Let’s Movez Together

Development and Evaluation of a Tool for Meaningful Child Participation in Understanding and Supporting Digital Resilience

TU Delft · Erasmus MC · Erasmus University Rotterdam · YouInG · Convergence Healthy Start

Convergence
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Summary

Children aged 9–12 are at a critical developmental stage where they gain increasing independence online and begin to encounter digital challenges with less supervision. Strengthening their digital resilience is essential at this age, as digital media not only offer opportunities to enhance their lives but also pose risks to their well-being. To address these risks with meaningful and impactful solutions, the Let's Movez Together project focuses on the collaborative development of a tool to actively engage children in understanding their online world—uncovering their perceptions, challenges, solutions, and needs.

Within this project, together with You!nG and Erasmus MC, we develop, co-design, and evaluate a prototype child participation tool on the topic of digital resilience. The tool aims to provide an empowering environment for children to make their voices heard about their online world and, eventually, empower them to behave more resiliently online. Within the tool, children identify their biggest online challenge, explore the obstacles that hinder resolving this challenge, and develop solutions to overcome these obstacles. They conclude with a concrete plan and define the necessary support to address their challenge effectively.

Children participated in the tool and it's development by giving their evaluative feedback, which we then incorporated in the following design process of the tool. The design process consists of three developmental phases, each described in detail in this report. The report concludes with a description of the final design decisions, the final product and concrete recommendations for researchers, professionals, and policymakers aiming to meaningfully engage children in discussions about matters affecting their everyday lives.

Introduction

Children are growing up in an interactive digital society. This offers many opportunities and makes their lives easier and more enjoyable. However, digital media can also have negative effects on children's lives and well-being. To protect children from these potential negative effects of digital media, there is a growing call to strengthen their digital resilience. Digital resilience can be defined as a dynamic process in which individuals effectively apply coping strategies to seize the opportunities of digital media while adaptively handling its risks (Hammond et al., 2023; Lee & Hancock, 2023; Pan et al., 2024; Sun et al., 2022).

Recent theoretical and empirical insights from the field of communication science, developmental psychology and behavioral science help us better understand children's digital resilience, the coping strategies underlying it, and the factors that facilitate and hinder performance of these strategies (e.g., Chuck et al., 2024; Chuck et al., 2025; Hammond et al., 2023; Pan et al., 2024; Vandoninck & d'Haenens, 2014). However, to promote digital resilience among children, whether it is as researcher, teacher, policy maker, or other professional, it is crucial to also understand children's perspective on their online world and what they need in order to take advantage of its opportunities while managing its risks in a resilient way. What do they experience as challenges of their online world? What digital resilient behaviors do they find effective in coping with those challenges? What helps or hinders them to perform those digital resilient behaviors? And, most importantly, what and who do children need to overcome those hurdles and deal with their challenges? With the development of our child participation tool on digital resilience, we aim to give children a voice in answering those questions regarding their online world.

Despite increasing attention for child participation, children are still rarely asked to actively participate, discuss, and decide on conversation topics and interventions aimed at promoting their digital resilience. Instead, it is mainly adult professionals who decide what is important and how to promote digital resilience (for a reflection see Rozendaal & de Jong, 2024). Children have a different perspective than adults, especially when it comes to digital media. By actively involving children in the discussion about their online world, perceptions, solutions, questions and needs become clear. The way children perceive and experience their online world can enrich the perspective of adult professionals and facilitate meaningful conversations about stimulating digital resilient behaviors in children but can also lead to more relevant and effective interventions. Finally, according to the UN convention of the right of the child (Convention on the Rights of the Child., 1989), children have the right to have a say and participate in matters affecting their daily lives.

However, professionals often struggle to engage children in a way that is meaningful and appealing. Existing tools typically focus on older adolescents, leaving a gap in understanding how to meaningfully engage pre-adolescents (aged 9–12-year-old), particularly in the area of digital resilience (Dunne et al., 2010). This age group is especially interesting given that, during this stage, children often receive their first smartphone, gaining independent online access, and encountering initial digital challenges with decreasing supervision (Beresford et al., 2023; Magis-Weinberg et al., 2021; Ofcom, 2023; Rideout et al., 2022)

Collaboration

In developing and co-designing the tool, we worked together with Bianca Boender and her company You!nG. Bianca Boender has a broad expertise regarding method development and activities to meaningfully reach, engage, and empower youth. She has developed an escape game experience around the topic of catfishing and grooming and has trained numerous child and youth workers. Frank van Lenthe and Famke Mölenberg from Erasmus MC provided their expertise on youth health prevention and intervention, shared their experience with citizen science and provided us with their expert feedback in the beginning and final stage of the project.

Youth Participatory Action Research and Design Thinking

An approach for active child engagement in research is the Youth Participatory Action Research (YPAR) approach. YPAR is a collaborative research approach where adult facilitators work alongside children, engaging them in various stages of the research project (Anyon et al., 2018; Shamrova & Cummings, 2017). The three foundational principles of this approach are outlined in Textbox 1.

Textbox 1: Youth Participatory Action Research

The YPAR approach consists of three principles (Ballonoff Suleiman et al., 2021; Rodríguez & Brown, 2009):

1. Understanding the World: Children are encouraged and trained to ask questions and collect information to gain a deeper understanding of the world around them and the challenges they face.

2. Proposing Solutions: Based on the results they propose solutions to the challenges found.

3. Take Action: Finally, they take action by advocating for changes in practices, policies, and programs that can improve their lives.

Through YPAR children are given the opportunity to participate meaningfully in research and discussions about their online world, as their knowledge is acknowledged as a form of expertise. This fulfills one of their fundamental needs—the sense of being heard and having influence. Participating actively in matters that affect their daily lives can promote feelings of autonomy, agency, and empowerment (Aeschbach et al., 2022; Powers & Tiffany, 2006).

Empowerment is an important outcome of YPAR and can be described as enhancing the quality of life for individuals by increasing their sense of control and mastery over their own lives (Abraczinskas & Zarrett, 2020; Tengland, 2008; Zimmerman, 2000). To enable empowerment in the process of child participation, provision of an enabling environment is essential. The four factors that facilitate such an environment are described in Textbox 2 (Chrifou et al., 2024).

YPAR aligns well with the Design Thinking approach. Where YPAR is a human-centered research approach, Design Thinking is a human-centered design approach commonly used in the private sector. However, both approaches share similar values, purposes, processes, and outcomes, while the differences can complement one another to design solutions with a greater societal impact (Chen et al., 2020). Design Thinking is a structured, human-centered methodology that engages stakeholders in identifying and co-creating innovative solutions throughout various stages of an iterative design process (Milewska, 2017; Tschimmel, 2012). By integrating YPAR principles into the different phases of Design Thinking, children can actively and meaningfully participate. This means, their perspectives are at the center of the project, and their participation supports their social, emotional, and cognitive development, as well as their participatory skills and competence (see e.g., Chrifou et al., 2024).

By following the Design Thinking steps, within the three YPAR principles, while facilitating an enabling environment, we can empower children to make their voices heard about their online world and eventually empower them to behave more resiliently online.

Textbox 2: Factors for an Enabling Environment

According to the empowerment framework by Chrifou et al. (2024) an enabling environment can be facilitated by:

1

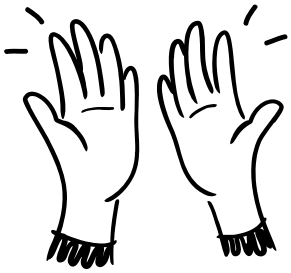
Providing Sufficient Resources

An enabling environment requires the involvement of people that are committed to the project (i.e., put time and energy in it) and a safe and welcoming space that fosters physical, emotional, and social safety. Children have to feel valued, respected, and supported to share their views and try new skills without fear of failure (Jennings et al., 2006).

2

High Quality Adult Facilitation

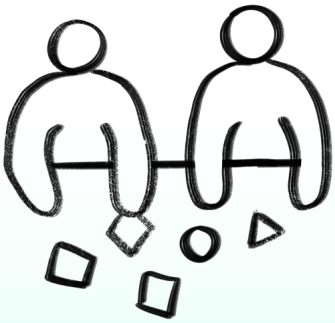
This requires topic knowledge and empowering facilitation skills among facilitators, giving children a high degree of control and autonomy by sharing power and building trust. Adults can act as collaborators rather than experts, fostering discussion, providing guidance that encourages critical thinking to enable a co-learning experience. It is essential to clarify the nature of the collaboration by discussing the responsibilities and the value of both children's and adults' participation beforehand (Jennings et al., 2006; Wong et al., 2010).



3

Sense-Making Discussions and Activities

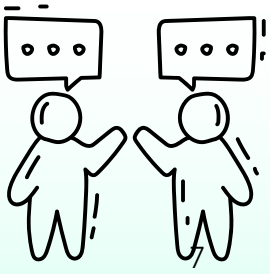
Participation is meaningful when it supports children's social, emotional and cognitive development. Conversations can help to develop critical consciousness, and activities can be motivating to learn participation skills (Chrifou et al., 2024). Moreover, activities must be fun and engaging and resonate with children's experiences of the online world to be experienced as meaningful (De Jong et al., 2024).



4

Enabling Capacity Building

Enabling capacity building involves cognitive development through knowledge exchange, partnership building, shared decision-making, learning research skills, and critical thinking (Chrifou et al., 2024). By participating in discussions and exchanging embodied knowledge, children can develop a critical consciousness of their online world, a key element of empowerment (Jennings et al., 2006). Building partnerships and shared decision-making helps children learn how to navigate relationships in the adult world while enhancing their competence and sense of control (Jennings et al., 2006; Wong et al., 2010). Additionally, learning and applying research skills not only requires critical thinking but also strengthens these skills (Jennings et al., 2006).



The Let's Movez Together Project

In this report we describe the Let's Movez Together project, which involves the co-design, development and evaluation of our child participation tool on digital resilience. We distinguish three developmental phases with three evaluation steps. In phase one, we first describe the theoretical basis, after which we evaluate the tool based on children's perspectives and researcher observations. The second phase represents a second evaluation round focused on the practical implementation of the improvements identified in phase one and an evaluation session to test the session flow using researcher observations. In the third phase, we outline our final design decisions and detail the plans for the practical implementation and evaluation session of the final tool. We end our report with fifteen concrete recommendations for researchers and professionals aiming to meaningfully engage children in topics regarding their everyday world.

Project Objectives

In the Let's Movez Together project, we aim to give children a voice regarding conversations about and solutions for challenges they face in their online world. In co-designing the tool, we specifically focused on two objectives. First, we aimed to create an enabling environment for child empowerment to not only make their voices heard but also leave a positive impact on their future lives (see Textbox 2; Chrifou et al., 2024). Second, we aimed to develop a tool that facilitates meaningful conversation between children and professionals (see Textbox 3 for different applications) on digital resilience, which allows us to understand children's needs in promoting digital resilient behaviors (Rozendaal & de Jong, 2024).

Textbox 3: The Use of the Child Participation Tool by Different Professionals

As a professional you can use the tool to gain insight into children's perspectives on their online world, the opportunities they see, the challenges they face, how they cope with these challenges, and what they need to behave in a digital resilient way. While the tool may be of use for a diverse audience, we target three main groups of professionals with our tool:

- **Teachers.** Use of the tool enables teachers to engage in meaningful discussions with their class, discover what struggles pupils may have online, and based on the gained insights, select the most appropriate interventions to effectively promote their digital resilience.
- **Intervention developers.** The insights gained from the tool help identify what challenges and needs they may target for an effective and impactful intervention promoting digital resilience, for example when it comes to who may help children and how.
- **Policy makers.** The insights gained from the tool can inform the development of policies that address children's online challenges and needs from the perspective of children, as they propose solutions to promote their digital resilience.

Design Phases of our Tool for Child Participation

Phase 1: The Challenge Factory

In developing and designing our tool for child participation, we already identified a lack of practical, empowering tools for child participation on digital resilience. Therefore, we took a co-design approach, designing the tool together with children based on an existing problem definition (see Textbox 4 for the differentiation between co-creation, co-design and co-production). Given the age of the children (i.e., 9-12 years) – and to enable this co-design approach – we started the development and design of our tool with a concrete concept and aim – which we named *The Challenge Factory*. Bianca Boender was actively involved in this phase of the project, especially when it comes to her expertise on session facilitation, empowerment of children, and further development of the conceptual idea (e.g., narrative, fun activities).

In *The Challenge Factory*, children participated in two sessions of two hours wherein they identified and solved digital challenges for an imaginary peer (i.e., persona) by moving between different departments in a factory, such as the research room, the design room, and the production room (see Appendix A for the detailed procedure).

Textbox 4: Forms of Stakeholder Participation and Involvement

The following terms are often used interchangeably but represent different levels of stakeholder participation and involvement (Vargas et al., 2022):

- **Co-creation:** The involvement of the target group in all phases of a project, including problem definition, solution design, implementation, and evaluation.
- **Co-design:** The involvement of the target group specifically in designing a solution as part of a project. The problem is typically predefined, and participants are not fully involved in the implementation or evaluation of the designed solution.
- **Co-production:** The involvement of the target group in the implementation and evaluation of a solution, where the solution design has already been predetermined.

1.1 Design of *The Challenge Factory*

In designing the participation tool and its activities, we were inspired by the Behaviour Change Wheel (BCW) (see Textbox 5 for the stages of the BCW design process), a method for characterizing and designing effective behavior change interventions (Michie et al., 2011).

While the tool itself is not meant as an intervention, the aim was to discover children's needs when it comes to online challenges, while also allowing room for solutions regarding those challenges, with the eventual goal of supporting children's digital resilient behavior (i.e., effectively applying coping strategies).

In addition, we have followed the Design Thinking approach (Milewska, 2017; Tschimmel, 2012) – as a framework for solving complex problems, within the YPAR principles (see Textbox 1; Ballonoff Suleiman et al., 2021; Rodríguez & Brown, 2009). The Co-design With Kids – a Toolkit for Designers (Wetenschapsknooppunt TU Delft, n.d.) served as an inspiration source for the activity design. Together, these theoretical and more practical approaches led to the five steps illustrated in Figure 1.

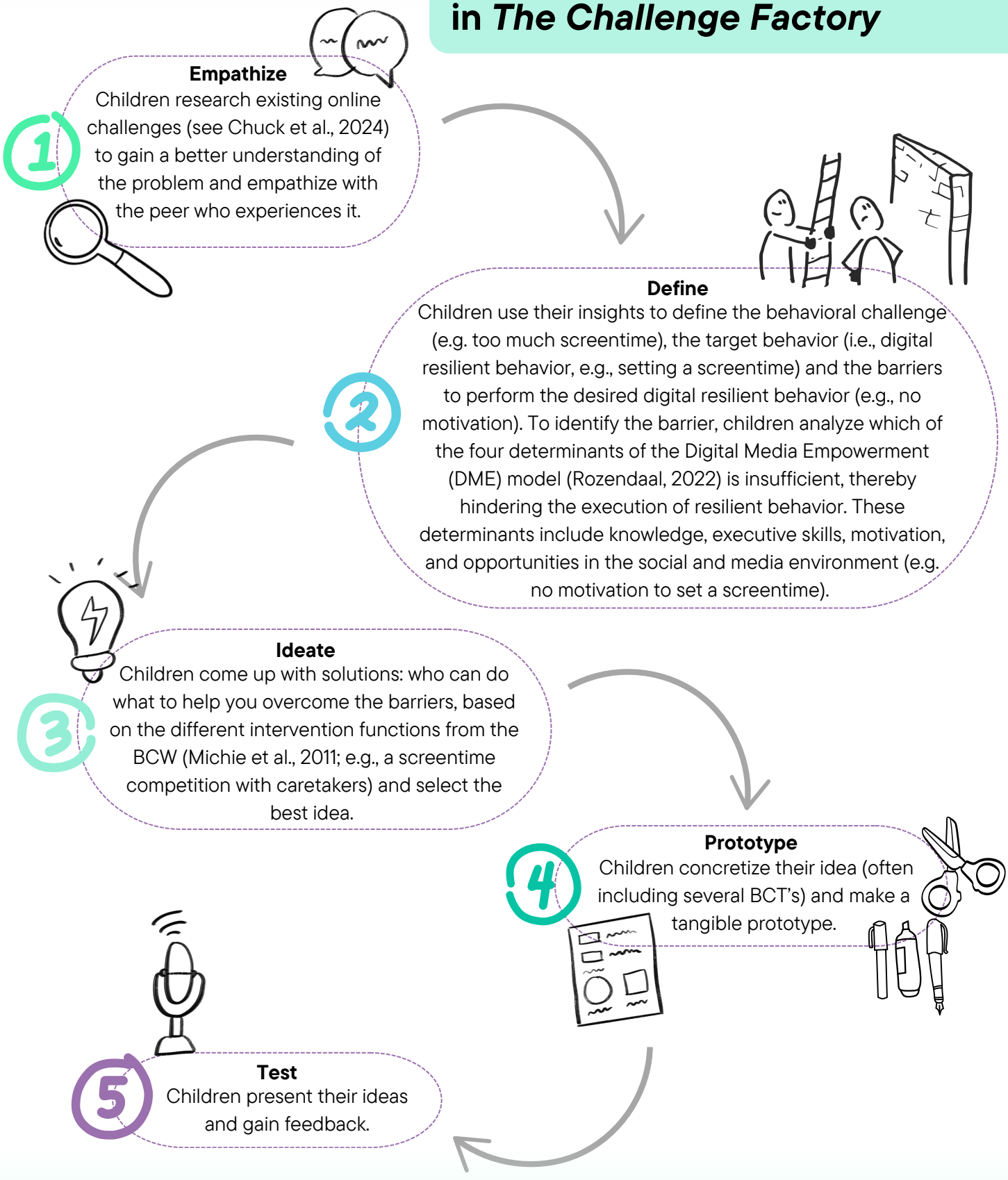
Textbox 5: The Behavior Change Wheel (BCW)

To develop a behavior change intervention (i.e., a solution for a given behavioral challenge), you need to go through three stages:

1. **Understand the behavior:** To understand the 'target' behavior, you first need to define the problem in terms of behavior, select the target behavior (e.g., setting a screentime), specify the target behavior (e.g., when and what limit), and identify what needs to change (i.e., what are facilitators and barriers to the target behavior).
2. **Identify intervention options:** Next, you can identify, based on the barriers of the target behavior (e.g., motivation is lacking), what intervention functions (e.g., persuasion), and (optionally) policy categories (e.g., communication) to target.
3. **Identify content and implementation option:** Finally, the intervention becomes concrete when you identify specific behavior change techniques (e.g., social comparison) and a mode of delivery (e.g., digital).

The stages can be cyclical in nature and are aimed to more systematically develop a behavior change intervention. The BCW prescribes different sources of behavior, intervention functions, and policy categories, based on 19 behavior change frameworks (Michie et al., 2011).

Figure 1: Design Thinking Stages in *The Challenge Factory*



1.2 Actualizing Child Empowerment in *The Challenge Factory*

The empowerment framework by Chrifou et al. (2024) was central in the practical realization of the tool (see Textbox 2). Below we will describe our attempt to actualize the framework in *The Challenge Factory*.

Creating a Safe and Supportive Environment. To provide sufficient *resources*, we have involved after-school care supervisors, who provided the necessary space and time to conduct sessions with the children about their online world. Sessions were held at the after-school location to create a safe physical environment. We emphasized the value of the children's participation and that there are no right or wrong answers to foster a sense of respect and support. To promote emotional and social safety, we introduced safety rules (see Textbox 6), did a get-to-know exercise, and allowed children to choose their group members, thereby encouraging a respectful and supportive group dynamic. During the activities, the facilitators supported children without judgement, by answering children's questions, and by asking facilitating questions to support children's thinking process.

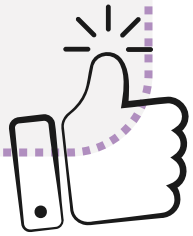
To further enhance the support provided by the children's social environment, the after-school supervisor was informed about the session plans, received updates on the progress and group dynamics after each session, and received a general debriefing on (anonymous) insights gathered after the last session. Additionally, the supervisor was invited to attend the first session to help establish a safe physical, social, and emotional environment. The children were also encouraged to reflect on ways their social environment, both within and outside the care facility, could support them in addressing their online challenges.

Textbox 6: Safety Rules by You!nG

The following basic needs for children were introduced as safety rules, which are the standard rules used by Bianca Boender and her organization You!nG:

- **Basic safety**: everything that is shared within the sessions cannot be shared with other people.
- **Connectedness**: we treat each other with respect and support one another.
- **Self-esteem**: we give each other compliments.
- **Autonomy**: everyone is responsible for their own contribution.
- **Self-expression:** we respect and appreciate each other's talents, wishes and boundaries.
- **Realistic boundaries**: we express it when someone crosses our personal boundaries.
- **Spontaneity and play**: we are free to express our emotions and needs and most of all have fun together.

To reinforce those safety rules throughout the sessions, we used the phrase "*put up, not put down*" emphasizing respect, support, and complementing each other.



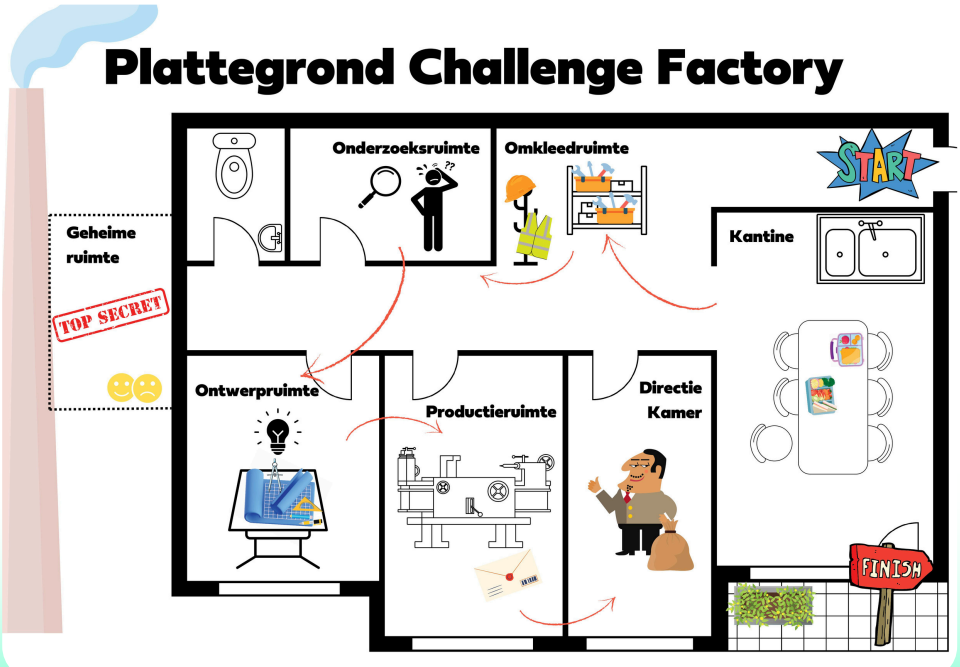
Fostering Autonomy and Co-learning. The project team, responsible for facilitating the sessions, consists of experts in digital resilience research with children (a post-doc, Phd, and junior researcher) and Bianca Boender, a specialist in child empowerment, all having facilitation experience. We aimed to provide *high-quality adult facilitation* in three ways. We clarified the degree of control children had throughout the session by emphasizing children's value and role as the experts on the topic. Children were given the autonomy to choose an online challenge, come up with the solution, pick their preferred work form to do the activities, and determine how to share their insights.

Facilitators provide an explanation of the activities and foster discussions by asking questions and active listening to encourage critical thinking and create co-learning opportunities, focusing on encouraging self-reflection on children's online challenges.

Facilitating Meaningful Conversations and Creative Problem-Solving. We aimed to facilitate *sense-making* discussions and activities. We facilitated meaningful conversations through group discussions on challenges and solutions faced in children's online world. To enable discussions that resonated with children's experiences, the challenges discussed were based on our previous research project on the online world of pre-adolescents (Chuck et al., 2024). By asking facilitating questions we encouraged children to express their opinion and share their experiences, helping to develop critical consciousness of their online world.

We designed the activities in a way that encourages fun and engagement in the process. To achieve this, we integrated the complex problem-solving steps into an engaging storyline centered around a playful narrative about The Challenge Factory (see Appendix A). We offered a variety of exercises and creative work forms, like building with LEGO, drawing, writing, crafting, taking pictures, and solving riddles. Finally, we added incentives like sweet treats and certificates to make the sessions even more rewarding.

Guiding Children in Research and Critical Thinking through Self-Reflection. To make children gain research and critical thinking skills – that is *capacity building* – the children were guided through complex problem-solving steps (see Figure 1). The children worked in groups, engaging in partnership building and shared decision-making throughout the process. Group discussions further supported this, with facilitators focusing on encouraging self-reflection. Rather than sharing their own embodied or scientific knowledge, facilitators asked the children to share and reflect on their own lived experiences (i.e., online experiences) to enable the development of critical consciousness.



1.3 Co-designing *The Challenge Factory*

Before co-designing *The Challenge Factory* with children, we tested the session flow and clarity of the explanations and activities with our adult colleagues. Subsequently, we conducted co-design sessions with fifteen children, aged 8-11 years old, at an after-school care facility, together with Bianca Boender. The after-school care facility was recruited through convenience sampling. We informed the group leader during a face-to-face meeting and used flyers to inform the children and their caregivers about the sessions and invite children to participate. The director of the after-school facility and children's caregivers gave active written consent for children's participation.

During the sessions children participated in the activities of *The Challenge Factory* and were invited to evaluate every activity through an evaluation activity. At the end of each session, children evaluated the concept and storyline of the tool and the degree to which they experienced empowerment by answering specific questions (see Textbox 7). Also, the facilitators observed the children's behavior and made notes regarding session flow, group dynamics, degree of self-expression, children's understanding of objectives, instructions and exercises, children's engagement and experienced fun in the process.

Textbox 7: Co-Design Activities

- **Activity evaluation:** To evaluate the session activities and the overall concept of the session the children were asked to choose a spot on a matrix on the floor. The matrix had two axes to judge whether the activity was "boring" or "fun" and "unclear" or "clear". We asked the children to explain their choice and to elaborate on how we could improve or change the activity.
- **Session evaluation:** At the end of each session, children were asked about their participation experience by answering eight questions to evaluate the four factors for an enabling environment for empowerment by Chrifou et al. (2024). They responded by standing on a five-point smiley scale and were encouraged to elaborate on their answers.

Resources:

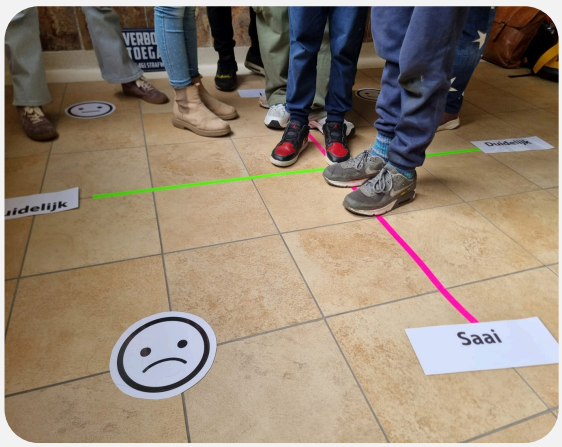
- Did you feel like you could say everything you wanted to say?
- Did you feel like you could be yourself?

Adult facilitation:

- Did you feel like the researchers listened to what you had to say?
- Did you feel like the researchers took you seriously?

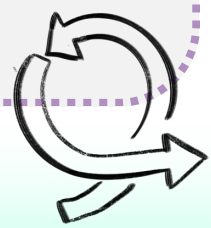
Sense-making:

- Did you enjoy participating?
- Do you feel like the solution(s) you came up with are useful to you?



Capacity-building:

- Do you feel like you learned something from this project?
- Do you feel like you built a connection with your team and the researchers?



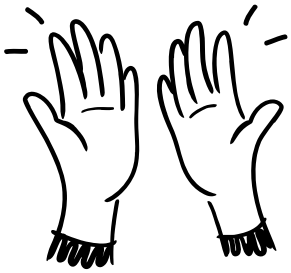
1.4 Evaluation of *The Challenge Factory*

As a result of the child evaluations and the researcher's observations we were able to critically evaluate our tool. Below we describe the strengths and room for improvement.

Group Dynamics and Facilitator Connection. Generally, we provided sufficient *resources* to establish a safe physical, social, and emotional environment. Most children expressed a sense of safety and the feeling they could fully express themselves. Throughout the sessions they actively asked questions and suggested improvements to the tool. More specifically, the reinforcement of the safety rules with the sentence "*put up, no put down*" was effective in stimulating respect and support within the group.

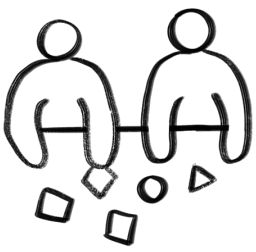
Some children struggled to express themselves in the presence of more outspoken peers and felt unheard. One child noted, *"I wanted to say something, but then other children were already talking and then you were already moving on to the next exercise."* Researchers observed that this was partly due to an age gap, which led to different perceptions of the online world and caused older children to dominate the discussions. As a result, some younger children felt uncomfortable speaking up. Additionally, personality differences led to some children being more dominant in the discussions.

Finally, the sessions required significant time and energy to facilitate, even without the evaluation activities. This may limit the tool's accessibility and feasibility for other professionals to implement it.



Adult-Child Collaboration. *Adult facilitation* was effective in that most children felt that facilitators were knowledgeable about the topic, took them seriously, and listened to their opinions. However, children expressed a preexisting distrust in adults when talking about their online worlds, particularly regarding the use of their feedback, *"Little is done with what kids do. I have little faith in adults".* Additionally, children did not perceive the collaboration with the researchers as equal. As one child remarked, *"You didn't really work with us; you explained it well, but it wasn't collaborating"*. We shared limited personal information, which may have prevented them from getting to know us better and perceive us as their equals. Also, researchers noted that facilitators were leading rather than guiding the process, due to the complexity of the session content, which restricted them from sharing enough power to support children's autonomy or encourage critical thinking and foster co-learning.

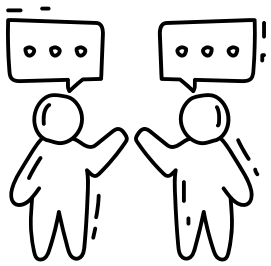
Additionally, to improve the trust bond between children and facilitators and work together as equal collaborators, facilitators can join the get-to-know exercises and share, for example, what (online) challenges they have faced.



Engagement and Meaningfulness. In terms of *sense-making,* the conversations and diverse activities were experienced as engaging and motivating, with children recommending the experience to their peers. However, some expressed to find parts boring or too long. Researcher observations also showed that children lost focus because they were unable to release their energy during the activities, sessions were too long, and the session content had a high mental load.

Even though we based the challenges on previous research with the same age group, children expressed that the online challenges did not always match their own experiences. This limits the meaningfulness of the conversations and potentially hinders the development of critical consciousness of their online world. Moreover, from a researcher's perspective, the third principle of the YPAR approach (see Textbox 1), which is crucial for empowerment, was not sufficiently addressed. Children were only asked where they would like to share their insights, rather than being given the opportunity to share and take action themselves. The focus on action and change by actively involving children in the implementation can also increase the sense of meaningfulness. Finally, to enhance engagement and focus, children suggested several ways to make the activities more fun, and energetic, including more time for creative tasks, movement-based exercises (such as puzzles or escape game-inspired activities) and additional gamified elements. They also preferred a simpler, action-oriented storyline with less narrative focus: “I understand the idea, but it feels too much like a story; it could be more straightforward”. They also did not like the name of the tool and suggested alternative names that better aligned with the topic of digital resilience.

Learning Outcomes. In terms of *capacity building*, children developed research and critical thinking skills by applying design thinking methods and YPAR principles to solve complex problems. However, the learning objectives behind these research methods and activities were unclear to them. Additionally, since the online challenge did not always resonate with their own experiences, children questioned whether the solutions they created were applicable to their own lives. This has limited the potential to develop critical consciousness of their online world and the experienced educational value of the sessions.



Furthermore, as previously mentioned, facilitators could have been more supportive of autonomy, and peer partnerships could have been more effective in boosting self-efficacy. These limitations may have hindered opportunities for capacity building such as knowledge sharing, and shared decision-making among peers.

Design Phases of our Tool for Child Participation

Phase 2: Escape Your Screen

We have used the insights from phase 1 to redesign and improve the Challenge Factory, assisted by Bianca Boender. This has resulted in significant changes to the storyline and activities and led to the creation of a new concept: *'Escape Your Screen'*. We chose this name because it reflects the children's suggestions for names more closely related to the topic of digital resilience and serves as a teaser for the session content: the escape game.

Escape Your Screen is an escape game, in which children participate in one 75-minute session in which they are 'trapped' in their screen. By searching objects for in the room, following clues and solving riddles and puzzles, children are guided through complex problem-solving steps. By identifying their biggest online challenge, brainstorming a coping strategy to overcome that challenge, discovering hurdles to using that coping strategy, and, finally, finding solutions to overcome those hurdles, they ultimately escape their screen [see Appendix B for a detailed description of the procedure].

2.1 Actualizing Child Empowerment in *Escape Your Screen*

While our approach and the aim of the tool remained unchanged, we have optimized the practical realization of an enabling environment according to the empowerment framework by Chrifou et al. (2024) (see Textbox 2) in the tool, by incorporating the suggestions from the co-design session with children, as described below. It is important to note that – due to resource restrictions – the sessions in this phase took place during a science festival at the university and not at an after-school care facility. As a result, we had to partly adapt the design of the session to this different context (as described in 2.2).

Enhancing Group Dynamics and Facilitator Connection. In terms of *resources*, we mainly aimed to improve group dynamics and allow all children to express themselves. While we did try to cluster children of around the same age to ensure a safe environment, due to the session's context (see 1.2), children often did not know each other, and we could not carefully group children by age or personality. Moreover, to ensure a supportive group dynamic and allow everyone to share their opinions and experiences, we limited group sizes to a maximum of five children. We allowed children to work in smaller sub-groups and individually on their own online challenges during certain activities. Children shared their experiences with their peers and caregivers (who often joined them during the festival) through two special exercises designed to facilitate one-on-one sharing instead of group discussions. The first exercise we incorporated is a peer interview in pairs to further empower sharing.

The second exercise was designed to facilitate one-on-one discussions and sharing with caretakers and involved creating a mind map to encourage conversation about the support the child needs from the caretaker to practice digital resilient behavior.

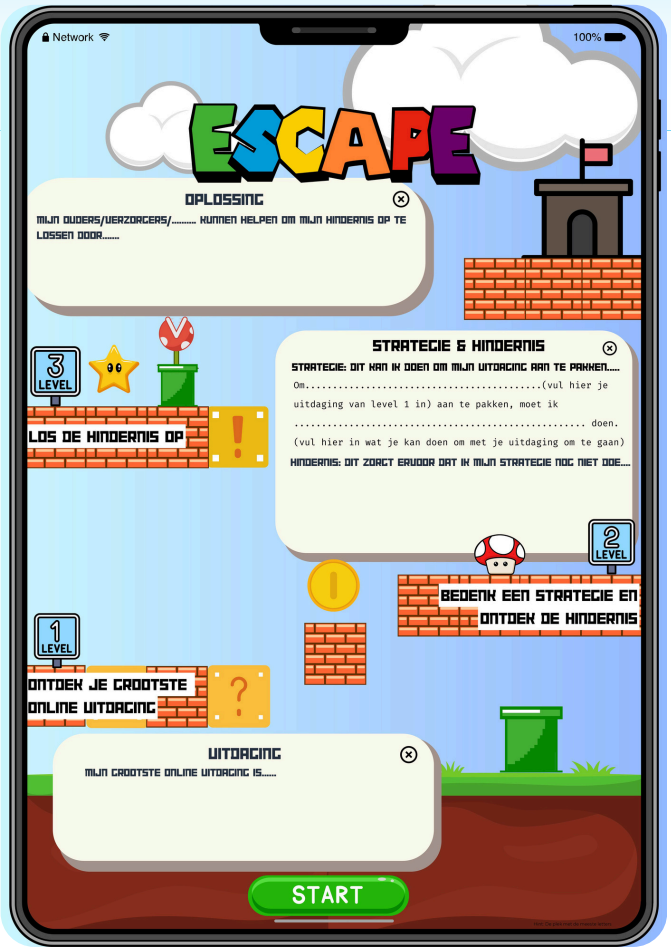
Improving Adult-Child Interactions. To enhance *adult facilitation* and gain trust to work as equal collaborators with the children (i.e., address the preexisting distrust in adults), facilitators joined the get-to-know exercise and shared their biggest online challenge. Additionally, we carefully introduced the session and clarified the roles and expectations of both children and facilitators, while emphasizing the autonomy-supportive nature of the activities: *"Today you are the expert. This also means that you will do the activities independently, choose what you want to share with the researchers, and decide what you prefer not to share. We will explain the tasks, ask questions, and help if needed. You can also always ask for help".* To enhance power-sharing and equality between children and facilitators, the activities in *Escape Your Screen* were designed for individual or peer group work, rather than facilitator led. Moreover, to stimulate children's sense of autonomy and control over the process, instructions were shortened, simplified, and provided in written or recorded form (audio and video), allowing children to complete the tasks independently and only seek help when needed.

Although these changes reduce the amount of adult-child interaction, they are still an improvement as they create a more autonomy-supportive environment that enables critical thinking and co-learning.

Improving Engagement and Meaningfulness. To enhance *sense-making*, and make sure challenges and solutions resonate with children's lived experiences, we asked children to identify their biggest personal online challenge, based on their own experiences rather than those of a peer. Given their age, we did provide them with four themes (i.e., discomforting online contact or content, hacking and screen addiction) – based on the most important challenges identified by pre-adolescents in our earlier research project (Chuck et al., 2024). We also allowed room for children to bring in their own challenge if they could not identify with one of the above. To emphasize action and change based on their solutions (in line with YPAR principle three), we encouraged children to discuss their ideas and potential obstacles with someone who could help them overcome these challenges. Since caregivers were present, we asked children to discuss their challenge, obstacles, and potential solutions with their caregivers rather than a stakeholder of their choice.

Children's suggestions for making the tool more engaging were incorporated by designing escape game-inspired activities and using a straightforward storyline. To simplify the session flow and objectives, the storyline in Escape Your Screen is specific to the topic of digital resilience. The escape game-inspired activities encouraged children to move around the room and collaborate, while the action-oriented storyline focused on clear goals: defining a coping strategy to overcome an online challenge and designing a solution to overcome key obstacles to perform the solution, ultimately allowing them to 'escape' their screen. To address children's limited focus, we incorporated all steps in one concise session.

Enhancing Learning Outcomes. To optimize *capacity building* opportunities, and to clarify that children are learning critical thinking and research skills, we highlighted the session's goals and learning objectives in the introduction *"Level 1: Discover your biggest online challenge... Level 2: Come up with a strategy and discover the obstacle... Level 3: Overcome the obstacle"*. To foster critical consciousness of their online world, the focus was placed on children's embodied knowledge and their personal biggest online challenge. The incorporated additional peer interview and caretaker exercise as elaborated on earlier, further promoted knowledge sharing, partnership building and shared decision making, while teaching additional research and communication skills. The importance of teaching to ask questions to create a deeper understanding of the challenges children face is also illustrated in principle one of the YPAR approach and increases the degree of empowerment (see Textbox 1).



Additionally, to further promote partnership building and shared decision making, we designed the escape game elements to be performed with a bigger group of four or five (see Appendix B for the content of the exercises), while the exercises to exchange embodied knowledge were performed in pairs (i.e., to ensure a safe environment).

2.2 Co-designing *Escape Your Screen*

We evaluated the improved version of our tool during a science festival at Erasmus University Rotterdam, where children and caretakers participated in workshops at the university to get acquainted with research. Children and caregivers signed up for the workshop beforehand, but we did not have access to any personal data, such as age to group children based on that.

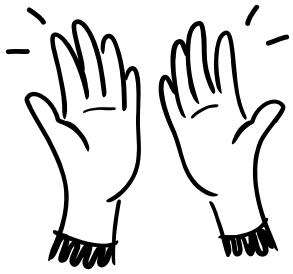
Distributed over three workshop rounds, around 40 children – mostly together with one caretaker – participated in *Escape Your Screen* during the science festival. Some children joined the workshop with a peer, but most children did not know each other. Finally, we could not collect data at the festival. Rather than gathering individual evaluations from children, researchers who facilitated the sessions noted their reflections, focusing specifically on session flow and the realization of empowerment. Caregivers were also invited to share their observations and key takeaways from their perspective as caretakers.

2.3 Evaluation of *Escape Your Screen*

We evaluated the practical implementation of an enabling environment in Phase 2 to actualize the final improvements and tool design in Phase 3.

Resources. Our attempt to provide better resources seems successful. Sharing embodied knowledge in pairs helped children feel comfortable expressing themselves. From the researchers' perspective, they were open about their online challenges. Children were engaged in peer interview exercise and used it to share their experiences. In addition, the discussions with caretakers seemed to have a positive effect for children to feel supported and share their experiences. Additionally, we experienced the shorter sessions as easier and more accessible to facilitate, while still allowing enough time to develop concrete solutions to the challenges.

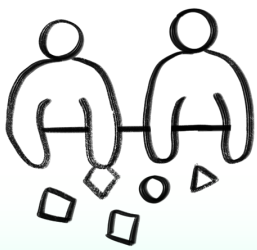
However, during the escape game elements, situations arose where the group dynamics in the larger groups were unsupportive, as part of the group took the lead while the other group members were not heard. This may have affected the children's ability to express themselves without fear of judgement. It thus seems necessary to involve someone who is familiar with the children actively in the process of managing supportive group dynamics.



Autonomy. With regard to *adult facilitation*, facilitators' openness about themselves and their biggest online challenges during the get-to-know exercise helped build trust with the children and encouraged them to share their own challenges openly. In addition, the session introduction emphasizing roles and responsibilities of children seemed effective, as the children independently started the escape game without requiring assistance.

However, the amended exercise design still provided limited autonomy and control due to the complexity. Children were not always able to start and complete exercises individually and required help from facilitators, particularly the young children. Facilitators could therefore not fully put children in charge and work as equal collaborators to encourage critical thinking and co-learning experiences.

Finally, facilitators moved around the room instead of staying with their assigned group, which caused disruptions, as children had to explain their process repeatedly to different facilitators.

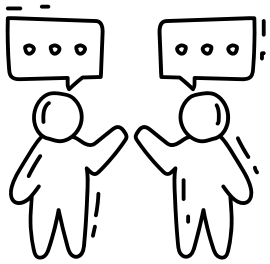


Fun and Discussion. In terms of *sense-making*, children seemed to experience the session and their solutions as meaningful and useful and seemed to enjoy working on their own challenges and solutions. While not all children enjoyed the conversations with their caregivers, both caregivers and researchers observed that these discussions were valuable and led to action. For some children and caregivers, it was their first time discussing the online challenge together, and they left with new, concrete insights on how they could collaborate to overcome it.

However, due to time constraints, we could not give children the chance to discuss and share their creations with the entire group to further enhance meaningfulness of the session.

The escape game-inspired elements seemed to successfully engage the children, who showed enthusiasm throughout the session. They particularly had fun in the process through the puzzles, riddles, and movement. The only suggestion, from older children, was that some puzzles could have been more challenging.

The written instructions of the exercises were often too complex or lengthy, especially as reading and writing is often considered difficult and boring by children (de Jong et al., 2024). This hindered their ability to grasp the content, stay focused, and continue with the exercises, thereby also limiting the development of critical consciousness.



Critical Consciousness. In terms of *capacity building*, the peer interviews and discussions with caregivers effectively encouraged the sharing of embodied knowledge, and concrete solutions, and, as such, successfully fostered critical consciousness. Children seemed to have developed a greater awareness of their online world. Additionally, the peer interview seemed successful in teaching additional research and communication skills, as children learned how to formulate and ask questions and to be an active listener (YPAR principle one). Visualizing the process steps and explaining their objectives proved effective in helping children understand the learning objectives. This clarity further enhanced their awareness of the research process and skills they apply, which likely had a positive impact on their critical thinking skills.

However, sharing experiences during the peer interviews proved more challenging when children were younger (7 or 8 years old) or unfamiliar with each other. Additionally, children did not always collaborate effectively in groups during the game elements, because it was unclear to some that they were part of a larger group. This limited partnership building and shared decision making during the game elements. Furthermore, the game elements were somewhat disconnected from the topic and lacked educational value.

Design Phases of our Tool for Child Participation

Phase 3: Escape Your Screen

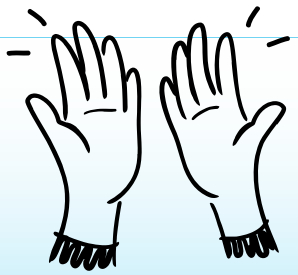
In the final project phase, we collaborated with communication agency Podium to incorporate all improvements and professionalize the *Escape your Screen* game. The session concept, aim, and content remained the same. The main target group of the final version of the escape game is group 6, 7, and 8 in a primary school setting, with their teacher as facilitator. However, as the escape game can be used to gain insights into children's perspectives on their online world, it can also be applied in different contexts by adapting the conversations during and after the game to align with the facilitator's objectives (see Textbox 3 for different applications).

3.1 Actualizing Child Empowerment in the Development

In the third phase we focused on partially digitizing the game (hybrid) to enhance fun, engagement, user-friendliness, simplicity, and visualization of instructions and exercises, while also increasing the applicability and flexibility for facilitators. This choice will be substantiated below. Additionally, we reviewed didactic quality in terms of autonomy enhancement, sharing opportunities, and teaching research and design skills. We will elaborate on the practical implementation of the improvements to provide an enabling environment for child empowerment below (see Textbox 2).

Supportive Group Dynamics. We aim to provide supportive group dynamics. We have chosen to adjust the final tool to a classroom setting, because the teachers' experience with managing supportive group dynamics within the classroom setting increases the emotional and social safety during the session.

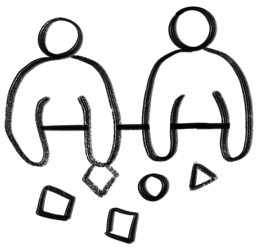
Considering resources in general, we aim to provide a tool that is easily accessible and user friendly for facilitators and children. The tool is free of charge, only requires materials that are present in a classroom, and takes 60-90 minutes to complete (in contrast to 240 minutes for our initial tool), so that teachers can easily fit the session within the curriculum. Additionally, by extending the session time compared to phase 2, we can provide more time for sharing and discussion.



Facilitation in the Classroom. We aim to enhance children's autonomy and their control over the process while further encouraging critical thinking. In the classroom setting it is crucial to provide autonomy-supportive exercises so that the teacher can facilitate the session for the entire classroom by themselves. To enable this, we simplified exercise instructions by revising the wording and use a digital tool to provide visualization and audio where valuable.

This digital tool also enables teachers to monitor children's personal process through plenary discussions, supported by polls that teachers can complete (e.g., indicating how many children have encountered discomforting online content).

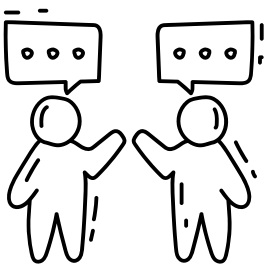
To better support facilitators, we also provide a facilitation guide that includes the session objectives, session flow, and tips for managing specific situations—such as energizing the children or helping them with exercises. Additionally, we provide guidance for teachers on how to approach the session results, including how to address the identified challenges, obstacles, and needs to support digital resilience among their students.



Interactive Design. To increase engagement and meaningfulness of the exercises, we have made the game elements more challenging (with optional hints), aligned them with the topic of digital resilience, and designed them to stimulate self-reflection, so that it resonates with children's experiences. To further promote critical consciousness and thereby enhance meaningfulness of the session we will ask teachers to use the polls to encourage children to share and discuss their solutions and creations with the class.

The classroom setting is beneficial to encourage discussion and sharing, as children are familiar with each other, which makes it easier for them to share their experiences with peers.

Focus on Action. To avoid confusion about group composition and maintain supportive group dynamics, while still encouraging partnership building and shared decision making, we have decided to limit groups to pairs. Children work in the same pair throughout the session. Also, as mentioned above, the game elements are related to the topic and stimulate self-reflection, which also comes with additional educational value as it further encourages critical consciousness.



Furthermore, we have incorporated principles of *research-oriented learning* (see Textbox 8; Wetenschapsknooppunt Erasmus Universiteit Rotterdam, 2020). Those principles are comparable to the complex problem-solving steps followed in *Escape Your Screen*, as children 'research' their biggest online challenge, by asking questions and reflecting on their online behaviors to find solutions and answers. However, the principles further encourage critical thinking and self-reflection and suit the key objectives of the school curriculum. This makes it easier for teachers to fit the tool in the school curriculum.

Additionally, we provide guidance for after finishing *Escape Your Screen* to encourage teachers to give children the opportunity to share their final solutions with a stakeholder of their choice, such as teachers, caretakers, friends or platform developers. By providing for this additional opportunity for 'taking action', we aim to promote partnership building and shared decision making, and further increase children's sense of competence and control.

Lastly, we give advice to help teachers make informed decisions about the next steps based on the tool's results. What can be done when many children express a lack of knowledge, motivation, difficulty stopping to reflect, or need support from their social environment to act in a digitally resilient manner?

Textbox 8: Principles of the Research-Oriented Learning Cycle

1. Wonder: Children are encouraged to look at the world around them with curiosity and ask questions.
2. Explore: Children explore the topic by gathering information to decide what they want to learn and formulate a research question.
3. Design research: Children make a list of materials, decide on their target audience and what they want to measure. They list their research steps.
4. Conduct research: Children carry out the research steps and collect results.
5. Conclusion: Children document their findings, answer their research question, and conclude with a critical reflection on their research.
6. Present: Children share their research with others who can learn from it or conduct further research on the topic.

As a result of following these steps, children can develop the following research skills: observe, use imagination, explore connections, be curious, be critical and question things, share ideas, analyze and share information, and reflect on their work (Wetenschapsknooppunt Erasmus Universiteit Rotterdam, 2020).

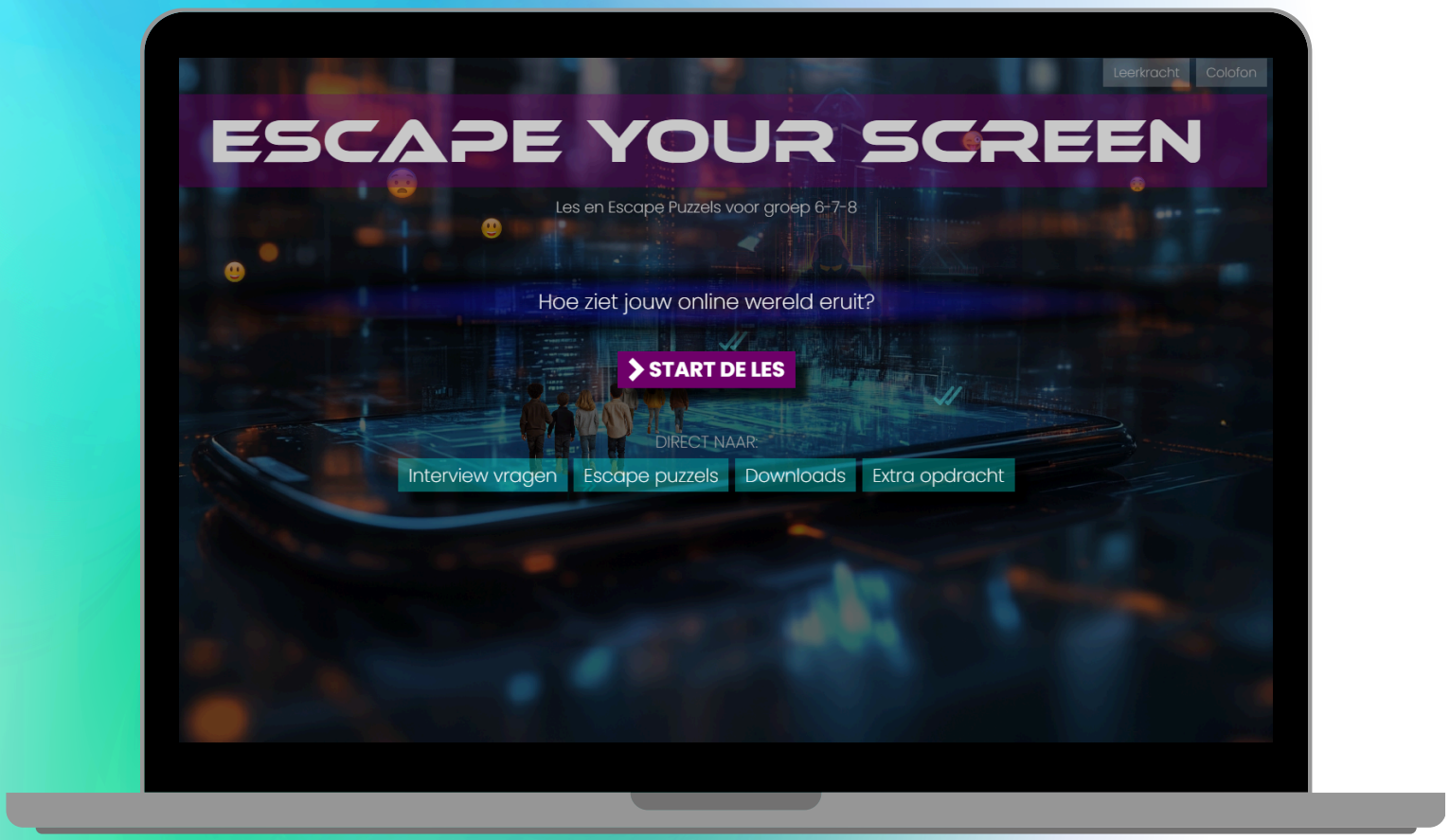
3.2 Future Steps

The co-design sessions with children and caretakers primarily focused on the concept and content of the tool. Although we initially intended to also involve children in co-designing the visual layout, due to time constraints this was infeasible. To address this, and to evaluate whether our final adjustments to the tool are successful, we conducted a final test session with children in a classroom setting and made some minor changes based on the feedback from the children and teacher.

Moreover, to facilitate children's partnership building and sharing with various stakeholders – such as caretakers and policymakers – we are exploring a collaboration with the Science Hub (i.e., Wetenschapsknooppunt Erasmus University Rotterdam). For the dissemination of the tool, we are using our existing network within the Erasmus University Rotterdam, such as Healthy Start and the Movez Network but will also consult our societal partners and the Science Hub. Finally, the tool will be part of a citizen science project for children called 'Alle scholen verzamelen' [i.e., 'all schools gather'] in 2027.

To conclude, it is important to note that the co-design sessions were conducted with children from similar socio-cultural backgrounds. Although we have done the test of the tool in a different context, we still encourage professionals to also test the tool with children with a larger variety of backgrounds to ensure its broader applicability.

Click on the picture below and explore Escape Your Screen!



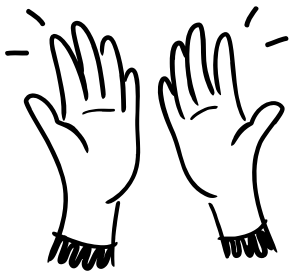
Recommendations for Meaningful Engagement of Pre-Adolescents

Based on our experiences and our evaluation of the realization of an enabling environment in our tool, we have formulated several key takeaways that can be applied to other child participation and design contexts, helping create an empowering environment for children to make their voices heard.

To provide resources:

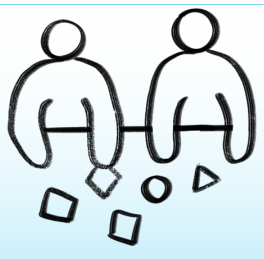
- Foster respectful and supportive group dynamics by setting 'safety rules' (such as in Textbox 6) and involving someone familiar with the group to advise on group composition or help with facilitation.
- Clarify the aim of collective problem solving in group activities to help children understand their role and collaborate more effectively.
- Adjust the group composition and size based on age and session objectives (e.g. gathering individual insights, or gaining insides from group discussions), to encourage equal collaboration and shared perspectives on the topic.
- Keep the session as short and straight to the point as possible, to optimize engagement, while allocating sufficient time for sharing and discussion to encourage critical consciousness and sense-making.

To provide high quality adult facilitation:



- Keep instructions and activities simple to promote autonomy and encourage critical thinking. Support instructions with audio-visual content and offer varied, creative ways for children to express themselves.
- Assign facilitators to guide the same group throughout the session(s), to monitor every child's process. Also, share personal experiences as facilitators to build trust and encourage children to share their own experiences.
- Provide clear, simple facilitation instructions, clarify adult and child roles and responsibilities, provide guidelines on how to provide autonomy and encourage self-expression. Facilitators should balance offering assistance with giving children control to explore independently.

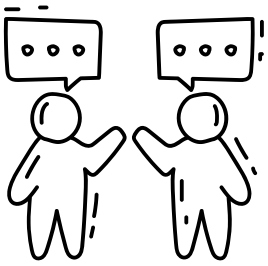
To promote sense-making:



- Optimize engagement by incorporating creative tasks, movement-based exercises, gamified elements, and an action-oriented storyline. Also, make them challenging enough by adjusting them to the age of the target group.
- Focus on children's embodied knowledge by discussing their experiences to promote the development of critical consciousness. Keep in mind that it is easier for children to share experiences with each other when they know each other.

- Involve children in problem definition if feasible to make the problem-solving process meaningful, ensuring the solution feels relevant and impactful. Working on predefined problems feels less meaningful to children, particularly younger ones.
- Additionally, emphasize the facilitators' approach and intentions from the start—along with the value of children's participation, their roles and responsibilities, their level of control over the process and outcomes, and the focus on real action—so children gain a clear understanding of what to expect and how participating will benefit them.
- Provide sufficient time and support for children to share their solutions, to promote the development of critical consciousness of their online world and optimize the sense of meaningfulness.

To promote capacity building:



- Clarify the goals of each session and activity and provide a process visualization to ensure children are fully informed about the skills they will learn, which may positively impact critical thinking skills.
- When including gamification, the game elements can serve educational purposes if related to the topic or for example require self-reflection.
- Give children the opportunity to take action and make a change. For example, allow them to present their policy advice to policymakers, implement a solution themselves and evaluate its impact, or share their ideas with a stakeholder of their choice.

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Appendix A

Session Content Phase 1: The Challenge Factory

The storyline of The Challenge Factory unfolds as follows: *"People from across the country used to come to this factory to find solutions to their challenges. Over time, however, the adults could no longer keep the solution machines in the factory running, as new challenges emerged that they didn't know how to solve."* The story highlights how children, being more knowledgeable about the online world, can help repair the factory. They do so by navigating through various rooms, each with a unique goal and activity, visualized on a factory map. This map guides the children through the Design Thinking process, which they complete over two sessions.

Session 1

The session begins in the factory's "canteen", where an introductory video explains the seven "safety rules"—the basic needs that children and facilitators should keep in mind during the activities (see Textbox 6). Following this, to help the children get to know each other and reinforce their understanding of the seven rules, we play a dice game. Each number on the dice corresponds to a question related to a basic need or a personal topic, like hobbies.

Research Room. The children start the empathize activities in the factory's "research room." Here, they select an online challenge from options based on previous participatory research by Chuck et al. (2024) on children's online experiences. To better understand their peers' challenges, they create a persona representing an imaginary peer they wish to help. This persona includes details like a name, appearance, hobbies, and favorite apps, which the children bring to life using magnets and drawings on a whiteboard.

Design Room. The children then move on to the "design room," where they deepen and define their understanding of the challenge and work toward a solution. Each group discusses possible solutions, selects the one they feel best fits the challenge, and creates a storyline that captures the journey from challenge to solution. They consider questions like: What does the challenge look like for our persona, and how does it make them feel? What steps does our persona need to take to solve it, and how does our persona feel once the challenge is overcome?

Production Room. To bring their ideas to life, they can choose to build the scene with LEGO, craft it, draw it, write it, or act it out. Finally, they move to the "production room," where they complete an "if…then" plan and post it to their peer.

Session 2

At the start of the second session, the children learn that their "if…then plan" could not be executed by their persona due to a specific obstacle. Their mission for this session is to remove this obstacle and help get the Challenge Factory up and running again.

Research Room. They return to the research room to identify and define the problem and discuss potential obstacles with the facilitators. Could it be that their peer lacks knowledge, motivation, the ability to stop and think, or support from their social or physical environment?

To uncover the nature of the obstacle, they unlock a code-protected locker and find their persona's story inside. They discuss this story and use a checklist to pinpoint the exact problem.

Design Room. The children proceed to the design room, where they *ideate* ideas about who could help their peer overcome the obstacle and what specific actions this person could take. They quickly generate ideas, considering people like caretakers, teachers, the mayor (government), other peers (friends), app/game/platform developers, and anyone else they think of. As they share their ideas, the facilitator notes them down for each "who."

After the brainstorm, the children gather around the table to select the best "who" and the best "what" to support their persona. Each child uses stickers to vote for their top three "who's," and then, for the "who" with the most votes, they vote again for their favorite "what." The chosen idea, or a combination of ideas, is what they will develop into a prototype.

Production Room. The children return to the production room to create a *prototype* of their idea. They draw, craft, build, act out, or write about how a specific person in their peer's environment can help them overcome the obstacle(s) and resolve the challenge.

Appendix B

Session Content Phase 2: Escape Your Screen

The session begins with the following introduction: *"We want to explore with you the online challenges you face, how you can tackle them, what the biggest obstacles are, and how others, such as your caregivers, can help you. We'll do this through an escape game."* An introductory video provides an overview of the storyline, the session's structure, and the concept of the 'escape plan.' It also outlines the respective roles of children and adults and emphasizes the safety rule: *"Put up, no put down."*

The storyline of the escape game revolves around children being metaphorically trapped in their online world. To escape, they must regain control by progressing through three levels and documenting their insights on a personal escape plan. This escape plan, represented as a poster, visually maps out the session flow, the three levels, and the key takeaways at each stage.

Before the game begins, participants engage in an icebreaker activity in small subgroups of four to five children. They are asked to stand up if they agree with specific statements about media use (e.g., *"I own a smartphone"* or *"I enjoy watching YouTube or Netflix"*). Following this activity, the groups proceed with the escape game, working collaboratively to complete all levels and escape within 60 minutes.

Game Elements

The escape game incorporates various interactive elements that participants must solve to access the necessary exercise materials. These include:

- Solving riddles to crack codes and unlock lockers,
- Using UV light to reveal hidden letters,
- Navigating a map to locate objects in the room,
- Searching for clues with magnifying glasses,
- Finding keys hidden in books, and
- Listening to audio recordings triggered by colored buttons.

Level 1: Discover your Biggest Online Challenge

In the first level, participants explore their online experiences to identify their biggest online challenge. This process is facilitated through peer interviews conducted in pairs, supported by interview guidelines and thematic cards covering four themes: Discomforting online contact, hacking, screen addiction, discomforting online content. As a result, children explore their online challenges and decide what their biggest online challenge is. They write this down on their escape plan.

Level 2: Devise a Strategy and Discover the Obstacle

In the second level, participants formulate a strategy to solve their biggest online challenge. This is guided by a structured prompt: *"To target……(fill out your challenge), I have to do….(fill out what you can do to deal with the challenge)"*.

Subsequently, they discover the biggest obstacle preventing them from implementing the proposed strategy. By answering targeted questions, they define what the obstacle is or what the obstacles are: a lack of knowledge on how to implement the strategy, difficulty stopping with what they are doing to think about the strategy implementation, a lack of motivation, factors in the social environment make it difficult to perform the strategy, factors in the media platforms make it difficult to perform the strategy. As a result of the answers, the children are directed to their biggest obstacle which they share with their caregiver present in the room and write down on their escape plan.

Level 3: Solve the obstacle

In the final level, participants and their caregivers collaborate to brainstorm solutions for overcoming the identified obstacle. They make a mindmap with in the center, *".....(caretaker) can help me by....."* to brainstorm on how the caregiver can help the child to overcome their biggest obstacle(s). This is facilitated by reflective questions, such as: *"can I (caregiver) teach or explain something?"* and *"Can I change my own behavior or opinion?"*. Children come up with creative solutions to overcome their obstacle and regain control of their online world. They write their solution down on their escape plan and finalize the escape game with their escape.