUDENT FEEDBACK

Incluso! was tested in multiple play sessions with both high school and university students. The response was overwhelmingly positive. The gameplay lasts about 20 minutes, but even in that brief time, students found it to be a powerful and engaging learning experience.

Feedback was resoundingly positive. Many students described it as "much better than listening to a teacher teach," highlighting its interactive, hands-on approach. The game served as a clear eye-opener: one student reflected, "Oh, I didn't even realize that someone with color blindness might have a hard time with a website." Comments like these showed a genuine shift in perspective and a newfound awareness of accessibility issues.

One of the most appreciated aspects of Incluso! was its open-endedness. Instead of being guided toward a single correct solution, students were encouraged to explore different approaches, debate trade-offs, and develop their own ideas. This flexibility sparked meaningful conversations and allowed students to think critically and creatively about real-world design challenges. Students appreciated this engaging and empowering aspect of gameplay.

5 RECOMMENDATIONS

This game is most suitable for a class in Human-Computer Interaction, Web Design/Development, and Mobile Apps Development, or other courses related to front-end design. However, it can be used in any class where digital accessibility or universal design is relevant. Because it doesn't require any technical knowledge of accessibility, it is suitable for novices, including high school students.

We've found that instructor involvement during gameplay significantly enhances the learning experience. Even when multiple groups are playing simultaneously, we recommend that instructors circulate among the groups, answering questions, listening to student ideas, and prompting reflection. This kind of informal facilitation helps students stay engaged, think more deeply about the choices they're making, and draw connections to broader accessibility concepts.

One note is that because there can be multiple correct pairings, ambiguity can arise as to whether a pairing is correct. Our recommendation is to encourage players to discuss disagreements, and appeal to the instructor only if the conflict persists after discussion. However, we did not include this in the rule set to allow instructors the freedom to devise their own approaches to this issue.

6 EXTENSIONS AND MODIFICATIONS

The following modifications may increase the pedagogical strength and/or engagement of Incluso! We note that we have not fully playtested these changes with the target groups of students.

(1) **Expanded Deck:** To increase the complexity of the game, we include a larger deck of cards (60 cards / 20 tripartite sets vs. the core set of 42 cards / 14 sets).
(2) **WCAG guidelines:** The Web Content Accessibility Guidelines (WCAG) [5], created by the World Wide Web Consortium (W3C), are widely regarded as the global benchmark for ensuring accessible digital content. They outline principles and recommendations designed to make websites usable for people with various disabilities. By following these standards, creators can develop content that is perceivable, operable, and understandable for a broad spectrum of users, including individuals who rely on assistive tools like screen readers, voice-control systems, or keyboard-only navigation [16].
Educators are encouraged to modify the game to include a focus on WCAG: either through creating WCAG cards that can be matched to sets, or by requiring students to discuss appropriate WCAG criteria (if applicable) when claiming sets. For example, "Enable zooming or changing of font size" aligns with the WCAG 2.1 criterion 1.4.4 "Resize text." The added cards in the expanded deck were especially designed to align with WCAG criteria.
(3) **Gameplay twist – "Stealing" sets:** Once players claim a full set of three cards, the set remains theirs for the duration of the game. To make the game more dynamic and engaging, consider allowing players to "steal" sets created within the last round if they have cards that match any cards in that set. For example, suppose player Alice has just claimed the following set:
- Persona: Richard – A 68-year-old man who just retired from his cameraman job. He has difficulty hearing after years of working at loud shows.
- Challenge: Audio from a website is very quiet.
- Solution: The volume of audio can be edited.

Now player Bob has a new Solution card that matches this set:
- Captions are available for audio.

Bob can steal the set from Alice and add the new Solution card. Alice keeps a card from the set to claim a single point.
(Note that we limit this to sets formed within that round to minimize the complexity of players looking at everyone else's cards.)
In this version of the gameplay, players can't rest on their laurels as easily, because other players can take their sets. It also encourages students to think more

carefully and deeply about how multiple types of personas / solutions / challenges can interact.

(4) **Collaborative gameplay through teams:** Allowing students to team up can introduce a collaborative element. It can also help scale the game up for more students. (For example, the game can accommodate 10 students when each pair of students play as a team.)

6.1 Further Extensions and Modifications

Instructors are encouraged to refine the game to meet the needs of their students. Redesigns could include:

- **Special Cards:** For example, "Wildcard Solution" that can be used for any Challenge (for which the user can verbally specify any solution that aligns with the set) or "Curveball Persona" that introduces complex intersectional needs: for example, a teenager with low vision and epilepsy or a cancer survivor who has impaired fine motor skills and a decline in cognitive function.
- **Expansion Packs:** New cards that explore additional contexts (e.g., public spaces, transportation, education) or introduce new demographic groups.
- **User-Contributed Cards:** Players or instructors could create and submit new Personas, Challenges, or Solutions to keep the game evolving.

There are also opportunities to make the physical game more accessible, with large-print cards, braille, and tactile features.

6.2 Future Work

In future work, we hope to create a set of lesson plans, lecture slides and assignments for instructors to use in tandem with Incluso! for a complete accessibility module.

7 ACKNOWLEDGEMENTS

We thank the students who generously gave of their time and feedback to help us pilot test the game. We also thank the reviewers for their helpful feedback and suggestions.

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