Cognitive Empathy Toolkit: A Co-design Exploration with Adolescents with MID

Simone Ooms
Utrecht University
Princetonplein 5, 3584 CC
Utrecht, The Netherlands
s.c.ooms@uu.nl

Lloyd van Boxtel
Utrecht University
Princetonplein 5, 3584 CC
Utrecht, The Netherlands
lloyd@vboxtel.com

Hanna Hauptmann
Utrecht University
Princetonplein 5, 3584 CC
Utrecht, The Netherlands
h.j.hauptmann@uu.nl

Cognitive empathy is an essential skill in adolescents' social and emotional development. Adolescents with a mild intellectual disability (MID) face additional challenges in this development. Interventions and school programs tailored to this target group are scarce. We present a co-design study with adolescents with MID (age 13-14) and their teachers, resulting in a design concept for a cognitive empathy toolkit. We contribute 1) a conceptual design of a digital toolkit for cognitive empathy development and 2) how to meaningfully involve adolescents with MID in a participatory design process.

cognitive empathy, social emotional learning, adolescents, mild intellectual disabilities, school

1. INTRODUCTION

Social-emotional development is an important contributing factor to relationship quality, resilience and thus wellbeing in life (Greenberg 2025). The acquisition of social-emotional competencies often happens during early adolescence (Backes and Bonnie 2019; Uhlhaas et al. 2023). Schools are a critical setting for strengthening these competencies and school-based social and emotional learning programmes have demonstrated improvements in social-emotional skills (Durlak et al. 2011; Taylor et al. 2017). For adolescents with mild intellectual disabilities (MID), the development of these skills needs additional support (Smogorzewska, Szumski, and Grygiel 2019). However, school-based interventions for learners with MID remain fragmented and face practical constraints (Batinović et al. 2026).

A key competency of social-emotional development is cognitive empathy: understanding another person's perspective without necessarily sharing their emotions (Heynen et al. 2024). Cognitive empathy is associated with better social functioning and mental health (De Wied et al. 2020; Winters et al. 2021; Salem et al. 2023; Wang et al. 2024), yet existing interventions and digital tools are rarely tailored to adolescents with MID. Further, interventions for people with MID are still rarely shaped through participatory design (Spencer González et al. 2020).

This paper presents an empirical HCI contribution and an initial step towards an artefact contribution (Wobbrock and Kientz 2016) in the form of a three-phase co-design process with adolescents with MID and their teachers. In Phase 1, we interviewed teachers to understand their current cognitive empathy teaching practice and to derive teaching methods for different cognitive empathy skills. In Phase 2, we ran two co-design sessions with adolescents with MID to surface their needs and generate design directions. In Phase 3, we returned to teachers to evaluate the resulting toolkit in terms of appropriateness, potential effectiveness and feasibility for school implementation. We contribute (1) a design for an interactive toolkit aimed at teaching cognitive empathy to adolescents with MID and (2) a co-design process that details how adolescents with MID can be meaningfully involved.

2. RELATED WORK

2.1. Supporting Cognitive Empathy Development in Adolescents with MID

Empathy is described as the capacity to understand and respond to others' experiences (Eisenberg and Fabes 1990; Decety 2010). Cognitive empathy is closely related to Theory of Mind (Bensalah, Caillies, and Anduze 2016; Bulgarelli and Jones 2023): the cognitive ability to understand that other people have their own thoughts, beliefs and feelings, which may differ from one's own (Premack and Woodruff

© Ooms et al. Published by BCS Learning and Development Ltd.

1978; Baron-Cohen, Leslie, and Frith 1985). Prior work highlights children with MID to have more difficulty developing Theory of Mind (Smogorzewska, Szumski, and Grygiel 2019), challenging the fundamental development for social interaction, as it enables empathy, recognition of false beliefs and perspective-taking (Byom and Mutlu 2013). To guide our toolkit design, we draw on Selman's developmental perspective-taking framework, which describes a progression of five developmental levels from egocentric to self-reflective and eventually contextualised perspective-taking (Selman 1980).

While psychological theories explain how cognitive empathy develops, the HCI field shows an increasing interest in empathic-centric design. A recent scoping review highlights the diverse conceptualisations of empathy across HCI and argues for greater conceptual clarity in empathy-related research (Genç and Verma 2024), while recurring EmpathiCH workshops reflect a growing HCI research agenda (Ppali et al. 2026). Complementing this, Pratte et al. propose a descriptive framework for empathy tools, characterising interactive systems according to the agency they afford users, the perspectives they present and the sensory experiences they evoke (Pratte, Tang, and Oehlberg 2021).

Although HCI research has begun to explore the design of empathy-support technologies, digital tools specifically supporting cognitive empathy development for adolescents with MID remain limited. Existing work includes an exploratory game-based approach, MODU (Park, Sunok Lee, and Sangsu Lee 2021), a mobile app simulating video calls, MATTIE (Wartena et al. 2013), technologies focused on emotion recognition, Emotion4Down (Hernandez-Lara, Martinez-Garcia, and Caro 2023) and virtual dialogue training (Daunhauer et al. 2021). Frameworks such as the BES-MID (Heynen et al. 2024) evaluate which empathy components are measurable and meaningful, but do not provide an intervention.

2.2. Co-designing with Adolescents with MID

Meaningful contribution of people with MID to technology development is possible when activities are concrete, visually scaffolded and minimise information overload (De Wit, X. Moonen, and Douma 2012; X. M. H. Moonen 2017; Derks et al. 2022)). Recent work also offers guidance on specific approaches to enable participation, including rapid prototyping through a board game (Gennari et al. 2024) and reflections on adjusting facilitation to individual needs (Safari et al. 2024).

Prior work offers both general reflections (Raman and French 2022) and concrete examples of co-designing technologies with young people with intellectual or learning disabilities, such as tools for self-reporting psychological health (Boström and Eriksson 2015) and an interactive game-based learning tool on internet and social media safety (Raman and French 2015). Work focused on young adults with intellectual disabilities also offers insight. For example, exploratory TechShops and the resulting HowToApp to support life skills development (Bayor 2019; Bayor et al. 2019) and collaborative development of a mobile app to support the communication, interests and goals of young adults (Wilson et al. 2016). Finally, scoping reviews conclude that involving key stakeholders throughout development can reduce the gap between co-developed technologies and users' needs, capabilities and contexts upon implementation (Calis et al. 2023). Nevertheless, co-design with adolescents with MID remains scarce, particularly for educational technologies that aim to support higher-order socio-cognitive skills, such as cognitive empathy.

3. PHASE 1: TEACHERS' PERSPECTIVES ON EMPATHY LEVELS AND TEACHING METHODS

All three research phases took place at a single vocational secondary school for adolescents with MID[1]. All studies received prior ethical approval (approval nr: 24-0098). In Phase 1, we interviewed teachers to understand their current cognitive empathy teaching practice and to derive teaching methods for different cognitive empathy skills.

3.1. Method

Participants: We used convenience sampling of school staff in the staff room during one school day. Three male staff members participated (one aged 20-30, two aged 40-50; two teachers, one social worker). Sessions were individual and lasted approximately 75 minutes. All participants received an information letter and provided informed consent.

Materials: Participants worked with a paper-based conversation tool: an A2 placement sheet and two card sets. The placement sheet operationalised a judgment task of teaching method suitability for pupils at different levels of cognitive empathy development. The sheet comprised two axes: **likelihood to learn** (x-axis; feasibility/teachability for a given development level) and **impact** (y-axis; expected contribution to cognitive empathy development). Card set 1 comprised five cognitive empathy level cards

[1] IQ of 50–70 (MID range) or IQ of 70–85 (borderline intellectual functioning range) with additional learning deficits.

based on Selman's developmental levels (1980). Each card included a one-sentence adolescent persona quote designed to anchor discussion in pupils from participants' practice: (1) Egocentric: "Why can he/she go home while I have to stay? That's not fair!", (2) Logical reasoning: "They both know the same thing, so it makes sense they reach the same conclusion.", (3) Intention recognition: "He/She thinks I did it on purpose, but I didn't do it on purpose.", (4) Emotional validation: "You felt X and you experienced X, so it's not both your fault." and (5) Cultural relativism: "In every culture people think differently about what is normal or good, so rules change too." Card set 2 comprised five cognitive empathy skill cards: (1) recognising emotional signals, (2) identifying behavioural motivations, (3) practising perspective-taking, (4) reflecting on one's own perspective bias and (5) applying empathy to one's own behaviour.

Procedure and Analysis: Each session followed a semi-structured interview format. After a brief introduction, participants selected some level cards representing pupil types they commonly encountered. Per selected level, they positioned each skill card on the placement sheet to express their judgment of learnability and impact. We then ask for reasons for placements, concrete examples and preconditions or barriers to success. Data comprised (transcribed) audio recordings, photographs of the A2 sheets and notes. We applied the reflexive thematic analysis approach (Braun et al. 2022) through the lens of the empathy skills to identify perceived pupil empathy levels, suitability of the skills and implementation constraints. Photographs were used to contextualise participants' verbal rationales.

3.2. Results

Below, we report qualitative insights on teaching methods per empathy skill, focusing on current practice and implications for our design. With three participants, we cannot draw quantitative or representative conclusions.

Recognising emotional signals: For the lowest empathy level, teachers thought recognising emotional signals could be feasible after guided prompting: "Then you ask if he recognises that in someone else and then usually the answer is 'well, no, I find it hard'. And then you give certain examples ... and then you see them thinking 'oh yes, that might be possible'." (P2). For the higher empathy levels, the teachability was estimated higher but the impact lower. "This pupil (level 5) is already very good at this. I don't think the impact is that great." (P1). Although the environment has a crucial influence "It depends on the situation. If it's calm it goes that way. If it's turbulent then it goes the other way." (P3). For our toolkit, this positions recognising emotional signals as an entry-level skill that benefits from guided prompting and examples.

Identifying behavioural motivations: Teachers framed identifying behavioural motivations as difficult because it requires the adolescents to move beyond their own viewpoint. P2 called it "rocket science for some pupils" and rated it low for level 1. The challenge is moving beyond their own viewpoint: "Of course, you have to understand the pupil themselves, know what their issues are. And then you join in the conversation and ultimately you want to get to the point: yes, but hey, what did that mean for someone else?" (P2). P3 rated the method as moderately feasible across levels, but highly state-dependent: "If you're angry, you make different choices. If you haven't eaten, you make different choices." (P3). For higher empathy levels (4–5), participants expected it to be more teachable. This suggests the toolkit should support stepwise prompting (from 'my' to 'their' perspective) and be sensitive to adolescents' current emotional state.

Practising perspective-taking: Teachers consistently described practising perspective-taking as the most impactful skill to include in a toolkit, provided the activity is concrete and pupils are willing to engage. P2 emphasised motivation as a barrier, while P3 saw the largest growth potential at level 1. Teachers often grounded the method in concrete, familiar situations. P1 used physical exercises in gym class to make power differences tangible: "Look, guys, this is how it feels when a first-year pupil tackles you." (P1). P1 also used a simple left/right exercise to surface how perspective changes: "Stand next to each other. What is right? ... Now stand opposite each other. What is right? And then they look at each other very angrily 'No, that's right!'" (P1). Similarly, P3 described using an internship incident to redirect attention to the other party: "Do you understand your supervisor's reaction?" (P3). P2 emphasised ownership by describing a structured method in which pupils take active steps themselves to make the learning process more effective: "First you get to tell your story, then the other person, and you have to respond to that story." (P2). Overall, participants suggested that perspective-taking can be addressed even at low empathy levels when made tangible: "You can make this very tangible, which makes it easier to learn." (P1). For the toolkit, this highlights that practising perspective-taking should be done stepwise and grounded in tangible, familiar situations.

Reflecting on one's own perspective bias: Bias reflection was described as high-impact but rarely attainable at lower empathy levels. P2 stated: "In my opinion, reflecting on one's own perspective bias

is almost impossible with this pupil" but added that success would be substantial: "Then it would have a huge impact, yes, definitely." (P2). P1 noted that at level 5 the skill is "already very good", yet highlighted a key implementation barrier: "These pupils often consciously choose to impose their own opinion and take little account of the feelings of others, which seems a conscious choice." (P1). P3 linked learnability to time and maturity: "It is more difficult in the first two years than in the third, fourth and fifth years here at school." (P3). This suggests the toolkit should carefully time when this teaching method is applied and requires strong scaffolding for the lower empathy development levels.

Applying empathy to one's own behaviour: Applying empathy to one's own behaviour was framed as an intended outcome, but one that depends on earlier steps (especially perspective-taking) and is constrained by willingness and context. P2 described it as a valuable outcome, but not just by itself: "Suppose you manage to get them to take others into account when making choices. Then you're not there yet." (P2). P1 positioned it as dependent on prior perspective-taking: "I think you first need to be able to do this (take perspective) before you can apply it." (P1). Even for level 5, P1 saw room for growth in translating understanding into action: "Taking others into account when making choices, because that happens a lot less, so there would still be a lot to gain." (P1). They believe the gap is less about ability but more about willingness in context: "There is a whole fixation behind that, which makes me think: to what extent does that person even want it themselves?" (P1). P3 again linked variability to school years, suggesting that applying empathic understanding in behaviour develops over the school years. For the toolkit, this highlights the importance of thoroughly practising perspective-taking so adolescents develop a foundation for applying it to their own behaviour.

4. PHASE 2: CO-DESIGNING EMPATHY TOOLS WITH ADOLESCENTS WITH MID

In Phase 2, we ran two co-design sessions with adolescents with MID to surface needs and generate concept directions for our toolkit.

4.1. Method

Participants: A school staff member used convenience sampling to recruit seven male adolescents with MID (13–14 years). We capped the group size ($\leq$8) to enable individual support (Bayor et al. 2019). Participants came from two classes and worked in three self-chosen subgroups (A2/A5, A3/A4/A6, A1/A7) across both sessions to support continuity. Sessions were held one week apart during class time (70 minutes each). Oral consent was obtained after a slide-supported explanation of the ethics-approved information sheet. Oral consent was witnessed and signed by a teacher.

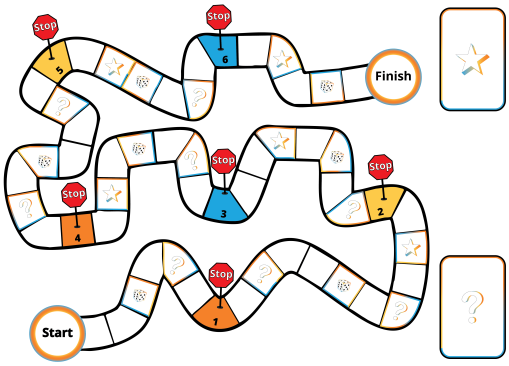
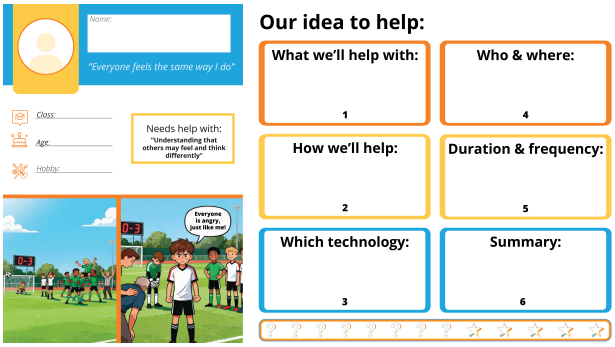


Figure 1: *The 'Game of Life'-like game board used in the first session with the adolescents.*



(a) *Persona sheet* ***(b)*** *Design-components sheet*

Figure 2: *Sheets used in the first adolescents' session.*

Materials: Both sessions used visually scaffolded poster-style worksheets that made each task concrete. In the **first session**, groups generated initial concepts using an A4 persona sheet (Fig. 2a), an A3 design-components sheet (Fig. 2b) and a 'Game of Life'-style board game (Fig. 1). The persona sheet anchored the design goal (supporting cognitive empathy) and was partially pre-filled (empathy quote, help request and a familiar scenario: losing a soccer match); groups completed the remaining fields (e.g. name, age, hobby, facial representation). The board game scaffolded ideation: landing on 'component stop' fields prompted groups to define and record key concept elements (what/how to help; technology; who/where; duration/frequency; summary), supplemented with fields for re-rolls, challenges and question prompts to maintain engagement. In the **second session**, groups refined their ideas using two A4 design-detail sheets (Fig. 3) and low-fidelity wireframe sheets (six blank screens). The sheets guided groups to elaborate their session one concepts.

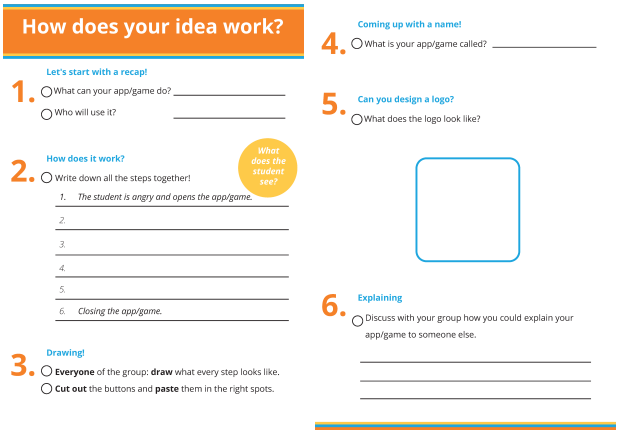


Figure 3: *The design detail sheets used in the second session with the adolescents.*

Procedure and Analysis: After collecting informed consent, the **first session** started with a brief ice-breaker. Next, we discussed three illustrated soccer-based loss scenarios ("You just lost your soccer match 0–3") with a main character representing different empathy skill levels, using guided prompts (e.g. "Is everyone angry?"; "Why might they think that?"). As participants struggled with the more complex scenarios, all groups worked from the level one persona scenario (Fig. 2a). Participants then worked in three groups using the materials. Groups completed the persona, played the board game and responded to field types they landed on (re-roll, question, challenge). At 'component stop' fields, groups defined the corresponding concept element on the components sheet. The session ended with short group presentations of the initial concepts. In the **second session**, groups elaborated their concepts using the design-detail sheets and individual wireframes. The sheet guided: (1) purpose and user, (2) usage steps, (3) wireframing, (4) naming, (5) logo and (6) how to present the tool. Researchers provided one-on-one support through guiding questions to help pupils articulate their ideas. The session ended with short group presentations of the final concepts. Data included (transcribed) room audio and photographs of completed artefacts. We inductively coded transcripts to describe concepts and identify cross-group patterns for the toolkit. Photographs supported interpretation and reporting.

4.2. Results

All three groups created a unique concept to support cognitive empathy development. Coincidentally, each group chose to design support for a different moment in time: preventive skill training, in-the-moment time-out, comforting afterwards.

Team 1: Preventive gameplay to rehearse pro-social habits: Team 1 approached empathy development as something that could be built before conflict occurs. In their first-session concept, they proposed a cooperative computer game in which players have to survive together. The core mechanism was mutual dependence: to win, players must notice each other, coordinate and actively help one another. As A5 put it, "He needs to think more about others" and "They have to save each other. If they die, they have to save each other" (A5). The team implicitly positioned repeated cooperative play as a way to rehearse pro-social habits that could carry over into everyday interactions. On the components sheet, they noted that the game should be played daily over a long period (two years), would be freely accessible and would work best on a computer. In the second session, Team 1 kept the preventive intent but translated it into a more individually used calming experience. Their final concept, 'Portnite', starts by choosing a character, arriving by (egg-shaped) aeroplane and walking to a virtual soccer field. There, the player can put on quiet music and take calm shots at goal, creating a structured, low-stakes activity intended to reduce arousal before it escalates into anger. A5 described the flow as follows: "First you choose a character, then you walk to the runway. There is an egg-shaped aeroplane and it lands on that runway ... then you walk to that soccer field and there you see a ball, a goal, and you can quietly put on whatever music you want. And you have to click a certain button to shoot, so you can miss and not miss." The design-detail sheet mirrored this as a step-by-step routine: choose a character, land, play soccer calmly with quiet music, complete tasks and goals, and exit by 'swiping away' or 'dancing'.

Team 2: In-the-moment time-out via music and conversation: Team 2 designed for the in-the-moment phase: when anger is already present. Their concept was a peer-supported time-out in which teammates remove the pupil from the situation and bring him to the changing room. A3 summarised the intervention in one sentence: "Take him to the changing room". The regulating mechanism was straightforward: physical distance from the trigger, plus music on a phone to support calming down. When asked whether an educational or reflective game might also help, A3 reinforced the focus on de-escalation: "Well, just music". They anchored the duration to a familiar timeframe (90 minutes, the length of a soccer match), keeping the intervention concrete and realistic. In the second session, Team 2 elaborated the concept into an app experience with a clear core function ('calming down') and a broader target audience ('people'). Their storyboard added imaginative elements (e.g. a bat character) but

preserved the same functional sequence: entering a separate room, grabbing a phone/music box, and adding a new supportive layer through someone talking to the angry person.

Team 3: Restoring connection via collaborative play at home: Team 3 focused on what happens after an incident, aiming to prevent anger from lingering. Their initial idea was to comfort the pupil through shared, enjoyable activities: "Playing games and having fun, so that he forgets his anger. He becomes happy again more quickly" (A1). The proposed setting was specific (at home, with parents) and moderately frequent (twice a week), positioning the intervention as part of family routines. While the central strategy was distraction through positive play, A1 also considered an element of self-initiated regulation: "Or if he is angry, he can do something for himself." This shift from being comforted to choosing a coping action hints at agency: the pupil can take an active step to change his state. Notably, Team 3 was the only team that explicitly identified with the persona when asked through a question card in the game, which may explain why their concept foregrounded everyday home life and personal coping. In the second session, Team 3 largely retained their approach and formalised it into a cooperative adventure app, 'Discovering the world', designed for parents and children. The mechanism here is reconnection through collaboration: "You are in a world with two people and you have to complete tasks and then you can move on to multiple worlds." (A7).

Overarching patterns: Across the three concepts, the pupils told a remarkably consistent story about what 'help' should look like for this situation. First, help was imagined as something you do rather than something you analyse. All teams gravitated toward **playful, entertainment-oriented activities** (games, music, fun) instead of explicitly educational or reflective approaches (e.g. practising perspective-taking or talking about emotions as a learning goal). This aligns with Phase 1, where teachers rated reflective methods as hard to learn for this target group. At the same time, the session format may have nudged teams in this direction: using a gamified design activity (Game of Life) likely made game-based solutions feel like a natural answer. Second, the pupils treated regulation and empathy as relational rather than individual. Each concept embedded the mechanism in a **social context**: friends cooperating in a survival game, teammates physically guiding someone to a time-out space, parents and children playing together at home. Even when the immediate goal was calming down, the implied pathway was mostly 'someone helps you regulate' rather than 'you regulate alone'. Third, their ideas prioritised **emotion regulation as a prerequisite** for empathy-building. The teams repeatedly returned to 'calming down' and 'forgetting anger' as the immediate need, with little emphasis on understanding the other person's perspective in the heat of the moment. Taken together, the concepts suggest a sequence: reduce arousal first (through music, play and supportive presence), then create room for more reflective perspective-taking later. This sequencing directly supported the teacher-phase insight that managing emotional signals should be treated as a foundational step before addressing cognitive empathy.

Process Reflection: The Game of Life method functioned well as a participatory scaffold: it helped adolescents generate ideas quickly, but it also meant that researchers needed targeted follow-up questions to move from surface-level proposals to the underlying 'how' and 'why' of each concept. The three-part temporal framing (preventive, during and after the incident) was not imposed by the researchers but emerged organically across teams, and it offers a practical structure for organising intervention components in the toolkit. The subsequent wireframe activity then supported a shift from abstract ideas to implementable flows, as pupils translated their concepts into step-by-step app descriptions. Across sessions, concepts generally stayed on the same trajectory while becoming more specific and detailed, although cross-pollination of ideas between groups is also present (e.g. music).

5. PHASE 3: TEACHER'S DESIGN EVALUATION

In Phase 3, teachers evaluated a conceptual toolkit design that was synthesized from Phases 1–2.

5.1. Method

Participants: We used convenience sampling of school staff in the staff room over one school day. One male and three female staff members participated (one aged 20-30, one aged 40-50, two aged 50-60; three teachers, one career coach). Sessions were individual and lasted approximately 60 minutes. All participants received an information letter and provided informed consent.

Materials: Participants worked with a paper mockup of a concept toolkit synthesised from Phases 1–2. While adolescents acted as primary designers in the previous phase (generating concepts and wire-frames), Phase 3 required researcher-led translation of this co-design input into a coherent, testable artefact (a recognised tension in participatory design (Botero et al. 2020)). The mockup included a home screen and three components (emotion check-in, scenario training and empathy games). These

components and overarching design choices were derived from design principles extracted from the Phase 1–2 findings. We outline each principle and its design implications on the toolkit design below.

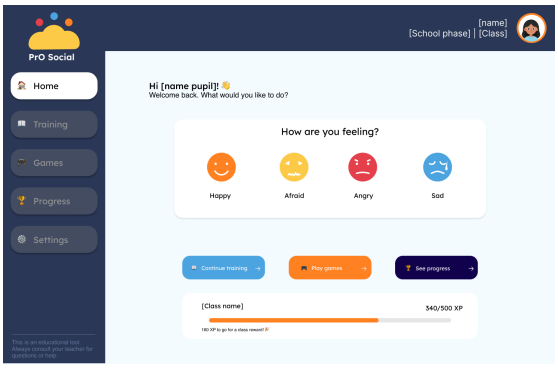


Figure 4: *Home screen. See Appendix A for all screens.*

Principle 1: Emotion regulation as the foundation for cognitive empathy. Phase 1 teachers emphasised that adolescents need to be calm before they can reflect on others' perspectives, and Phase 2 concepts similarly included a 'cool-down' step (e.g. music/space) before empathy training or development can take place. Toolkit implementation: The toolkit therefore opens with an emotion check-in (Fig. 4) and routes high-arousal users to a brief regulation activity before continuing in the application.

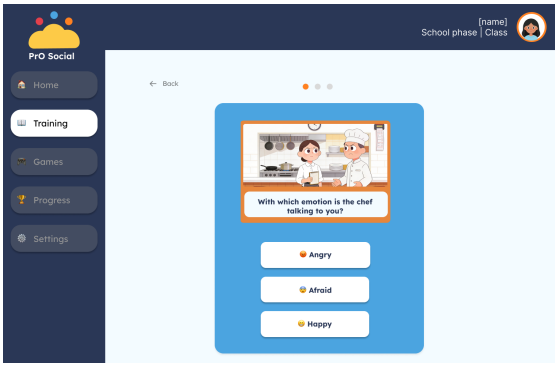


Figure 5: *Toolkit scenario screen cooking class.*

Principle 2: Tangibility in practising perspective-taking. Phase 1 teachers framed scaffolded perspective-taking in familiar incidents as the most actionable empathy practice. In Phase 2, unscaffolded prompts during the session (e.g. asking directly 'Why might the pupil need help?') produced 'we don't know', indicating a need for concrete, guided practice. Toolkit implementation: Scenario training therefore uses visually grounded situations in familiar contexts (Fig. 5) with progressive hints and brief explanations if the pupil struggles.

Principle 3: Build on social context and peer learning. Phase 1 highlighted peer-to-peer exchange and ownership (e.g. structured turn-taking

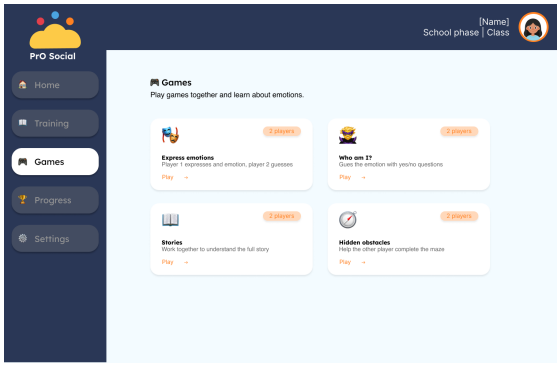


Figure 6: *Toolkit games overview screen.*

of 'your story / my story / response') as central to learning. Phase 2 concepts consistently located support in social relations (peers/parents/teams) and proposed cooperative play. Toolkit implementation: The toolkit therefore includes cooperative games such as expressing and guessing emotions where success is achieved together (Fig. 6).

Principle 4: Gamification to enhance motivation. Phase 2 adolescents designed highly gamified systems with various specific elements like progressing collaboratively and rewarding repeated play. Toolkit implementation: Rewards therefore target engagement and learning progress (e.g. completing scenarios) and are rewarded at the group level (Fig. 4) in addition to individual tracking of progress.

Principle 5: Design for cognitive accessibility. Phase 1 staff emphasised the need for stepwise interaction support because pupils struggle to translate abstract concepts into actionable steps. Phase 2 sessions showed a clear preference for visual/interactive activities and limited sustained attention to tasks. Toolkit implementation: The interface minimises cognitive load (Sweller 1988; Paas and Van Merriënboer 2020) through one action per screen, short activities, minimal B1-level text paired with illustrations and predictable navigation.

Principle 6: Explicit transfer to the real world. Phase 1 staff emphasised that empathic behaviour must be trained and applied in situated school interactions first and then transferred to workplace contexts. Toolkit implementation: Scenarios therefore span real-world contexts (school and work) so adolescents practise the same skill across settings.

Principle 7: Context-responsive and flexible design. Phase 1 teachers described strong between-pupil and within-day variability (emotional state, developmental differences, group dynamics and reduced capacity late in the day). Toolkit implementation: The toolkit therefore structures content progressively (from recognising one's own emotions to

identifying causes of others' emotions) and supports flexible in-the-moment use by teachers in the lesson.

Procedure and Analysis: Each session followed a semi-structured interview format. After a brief walk-through of the tool, participants were guided through the screens of the different components to evaluate. For each component, participants could share any thought that came to their mind when imagining implementing the toolkit in their teaching practise. They wrote down initial thoughts on an empty poster (except for component titles) and then explained their thoughts in conversation with the researcher. Data comprised (transcribed) audio recordings and a photograph of the evaluation poster. We applied the reflexive thematic analysis approach (Braun et al. 2022) to identify themes per component of the toolkit. Photographs were used to contextualise participants' rationales.

5.2. Results

The teachers' evaluations provide insights into the appropriateness, implementation feasibility and possible concept changes to increase potential effectiveness.

5.2.1. Emotion check-in

Teachers primarily evaluated the emotion check-in in relation to an existing 'sent out of class' paper form (listing the situation, thoughts, feelings, behaviour, consequences). They described that form as overly verbal and abstract for this target group. T1 highlights that pupils are still too preoccupied with the incident and T2 noted that pupils respond at the height of their emotion when filling in the form: "What do you think? Angry. What happened? Angry. Everywhere angry angry angry." (T2).

The digital check-in was largely welcomed because it could lower the entry barrier through visual, interactive input and guide the pupil in emotion recognition: "I really like the fact that you actually give people space and allow them to have their emotions. So, I'm just really angry right now. OK, let's start by calming down." (T4). However, they stressed that it should not function as a standalone debrief. In current practice, the form is followed by a support team conversation that determines next steps. Teachers therefore framed the check-in as an input to, and a shared artefact for, guided reflection rather than an endpoint. T3 also contributed a counterpoint to the digital-only approach by noting that writing itself can serve as a calming method. Beyond emotion management after an incident, T4 also saw the check-in as a potential sharing tool in mentor/ social-emotional learning (SEL) lessons to jointly map how the class feels and adapt activities in situ. This reinforces the toolkit requirement for flexible use across contexts.

Participants also stressed that emotion labels must be linguistically accessible. Terms such as 'disgust' were flagged as potentially unfamiliar and therefore risk triggering disengagement. T1 explained: "I've noticed that if you use words your pupils don't understand, they immediately shut down and can no longer think clearly." Suggestions included swapping to simpler vocabulary and/or pairing emotions with supportive visuals or short explanations.

Teachers preferred a dedicated 'sent out of class' tablet for practical reasons (login, portability). Additional suggestions included mounting it somewhere safe, restricting access to other apps, a robust casing and a headset for the music feature. Teachers also suggested including boundaries to avoid prolonged interaction: "I'd put a list on there and let them pick a song from it. Otherwise, they'll spend the first five minutes scrolling." (T2).

5.2.2. Scenario training

The perspective-switching mechanism in the scenarios was positively received: "I think it's really cool that you get to play both sides of the situation in two sessions ... so for a moment, you really are the other person. And I think that helps you understand it better" (T4). They additionally appreciated the explicit connection to real-life situations: "It's great that you're making the transition to real life." (T4).

Participants identified a need for year-specific scenario content. T2 made a clear distinction between the first years and the later years. Initially, scenarios should focus on school and peer contexts: "Yes, I think I'd do more of that at school or with friends." (T2). For upper-year pupils, internship-related scenarios were considered essential: "They often lose them [internships] again in no time, because they didn't quite understand something when someone said something to them." (T2).

(Public) transport was also identified as a relevant scenario context. T4 described recurring incidents in the bus and captured this as a scenario idea on the poster 'be spoken to in a negative manner (e.g. on the bus)'. Practising to manage the social interaction on the way to school could improve their wellbeing on school days: "That [the bus] was a source of stress in itself, and he hadn't even got to school yet." (T1).

An important consideration is the visual style of the scenarios. Too childish could be rejected by older pupils, but too realistic could distract from the content: "If you make it too realistic, they'll start looking at clothes or how someone looks." (T2). An animation style was suggested as the optimal middle

ground, engaging enough for younger pupils while sufficiently mature for older ones.

T1 favoured an appreciative approach in scenario framing, emphasising that the pupils are used to being addressed from a deficit perspective and that an inviting, strengths-based approach would be more engaging: “It would be great if the app encouraged a positive outlook rather than being seen as an app where you have to manage your problem all over again.” (T1).

5.2.3. Empathy games

Participants expressed the value of game-based empathy exercises “We also incorporate lots of games into our lessons because it just makes them more fun.” (T4). T2 proposed a specific game idea drawing on an existing classroom exercise about interpersonal influence: “Someone sees someone being shouted at. What would you do in that situation? First, write down your own answers, and then share them with each other.” This was captured on the poster as ‘think, pair, share’ and represents an integration of a well-established pedagogical structure into the empathy game component. The format reduces the influence of dominant voices in the group “then you’ve really got them, because if you just ask the whole class or a group, it’s always the same people who speak up.” (T2). However, participants also identified limitations. The proposed ‘hidden obstacle’ game might not work for all pupils and be more trust-focused instead of empathy-focused: “Some of them just start messing about, and then others are already saying, ‘Well, I’m not going with him’” (T2). The games could also be embedded as classroom activities “I think I’d turn this into a carousel activity, so that you work in small groups and keep moving on to the next one, because these aren’t the sort of games you play for hours on end.” (T4). In this format, small groups rotate through different game stations, each lasting approximately ten minutes. T4 saw this as the most practical and engaging way to incorporate multiple games in a single lesson, as it allows the teacher to circulate and facilitate. This setup could also strengthen the engagement as “the attention span lasts an average of five minutes” (T1).

5.2.4. Embedding in the school context

Participants identified several natural curricular anchors for the toolkit. T4 proposed using the emotion check-in component to start the day in the mentor time: “That you just check in with each other in the morning and then you know straight away how everyone’s doing.” (T4). The current SEL lessons address similar topics but in isolated lessons: “That’s one lesson and then you carry on. If you practise this with them for a bit every day and really emphasise it, because it doesn’t have to take much time at all.” (T4). Besides, internship preparation lessons were identified as a key integration moment for upper-year adolescents, as T2 explained that incidents arising during these preparatory and placement phases regularly provide natural teachable moments that the toolkit could help structure and support. A responsive rather than curriculum-driven approach was also highlighted: “You could do it when there’s a fight in class, and then get them all to fill it in.” (T4).

The teachers pointed to a shift in content over time. For the first years, the toolkit would focus on school-based and peer-related scenarios, embedded in SEL and mentor lessons. T2 described the specific social challenges that first-year pupils face: “You have your lunch break together with totally different classes and in a completely different place.” (T2). For the upper years, the focus shifts to internship-related contexts. T2 emphasised that incidents at internship placements are a frequent and emotionally charged occurrence. The toolkit could integrate with existing internship preparation and mentor conversations in these years. Beyond shifting content over time, T4 articulated a vision on adaptive learning in which teachers could decide the activity pupils work on but the toolkit adapts the difficulty level for individual users. They considered this essential given the wide variation in pupil levels within a single classroom and could really support teachers at the start of their career: “For new teachers, it really is great to have something to fall back on.” (T4).

5.3. Future Design

In summary, the teachers appreciated the design and proposed extensions and embedding strategies to increase the potential effectiveness. Most notably, the emotion check-in should be embedded after incidents as well as at regular events (e.g. mentor lessons) while the perspective-taking and scenario training should be incorporated as in-class activities. The design should be cognitively accessible (e.g. a choice list for music). The scenarios should further be context- and user-adapted either by the teacher or the system.

6. DISCUSSION

We discuss the findings in relation to our two contributions: (1) a toolkit design for teaching cognitive empathy to adolescents with MID, and (2) a co-design process for meaningfully involving adolescents with MID.

6.1. Design Implications for Cognitive Empathy

Our work offers five design takeaways, based on our exploratory work, for designing cognitive empathy tools for adolescents with MID or groups with related

challenges. First, emotion regulation is not an optional add-on but a prerequisite for cognitive empathy practice. Without regulation support, perspective-taking risks becoming a stressful experience rather than a reflective moment, as is also highlighted in research on the relationship between empathy and emotion regulation (Eisenberg 2000; Powell 2018; Fombouchet et al. 2023). Second, cognitive accessibility needs to be treated as an interaction design priority: B1-level language, limited writing fluency and short attention spans ask for tangible, low text and highly structured and engaging interaction formats. Third, perspective-switching can be operationalised as a concrete interaction mechanic (e.g. in scenarios that explicitly prompt 'self' vs 'other' viewpoints). In our work, this mechanic was the most positively received feature across the research phases, suggesting that making 'who is thinking/feeling what?' explicit through scaffolded steps is a productive way to translate the abstract construct 'cognitive empathy'. Fourth, adoption depends on fitting the toolkit to the setting. Teachers framed the toolkit as a flexible resource embedded in existing curricular routines (e.g. mentor time / SEL lessons) with short, repeatable training rather than as a stand-alone curriculum. The resulting year-specific mapping of scenarios (peer/school contexts in early years and later supplemented with internship contexts) offers a concrete pattern for context-responsive content progression. Fitting such a toolkit to other contexts would need tailoring to the specific curricular structure present. Finally, facilitation of the toolkit is essential. The toolkit's impact relies on teachers recognising teachable moments and scaffolding discussion without supplying the 'correct' answer right away. A toolkit can support this with lightweight guidance built in (e.g. example questions and support prompts).

6.2. Co-designing with adolescents with MID

Our experiences of co-designing with adolescents with MID contribute methodologically to HCI research, while being explicit about the trade-offs. We operationalised meaningful participation by positioning pupils as co-researchers and using concrete, artefact-centred activities that reduced reliance on abstract verbal explanation. This aligns with the Six-Element Framework for Child and Adolescents Empowerment (Chrifou et al. 2024) by showing how 'meaningful roles' can be facilitated through structured ideation and prototyping. At the same time, our process makes a scaffolding tension visible: structure enables participation but also may shape outcomes. In our case, pupils consistently prioritised game-like formats which could have been influenced by the game-like setting of the session. Pupils actively incorporated emotion-regulation in their designs, a component that an expert-led co-design process might have missed when designing for cognitive empathy. For future participatory research with adolescents with MID we provide two takeaways: 1) report on methodological decisions that might bias the solution space but make meaningful participation possible so future work can intentionally vary structure and reflect on its effects and 2) treat youth-adult divergences as a key output (not noise) and design for all stakeholders (e.g. emotion check-in to replace a form for adults and with calming music for pupils).

6.3. Limitations

Our findings should be viewed in light of several limitations. First, the structured and playful Game of Life activity may have primed pupils toward game concepts. The observed preference for game formats may not be fully spontaneous, but gameful learning preferences have been observed in the past (Raman and French 2015). Second, the researcher's dual role as facilitator and data analyst means data generation and interpretation were not fully independent but did enable the extraction of design principles through the interpretation of the materials in combination with experiencing the participants' design process. In a school context, adult-youth power imbalance may also bias toward socially acceptable responses. Third, the studies were small and sampled by convenience which is common in participatory design but limits transferability and may under-represent pupils with more pronounced cognitive or social difficulties. Finally, we have not yet tested whether the toolkit produces empathy-skill gains or whether the effectiveness suggested by the teacher's evaluation actually holds in practice.

7. CONCLUSION AND FUTURE WORK

We explored what an interactive toolkit to support teaching cognitive empathy for adolescents with MID could look like. Through semi-structured interviews, co-design sessions and concept validation we contribute (1) design implications derived from our toolkit design and (2) reflections on enabling meaningful participation of adolescents with MID in co-design. Future work should move from concept exploration to implementation and evaluation. First, the toolkit should be prototyped at higher fidelity and evaluated with the target users to assess potential learning outcomes for cognitive empathy. Also, future iterations could investigate more immersive representations of social situations (e.g. animated exchanges or VR) to support comprehension and perspective-taking. Curating personalised material (e.g. AI-supported story creation) could also help tailor to pupils' everyday contexts but requires careful design to remain transparent in decision-making.

REFERENCES

Backes, Emily P. and Richard J. Bonnie (May 2019). *The Promise of Adolescence: Realizing Opportunity for All Youth.*

Baron-Cohen, Simon, Alan M. Leslie, and Uta Frith (Oct. 1985). "Does the autistic child have a "theory of mind" ?" In: *Cognition* 21.1, pp. 37–46.

Batinović, Lucija et al. (2026). "School-based interventions for primary and secondary school students with intellectual disability: A scoping review". In: *International Journal of Educational Research* 137, p. 102960.

Bayor, Andrew A. (2019). "HowToApp: Supporting Life Skills Development of Young Adults with Intellectual Disability". In: *Proceedings of the 21st International ACM SIGACCESS Conference on Computers and Accessibility*. ASSETS '19. Pittsburgh, PA, USA: Association for Computing Machinery, pp. 697–699.

Bayor, Andrew A. et al. (2019). ""TechShops" Engaging Young Adults with Intellectual Disability in Exploratory Design Research". In: *Extended Abstracts of the 2019 CHI Conference on Human Factors in Computing Systems*. CHI EA '19. Glasgow, Scotland Uk: Association for Computing Machinery, pp. 1–8.

Bensalah, Leïla, Stéphanie Caillies, and Marion Anduze (2016). "Links Among Cognitive Empathy, Theory of Mind, and Affective Perspective Taking by Young Children". In: *The Journal of Genetic Psychology* 177.1, pp. 17–31.

Boström, Petra and Eva Eriksson (2015). "Design for self-reporting psychological health in children with intellectual disabilities". In: *Proceedings of the 14th International Conference on Interaction Design and Children*. IDC '15. Boston, Massachusetts: Association for Computing Machinery, pp. 279–282.

Botero, Andrea et al. (Aug. 2020). "Getting Participatory Design Done: From Methods and Choices to Translation Work across Constituent Domains". In: *International Journal of Design* 14.

Braun, Virginia et al. (2022). "Doing Reflexive Thematic Analysis". In: *Supporting Research in Counselling and Psychotherapy : Qualitative, Quantitative, and Mixed Methods Research*. Ed. by Sofie Bager-Charleson and Alistair McBeath. Cham: Springer International Publishing, pp. 19–38.

Bulgarelli, Chiara and Emily J. H. Jones (Jan. 2023). "The typical and atypical development of empathy: How big is the gap from lab to field?" In: *JCPP Advances* 3.1.

Byom, Lindsey J. and Bilge Mutlu (Jan. 2013). "Theory of mind: mechanisms, methods, and new directions". In: *Frontiers in Human Neuroscience* 7.

Calis, Julia F E van et al. (May 2023). "Toward Inclusive Approaches in the Design, Development, and Implementation of eHealth in the Intellectual Disability Sector: Scoping Review". In: *J Med Internet Res* 25, e45819.

Chrifou, Rabab et al. (May 2024). "Actualizing child and adolescent empowerment in participatory action research for health promotion: a six-element framework". In: *International Journal of Adolescence and Youth* 29.1.

Daunhauer, Lisa et al. (2021). "Chapter Five - Captivating: Avatars as therapeutic agents for children with intellectual and developmental disabilities". In: *Prevention Science and Research in Intellectual and Developmental Disabilities*. Ed. by Nathaniel R. Riggs and Bethany Rigles. Vol. 61. International Review of Research in Developmental Disabilities. Academic Press, pp. 133–157.

De Wied, Minet et al. (Aug. 2020). "The role of client empathy in treatment outcome in a sample of adolescents referred to forensic youth psychiatric services". In: *Children and Youth Services Review* 118, p. 105301.

De Wit, Marjolein, Xavier Moonen, and Jolanda Douma (2012). "Guideline effective interventions for youngsters with MID: Recommendations for the development and adaptation of behavioural change interventions for youngsters with Mild Intellectual Disabilities". In: *Dutch Knowledge Centre on MID*.

Decety, Jean (Jan. 2010). "The Neurodevelopment of Empathy in Humans". In: *Developmental Neuroscience* 32.4, pp. 257–267.

Derks, Suzanne et al. (2022). "The co-creation design process of 'You & I': a serious game to support mentalizing and stress-regulating abilities in adults with mild to borderline intellectual disabilities". In: *Behaviour & Information Technology* 41.14, pp. 2988–3000.

Durlak, Joseph A et al. (Jan. 2011). "The Impact of Enhancing Students' Social and Emotional Learning: A Meta-Analysis of School-Based Universal Interventions". In: *Child Development* 82.1, pp. 405–432.

Eisenberg, Nancy (Feb. 2000). "Emotion, Regulation, and Moral Development". In: *Annual Review Of Psychology* 51.1, pp. 665–697.

Eisenberg, Nancy and Richard A. Fabes (June 1990). "Empathy: Conceptualization, measurement, and relation to prosocial behavior". In: *Motivation and Emotion* 14.2, pp. 131–149.

Fombouchet, Yoann et al. (2023). "The development of emotion regulation in adolescence: What do we know and where to go next?" In: *Social Development* 32.4, pp. 1227–1242.

Genç, Uğur and Himanshu Verma (Nov. 2024). "Situating Empathy in HCI/CSCW: A Scoping

Review". In: *Proc. ACM Hum.-Comput. Interact.* 8.CSCW2.

Gennari, Rosella et al. (2024). "A rapid-prototyping toolkit for people with intellectual disabilities". In: *International Journal of Human-Computer Studies* 192, p. 103347.

Greenberg, Mark T. (2025). "Social and emotional learning and physical health outcomes across the lifespan: Little progress & big potential". In: *Social and Emotional Learning: Research, Practice, and Policy* 5, p. 100108.

Hernandez-Lara, Marisela, Ana I Martinez-Garcia, and Karina Caro (Mar. 2023). "Using Emotion4Down: Evaluating the Design of a Serious Video Game for Supporting Emotional Awareness with People with Intellectual Disabilities". In: *Interacting with Computers* 35.2, pp. 363–386.

Heynen, Evelyn et al. (May 2024). "Measuring empathy in youth and young adults with mild intellectual disabilities or borderline intelligence in residential care - The validation of an adapted basic empathy scale: The BES-MID". In: *Heliyon* 10.10, e31050.

Moonen, Xavier M H (July 2017). *(H)erkennen en waarderen: Over het (h)erkennen van de noden mensen met licht verstandelijke beperkingen en het bieden van passende ondersteuning*. Dutch. Amsterdam.

Paas, Fred and Jeroen J. G. Van Merriënboer (July 2020). "Cognitive-Load Theory: Methods to Manage Working Memory Load in the Learning of Complex Tasks". In: *Current Directions in Psychological Science* 29.4, pp. 394–398.

Park, Juhyeong, Sunok Lee, and Sangsu Lee (2021). "MODU: A Story-Based Empathy Expression Training Game for Children with Mild Intellectual Disability and Borderline Intellectual Functioning". In: *Proceedings of the 20th Annual ACM Interaction Design and Children Conference*. IDC '21. Athens, Greece: Association for Computing Machinery, pp. 615–619.

Powell, Philip A. (Mar. 2018). "Individual differences in emotion regulation moderate the associations between empathy and affective distress". In: *Motivation And Emotion* 42.4, pp. 602–613.

Ppali, Sophia et al. (2026). "(Re-)Thinking Empathy's Materiality in HCI". In: *Proceedings of the Extended Abstracts of the 2026 CHI Conference on Human Factors in Computing Systems*. CHI EA '26. Barcelona, Spain: Association for Computing Machinery.

Pratte, Sydney, Anthony Tang, and Lora Oehlberg (2021). "Evoking Empathy: A Framework for Describing Empathy Tools". In: *Proceedings of the Fifteenth International Conference on Tangible, Embedded, and Embodied Interaction*. TEI '21. Salzburg, Austria: Association for Computing Machinery.

Premack, David and Guy Woodruff (Dec. 1978). "Does the chimpanzee have a theory of mind?" In: *Behavioral and Brain Sciences* 1.4, pp. 515–526.

Raman, Sneha and Tara French (2015). *Game Jam: Co-designing a game-based learning tool on internet and social media safety with young people with learning disabilities*. Tech. rep. Glasgow: The Digital Health and Care Institute.

– (2022). "Enabling genuine participation in co-design with young people with learning disabilities". In: *CoDesign* 18.4, pp. 431–447.

Safari, Niloufar et al. (2024). "One Size Does Not Fit All - Facilitating Participation in Design for People with Intellectual Disability". In: *International Journal of Design* 18.1.

Salem, Ashraf Atta M. S. et al. (Jan. 2023). "Empathic Skills Training As a Means of Reducing Cyberbullying among Adolescents: An Empirical Evaluation". In: *International Journal of Environmental Research and Public Health* 20.3, p. 1846.

Selman, Robert L. (1980). *The Growth of Interpersonal Understanding: Developmental and Clinical Analyses*. New York: Academic Press.

Smogorzewska, Joanna, Grzegorz Szumski, and Paweł Grygiel (May 2019). "Theory of mind development in school environment: A case of children with mild intellectual disability learning in inclusive and special education classrooms". In: *Journal of Applied Research in Intellectual Disabilities* 32.5, pp. 1241–1254.

Spencer González, Herbert et al. (2020). "Including intellectual disability in participatory design processes: Methodological adaptations and supports". In: *Proceedings of the 16th Participatory Design Conference 2020 - Participation(s) Otherwise - Volume 1*. PDC '20. Manizales, Colombia: Association for Computing Machinery, pp. 55–63.

Sweller, John (1988). "Cognitive Load During Problem Solving: Effects on Learning". In: *Cognitive Science* 12.2, pp. 257–285.

Taylor, Rebecca D et al. (July 2017). "Promoting Positive Youth Development Through School-Based Social and Emotional Learning Interventions: A Meta-Analysis of Follow-Up Effects". In: *Child Development* 88.4, pp. 1156–1171.

Uhlhaas, Peter J. et al. (Aug. 2023). "Towards a youth mental health paradigm: a perspective and roadmap". In: *Molecular Psychiatry* 28.8, pp. 3171–3181.

Wang, Jun et al. (Mar. 2024). "Effects of Adolescent Empathy on Emotional Resilience: The Mediating Role of Depression and Self-Efficacy and the Moderating Effect of Social Activities". In: *Behavioral Sciences* 14.3, p. 228.

Wartena, Bard et al. (2013). "Mobile Adaptive Therapeutic Tool In psycho-Education (MATTIE): Design Principles for a Persuasive Application

Tailor-Made for Adolescents with a Mild Intellectual Disability". In: *Proceedings of ISAGA 2013*.

Wilson, Cara et al. (2016). "'Put yourself in the picture': designing for futures with young adults with intellectual disability". In: *Proceedings of the 28th Australian Conference on Computer-Human Interaction*. OzCHI '16. Launceston, Tasmania, Australia: Association for Computing Machinery, pp. 271–281.

Winters, Drew E. et al. (Sept. 2021). "Cognitive and Affective Empathy as Indirect Paths Between Heterogeneous Depression Symptoms on Default Mode and Salience Network Connectivity in Adolescents". In: *Child Psychiatry & Human Development* 54.1, pp. 213–222.

Wobbrock, Jacob O. and Julie A. Kientz (Apr. 2016). "Research contributions in human-computer interaction". In: *Interactions* 23.3, pp. 38–44.

ACKNOWLEDGEMENTS

This research would not have been possible without the participants throughout the different phases; both the teachers for sharing their expertise and the adolescents for sharing their creative ideas. This publication is part of LIFTS: Healthy Lifestyle for low liTerate teenagerS and funded by the Dutch Research Council (NWO) (project number: KICH1.GZ03.21.011).

DECLARATION ON GENERATIVE AI

During the preparation of this work, the authors used Grammarly in order to: Grammar and spelling check. After using these tools, the authors reviewed and edited the content as needed and take full responsibility for the publication's content. Additionally, some of the visuals used for inspiration in the design sessions and prototypes were generated, e.g. cooking comic, soccer comic. Finally, we used the Overleaf AI assistant to discover additional references, which were then read and checked by the authors before inclusion.

APPENDIX A: TOOLKIT SCREENS

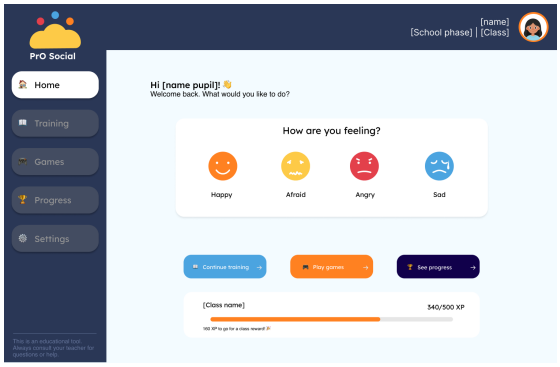


Figure 7: *Home.*

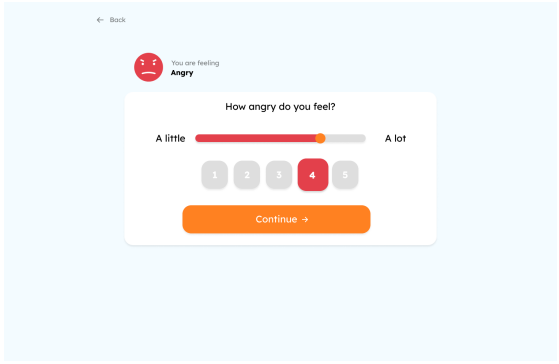


Figure 8: *Emotion check-in set severity.*

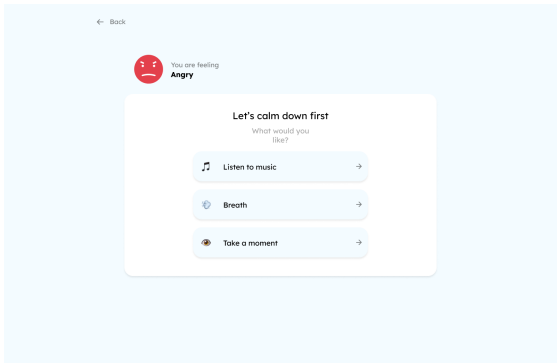


Figure 9: *Emotion check-in choose calming option.*

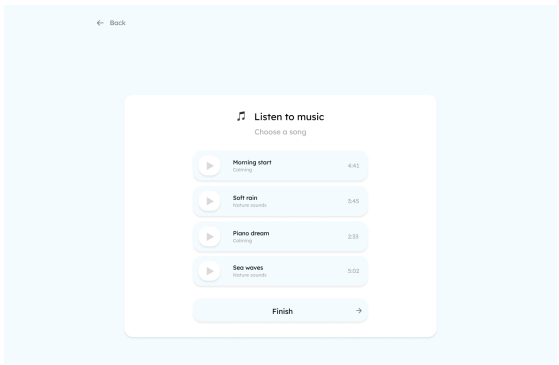


Figure 10: *Emotion check-in option music.*

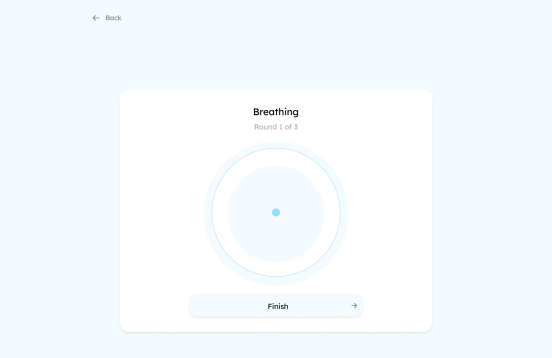


Figure 11: *Emotion check-in option breathing.*

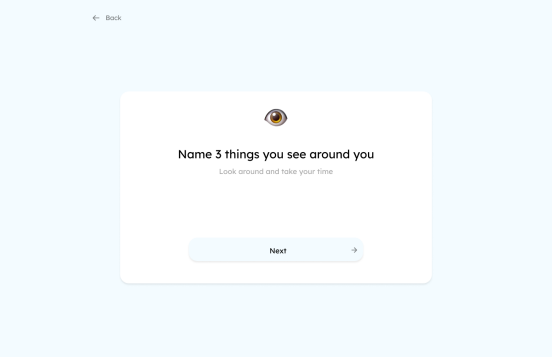


Figure 12: *Emotion check-in option taking a moment.*

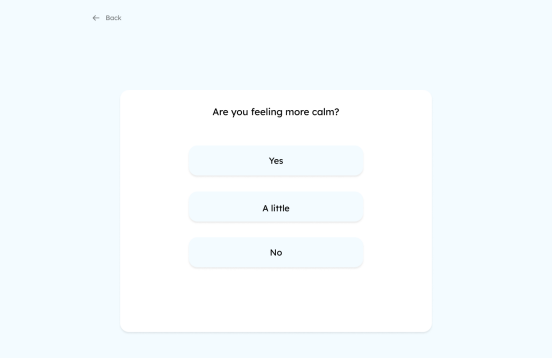


Figure 13: *Emotion check-in end.*

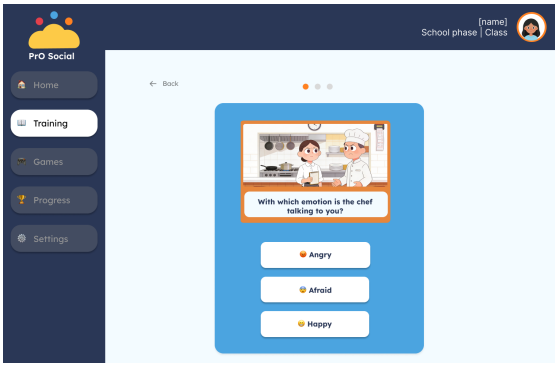


Figure 14: *Scenario training own perspective.*

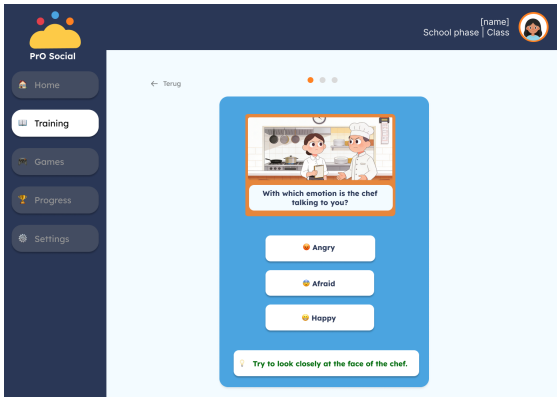


Figure 15: *Scenario training guiding prompt.*

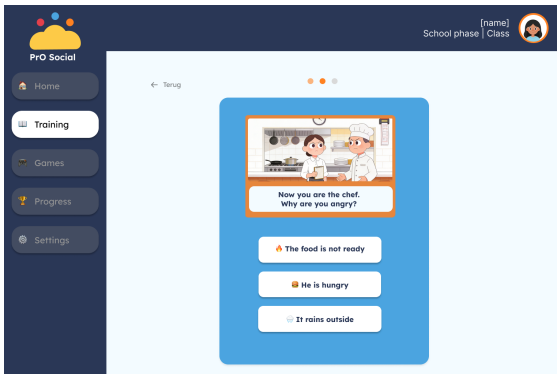


Figure 16: *Scenario training their perspective.*

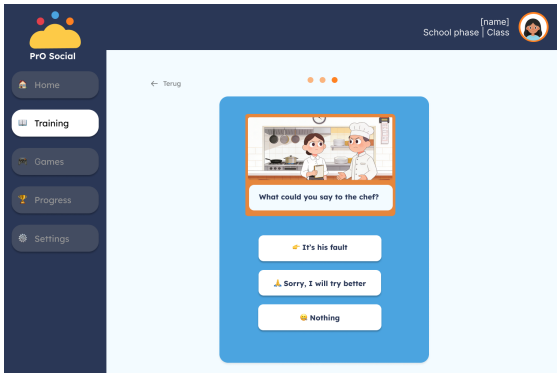


Figure 17: *Scenario training dealing with situation.*

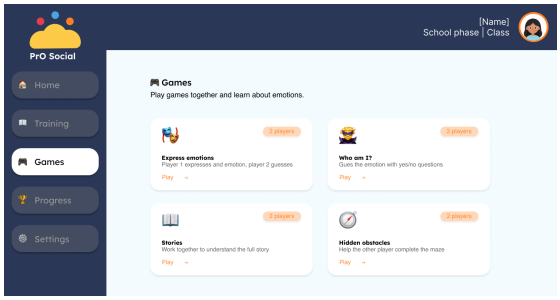


Figure 18: *Games overview.*

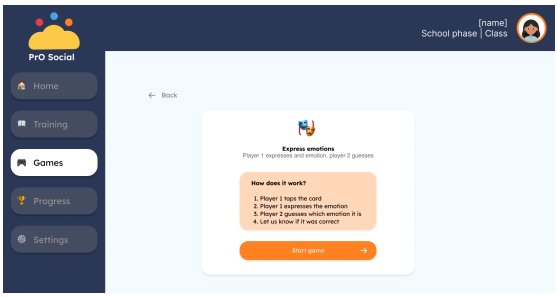


Figure 19: *Games expressing emotion game explanation.*

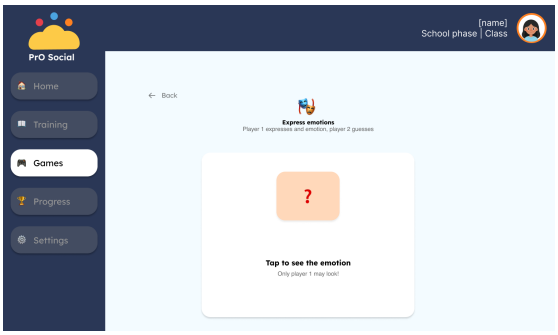


Figure 20: *Games expressing emotion player 1.*

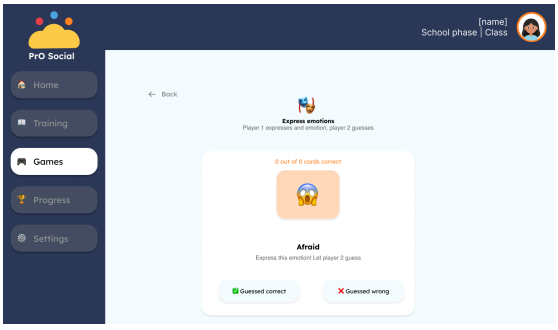


Figure 21: *Games expressing emotion guessing player 2.*