

Arefe Jasbi

Design Game for co-design workshops with the scope of improving dental health for adolescents

January 2022



Norwegian University of
Science and Technology

Design Game for co-design workshops with the scope of improving dental health for adolescents

Arefe Jasbi

Industrial Design

Submission date: January 2022

Supervisor: Marikken Høiseth

Co-supervisor: Nina Fjelnset

Norwegian University of Science and Technology
Department of Design

ACKNOWLEDGEMENTS

I want to sincerely thank my supervisor [Marikken Høiseth](#) for her invaluable guidance, support, constant motivation and for allowing me to deepen my knowledge about promotional health interventions, children, and design game methodology.

It was a pleasure to have [Nina Fjelnset](#) as my co-supervisor, and I want to thank her for guiding me through this engaging topic.

In addition, I had the great chance to sit at ablemagic office, working closely with ablemagic team. I want to thank [Simone Bak Laursen](#) for her support. And I want to thank the rest of the team.

It was an honour to have studied for two years at NTNU, and most of all, I want to thank head of the Department of Design, [Sara Brinch](#) and [Ole Andreas Alsos](#), previous head of the department. The personal attention you receive as a student at NTNU is unique and gives you the opportunity to study the whole program at peace. And thank you for providing me with an office.

I also wish to thank [caregivers](#) of children who participated in my workshops for their collaboration and support.

Last but not least, this project would not be as valuable as it is now if children were not participating in the project. Therefore, I want to thank all the [children](#) who spent their time and participated.

DEFINITION OF TERMS

#Care4YoungTeeth

(#C4YT) is led by SINTEF Digital's Department of Health and collaboration partners consisting of the academic and research institutions: Norwegian University of Science and Technology (NTNU); University of Sheffield; Center for Oral Health Services and Research Mid-Norway (TkMidt), UiT The Arctic University of Norway; Karolinska Institutet (KI) and stakeholders representing The Public Dental Services in Trøndelag County (TRFK), industry: Orkla Home & Personal Care (OHPC), owner of Jordan, and ablemagic AS together with the non-profit foundation The Change Factory, an organisation aiming to engage young people in design and management of social programmes and organisations directly affecting them. Hence, these collaborators represent dental services, businesses developing dental care products and interactive game development, a non-profit foundation and academic professionals. The project started in May 2021 and is lasting for four years. The overarching research question for the project is: How can adolescents be supported and motivated to take care of their teeth through co-created health-promoting products, tools, and service adaptations.

The purpose of the #Care4YoungTeeth<3 is to develop a combination of new oral health products, digital information and communication tools and new service touchpoints that can improve dental health in adolescents in Norway. In addition, the aim is to improve oral health status all and the same for everyone in the target group by including lifelong health-promoting habits.

Ablemagic

Is a company based in Trondheim. At ablemagic, they create, develop and deliver stories and games. Shortly it is a digital storytelling company.

ADCo- : (Adolescents. Designers. Co-design)

Is the name of the toolkit I have designed in the specialisation project. (see Appendix A).

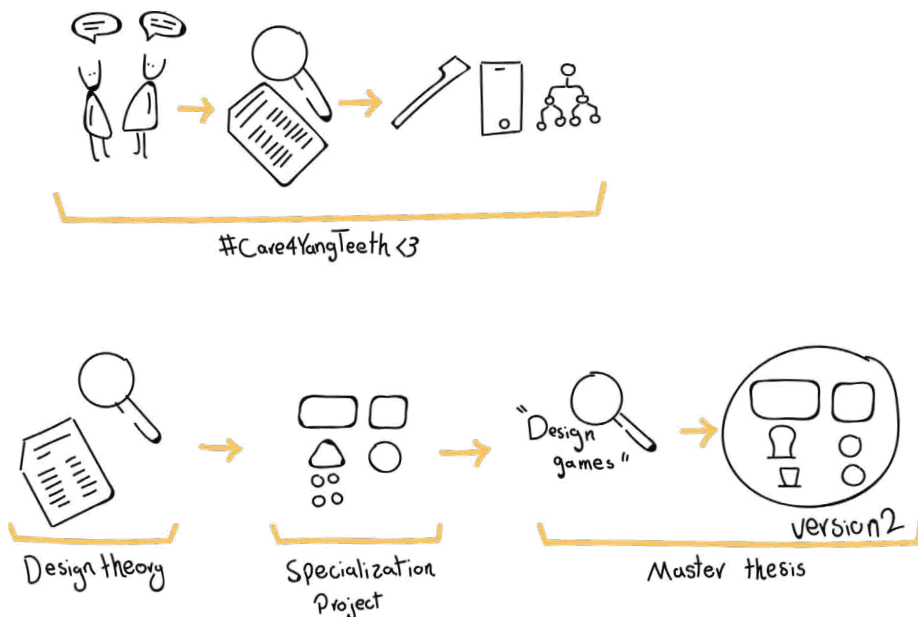
PREFACE

This report is a self-chosen master thesis project carried out by Arefe Jasbi. This project complements the specialisation project in the subject TPD4500, Design 9 and Design Theory TPD4505. The Specialisation project was linked to the Design Theory TPD4505, where I have written a literature review article entitled “Interactive Design Intervention for Health Promotion” with the research question of “How can interactive design interventions facilitate oral health promotive measures in adolescents?”. The specialisation project was based on the article’s findings and reflections explored.

This report introduces a toolkit for co-design workshops with children who are co-designers. The co-design workshop will be part of designing an interactive design intervention for improving children’s oral health. This toolkit was first developed in the specialisation project (called ADCo-), and that I continued to develop in my master thesis (which is the second version of ADCo). This project is based on a defined project in dental care called “#Care4YoungTeeth<3” which aims to tackle a significant dental health problem in adolescents between the age of 12 to 19. Based on Statistics Norway (Statistics Norway, 2015-2018), 2 of 3 18year olds in Norway had experience with caries in 2019. There is some knowledge on what

factors could cause erosion in this age. But there is not enough information regarding the reasons, how to solve the issue and find the best way to address this problem. Along with that, there are vulnerable groups that require further research.

The design process of #Care4YoungTeeth<3 is to involve children in the research process. It is planned to have co-design workshops with children in the early phase of the design process. ADCo- provided a simple and playful toolkit for the co-design workshop with children. This toolkit is designed to guide co-designers to build their ideas. The strategy aims to help designers support co-designers better by introducing some clear boundaries for their ideation and helping to reduce confusion with the assignment.



ADCo- Goal

Different partners are helping and collaborating in #Care4YoungTeeth<3. These partners are from both health care services and design. Some co-designers are health care associations, and some are the target group who are adolescents. Through a critical look at the design process, the goal has been to identify the potential for improvement and present recommendations for future co-design workshops. This project aimed to improve dental health in line with recommended and reported strategies in research. For this reason, a toolkit is designed to include methods in the co-designers ideas and ease the co-design workshops. This collaboration toolkit opens for playfulness, experimentation, and new design ideas.

CONTENT

Introduction	01
Project description	04
Project timeline	05
The starting point of the project	06
ADCo-	10
Tutoring and collaboration	11
Moodboard	12
Service model canvas	14
Method	16
Ethical consideration	18
Exploration	21
Desk research	22
Design game	24
Design game examples	28
Game	32
Game elements	33
Co-design	35
Why co-design	36
Human-centred design	37
Service design	38
Adolescents	42
Early adolescents	44
co-design with adolescents	45
Infield research	46
Workshop 1	48
Developing, Prototyping & Testing	51
Develop	52

Rapid prototyping	54
Test	58
Workshop 2	62
Reflections	64
Workshop 3	66
Reflections	68
Comparing Workshop 2 and 3	70
Develop	72
Focus	74
Workshop 4	76
Reflections	78
Develop	82
Deliver	85
The concept	86
Design game elements	92
Design game setup	94
Instruction	95
Implementation	102
Recommendation	108
The outcome	112
Further potentials	114
Evaluation & Reflection	119
Toolkit as a Design Game	120
Toolkit as a Game	122
Adaptable toolkit	124
Sailboat	126
Reference	129
Appendix A	137
Appendix B	145
Appendix C	167



INTRODUCTION

Project description, Project timelin, The
starting point of the project, Method,
Ethical consideration

How can we make children or other audiences talk about something that is not much of their interest or doesn't feel comfortable talking about?

This master thesis is a design research and a service design project for co-design workshops to understand users and their needs better. The increasing interest in user engagement and other stakeholders in the design process has led to a growth in the number of methods for organising collaboration design. These methods aim to support collaborative explorations of future opportunities in motivating environments.

In this project, Design Games have become a central focus of the design process. The findings in this thesis are primarily based on literature research and test workshops and gathering insights from the users and other experts. The Design Game Toolkit aims to bring together multiple stakeholders to co-create solutions in an hour. The toolkit enables experts to empathise with the needs of end-users, whilst end-users are enabled to communicate on an expert level, leading to more meaningful health promotional solutions. This toolkit is a co-creative cycle of three phases: Co-analysis, Co-design, and Co-implementation.

Chapter one is the introduction of the project and explains the methods and first steps. Chapter two has explored and gathered insight from both primary and secondary research. Chapter three is a collection of all the developments, testing sessions and analysing the concept, which later leads to developments again. In this project, there was a need for two rounds of development between test sessions. Chapter four presents the final concept with all the details and recommendations. The final chapter is an evaluation and reflection of the topic and project.

“Designing the design process itself is just as important as designing the artefact.”

(Eva Brandt, Professor in Social Design, Design School Kolding , 2006)

PROJECT DESCRIPTION



Master thesis for Arefehsadat Seyedmehdijasbi

Design game for co-design workshops with the scope of improving dental health for adolescents

To address poor dental health among adolescents, the project #Care4YoungTeeth<3 has been established as a collaboration between SINTEF, NTNU, Center for Oral Health Services and Research, and several other partners including ablemagic. In this project co-design with end-users is one of the key methods in the design process to emphasize the participation of users in creative work and gathering of insights. Throughout the process, adolescents will be engaged directly. The master thesis project will explore the value of a design game for this purpose and create a tool for designers' collaborative work with co-designers.

The project will include:

- Information gathering and analysis to define the scope of the project
- Contributing to co-design workshops and collect insights
- Idea and concept development, including testing and feedback from experts in the field
- Detailing of the concept
- Documentation and evaluation of design process and idea development

The thesis is performed according to "Retningslinjer for masteroppgaver i Industriell design".

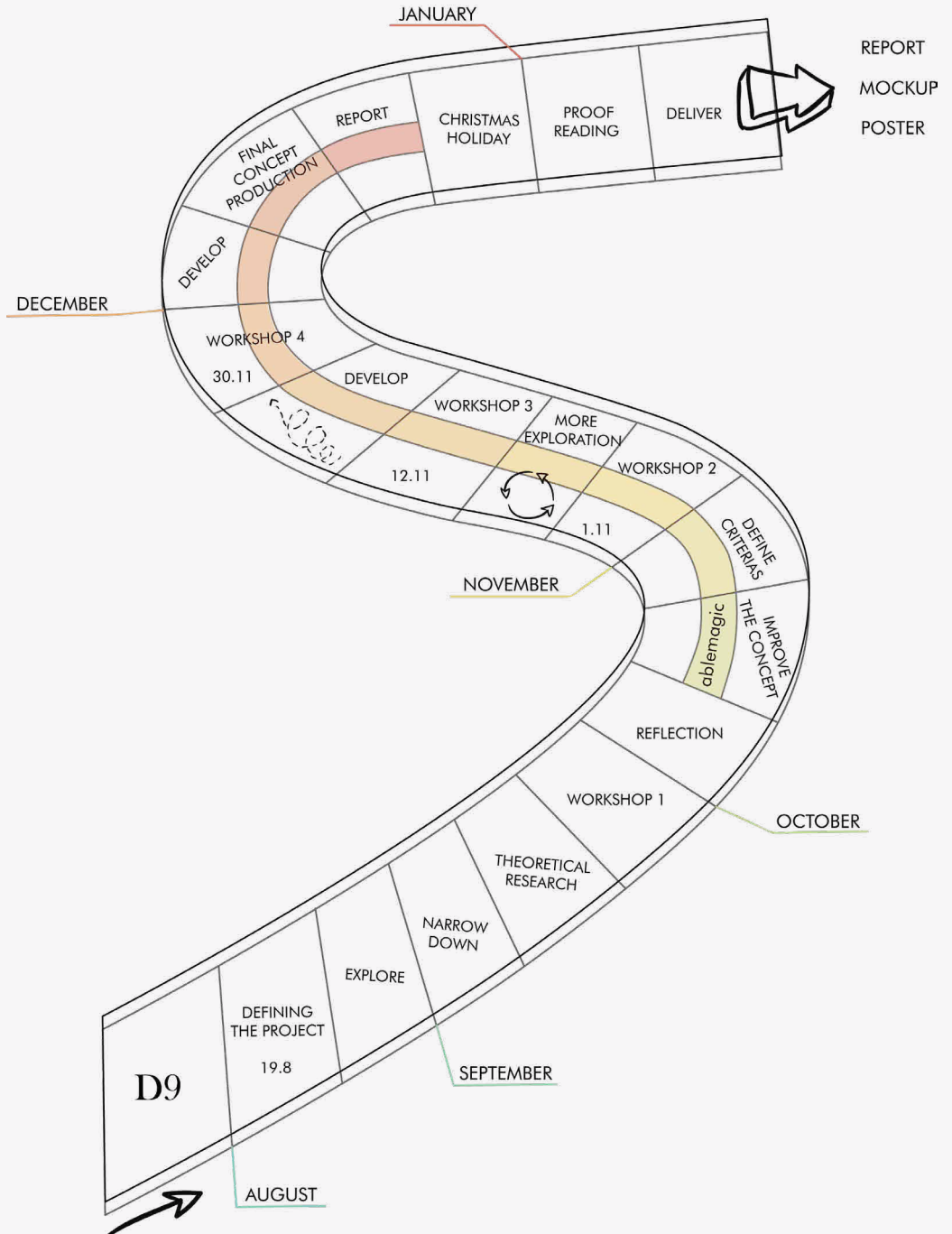
Department supervisor: Marikken Høiseith
Co-supervisor: Nina Fjelnset, ablemagic

Start date: August 19th 2021
Due date: January 19th 2022

Marikken Høiseith
Marikken Høiseith
Department supervisor
Trondheim, NTNU, August 25th 2021

Sara Brinch
Sara Brinch
Head of department

PROJECT TIMELINE



THE STARTING POINT OF THE PROJECT

Spring 2021, after exploring the interactive design interventions for improving adolescents oral health, I found it challenging to seek a direction to work on it. With the help of my supervisor, Marikken Høiseth, I decided to work on a toolkit for designers to create better and valuable communication with children. It was the time I had an interview with Nina, my current co-supervisor, and she opened up about her experiences in having co-creation workshops with children and how to approach them to get better results. After designing an activity as the communication toolkit between designers and co-designers, I discovered the “Design Game” term, a method introduced for such situations. A new door to the design world opened up to me at that time. However, there was not enough time to explore more about the Design Game and understand the characteristics and activities. Therefore, I mainly focused on the characteristics of children and how to approach them in the co-creation workshops, and mostly what boundaries to give them during the workshop.

September 2021, I defined the focus area for the master thesis as focusing on “Design Games” this time. In this project, I dived deep into design games and design activities while further developing ADCo-into a Design Game and testing it with the users. This toolkit is called *Design Game Toolkit*.

Qualitative & quantitative research

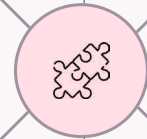


Discover

Research phase

Define

Synthesis phase



Design game

Develop

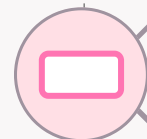
Ideation phase

Specialization project

Challenges

what will we need to address?

- Build trust and network with caregivers.
- conduct workshops with children
- build trust with children.
- collect data and have conversation with the ethical considerations.
- not able to have maybe enough workshops.
- Language barriers

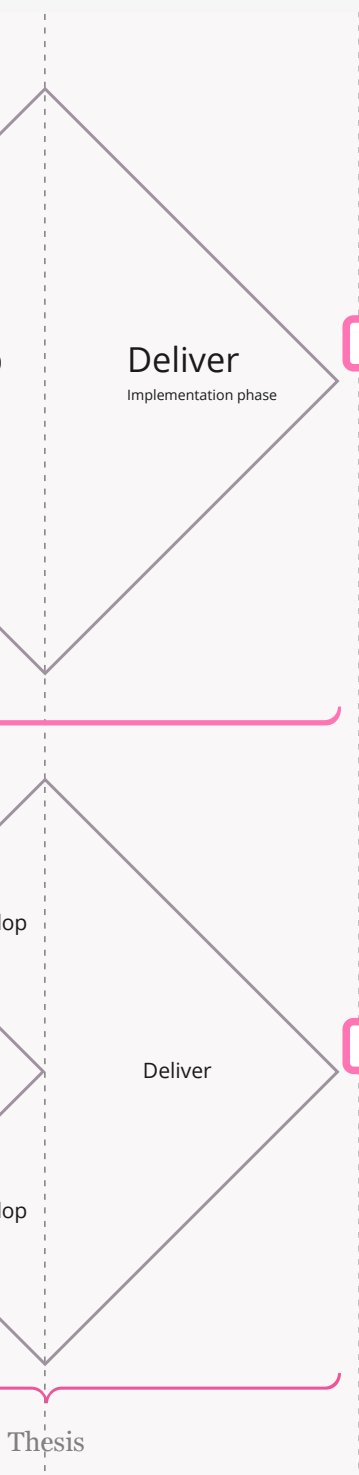


Design game

Discover

Define

Develop



Deliver

Implementation phase

Vision

what does our future look like?

Deep learning of the design game and design activities.
focus on children and design with children.



Impact

what difference will we make?

Better understanding of the users
Building empathy
Finding better solution for users
Ease the design process

Thesis

ADCO- (THE DESIGN GAME TOOLKIT VERSION ONE)

The original toolkit consisted of a deck of 58 cards: 8 Intervention cards, 9 Application cards, 5 Action cards (3 of each) (5x3), 5 Who cards (4 of each) (5x4), and 2 Led cards (3 of each) (3x2). Every five categories are divided by their functionality (see Appendix A for complete description)

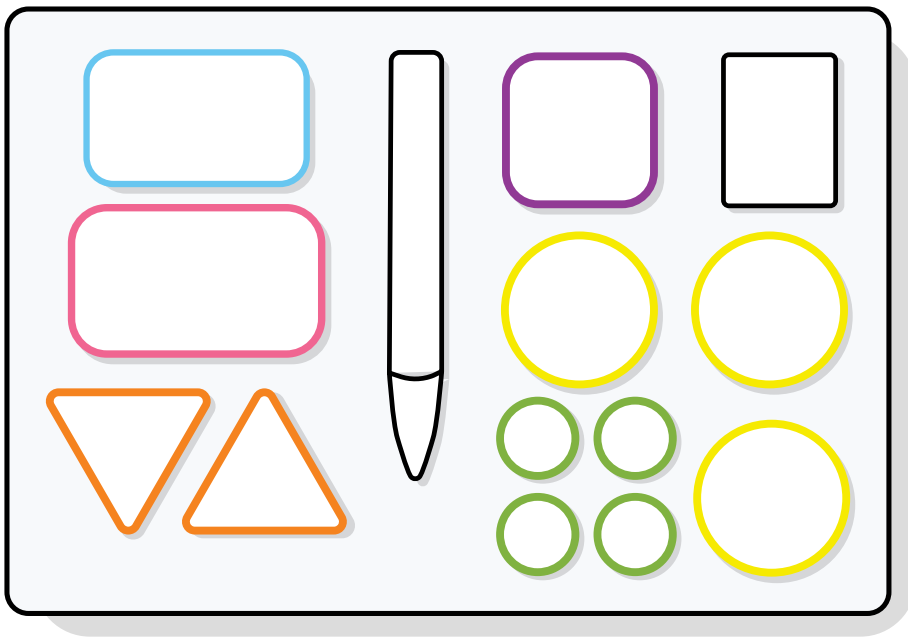


Figure 1: ADCo-

TUTORING AND COLLABORATION

On a weekly basis, I have met for tutoring with Marikken Høiseth, the project supervisor, to get feedback on tasks and what to continue working on. In addition, from mid-October, I have spent most Thursdays at the ablemagic office, allowing a closer collaboration with Nina Fjelnset, the co-supervisor of the project, and the rest of the team.

During the growing number of corona cases at the end of 2021, I continued having tutoring sessions but met digitally. Unfortunately, the close collaboration with ablemagic was somewhat challenging to maintain during the home-office period.

Sitting at the design department at Gløshaugen allowed me to have a close connection with Marikken Høiseth and other professors in the field. Plus, having access to the Oria service provided by the Norwegian University of Science and Technology (NTNU) and the physical library helps to meet the basic needs of the research projects. I was positioned in one of the individual office rooms, which was a great place to write all of my thoughts on the whiteboard and hang them on the wall to have them in front of me during the whole design process. In addition, I added, edited, developed all the visuals and notes I made as I went along with the project.

MOODBOARD

One of the first visuals I made early in the project was the project's mood board. Moodboard is a Visual composition of images, text, and other elements to communicate a general impression of an atmosphere, user worlds, moods, and visual qualities. In addition, it gives a sense of what the product is and how it will look (Design Methods Finder, n.d.).

When I started this mood board, I already had some ideas for the design game, and then I brainstormed some keywords associated with these ideas, but it was pretty early in the project. This mood board gives an impression of the content and goal of the product. It helped me refine my ideas within a visual method. I made this board by asking the following questions: What is the product? Who are the users? What is the content of the product? What is in the user's world in the project context?. Then I collected relevant pictures that represent the answers. I had this mood board above my desk, and I added more images and texts during the project time.

One of the main advantages of this method was providing quick visual impressions of what mood a product should convey. Secondly, it helps to vividly communicate values and moods that are difficult to put into words.

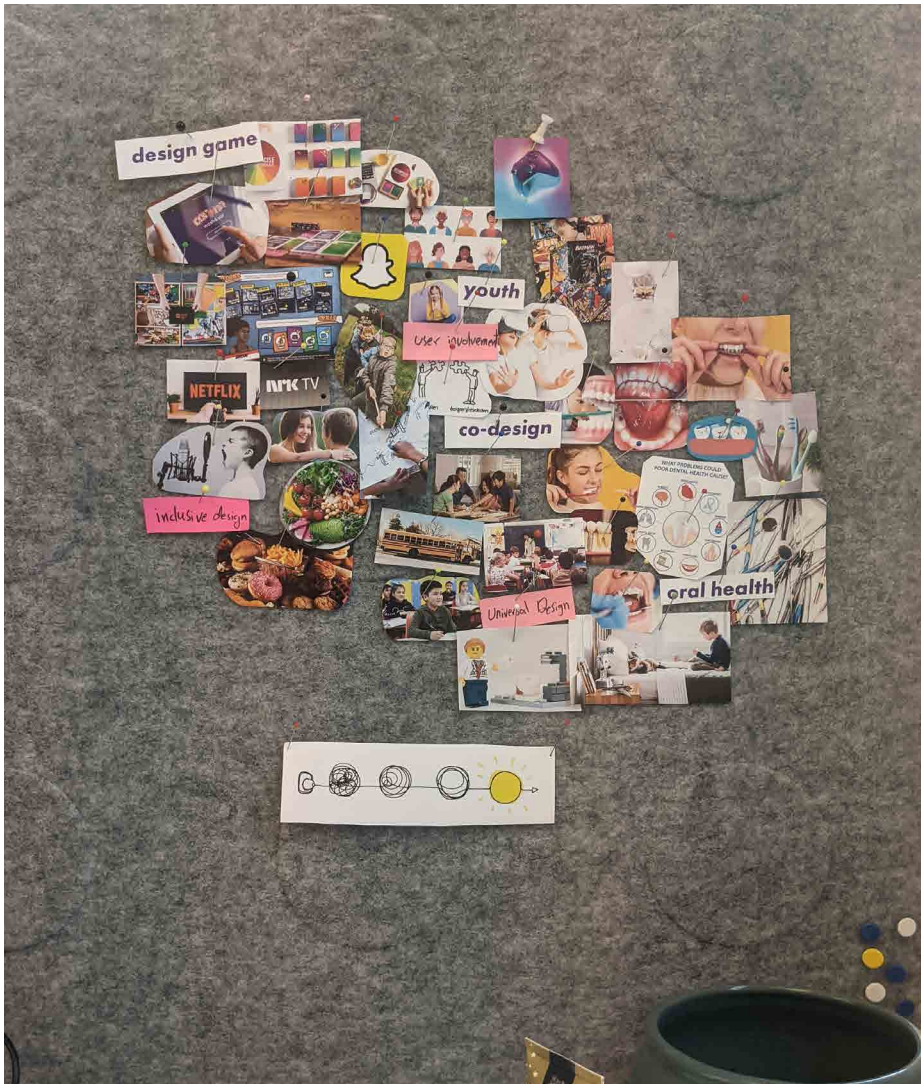


Figure 2: Moodboard

SERVICE MODEL CANVAS

Service Model Canvas is another visual I made early in the project and hung it in front of me. The Service Model Canvas is a method that initiates some of the conversations and debates necessary to set the team at the project's starting point. This method lists questions about the service that is most useful for the very early exploration of the possible new service or de-constructing an existing service. The technique brightens up the context of the project, success criteria, vision and project stages.

This method asks basic questions at the bottom of the project and complex questions that were difficult to answer, maybe because it was early in the project. But, all in all, it widened my vision of the project, and I tried to answer slightly difficult questions even though they might be somewhat ambitious and not realistic.

SERVICE MODEL CANVAS

Design game for co-design with children

PROJECT TITLE

WHAT IS TO BE SOLVED

DESCRIBE THE SOLUTION WITH A SENTENCE

Easy and valuable communication between designers, researchers and children during co-design workshops.

WHO IS GOING TO SOLVE IT

WHO IS PART OF THE TEAM

Arete Jasti

NEEDS OF THE ORGANIZATION

POP USE OF THE PROJECT

sustainable and ~~simple~~ design
inclusive

NEEDS OF THE ORGANIZATION

quality design, Deliver on time, practice-base design

VALUE FOR THE ORGANIZATION

New knowledge, experience

USERS NEEDS

WHO IS THE TARGET GROUP

children between age 11-15

USER NEEDS

To be heard - safe environment to take care for their oral health - healthy oral health improvement

VALUE FOR THE USER

Their voice being heard - ~~healthy~~ oral health improvement

CONTEXT

WHERE IS THE SOLUTION TO BE USED

During design process
for improving oral health
for children with children

OBSTACLES

gain trust - shame -
test the product
easily. ~~foreign~~
~~language~~ language
barriers

POSSIBILITIES

get in touch with
experts in this area -

CONDITIONS

Access to the users, maybe
good communication
skills with children.

SUCCESS CRITERIA

1 valuable
data from
children

2 clear ideas
for improving oral
health

3 usable
method for
other projects

4

HOW CAN THEY BE MEASURED

~~more~~ Pure
info from
children
(story)

straight forward
design process

Flexibility
of platform

PROJECT STAGES

WHERE DO WE BEGIN

with the cards from
previous project.

MILESTONES ALONG THE WAY

testing the platform for a couple of
times. Talk and share with hand-on
experts.

WHEN ARE WE DONE

receiving valuable
data from children
with straight forward
design game method.

VISION

WHAT IS THE DREAM SOLUTION

No oral health problem
in children.

ENOUGH

MINIMUM LOVABLE PRODUCT

Person
one oral health
improvement

STARTING POINT

PROJECT STAGES

GOAL

Figure 3: Service model canvas

METHOD

Methodology in service design and strategic design is used to gather qualitative data and process insights, provide a basis for understanding how the design process unfolds, and make it possible to say something about the potential for improvement. A combination of sources of insight such as desktop research, interviews with stakeholders and experts and co-design with the users were used.

The most important findings from the various methods were selected and reformulated into future recommendations in the design process and co-design.

Secondary Research

The content of the toolkit materials is the core of the design game. This content is mainly based on the findings and discussion of the review article. Additionally, during the project time, I kept finding background information to understand the context and necessities better.

Primary Research

Not entire, but most of the development of the concept is based on the collection of first-hand data. Even though it was challenging to look for users for this project due to the covid-19 and the target group being children, there were a sufficient number of test sessions with the user group. Some data gathering was from a small group of people, as the user group. I used different methods such as observation, semi-structured interviews, co-design test sessions, and persona to gather qualitative data.

ETHICAL CONSIDERATION

As the target group is adolescents and they are the central part of the project for some research, creativity, and testing, ethical issues should be considered. Researching this age group and creating with them may lead to ethical issues. The co-design team's responsibility is to consider ethical challenges during the processes.

Informed consent

The participants should be informed fully about the project, the purpose, participation, and influence. The informed consent is for the participants to decide whether they want to be part of the project or not.

Voluntary participation

Participation in the co-design should be voluntary and free of coercion. Participants should be free to withdraw from the events or any stage of the co-design process at any time. Therefore, no pressure should be put on those participants who decide to leave the group. Also, explanations should not be required.

No harm


Physical and psychological harm should be avoided. It means stress, pain, anxiety, pressure, and decreased self-esteem.

Confidentiality


Participants' personal information and their activities in the co-design should not be available for anyone outside the project team. This also means that this personal information should not be published. (Western Australian Centre for Health Promotion Research, 2010)



EXPLORATION

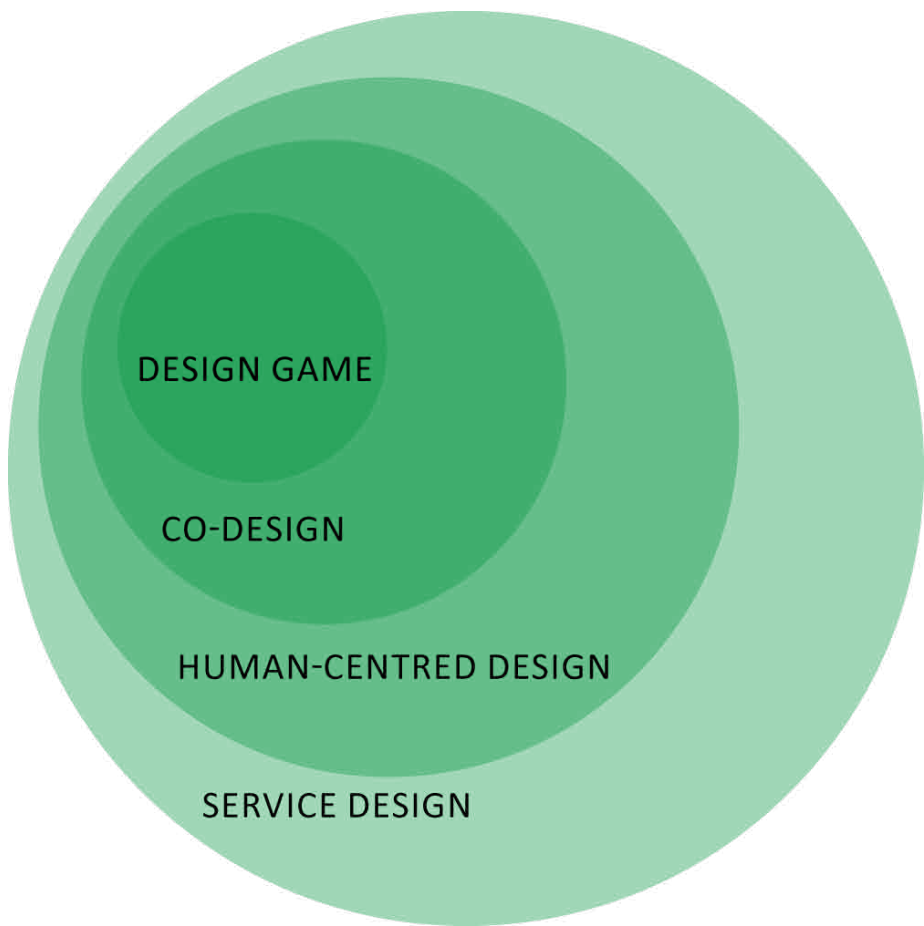


Desk research,
Infield research



DESK RESEARCH

Desk research, or secondary research, reviews previous research. On any user-centred design project, before conducting a field visit, designing a prototype, operating a usability test, it is best to see what people have done related to the product's domain. Reviewing this research is the fastest and most affordable way to comprehend the field (Travis, 2016). Desk research is very influential and can be performed at the starting point of the research process as it is pretty quick and cheap, and most of the basic information could be easily found, which can be used as an examination in the research process (Juneja, n.d.).



DESIGN GAME

What is a design game?

A Design Game is a toolkit or a method for designers and researchers to understand the users or stakeholders early in the human-centred design process by arranging for interaction in a playful setting using selected game elements. Design games provide a structure for planning and managing the co-design sessions to point to existing practises and/ or future practises. The objectives of applying this method are based on the design context, but the players may represent one or more design options (Brandt et al., 2008). Design game is one of the methods that could be used in participatory design. As a method, design games could be part of the development process to create a shared understanding, bring different perspectives, learn from each other and build a coherent and consistent view to be designed (Experio Lab, 2021).

How do design games work?

Design games are typically used during a design process whereas serious games are more typical outcomes of a design process (Marikken, 2021). Design games are a way to make people imagine new situations, new worlds. There are no right or wrong answers in design games. In serious games, you have the right ways to play the game but design games are

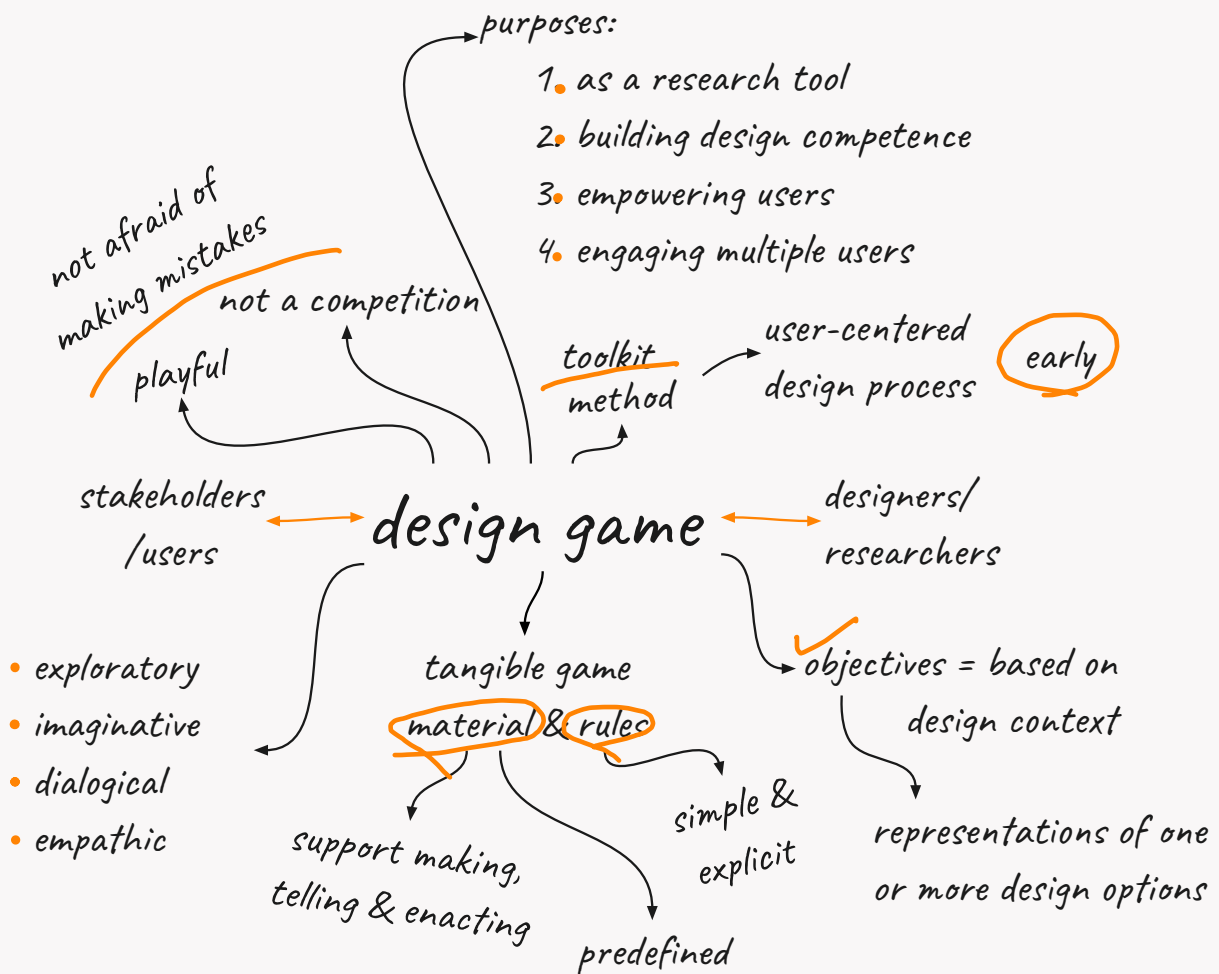


Figure 4: Design game characteristics

quite open even for that often. In other words, design games are meant to be playful and not a competition for winning and players should not be afraid to make mistakes. In general, a design game is an expression that highlights the exploratory, imaginative, dialogical and empathic aspects of co-design. Material and rules are part of the design games. Pre-defined materials support making, telling and enacting, and rules are simple and explicit (Experio Lab, 2021). Eva Brandt and Jörn Messeter (2004) argue that “power relations” between stakeholders might slow down idea generation. Such game-based activities are expected to improve communication between stakeholders and lead to more acceptable idea generation.

What are the purposes of design games?

Four primary objectives for design games have been identified; first, design games as a research tool to study design actions in an environment with limited moves, rules and principles like in real life. Second, for building design competence to teach interaction design students how to establish social interaction between stakeholders in participatory design processes. Third, to empower users by establishing a common language between designers and users and involving users in discussions on existing and future alternatives and lastly, engaging multiple users or stakeholders early in the design process to generate a shared understanding of stakeholders (Vaajakallio & Mattelmäki, 2014).

As an advocate of simplicity and visualisation, I

illustrated all of the Design Game characteristics in figure 4.

When does the Design Game fit a design process?

When using the design game method in the design process, there are some aspects we should consider to discover whether this method is appropriate or not.

Time limit; It takes time to create a good design game.

It is not as simple as it sounds. Enough time to make the design game ready for the project is necessary.

Suitable for the concept; There is room for reframing in the project or in the setup. It is about the context and how the project is framed.

Game afraid people; it is essential that people feel safe and comfortable playing games and not ashamed or fearful of playing games (Experio Lab, 2021).

DESIGN GAME EXAMPLES

Example 1

Hellon (n.d.), a design agency, designed and implemented a new service identity for a nordic life insurance company to gain customer loyalty, churn, satisfaction, employee satisfaction, and the tendency to use a service and advocacy. The service identity implementation was expanded towards other areas in the organisation. The team utilised gamification to ensure an inspiring and empowering way of learning. A series of workshops were arranged in all units and locations in which the participants played a specifically designed service identity on a board game. The purpose was to encourage the employees to take ownership of the new service identity and to discover what the feeling of caring could mean for their customers and themselves in their daily practice.

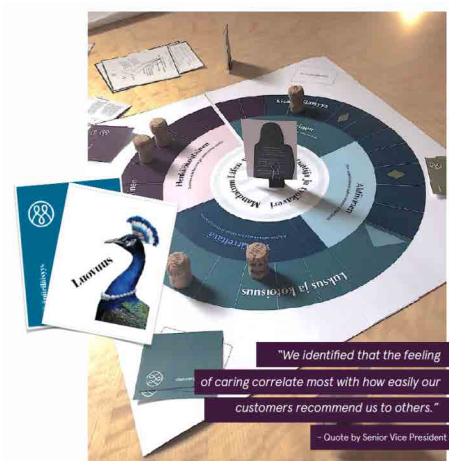


Figure 5: Hellon design game

Example 2

Manners&Co.(n.d.) design and produce interactive products for teaching children good manners in a fun and interactive way. TableTalk Conversation Cards are one of the toolkits. Children or parents can pick a card at the dinner table and give their child the confidence they need to initiate, encourage, and include others in mealtime conversations.

The TableTalk cards are split into seven categories: Philanthropy, Community, Family, School, Friendship, World, and Self. Each question is open-ended, lending itself to further conversations! Cards are suitable for the entire family.



Figure 6: Manners&Co. toolkit

Example 3

Neighborland (2015) introduced a human-centred design toolkit for public engagement. This toolkit includes editable files for interactive signage and sticker templates. It suggests two sticker designs: “I want ____ in my neighbourhood” and “I wish this was ____”. It is recommended a 4.5” x 3” rounded-corner rectangle, printed on white vinyl with split paper backing.



Figure 7: Neighborland toolkit

Example 4

Stembert Design (2017) produced a handbook describing the Co-Creative Workshop Methodology for the Internet of Things (IoT) Large Scale Pilot (LSP) projects in the European IoT-LSP programme. It contains materials for five topics corresponding to the context of the five LSP projects - Smart Mobility, Smart Entertainment, Smart Agriculture, Smart Cities and Smart Health.

The methodology aims to bring together LSP partners, stakeholders, and end-users to co-create solutions in 2 to 4 hours.

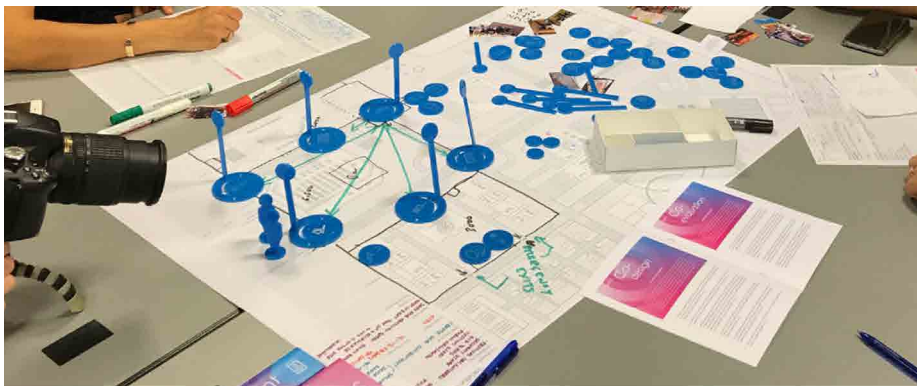


Figure 8: Stembert design game

GAME

In order to clarify where the Design Game stands in the world of different activities considered as games, the table below compares the differences between Game, Gamification, Serious game and Design game. This table was interpreted from Experio Seminar (2021) and Gamified.uk (Marczewski, A. 2015).

Game	Add defined goals, challenges and rules to play Purpose: entertainment Competition Example: Most children's games
Gamification	Add game to tasks Purpose: non-entertainment Game elements, competition Example: cooking, training
Serious Game	There is a right way to play the game Purpose: to advertise something, educational, meaningful Example: move more, train more for elderly people
Design Game	Guide your thinking, but there is no single or correct answer Purpose: as a research tool, building design competence, empowering and engaging users, No competition Example: development process, bring a different perspective

GAME ELEMENTS

Marczewski (2015) lists various mechanics and elements that can develop gamification designs. Among all those elements and mechanics (figure 9), I have listed the ones that fit well with this concept and project theme.

Development Tools: use modifications instead of hacking and breaking. Letting people develop new add-ons to enhance and build on the system.

Progress / Feedback: it is natural that the user wants to receive feedback or some sort of measure of progress, and sometimes consequences of an action.

Theme: gamification with theme and narrative adds a little fantasy to the concept.

Narrative / Story: tell a story and involve people to strengthen understanding of your story. Ask for other people's stories as well.

Curiosity / Mystery Box: leave some spots unexplained and like a mystery; this could encourage people in new directions.

Guilds / Teams: a small group could be more effective than a large group to build a close-knit relation and collaboration.

Branching Choices: Let the user choose their direction and destiny from multiple learning directions to responsive narratives. A choice has to be or at least feel meaningful to be most effective and appreciated.

Creativity Tools: for personal gain, pleasure, or to help other people, it might be useful to create their own content and express themselves. This might help them to feel they are part of something greater than themselves.

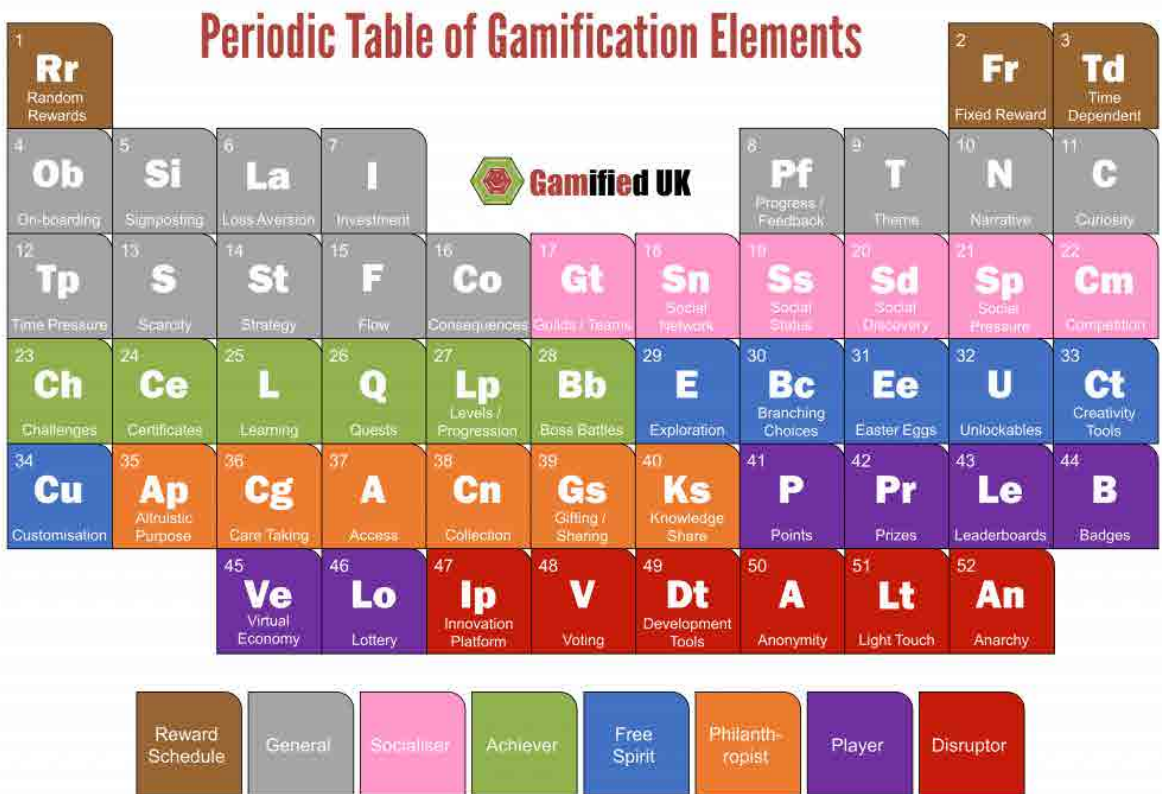


Figure 9: Gamification elements

CO-DESIGN

The collaborative design (sometimes called “participatory design”) was first rooted in the 80s as “democratic design” in Scandinavia (Johansson, 2005, p. 16). Co-design is a creative and designer method that uses user or stakeholder co-creation practices (Trischler et al., 2018). Co-design can be addressed in a different way in terms of its facilitation form, the time limit of the method, the process phases, and the users and other stakeholders engagement level (Mattelmaki and Visser 2011). In addition, Co-design could include the usage of design tools that encourage collaborative exploration and dialogue (Sanders, Brandt, and Binder 2010). Design tools are identified as “tools for conversation”, which can be different, ranging from make tools (Sanders 2000), design probes (Mattelmaki 2008), design games (Brandt, Messeter, and Binder 2008), and cards (Clatworthy 2011).

Co-design events have a predesigned structure, tasks and facilitation. The outcomes of such situations are not final design solutions but rather a co-constructed understanding of the context, people’s experiences, potential designs and dreams (Vaajakallio & Mattelmäki, 2014).

WHY CO-DESIGN

Because the people (children) are the experts of their experience. People who are not designers can create so many solutions. They are the ones who might know best what the possible right answers are for themselves. This approach gives voice to the users and guides them to create and implement the solutions. The more a user gets involved in the design process, the more likely that product will raise co-ownership in users. This will lead to loyalty and engagement of the user to the product or service (Stickdorn et al., 2018).

HUMAN-CENTRED DESIGN

Human-centred design processes usually start with the people we are designing for. This approach begins by investigating users' needs, dreams and behaviour. We tend to view the world through the design process through the desirability lens. Feasibility and viability lenses are the ones that come after. We then consider the solutions with these lenses. During the human-centred design process, we go through three main phases:

1. Hear: We collect stories and inspirations from the people through infield research.
2. Create: In this phase, we interpret what we heard to solutions, opportunities and concepts.
3. Deliver: We illuminate the implementation planning, cost, and capability assessment in the Deliver phase (Ideo et al., 2011, pp. 6-9).

SERVICE DESIGN

Designing a Design Game requires service design methodologies. Service design thinking proposes many research methods and development tools. All of these are a package of tools that some of them are useful for developing the design game toolkit. Besides, the service design approach places the user of the service in the centre and focuses on designing an optimal service for them. Finally, a design game is one of the tools that can be used in the service design approach. So, for these reasons, a short but deep understanding of service design thinking is needed.

Out of so many definitions of service design, I mention here the one that is with the right tone and theme of this project. “Service design helps to innovate (create new) or improve (existing) services to make them more useful, usable, desirable for clients and efficient as well as effective for organisations. It is a new holistic, multi-disciplinary, integrative field” (Stefan Morits, 2005) (Schneider et al., 2011). New solutions are then converted into prototypes, testing, and finally implementation.

**“A method for designing must itself be understood as a designed service.”
(Stefan Holmlid, 2021)
(Experio Lab, 2021)**

5 principles of service design thinking (Schneider et al., 2011):

User-centred: a deep understanding of users' motivation, habits, culture and social context. For designing services for the users, we should put them at the centre of our design process. Service design methods provide situations to slip into the customer's shoes. The user-centred approach provides a common language that all can understand each other.

Co-creative: each group of stakeholders have different needs and expectations. As designers or product managers, we need to involve all these stakeholders in the design process. This should be done in a prepared situation and environment to generate ideas for diverse stakeholders.

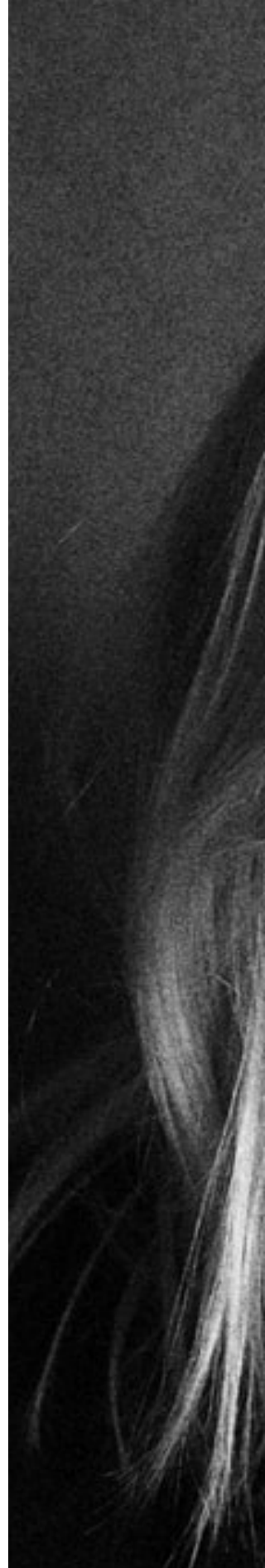
A flourishing service design project requires integrating stakeholders as early as possible in the project development process. This will be explained more in the next section.

Sequencing: a service has three stages; the pre-service period, the actual service period, and the subsequent post-service period. The rhythm of these three stages of the service period affects the user's mood, and a good narrative holds the user's interest. In this context, service is comparable to a movie! Well organised service achieves a pleasant rhythm, ensuring climatic progress of the user's mood in each touchpoint.

Evidencing: physical evidence can trigger the memory of positive service moments that can be categorised in the post-service period. This

increases users' loyalty and recommends the service to others. In addition, evidence can explain certain aspects of a service touchpoint or process. Sometimes adding tangible components to what would be intangible could reveal hidden backstage services. Finally, a better understanding of the work behind the service can result in an increased user's appreciation of the service experience.

Holistic: it is almost impossible to work in a holistic way and every aspect of service. However, we always focus on alternative customer journeys and touchpoints to build a better user experience.





ADOLESCENTS

Adolescence is a tricky period usually divided into three different age ranges (10-14, 15-17, 18-24) (SAHRC, 2021). The younger age range group is believed to be a more suitable group age to increase health literacy and establish a new habit.

- Adolescence is a phase of physical, cognitive, mental, and sociocultural changes (Rivara et al., 2009)
- They start to think differently and act differently but are eager to learn new skills.
- Peer-relationships are getting stronger as they grow until around age 18 (Healthwise, 2019).
- The earlier they receive intervention, the higher chance they have to be part of their life as an adult (Rivara et al., 2009) (Honkala, 2003).
- At the same time, they give less attention to their dental health and do not consider regular check-ups necessary.

(Jasbi, 2021) (SAHRC, 2021)

Because of the reasons mentioned above, we have an excellent chance to improve their health literacy and develop good health improvement habits.

EARLY ADOLESCENTS

(Ages 10 to 14) By summarising from (Teipel, n.d.), physical changes and sexual developments begin. Usually, girls develop earlier than boys (1-2 years). These physical changes may cause anxiety in those who do not know about their bodies and puberty (Allen, 2019).



www.unsplash.com

They worry about being average in terms of their appearance and sexuality. Their brains also continue to mature in this stage. They start to use their knowledge practically and most likely love to learn new practical skills from

their parents or others. At the same time, they are beginning to realise the connections between cause and effect (Teipel, n.d.). Instead of concentrating only on the present, mostly they start to think about consequences in the future of actions (Healthwise, 2019). Both boys and girls develop the cognitive ability to find their own identity, ignore things from childhood, and question values and beliefs. They can become moody and insist on more privacy (Allen, 2019; Teipel, n.d.). At this age, children see right and wrong in concrete, black-and-white terms, nothing in between (Allen, 2019). Conflicts with their parents often start while they build closer friendship-based relationships with peers (Teipel, n.d.).

CO-DESIGN WITH ADOLESCENTS

Co-design with children is a method to engage them more in everyday life around them (Van Mechelen, 2016). Children are often seen as more creative than adults. Besides, they are experts on being children/adolescents, and in the co-design, they will contribute gladly (Nørgaard, n.d.).

By co-designing with children in the early design process, we can contribute and benefit from their ideas, desires, and dislikes.

In the co-design workshops, it might be beneficial to gain the participants' trust, openness, and transparency to achieve more meaningful and effective communication. To obtain that, first, it could be vital that they feel safe in co-design with the facilitator and other participants.

Additionally, children should feel they are part of the team and not just users or guinea pigs (Pedersen, n.d.).

Finally, they must have boundaries, rules, and structure to build their ideas on (Fjelnset, 2021).

INFIELD RESEARCH

There is a wide selection of potential research methods for in-field research to collect data in service design research. The research methods I have used are structured in two categories: participant approaches and co-creative workshops. Each category consists of tools. I applied some tools in each approach. For example, I have involved participant observation, contextual interviews, and focus groups in participant approaches. In co-creative workshops, I have applied co-creating personas.

Workshop

In this project 4 workshops were conducted. Workshop 1 was led by #Care4YoungTeeth<3 project group. This workshop was the first step of in-field research. With the gathering insight from the mentioned workshop and knowledge gained from desk research, the developing phase was started. The rest of the workshops was opportunities for both test and in-field research.



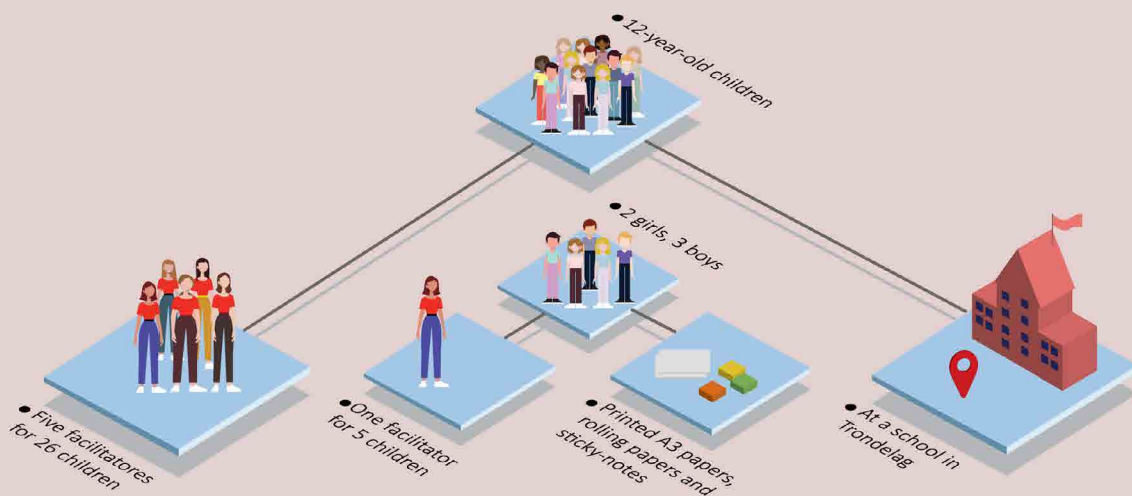
Figure 10: Workshop 1 reflection session

Figure 11: (on left) Workshop 1 outcomes

WORKSHOP 1

29 SEPTEMBER 2021

45 MIN



#Care4YoungTeeth<3 Group

Purpose: To map the dental hygiene habits and routines of youth, generate ideas and learn about children's context & needs and how they orient themselves around dental hygiene and oral habits and explore some of the barriers that hinder or motivate oral health.

The fictional persona was around their age to see themselves in this character. This person has a problem forgetting to brush his teeth. We have asked children some questions about this persona to see how they would help this person.

THINGS THE PARTICIPANT(S) SAID OR DID:

- They forgot to talk about the fictional persona and referred to themselves. The persona was not in the centre of attention.
- They were affected by others in the group; they tend to follow one person and repeat their ideas.
- *"I would never let my child not brush his teeth."* a girl said.

THINGS THE FACILITATOR(S) SAID OR DID:

- Process: I tried to be active, fun and tell a story.
- All facilitators and children wore name tags.
- I read out loud their names and repeated my name.
- I went around and tried to engage everyone in the group.

THINGS THAT HAPPENED THAT LED TO IMPLICATION:

- Process: They were shy during the first and second questions.
- Material: Varying materials, sizes, shapes and colours. They might have felt like different activities. So they forget about the fictional persona.
- Location: Many people in the room: loud noises and sometimes hard to hear.
- The participants felt comfortable in their school.
- Group work so that the conversation never stopped.

THINGS THE PARTICIPANT(S) DESIGNED:

- Toothpaste but like gum
- Toothbrush pirate
- Automatic toothbrush because if you are lazy, there is no need to brush yourself
- Toothbrush with toothpaste dispenser
- An alarm
- A note on the wall
- Message or reminder from Alexa or google home



DEVELOPING, PROTOTYPING & TESTING

Develop, Test, Workshop
2, Workshop 3, Focus,
Workshop 4,

DEVELOP

Narrative

Improvement from different directions was proposed. Among those, moving between **past, present, and future** in the co-creation sessions with the help of the toolkit and facilitator was picked. This direction indirectly gives the design game a story. This story can be completed with a character with a dental issue or a unique situation that needs an interactive design intervention to improve their dental health.

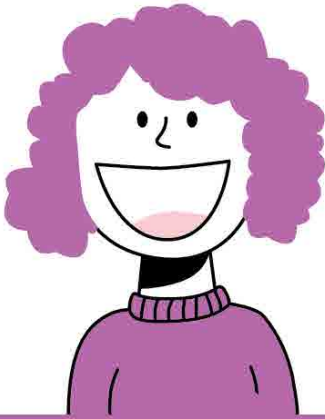
The past is the situation or the dental problem.

The present is the moment that we are helping this character

The future is the interactive design intervention that the player chooses for the character of the story

Who is the character?

These characters are made from the personas (figure 12) with different attributes, interests, challenges and needs. Attributes such as being different, like attention from friends, outgoing, or not wanting to be in the centre of attention are shy. Needs such as looking nice, becoming independent, or becoming famous as an adult or top in the class. More personas were made to make these characters (Appendix B). They were trimmed to small paragraphs about the characters' challenges. The conversations and discussions in workshop 1 and findings from article review inspired these personas.



NAME

Anne

AGE

13

KEY ATTRIBUTES

likes to be different, would like attention from friends, outgoing, sometimes moody, worries about her look and body shape.

“

I don't mind brushing my teeth, but the toothpaste tastes strong. I don't like its taste.

”

SHORT DESCRIPTION

She is dealing with hormonal shifts. Although she is sometimes moody, she has good communication with her friends. She has so many friends. She really cares about her social media accounts. She wants to be independent. She is usually not at home.

NEEDS

She wants to look nice, have clean and white teeth. She wants to decide on her own stuff, like her outfit, free time activities, hobbies, eating, and activity habits.

INTERESTS

Dance, fashion, social media, tiktok sleepovers

CHALLENGES

Lazy to take care of her teeth. Don't want to visit Dr. She rather's do something else. But she wants to look nice.

Figure 12: Anne's persona

RAPID PROTOTYPING

To reduce design & development time, I used a group of techniques to fabricate a rapid prototype to make characters of the toolkit. The prototype was created quickly and in the simplest form to visually and functionally evaluate the concept (figures 13 and 14). The character's quotes are attached to pencils and four different teeth conditions on four sides of a transparent cup.

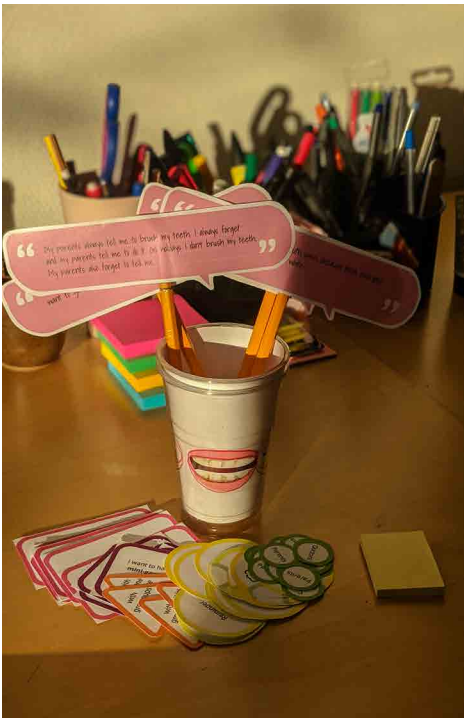


Figure 13: Character Prototype



Figure 14: Character Prototype



Other changes

One improvement in this phase was adding blank cards to the Intervention, Application and Action category. This is because it allows the player to express themselves and create their own content. Secondly, I made slight changes in the word choice of the Led cards.

TEST

WORKSHOPS

Preparation

For conducting another workshop, some tasks needed to be met: Finding another facilitator, volunteer participants, the workshop location, timetable, evaluation criteria, invitation letter for participants, describing the whole idea, activity, and the facilitator's sequence.

Timetable

I created a well-constructed timetable that establishes a natural rhythm and routine. This can be comforting to facilitators and participants. Having a plan as a facilitator is very important as it helps you maximise and prioritise the things of urgency or importance. Besides, a smartly designed schedule reduces confusion for facilitators, allows them to set their routines and creates comfort during the workshops. It also prevents confusion, duplication, overlapping and unnecessary repetition on the part of the facilitators. Lastly, the timetable makes the workshop work smooth, systematic and orderly.

The timetable (figure 15) clarifies exactly what is to be done in a particular order. Thus, it directs the facilitator’s attention to one thing at a time which prevents wastage of time and energy. In addition, the timetable shows the duration of each activity, how to do the activity, the purpose of the activity, who is responsible and the equipment necessary for that part. This clarification is then shared with another facilitator. The full version of the timetable is in Appendix B.

Duration	What
5 min	workshop introduction
5 min	ice-breaking
5 min	introduction of the game and the phase 0 explanation
5 min	start the game persona
10 min	continuation of the game Phase A explanation
	continuation of the game Phase B explanation
5 min	conversation period
5 min	reflection
2 min	thanks for participating & gift

Figure 15: Time table

Preparing the other facilitator

Simone from ablemagic voluntarily joined the test session as a facilitator. Besides explaining the game, I asked her not to interrupt their conversation if they switched to the Norwegian language and to keep speaking and reminding them at an appropriate time.

What is the goal?

The goal of these workshops is to find how suitable the game is. What are the weaknesses and strengths of the game and situation? What are the opportunities and threats? And then find out how we can improve the game and situation with opportunities and increase the strength, meanwhile decreasing the weaknesses.

Invitation letter

Preparing the participants on forehand can be useful to establish a shared mind-set among the participants in a fun engaging way. To do so I made an invitation letter (figure 16) with a short introduction, location and time. This letter was sent to the caregivers of the participants and asked them to send or show that to the children.

Purpose:

- Establish a shared mind-set
- It is not a surprise event to see their reactions.
- Don't come to the workshop blindly.
- Prepare them for the workshop.
- To feel respected.
- To feel comfortable.



My name is Arefe.
I am a designer.

I am studying design at NTNU and I need help from you for my project. I'll let you know more about what we are going to do when I meet

But for now, let me say that you are going to be a designer and design something really important and helpful for yourself and your friends and all the children in the world because you are an **expert!**

when? November 12

where? Your House



I am so excited to see you!

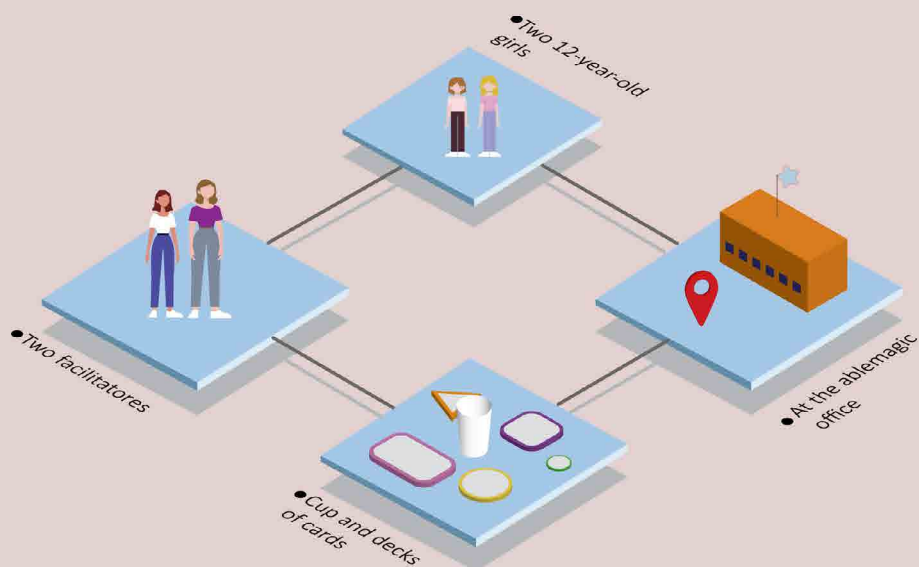


Figure 16: Time table

WORKSHOP 2

1 NOVEMBER 2021

50 MIN



Assumptions

I assume that I might become surprised as children always surprise you and do differently from what you expect.

I assume that I would have an experimental and flexible workshop.

I assume that the workshop would last for 45 min.

Purpose: To evaluate both phases of the toolkit. Moreover, discover how the target group finds the activities in terms of difficulty, simplicity and engagement. Besides, to discover strengths, weaknesses, opportunities and threats.

The participants were two friends joining the workshop after school time.

THINGS THE PARTICIPANT(S) SAID OR DID:

- Process: They were shy during the whole workshop.
- Body language: hands under the table, or around the neck or playing with her hoodie strings and sometimes whispering with each other.
- They mentioned a game on the phone that shows teeth, and the player must clean the teeth.
- One showed the application on her phone to show an app with mini-games.

THINGS THE FACILITATOR(S) SAID OR DID:

- The facilitator asked them and picked the cards for them.
- An ongoing conversation between facilitator and participants. The facilitator mostly pushed this conversation.
- We finished the workshop by asking some questions about the whole process.

THINGS THAT HAPPENED THAT LED TO IMPLICATION:

- They mentioned that the problem finding phase was more fun.
- They did not wholly engage with the game.
- The participants might felt uncomfortable in a new place.

THINGS THE PARTICIPANT(S) DESIGNED:

- Problem finding phase: -yellow teeth- Forgot to brush his teeth, and his parents always remind him to do so.
- Solution finding phase: they chose “game” as an intervention. They chose “receive happy face if I do things right”, “receive sad face if I do things wrong”, and “Learning new facts” cards. They have thought of sharing the game with friends and maybe playing it with teacher supervision. Another idea was to play the game in the waiting room before visiting the dentist. They collected the “reminder” card as a reminder of playing the game, and they wanted to receive feedback from parents. The Led card for this intervention was “with someone my age”.

REFLECTIONS

Maybe it is soon to judge with only one group, one workshop, one test. But to conclude with what we have:

- It seems like it is not as engaging as I thought.
- After asking reflection questions from the participants, I presume they were trying to please us by giving pleasant feedback, as I thought before the workshop.
- It seems that there are too many choices at first glance, which could make it overwhelming for the participant to read all and concentrate on what the facilitator is saying and decide what to choose at the same time.



Figure 17: Workshop 2 sketch

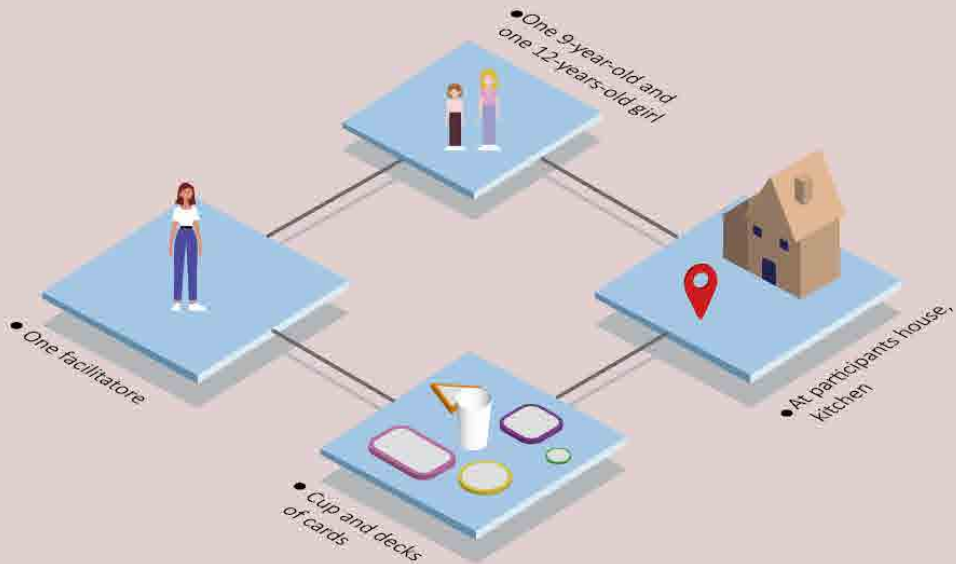
Figure 18 (left): Workshop 2



WORKSHOP 3

12 NOVEMBER 2021

30 MIN



Assumptions

I assume that the participants would be comfortable due to the workshop's location.

I assume that I would have a workshop with one child.

I assume that the workshop length would be less than the previous workshop due to the number of participants.

I assume that I would try different strategies during the co-design.

Purpose: To evaluate both phases of the toolkit. And discover how the target group would find the activities in terms of difficulty, simplicity and engagement. Besides, to discover strengths, weaknesses, opportunities and threats.

Right before the start of the workshop, I found out that instead of one, I would have two participants. The participants were two sisters who contributed to the workshop in the evening.

THINGS THE PARTICIPANT(S) SAID OR DID:

- Body language: comfortable, feet up on the chair, hands on the table, the younger was eating snacks. Sometimes the older sister looked at the younger sister and laughed at her choices, not in a humiliating way.
- The younger sister made a disgusted face while showing the “yellow teeth” on the cup.

THINGS THE FACILITATOR(S) SAID OR DID:

- I mentioned there is no right or wrong answer.
- I read all the cards aloud and put them in front of both participants one by one and each category at different times.
- I repeated the persona once in a while to remind them that we were designing something for her and solving her problem.
- The activity started by asking to give a name to the cup.
- The whole activity was constructed in the form of a story with an introduction and ending.

THINGS THAT HAPPENED THAT LED TO IMPLICATION:

- One said about “TV show” intervention that *“that sounds like something I would do at school. We do that sometimes before we take a vaccine.”* This discussion opens up a level for another level.
- In their opinion, the Led cards and the Action cards were complex, and the younger said all the cards were complex.
- The older girl saw the Intervention card as the most fun part of the game.
- The younger girl liked the cup more.
- Considering an expansion for the target age group for the toolkit.

THINGS THE PARTICIPANT(S) DESIGNED:

- Problem finding phase: -braces- Likes to brush his teeth, but it is boring.
- Solution finding phase: The younger sister quickly picked the “Game” & “Dental checkups” cards, and then the older chose “TV show”.
- The younger set the “Learning new fact” card for the “TV show”. The older chose “Set a goal” for “Game” and said, *“maybe, like if you brush your teeth every week, you will level up” “if you get a certain amount of points, then you can like go to the movies.”*
- They added a “Mini-game” card for “dental checkups”. *“When I think about mini-game, I only think about video games.”*
- The younger adds, *“when you are brushing your teeth while you are being tickled.”*
- They decided that the persona needed a reminder from parents.
- The younger said: *“Share the facts with the teacher, and then the teacher teaches to the whole class”.*

REFLECTIONS

- It was clear that the participants were completely comfortable and relaxed. The main reason behind this is that it was their place which they are most comfortable in.
- The younger participant -9 years old- was playful and not concentrating much on the game. The older kid made this game more serious and wanted to find the best choice.
- As a facilitator, there was so much noise that I could not concentrate properly and was distracted.
- I found it challenging to do the ice-breaking activity. Not enough space, I believe.
- When you play cards of each category separately, it doesn't seem like a lot of cards.



Figure 19: Workshop 3 design



Figure 20: Workshop 3 sketch

COMPARING WORKSHOP 2 AND 3

Location

I, as a facilitator, was not comfortable in workshop 3. The situation was out of control, and I couldn't get ready before the workshop started, like organising all the materials and putting them on the table. But it was clear that participants were much more comfortable than workshop 2.

Age

The younger participant in workshop 3 was not entirely interested in cards. I felt she was sitting there out of curiosity and not playing the game because it might not be as playful as it should be for their age group.

The process

Being only one facilitator makes it much harder to capture the time and focus on participants as well as the whole process. For example, it was not possible to take notes in workshop 3. But in workshop 2, since we were two facilitators, it is easier to take notes, observe, and track time while another facilitator communicates with participants.

In both, we had dynamic conversations.

For engaging the participants and making them play with cards, I believed I needed a new strategy for asking them to do things. In workshop 2, the facilitator asked questions and did the game herself. While

in workshop 3, I asked them questions and gave them the material to become part of the game. The way they were asked to do things by themselves was a new strategy to provide participants with a sense of ownership.

Timing

The third workshop was in a smaller area. There was no comfortable place for the facilitator to conduct the ice-breaking activity. The good thing about being in their comfort zone is that it is unnecessary to perform the ice-breaking exercise as they are already comfortable and relaxed. Because of the skipping, the ice-breaking activity, I spent less time on workshop 3 than workshop 2. Besides, because I was more comfortable telling the story and explaining cards and games, it required less time than another facilitator.

DEVELOP

In this development phase, I created a list of evaluation criteria. This list of evaluation criteria includes different categories. The categories to evaluate are situation, Experience/ Participation, Design, Conversation, Outcome. In each category, I asked some questions (Appendix B). This list represents guidance for evaluating the concept in many aspects. Then I used this list and the answers to analyse the concept and find the pain points.

Analysing the weaknesses and opportunities

Based on various sources within test sessions and experts' reflections, I conducted a list of weaknesses and opportunities. For this project, the purpose of this list was to state what advantages this toolkit has as a method. This would later be used to identify potential improvements that could be implemented in the concept.

Weaknesses

- Too many cards
- Too many steps
- Not engaging
- Not comfortable
- Being watched
- Too conclusive
- Some cards are difficult to understand

Opportunities

- Material
- Differentiate between each category
- Reduce cards
- Visualising the quote (add drawings to the quote)
- Take away some steps
- Three dimensions for cards

Process

- Adding more game elements (Narrative, curiosity, creativity tool)
- Open cards with question marks
- Move the cup around the table
- Cup in the centre

Condition

- Not observe them like a boss
- Group work
- Back and forth conversation during activities

FOCUS

After analysing the weaknesses and opportunities of the toolkit, the findings were used to create a matrix. This is done by distributing the weaknesses along one axis and the opportunities along the other. Potential search fields occur from the intersections between the weaknesses and opportunities. Not all intersections will be relevant to consider further, but they allow exploring what weaknesses and opportunities could be related to each other. When they are relevant to each other, it is worth considering it as a development area. These development areas aim to detect areas where the toolkit could grow and become closer to the goal.

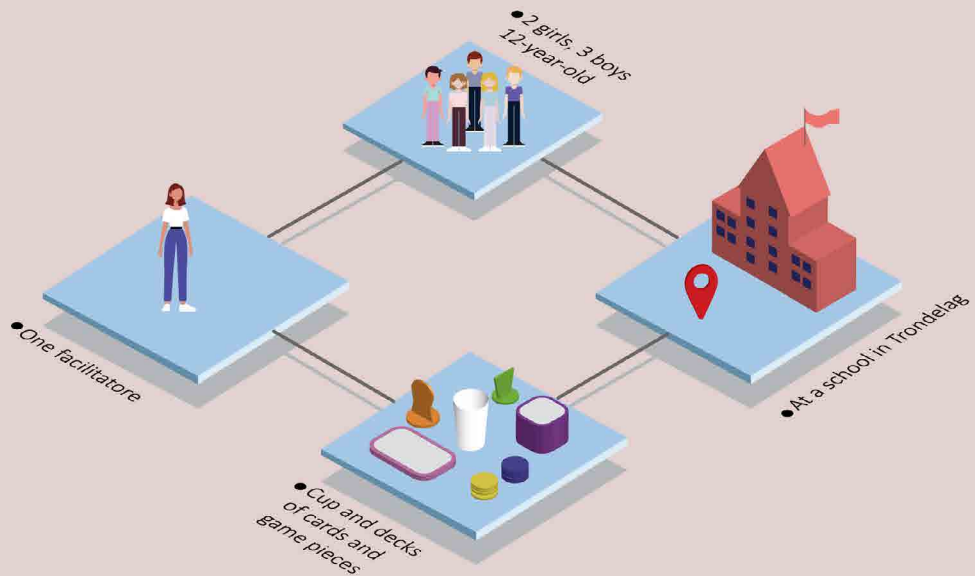
		Opportunities			
		Material improvement	Process improvement	Suitable condition	Adding game elements
Weaknesses	Confusing	Differentiate between each category	Take away some steps/ cards	Step by step giving the materials and explanations	
	Not engaging	Visualizing the quote (add drawing to the quote)	Goal setting for each phase or category		Three dimension for cards
	Not comfortable Being watched			Not observe them like a boss/ Group work	
	Too conclusive	Open cards, with question marks	Go round		

Figure 21: Opportunities and weaknesses matrix

WORKSHOP 4

30 NOVEMBER 2021

40 MIN



Assumptions

I assume that I would be familiar and comfortable with the place due to the same school as workshop 1.

I assume that children would be comfortable due to the workshop's location.

I assume that due to the one group of 5 children, there would be some challenges to handling the conversation.

I assume it would be challenging to manage the workshop due to only one facilitator.

I assume that it would be hard to document all the information.

I assume that the workshop length would be longer than other workshops.

Purpose: To evaluate both phases of the toolkit. Moreover, discover how the target group finds the activities in terms of difficulty, simplicity and engagement. Besides, to discover strengths, weaknesses, opportunities and threats.

The participants were a group of children at the same school as workshop 1.

THINGS THE PARTICIPANT(S) SAID OR DID:

- They immediately knew what they wanted.
- *"A poster in the bathroom, bedroom, he remembers." "if he could get a personal therapist." "in the podcast, they talk pretty much about health, and if I were this dude, I would listen to a podcast."*
- As Game examples, they said: *"the game gives us challenges like brushing your teeth over 2 minutes", "using floss", "make a board game with mini-games", "eat an apple or something every day".*
- One said, *"I like baby toothpaste; it tastes good."*
- The other one was concerned about the microplastics in the baby toothpaste. *"when you spit it out, it goes down to the ocean."*

THINGS THE FACILITATOR(S) SAID OR DID:

- I gave them a little introduction and played the ice-breaking game.
- I then took out all the cards and pieces step by step and not all at once.
- I read out loud the intervention cards.
- Before finishing the game, I repeated everything by taking the character to each intervention card they chose and repeating what they had chosen for the character and how he might improve his teeth. Then I thanked them for helping him and finding the best solution. *"We helped Leo (our imaginary character) survive with healthy teeth,"* I said and gave them all a high five.

THINGS THAT HAPPENED THAT LED TO IMPLICATION:

- They made two new characters.
- If you could change the game, what would you do? the facilitator asked. *"I would choose a new character" "keep on going until we have completed all the characters."*
- The "Location" layer is missing in the game.

THINGS THE PARTICIPANT(S) DESIGNED:

- The problem finding phase: yellow teeth, which matches better with the "forgets to brush his teeth" quote.
- Solution finding phase: They took 3 intervention cards: "Podcast" - "Motivational podcast" -, "Something to read" - "like a poster in the bathroom" -, and "Game" "Both physical and digital games".
- The "Learn new facts" were chosen for the podcast and poster. "Lose and get points", "mini-games", and "save activities" for the game.
- "Set goal" for the podcast.
- Receiving poster from the school nurse.
- They shared the poster with their parents, and one said: *"if they don't know why it's there, they're gonna take it out".*
- Sharing all with parents and teachers and they said: *"if you say to the teacher they say to the whole class" "with the dining table we talk about everything with parents."*

REFLECTIONS

- The same thing happened in all three workshops: Participants tried to find a perfect match between the teeth and the quotes.
- Participants need an empty character for the game, like the blank card. (Figure 23)
- I, as a facilitator, forgot one final question to ask: between these three interventions, which one do you think is the best? A clear list of questions to provide to the facilitator would be handy to prevent this from happening.
- The intro and the game's ending are conversations between the facilitator and the participants. Those parts are a significant part of the game that the facilitator should control (Fjelnset, 2021)
- Each workshop lasts for different lengths.
- Their teacher said they came out of the room so happy.



Figure 22: Workshop 4 design



Figure 23: The school nurse made by stacking teacher and doctor on each other, calling it teacher doctor.



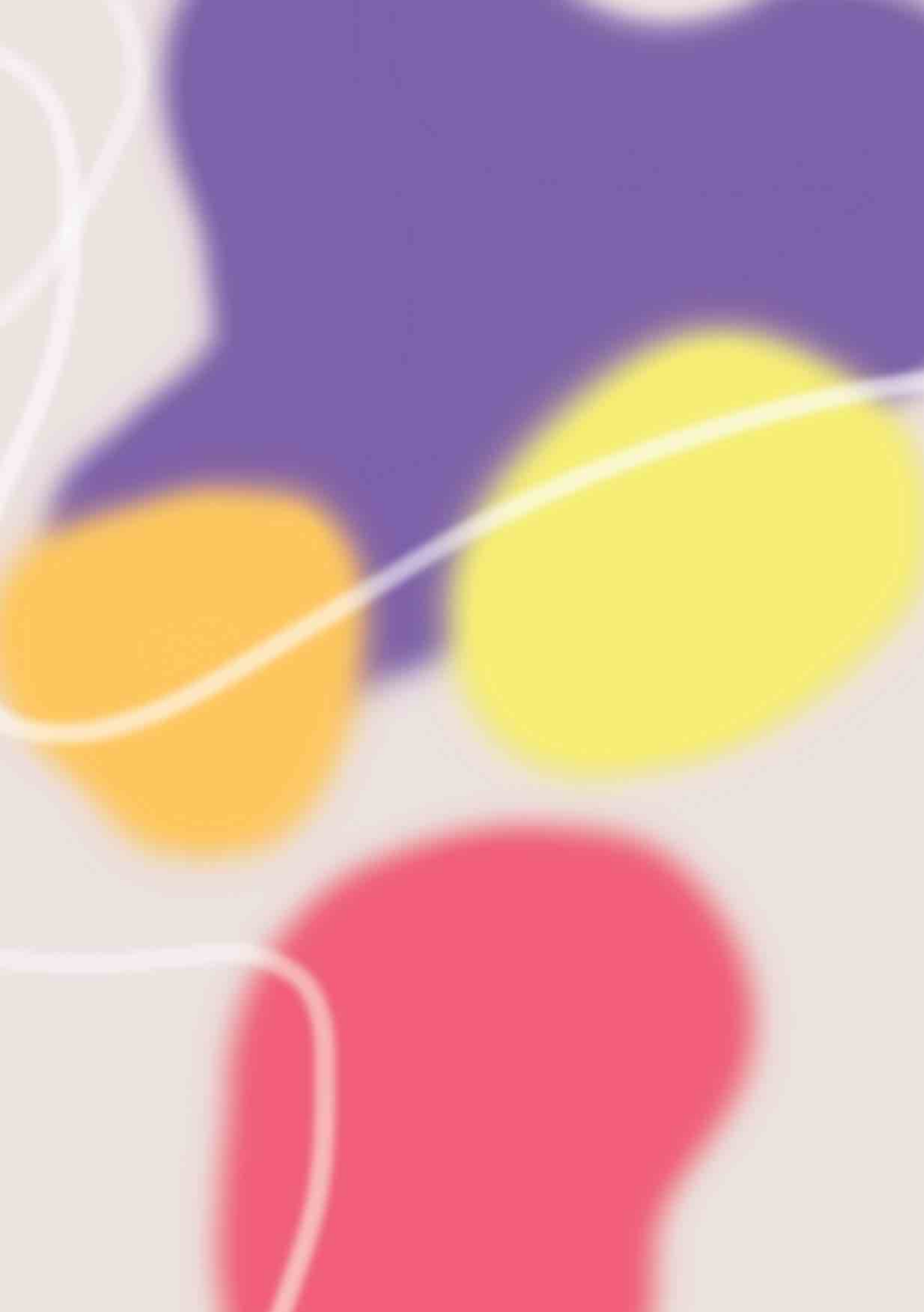
Figure 24: Workshop 4



DEVELOP

After having four workshops with children, I realised that there is a need for another layer in the game that specifies the location the interventions can be used. During the discussions in the workshops, some mentioned the location. But we did not elaborate on that much, besides not all of the interventions were given a location in previous workshops. This demand then led to a new layer called the Implementation board.

Two blank character pieces were added to the toolkit as I saw a need for it in the last workshop. This adds again a chance for participants to express themselves and be creative.





DELIVER

The concept, Implementation,
Recommendation, The outcome,
Further potentials,

THE CONCEPT

What is it?

The toolkit is a collection of cards, boards, pieces and characters that includes observing and conversing with children at co-design workshops. These workshops with this toolkit can develop a more profound understanding and translate that understanding into innovations. As a result, this toolkit helps create a better, more compelling and meaningful design. The components can be used in several co-design sessions. Identifying problems, solving them creatively, and iterating on those solutions are the core activities of the design game.



Figure 25: Design Game Toolkit

The main goal is to gather insights from children and empower them as a focus group. This toolkit is an advantage for the topics that are not that much of their interests. This toolkit helps to start a conversation and have a back and forth conversation. As a result, some children might open up faster and easier and express themselves. At the same time, some children might not be so talkative and shy. So with this toolkit, they might have a chance to express themselves in a fun and playful way, and if they are not willing to communicate, at least they could have had an exciting experience with the toolkit.

Why use this toolkit?

- To plan and conduct co-design workshops.
- To research with people in a playful environment.
- To involve people who are influenced by design.
- To interest diverse stakeholders in expressing, discussing and creating a shared understanding of users, use contexts and technology in early concept design

When to use this toolkit?

- Know context
- Know user
- Frame insights
- Explore concepts

Challenges

- People may behave differently when they are in groups or alone.
- Facilitators should be aware that their presence may affect the people they are designing.

- It might be hard to make children open up to facilitators.

How to use this toolkit?

- Listen
- Observe
- Document
- Be empathetic and honest
- Research the environment that the people you are studying are comfortable with
- Influence your subject's choices as little as possible
- Beware of bias
- Have clear goals related to understanding and prediction.

Resources

- The box of the design game
- Notebook
- Pen
- Post-it-notes
- Pencils
- camera



Figure 26: Design Game box

The tone of voice

For this design, the audience consists of curious, explorative children. Therefore, the tone of voice must be encouraging, active, fun, and friendly. The design must be perceived as the co-designers ally in the quest to create a customised promotive dental health intervention. It must also build trust with the co-designers by resonating with the values that drive them to make.

Script

This toolkit is designed to ease communication with children. Many parameters accomplish this mission; one is choosing light and straightforward word packages for adolescents. In addition, it has been tried to avoid a text-heavy concept, while there is enough explanation and clear description.

The sentences are written in open-ended question format. Therefore they are less conclusive than declarative sentences. Interrogative sentences might encourage participants to think and reflect more than declarative sentences.

Look and feel

Creating a toolkit for children who are co-designers has been the reason for the concept's look. In addition, the concept is characterised to be fun to fit with the adolescents' world. This has been done by giving the concept a playful and game-ish form plus colourful and round-shaped cards.

To differentiate easily between each layer of the game and also to distinguish between the cards various strategies have been applied: different shapes, colours, pictures, icons, avatars, materials, the thickness of the material.

Material choice

The toolkit is designed to be used in several co-creation workshops. And it is vital to present and do activities with clean components and have an adequate look every time. Therefore, to meet this objective, the main material for the concept was chosen to be MDF and cardboard. MDF is made from wood waste fibres. It is strong, readily available, and most affordable. In addition, post-processing is easy and includes painting, sticking and assembling.

All the pieces and the package sections were laser cut. The laser-cut machine cuts MDF cleanly and ideally, without knots or a tendency to warp.

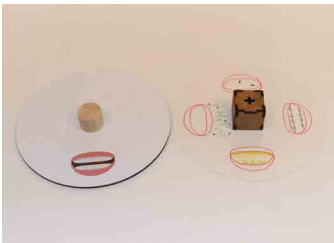


Figure 27: Design Game raw materials

DESIGN GAME MATERIALS



Name tag: The toolkit comes with a set of name tags. Other equipments to provide the co-creators are Sharpies, pencil and Post-it-notes.



The Problem Board: This board has two layers of illustrations. The top layer - a transparent sheet - slides over the other layer and completes illustrations. There are 4 different illustrations of mouth and teeth. Each shows different situations of teeth.



Main Characters: There are 4 characters, 2 boys and 2 girls. Each character says something about their relationship with dental health.



Play Cards: there are 8 play cards. These cards are the core of the game. Each card represents one or more health promotion interventions, with open-ended questions and a picture illustrating the interventions.

Action Cards: There are 8 Action Cards. Each Action Card provides an option for interventions. There are more descriptions and/or examples for better understanding.



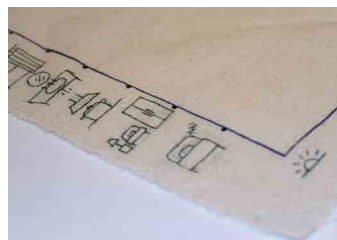
Items: There are 5 sharing and 5 chatting items. These items describe the Action Cards' future more.



Characters: 4 different characters who are basically the closest contact of the children: Parents, Teachers, Doctors, Friends.



The Implementation Board: this board illustrates a matrix diagram. The Y axis represents 9 different locations. The X axis represents a day time.



DESIGN GAME SETUP

- There is no need to take out all of the game materials at once until you are playing the corresponding layer.
- The game starts with choosing a character or a teeth condition on the board.
- Play one character at a time.
- When playing the cards layer, place them side by side, facing up, on the table in front of the participants.
- Read all the cards' scripts aloud.



Figure 28-31: Design Game layers

INSTRUCTION

Introduction

The activity starts with an opening such as:

“Our role in this game is designers. We have a big mission to accomplish. We, designers, must help people to live healthier lives. So let’s start!”

3 phases

This toolkit consists of three phases. With each phase, another form of value creation can be accomplished. Enabled by this Design Game Toolkit, a facilitator can assist participants in completing a three-step co-creative cycle: Co-analysis, Co-design, and Co-implementation.

Co-analysis:

The co-designer(s) chooses 1 tooth condition on the Problem Board.

Then they can choose one character based on the quote.

For the rest of the game, they continue with that character.



Figure 32: Co-analysis

Co-design:

The co-designer(s) must choose 2 or 3 cards from the Play Cards and put them in front of themselves.

Then the co-designer(s) chooses as many Action Cards as they want and puts them in front of themselves. Blank cards are for co-designers to reveal their opinion if it is not in the options given.

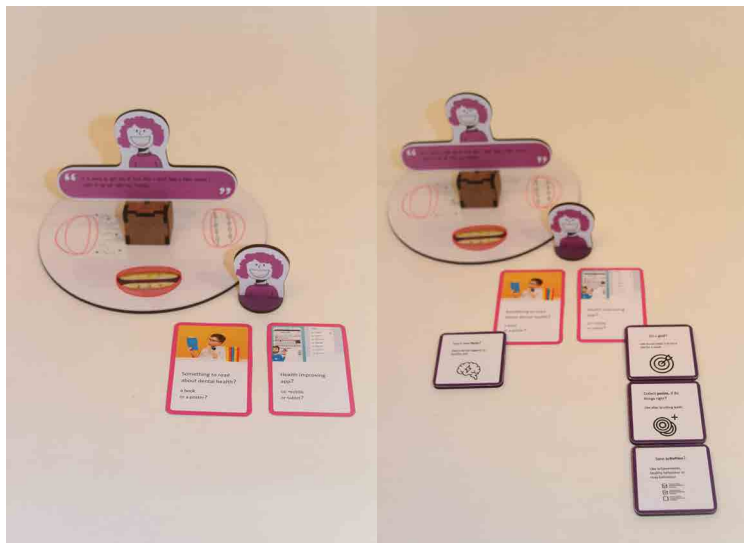


Figure 33 & 34: Co-design

Next, the co-designer(s) can give each Action Card one or two items (Sharing and Chatting). It is possible to use both two types for one Action Card as well as none.

“Sharing” and “Chatting” items have a following step. The co-designer must select one to four characters from the last layer of the toolkit.

Cards are played by laying them face-up on the table. The co-designer(s) may change their cards as much as they feel satisfied with their choices. The ideation is over when the co-designer declares.

Then, the facilitator documents this draft by taking a picture or noting down the chosen cards and their relations.



Figure 35: Co-design 2

Co-implementation:

The last part is to suggest a location and time for the Play Cards on the Implementation Board.

There should be a conversation between the co-designer(s) and the facilitator during the whole activity. For example, the facilitator may ask for an explanation for the chosen materials to generate a back and forth discussion.

Henceforth, it is the facilitators' responsibility to pay good attention to the story and reasons for the chosen materials, and the recorder takes notes.

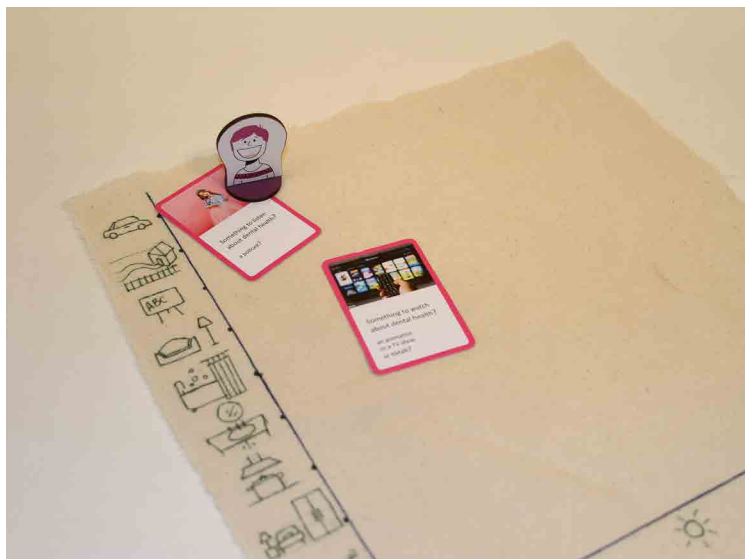


Figure 36: Co-implementation

Ending

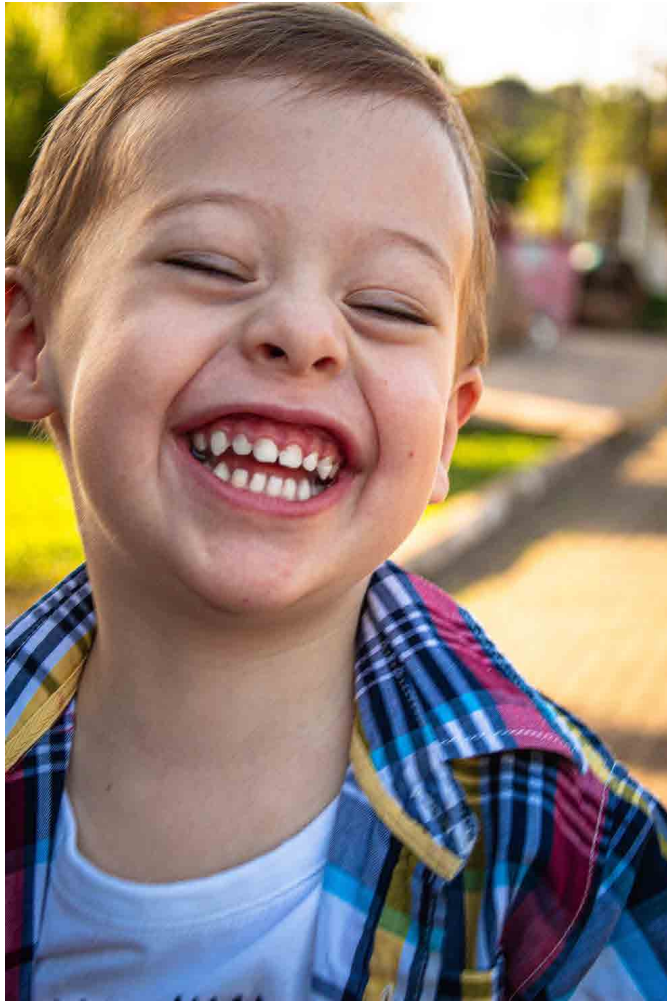
The activity winds up by recapping everything and then a combination of an ending such as:

“You helped them to find their problem and solve it with many great solutions. Hopefully, they will take care of their teeth more than before and have a healthy life from now on. Thank you!”

And showing the Problem Board (without the transparent layer -healthy teeth-).



Figure 37: Healthy teeth illustration



www.unsplash.com

IMPLEMENTATION

PARTICIPANTS

A group of participants could consist of two to five participants since this group size enables group discussions, whilst all participants are still able to contribute individually. The participants of the workshops should ideally be children aged 10 to 14, which is a possible time to develop new dental health habits. Participants should be fully willing to participate. But we can not assure that all the participants are gladly willing to participate. In either case, it is important to invite a mixture of participants with different gender, backgrounds, nationalities, immigrants, social levels, and abilities to the co-design workshops.

It is also recommended to have a safe peer environment for participants to have the chance to share their ideas and thoughts (Dahl & Høiseth, 2020). In a co-design, children tend to open up faster with their friends (Fjelnset, 2021). The number of participants should not be too many so that the facilitator and other team members can not catch up with the participants and their activities. In other words, there should be enough time for each person to contribute.

FACILITATORS

A recorder:

The co-design outcome can be considered the most valuable item that can be accomplished in the co-design workshops. This role is responsible for observing and documenting every activity and conversation held during the workshop by taking pictures, notes, recording voice or video, and sketching.

A facilitator:

A person who drives a group of people towards creating an imaginary problem and solving the proposed challenge throughout the workshop while dealing with a considerable number of protocols. Every workshop should have a facilitator. This is the most crucial role during the workshop, and they should play a completely natural role to create a framework of trust.

Based on all of the findings in the research, testing and experiences, some steps for a co-design are pointed out.

Before co-design:

- Define objectives, a workshop plan, expectations and criteria in advance.
- Based on the number of participants, prepare a method or a game for initiating the co-design to break the ice quickly.
- Make sure that everyone in the team knows their role and is familiar with their tasks.
- Send out an invitation letter to participants' caregivers. This invitation letter could directly be addressing co-designers. The information in the letter could be a short and straightforward introduction of the workshop subject, the date, and the event's location.
- Prepare a clean, organised, calm environment but informal, which helps the co-designers stimulate creativity.

During co-design:

Initiate:

- Start with an ice-breaking activity or a building trust method.
- Establishing a shared mindset among the participants on the forehand can be helpful to align everyone's objectives.
- Clearly state the purpose of the project and the event's goal to participants.
- Remind them that they are free to choose whether to stay or leave the event.
- Explain the task and proposed method clearly. Make sure that they know there is no right or

wrong answer.

- Ask them to write their names on the name tags and stick to their clothes. It is essential that children feel part of the team, not just users and guinea pigs. To do so, Pedersen (n.d.) recommended providing name tags with the “Designer” title to children to write their names on it. In this way, they feel respected and more critical to the design process.

process:

- The facilitator presents game levels one after another after each step has been done.
- The facilitator monitors and responds, and the recorder documents all the information during the session. But because of the fuzzy nature of this part, documenting everything would be difficult (Saure Hagen et al., 2012).
- The facilitator should keep in mind that all ideas are accepted. Also, send this message to the participants as well.
- The facilitator answers questions of the participants without interfering and influencing them.
- Give guidance when needed, but do not let your ambitions drive the outcomes.
- When the group gets ‘stuck’ in the process, the facilitator should try to intervene by asking questions or presenting the group with examples.
- The facilitator should make sure all participants will be provided with an equal amount of time to express themselves.

After co-design:

- The situation is evaluated and analysed from the recorder's notes, pictures, stories, and explanations when the workshop is over.
- These data could be shared with the rest of the designers involved in the project.
- Better to keep the participants updated about the project.

Interpretation:

- What they do and what they say may vary. It is our responsibility to figure out what they mean. To do so, all the information from the co-design is needed.
- Their conversation during the game is the most important takeaway from the workshop.
- Notice any pattern in boys' and girls' actions and explanations.





RECOMMENDATION

CONVERSATION

Be long enough to make your co-designer feel like they are being heard, and that allows them to have an open discussion.

Be focused enough to get helpful information to address your design challenges.

Be general enough to feel like an open-ended conversation that can lead to unexpected insights.

Generate an actual back and forth discussion to feel like a conversation and put the co-designers at ease.

Make the co-design workshops feel that the conversation is about them, not the interventions, organisation, or project you are representing.

Facilitation Tips

- Ask open-ended questions or questions that require a longer explanation than yes or no or one word.
- Listen and be mindful, even if taking notes at the same time.
- Have a dynamic conversation, don't ask questions

from a script.

- Allow long pauses to think and then reply.
- Ask naive questions to realise their perspective and hear the explanation in their words.
- Do not correct co-designers; try to understand their perceptions and why they perceive things differently from you.
- Do not bombard them with complex and professional vocabularies.
- Remember, the participants are the experts of their perspectives.

OBSERVATION

Closely observe and monitor what they do and say in the workshop within their interaction with the toolkit.

Facilitation Tips

During observations, look for:

- Things that prompt shifts in behaviour
- Body language
- Both in doubt choices and with confident choices
- Anything that surprises you
- Anything that you find “irrational”.

DOCUMENTATION

Capture everything you tell, see, hear and feel during the workshop. It's essential to capture the experience to bring back to the office and share it with team members who were not present.

Document the conversation with notes. Documenting through photos or recordings are associated with ethical issues as it needs the full consent of co-designers and caregivers for children below 16 years and approval from the Norwegian Centre for Research Data.

In addition to the toolkit, bring a notebook and pen and, if possible, a video camera or voice recorder.

Write down first interpretations of what's going on when it happened; this critical information is often lost and difficult to remember later. Then, immediately after the workshop (or within 24 hours), jot down immediate big picture takeaways from the toolkit and the conversation using the Documentation template in Appendix C . The longer you wait, the more points and details may be lost.

It's often helpful to work with a partner - one person responsible for facilitating the workshop while the other captures and documents. Compare the experiences, perceptions, and interpretations of the two facilitators.

Facilitation Tips

When documenting, capture:

- Personal details (age and gender, NO name)
- Direct quotes (and your immediate interpretations)
- The expressions and feelings of the person, not just their words
- Body language
- Ways they interacted with toolkit and others
- Things they care about most
- Moments or things that bring out emotional responses, positive or negative

THE OUTCOME

The data gathered during the co-design workshop with this toolkit is qualitative.

It means the data is the descriptive and conceptual findings. It is intended to inform and inspire #Care4YoungTeeth<3 partners with the aim to evoke empathy for the stakeholders and end-users involved. Insights can communicate quotes, use cases, written scenarios or requirements. However, it is also possible to visualise through personas, customer journey maps, storyboards, or sketches.

Learning through play, connecting with the topic and becoming curious about the topic are other outcomes of this method.



www.unsplash.com

FURTHER POTENTIALS

NEW LAYER

Furthermore, if we were to mirror the real world to a greater extent, some barriers might be against us to meet the objectives. The game also could have barriers to overcome without any judgement. Barriers could be another game layer. This layer can encourage participants to elaborate their ideas. Thus, there would be more discussion and topics in the workshop. This new layer adds more game spirit to the toolkit. Overcoming barriers and challenges will make participants feel they have earned their achievement.

This layer could be a new deck of cards that are faced down. Then, in the middle of the game or before finishing the game, they have to pull out one card randomly.

These barriers could be inspired by real obstacles that children might overcome. Barriers that could be found in a diversity of families including defined at risk groups in oral health such as families with low socio-economic status, immigrant families, children in child welfare or having parents with mental health issues.

To think of some examples of the card's content, I propose some obstacles like:

“Uh oh! The restroom is occupied, and I am sleepy!”

“Uh oh! We ran out of toothpaste!”

“Uh oh! It is late. I have to run to school! So I skip brushing my teeth.”

Then this time, participants should implement some changes to their ideas or represent a new idea that overcomes the given barrier.

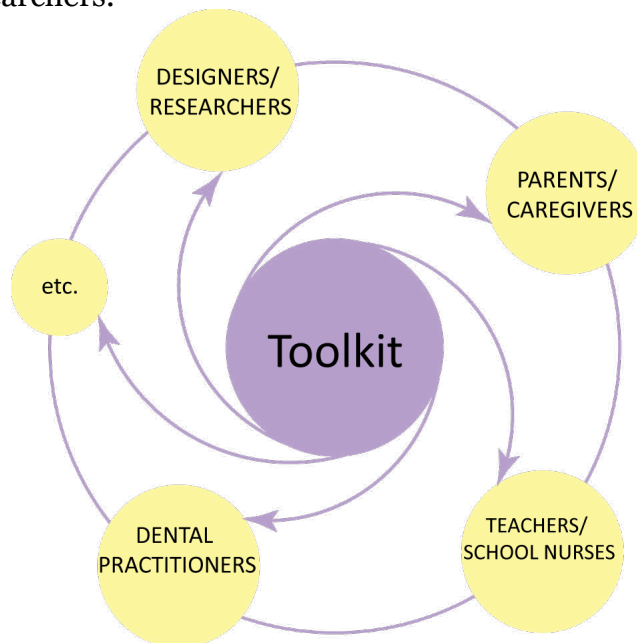


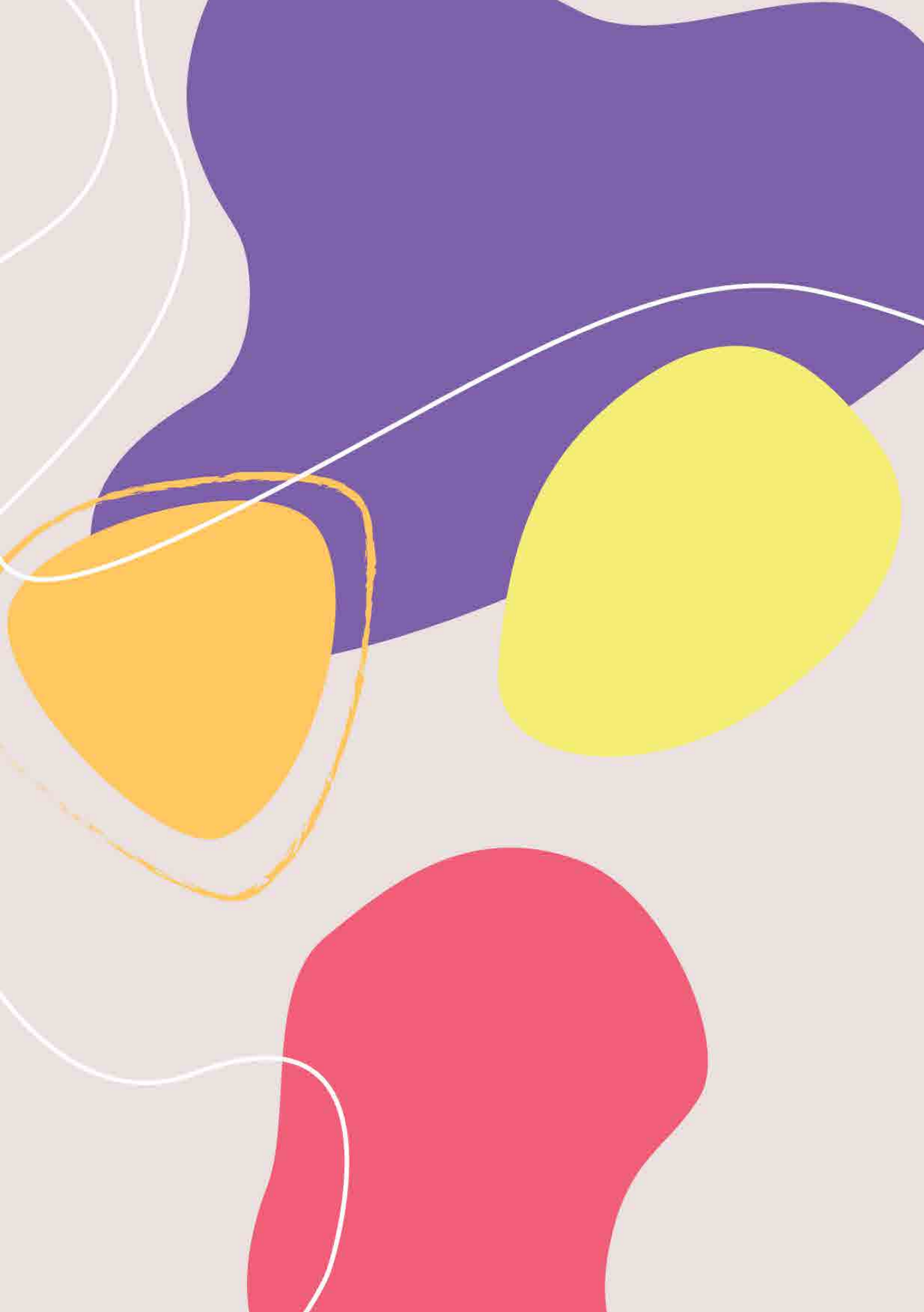
Figure 38: Barriers layer

BIGGER VIEW

If you design for complexity, you need stakeholders in the room. You need the system in the room. But you cannot expect those stakeholders to understand all the principles behind it, so the tools help to make the principles explicit without having to know them. You just do them; you just live them.

Having the design game toolkit allows us to democratise and make accessible this advanced form of design for people who may not have a lot of design experience. This toolkit has the potential to be used in a clinic setting, family setting and school setting, maybe with the facilitation of a school nurse. Further, it can increase awareness among professionals other than designers and researchers.







EVALUATION & REFLECTION

Toolkit as a Design Game ,
Toolkit as a Game ,
Adaptable toolkit, Sailboat

TOOLKIT AS A DESIGN GAME

The toolkit is a collaboration tool between designers/researchers and adolescents. Three out of four purposes of design games mentioned before are met in this toolkit. As a reminder, those purposes are the toolkit as a research tool, empowering the users and engaging the users early in the design process to generate a shared understanding. Game elements made this toolkit playful, but at the same time, it could not be a competition for winning, and participants would not be afraid to make mistakes. In addition, this toolkit highlights the exploratory, imaginative, dialogical and empathy aspects of the co-design workshops. There are predefined materials that support making, telling and enacting. Also, rules are straightforward.

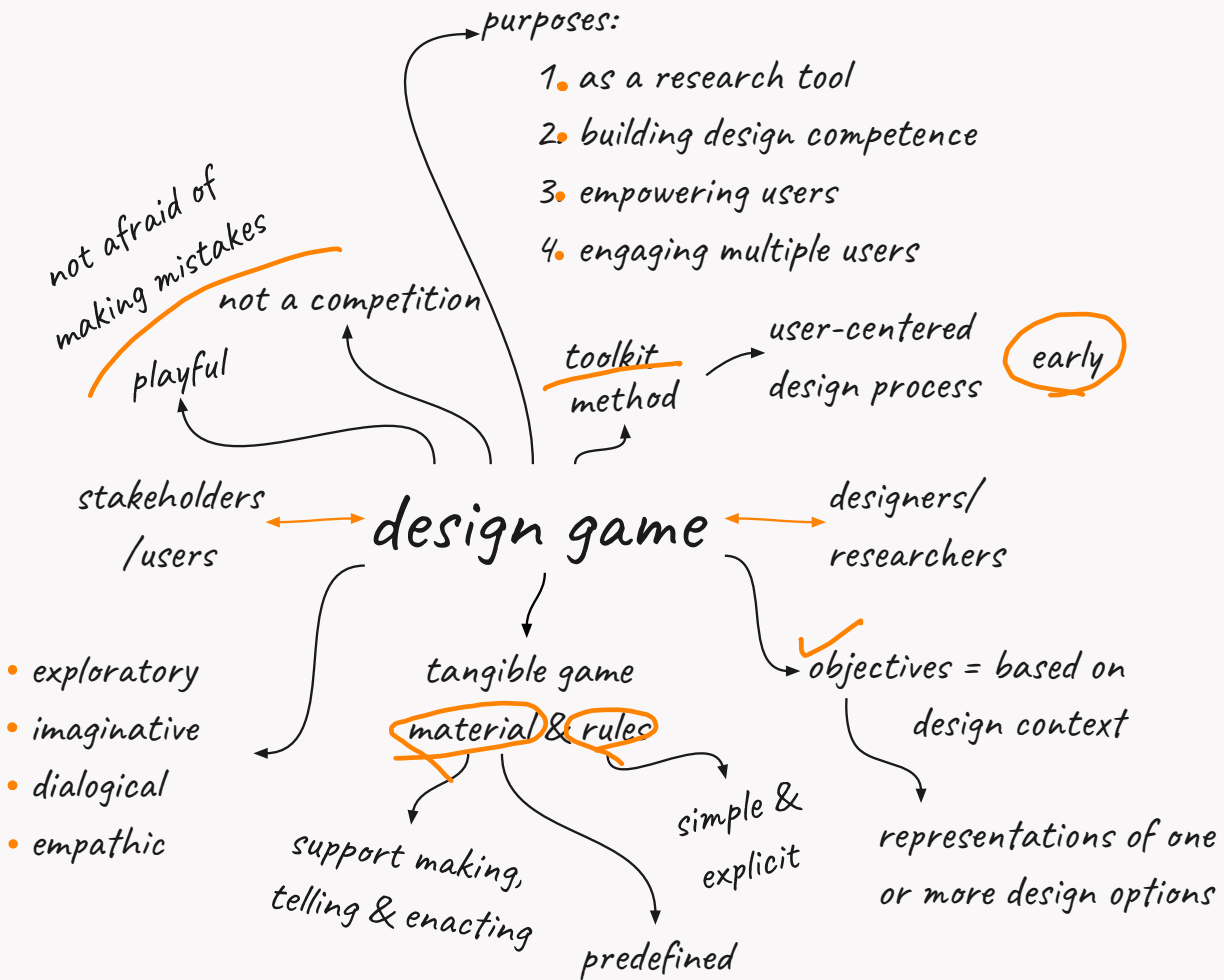


Figure 4: Design game characteristics

TOOLKIT AS A GAME

As mentioned in chapter two this toolkit could hold some game elements listed in figure 9. So here is the list of the game elements and mechanics and the way it has been used in the toolkit and the process.

1. **Development Tools:** The toolkit's basic idea is to build on a system. All the materials and pieces are provided to the participants to develop new ideas.

2. **Progress / Feedback:** the feedback system in the game reveals at the end of the game, where the facilitator wraps up together with the co-designers and presents the result of the game.

3. **Theme:** Dental health promotion theme is linked with a narrative. The theme gives a little fantasy to the toolkit.

4. **Narrative / Story:** the design game is strengthened with a story that covers the past, present and future.

5. **Curiosity / Mystery Box:** the way the toolkit would be explained to participants might make them curious. Not every step of the game is explained from the beginning.

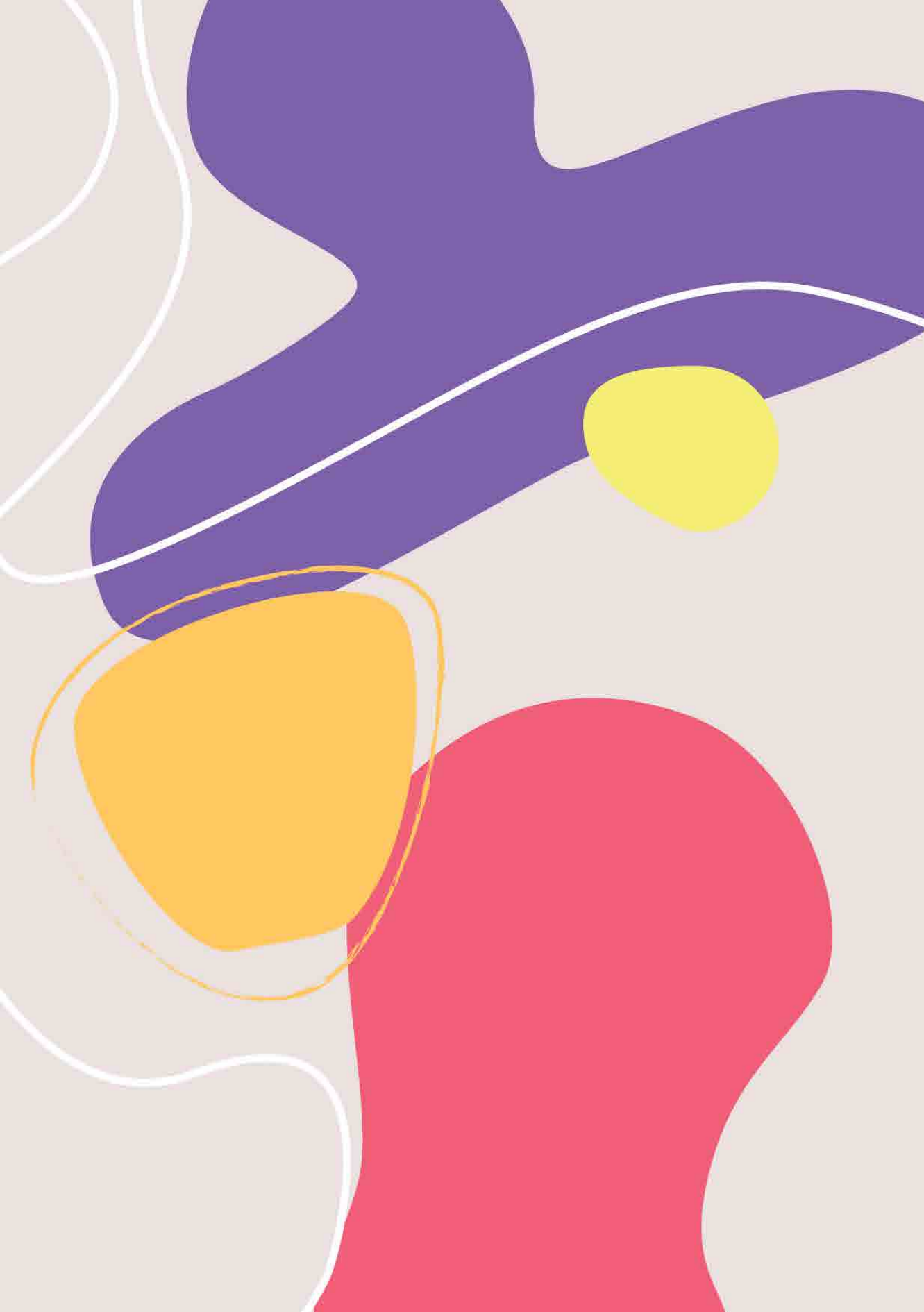
6. **Guilds / Teams:** team up a group of children that they already know and can bond with each other in the game even more. A group of 2 to 5 could effectively build a close-knit relation and collaboration.

7. **Branching Choices:** Letting the user choose their path and destiny from multiple cards and options to responsive narratives.

8. **Creativity Tools:** Blank cards could encourage people in new directions and express themselves.

ADAPTABLE TOOLKIT

The toolkit adaptability means the capacity for the toolkit to adjust effectively to the evolving demands of its context. This function could maximise its value. This toolkit can be modified for a new project or theme. The context can vary, and the content should be defined based on the context. The toolkit can be designed and built based on the content and the user group. This function is to explore further.



SAILBOAT

It's a visual way for a team to identify what pushed the project forward to the goal and what held it back from the plan. The Sailboat or Speedboat Method for Sprint Retrospectives is an easy method to reflect and map a team's way forward easily, in a fun, tactile and visual way. It helps the team reflect on what's going well and what could be better, analyse their sails and anchors and identify opportunities for improvement or change.

The idea is that the boat represents me heading towards the goal as an island while dealing with wind, anchors and icebergs along the way. Winds help lead the boat forward, but obstacles such as icebergs and stubborn anchors represent the barriers that I might encounter that could slow me down or stop me from getting to where I need to be.

Here in this project, the goal was to define and redesign a valuable toolkit. The things that accelerated me, like wind, were:

- My interest in designing with children.
- My interest in design for health promotion.
- Sitting at ID.
- Having a good network.
- Sitting at ablemagic.
- Good background knowledge about the area.
- Alignment of this project with #C4YT<3 and

- Good communication with Marikken.

Some barriers which made this project challenging:

- End-user children (sensitive focus group)
- Language barriers
- Not easy to have test sessions more frequently with users (due to pandemic)
- An individual project in terms of being the only facilitator.

But I have learned that I have the ability to work ahead of schedule, and secondly, children always surprise you.

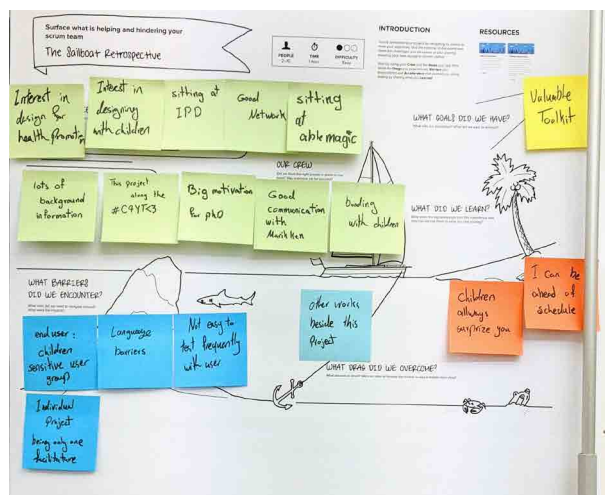


Figure 39: Sail boat



REFERENCE

REFERENCE

- Allen, B., & Waterman, H. (2019). Stages of Adolescence. Retrieved from <https://www.healthychildren.org>
- Brandt, E., Messeter, J., & Binder, T. (2008). Formatting design dialogues—games and participation. *Co-Design*, 4(1), 51-64.
- Brandt, E. (2006). Designing exploratory design games: a framework for participation in participatory design? Proceedings of the ninth conference on Participatory design: Expanding boundaries in design-Volume 1,
- Clatworthy, Simon (2011), “Service Innovation through TouchPoints: Development of an Innovation Toolkit for the First Stages of New Service Development,” *International Journal of Design*, 5 (2), 15-28.
- Dahl, T. L., & Høiseth, M. (2020, June). Co-Designing Immersive VR with and for Adolescents in Elementary School. 302-307. <https://dl.acm.org/doi/10.1145/3397617.3397848>
- Design Methods Finder, (n.d). Moodboard. Retrieved 17 November 2021 from <https://www.designmethodsfinder.com/methods/moodboard>
- Experio Lab. (2021, January 15). What games are good for in service design [Video file]. Retrieved 10 September 2021 from <https://experiolab.se/seminars-01/?lang=en>
- Fjelnset, N. (2021). personal communication, CEO at ablemagic. interview

Healthwise. (2019). Growth and Development, Ages 11 to 14 Years. <https://www.healthlinkbc.ca>

Hellon, (n.d.). Design and successful implementation of a new service identity. (Global Service design Award Winner 2019) Retrieved 30 December 2022 from <https://www.hellon.com/>

Honkala, E. (2003). Oral health promotion with children and adolescents. Oral health promotion. (169-187).

Ideo, Bill, & Melinda Gates, F. (2011). Human centered design : toolkit (2nd ed. ed.). IDEO.

Jasbi, A. (2021). Interactive design interventions for health promotion. (Article). Norwegian University of science and technology.

Johansson, M. (2005). Participatory inquiry: collaborative design (p.16).

Juneja, P. (n.d.). Management study guide. Desk research - Methodology and Techniques. Retrieved 27 December 2021 from <https://www.management-studyguide.com/desk-research.htm>

Manners&Co.(n.d.). Manners&Co. Gift Bundle. Retrieved 30 December 2021 from <https://manners.co/>

Marczewski, A. (2015). Game Thinking. Even Ninja Monkeys Like to Play: Gamification, Game Thinking and Motivational Design (1st ed., p. 15). CreateSpace Independent Publishing Platform.

Marczewski, A. (n.d.). 52 Gamification Mechanics and Elements. Retrieved 30 December 2021 from <https://www.gamified.uk/user-types/gamification-mechanics-elements/>

Mattelmaki, Tuuli and Froukje S. Visser (2011), "Lost in Co-x: Interpretations of Co-Design and Co-Creation," 4th World Conference On Design Research, Delft, the Netherlands.

Mattelmaki, Tuuli (2008), "Probing for Co-Exploring," *Co-Design*, 4 (1), 65-78.

Neighborland. (2015). Our Design Toolkit. Retrieved 30 December 2021 from <https://handbook.neighborland.com/design-toolkit-3324c41015b6>

Nørgaard, K. B. (n.d.). How to co-create with kids. What to consider when co-creating with kids. Retrieved 5 4, 2021, from <https://fundayfactory.com/blog/2018-co-creating-with-kids/>

Pedersen, T. L. (n.d.). 3 practical tips on co-creating with kids. What to consider when co-creating with kids. Retrieved 5 4, 2021, from <https://fundayfactory.com/blog/2018-co-creating-with-kids/>

Rivara, F. P., Park, M. J., & Irwin Jr, C. E. (2009). Trends in adolescent and young adult morbidity and mortality.

SAHRC. (2021). Retrieved 6 March 2021 from <https://sahrc.umn.edu/>

Sanders, B. Elizabeth, Eva Brandt, and Thomas Binder (2010), "A Framework for Organizing the Tools and Techniques of Participatory Design," 11th Biennial Participatory Design Conference, Sydney, Australia.

Sanders, B. Elizabeth (2000), "Generative Tools for Co-Designing," in Collaborative Design, Stephen Scrivener, Linden Ball and Andree Woodcock, eds. London, UK: Springer, 3-12.

Saure Hagen, E., Mathillas Røsvik, S., & Høiset, M. (2012). Co-Designing

with children: Collecting and structuring methods. In Proceedings of the 9th Norddesign Conference (pp. 27-28).

Schneider, J., Stickdorn, M., Bisset, F., Andrews, K., & Lawrence, A. (2011). *This is service design thinking : basics, tools, cases*. Bis B.V.

Statistics Norway. (2015-2018). Dental services : 11959. Statistics Norway. Retrieved 20 August 2020, from <https://www.ssb.no/statbank/table/11985/>

Stefan, M. (2005). *Service Design: Practical access to an evolving field* (M.A. Thesis: Köln International School of Design). Retrieved 10 August 2010, from http://stefan-moritz.com/welcome/Service_Design_files/Practical%20Access%20to%20Service%20Design.pdf

Stembert Design (2017). *Co-creation & the IoT*. Retrieved 30 December 2021 from <http://www.stembertdesign.com/cocreation-and-the-iot.html>

Stickdorn, M., Hormess, M. E., Lawrence, A., & Schneider, J. (2018). *This is service design doing: applying service design thinking in the real world*. “O’Reilly Media, Inc.”.

Teipel, K. (n.d.). *Understanding Adolescence Seeing Through A Developmental Lens*

Travis, D. (2016). *Desk research: the what, why and how*. Retrieved 27 December 2021 from <https://www.userfocus.co.uk/articles/desk-research-the-what-why-and-how.html>

Trischler, J., Pervan, S. J., Kelly, S. J., & Scott, D. R. (2018). The value of codesign: The effect of customer involvement in service design teams. *Journal of Service Research*, 21(1), 75-100.

Vaajakallio, K., & Mattelmäki, T. (2014). *Design games in codesign: as a tool*,

a mindset and a structure. *CoDesign*, 10(1), 63-77.

Van Mechelen, M. (2016). Designing technologies for and with children: Theoretical reflections and a practical inquiry towards a co-design toolkit.

Western Australian Centre for Health Promotion Research. (2010). My-peer toolkit. Ethical considerations. Retrieved from <https://mypeer.org.au/monitoring-evaluation/ethical-considerations/>



APPENDIX A

Appendix A - ADCo-

APPENDIX A - ADCO-

Phase A and B

This toolkit is structured in the form of playful cards. The deck consists of 58 cards: 8 pink rectangle cards, 9 purple square cards, five each of yellow circle cards (5x3), five each of green circle cards (5x4), and three each of orange triangle cards (3x2).

Every five categories are divided by their functionality described below:

“Intervention”: these cards consist of 8 different types of interventions for improving dental health. These cards are chosen first by the co-designer. On the back of each, there is more description and/or examples for better understanding. (Figure 40)

“Led”: these cards demonstrate two different led groups. These cards are chosen after the Intervention cards. The co-designer may lay the Led card next to an Intervention card. (Figure 41)



Figure40: Intervention cards



Figure 41: Led cards

“Application”: Each Application card provides an option for interventions. These cards are played separately from the other two first cards. On the back of each, there is more description and/or example for better understanding. (Figure 43)

“Action”: Each Action card assigns an action to the purple cards. These cards are chosen after the purple cards. The co-designer may lay Action cards next to the purple cards. (Figure 44)

“Who”: these cards are the following cards of “Receive Feedback From” and “Share With” cards. The co-designer may lay them next to the mentioned Action cards. (Figure 45)

The ADCo- box comes with a 2-side guideline booklet, a name tag, one pack of sticky notes, and a marker. (Figure 42)

The guideline booklet is a simple step-by-step explanation and example that could be used to remind what the facilitator has said.

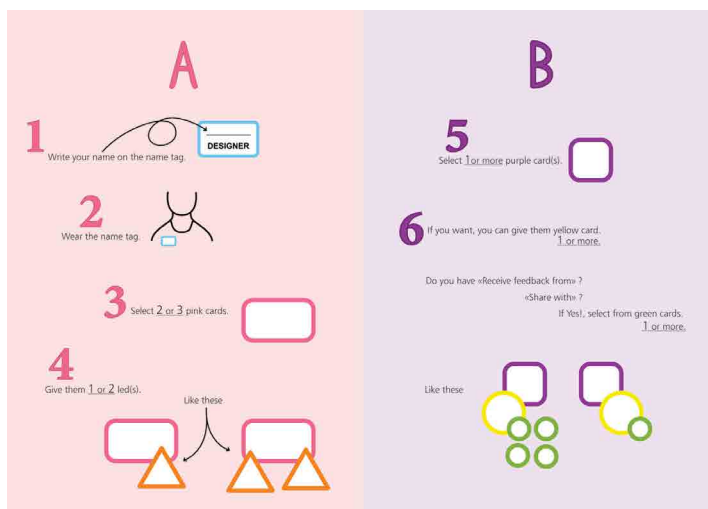


Figure 42: Guideline booklet



Figure 43 Application cards

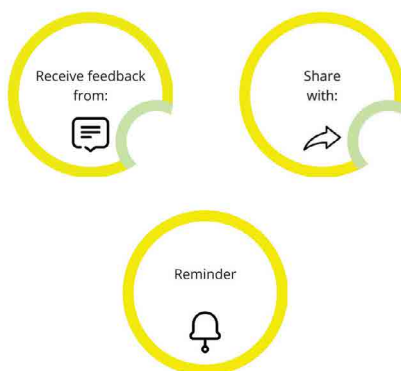


Figure 44: Action cards



Figure 45: Who cards

Instruction

The toolkit was divided into two phases:

Phase A:

All of the Intervention and Led cards are face-up side by side on the table to start ideation. The co-designer must choose 2 or 3 cards from the Intervention cards and put them in front of themselves.

Next, the co-designer must give each card preferred led from the Led cards. It is possible to have both types of leds.

The cards played are set aside.

Phase B:

All of the Application, Action, and Who cards are face-up side by side. The co-designer chooses as many Application cards as they want and puts them in front of themselves.

Next, the co-designer can give each Application card action from the Action cards. It is possible to use all three types for one Application card and none.

“Receive feedback from” and “share with” cards have the following step from the Who cards. The co-designer must select one to four cards from the who cards and put it next to the “Receive feedback from” and “share with” cards.

Cards are played by laying them face-up on the table. The co-designer may change their cards as much as they feel satisfied with their choices. The ideation is over when the co-designer declares.

Then, the facilitator documents this draft by taking a picture or noting down the name of the card that has been chosen and their relations.

The activity finishes with the conversation between the co-designer and facilitator. The facilitator may ask for an explanation for the chosen cards.

Henceforth, it is the facilitators' responsibility to pay good attention to the story and reasons for the chosen cards and the recorder to take notes.



APPENDIX B

[Appendix B.1 - Personas](#)

[Appendix B.2 - Time table](#)

[Appendix B.3 - Workshop 1 Notes](#)

[Appendix B.4 - Workshop 2 Notes](#)

[Appendix B.5 - Workshop 3 Notes](#)

[Appendix B.6 - Workshop 4 Notes](#)

[Appendix B.7 - Evaluation criteria](#)

APPENDIX B.1 - PERSONAS



NAME

Elio

AGE

12

KEY ATTRIBUTES

A bit shy, compare himself to others,
very polite

“

It is hard to get out of bed. Also, I don't find a time when I want to go out with my friends.

”

SHORT DESCRIPTION

He has some friends. He doesn't want to go to the dentist. He scared a little of the operation.

INTERESTS

Music, guitar, video game, hiking and climbing.

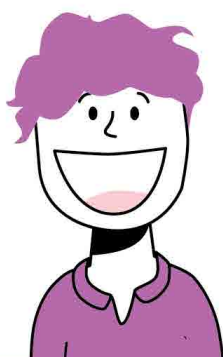
NEEDS

He wants to practice the guitar with his older brother or stay at home and play the video game.

CHALLENGES

He is scared of the dental care operations. He thinks that he spends so much time visiting the dentist.

Figure 46- 49: Personas



NAME

Petter

AGE

14

KEY ATTRIBUTES

Active, strong and energetic

“

I don't like to brush my teeth. It is boring. I want to go out and play football or other games.

”

SHORT DESCRIPTION

He wants to be good looking. He admires football players and their body shapes. He doesn't like to sit in the class for a long time. He wants to be independent.

INTERESTS

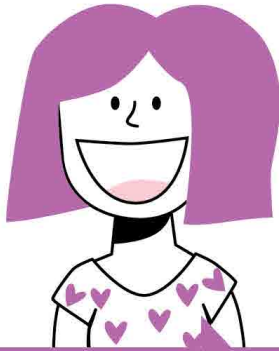
Football, outdoor activities, tiktok

NEEDS

He wants to become an athlete and a famous football player.

CHALLENGES

He finds brushing his teeth boring. He Doesn't pay enough attention to what his parents are saying.



NAME

Katrine

AGE

12

KEY ATTRIBUTES

Self-driven, love school, wants to be normal, don't like to be in the centre of attention.

“

My parents always tell me to brush my teeth. I always forget and my parents tell me to do it. On holidays I don't brush my teeth. My parents also forget to tell me.

”

SHORT DESCRIPTION

She stays home most of the time. She has some friends and one close friend that they practice school projects together.

INTERESTS

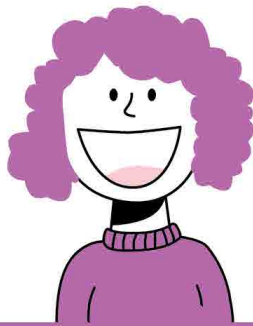
Math, handball, reading books

NEEDS

She want to be the best in her class.

CHALLENGES

She forgets to brush her teeth even though she knows it is important.



NAME

Anne

AGE

13

KEY ATTRIBUTES

likes to be different, would like attention from friends, outgoing, sometimes moody, worries about her look and body shape.

“

I don't mind brushing my teeth, but the toothpaste tastes strong. I don't like its taste.

”

SHORT DESCRIPTION

She is dealing with hormonal shifts. Although she is sometimes moody, she has good communication with her friends. She has so many friends. She really cares about her social media accounts. She wants to be independent. She is usually not at home.

NEEDS

She wants to look nice, have clean and white teeth. She wants to decide on her own stuff, like her outfit, free time activities, hobbies, eating, and activity habits.

INTERESTS

Dance, fashion, social media, tiktok sleepovers

CHALLENGES

Lazy to take care of her teeth. Don't want to visit Dr. She rather's do something else. But she wants to look nice.

APPENDIX B.2 - TIME TABLE

Name of the workshop	Test workshop x		No collection of personal data
Purpose of the workshop:	a. Evaluate the activities, materials, process, rules b. Explore what and in which conditions they want to improve their dental health		
Time: between ? & ?	??/2021, 45 minutes		
time:	Duration	What	How
	00:05min	workshop introduction	facilitator introduce herself. the facilitator present the project and tell them why they are here today. thank you for attending, purpose of the workshop, If there is something you do not want to talk about, that's fine. • Start the workshop
	00:05min	ice-breaking	1. The "name" game: standing in a circle. everyone tells their name and do a little action (each unique) , after everyone done that we all do together call names with the specific action 2. find something in comon. a hobby or favorite food or country been to.
	00:05min	explanation of the game in general and the phase 0 explanation	first start with name tags explaining the goal of the game. By using instructure and the cards in front of the player, explaing each cathegory. tell how many cards they can collect for each cathegory like in the instructure sheet. make sure that they know that there isn't any right or wrong answer
	00:05min	start the game	creat a persona
	00:10min	continue of the game	Phase A explanation
		continue of the game	Phase B explanation
	00:05min	conversation period	do you think XXX (the one intervention card they have chose) is helpful for improving dental health? follow up questions like that.
	00:05min	reflection	Questions to be asked How would you feel about doing this again? how did you find the game? was it fun or boring? was it too easy or difficult? how do you think we can make it better? how do you feel being a designer?
	00:02min	thanks for participating & gift	We repeat that they are part of the process and that they help create better services for everyone.

Why	main responsible	equipment
Get to know each other and explain the day's activities.	facilitator represent about the project and tell them their role in this project (designers). track of time	
a. warm up the conversation among participants and facilitators make a pressure free, fun environment b. learn names	facilitator explain the games and start by herself.	https://www.youtube.com/watch?v=TwcAl69YSyI the second activity in the video (2:00) for the first ice-breaking activity
clear the activity for them	not worry about losing. I make sure that the players understand that there isn't any right or wrong answer	cups, personas, sharpes, post-it, name tag
a. create an imaginary situation b. create a persona, situation, a problem	participants	
a. feel that they are a designer b. generate ideas c. give some boundaries d. solve the problem	facilitator explain the game and let them choose.	cards
	facilitator explain the game and let them choose.	other cards
empathy and understanding their viewpoint	facilitator asks the players to tell their thoughts, story of why they collected those cards recorder take notes	
this workshop is for testing the game. children can give a direct reflection of the game	facilitator asks some basic questions about the game in general,	
	facilitator	gifts

APPENDIX B.3 - WORKSHOP-1 NOTES

Two workshops with a total of 56 children at their school in Trondelag

29 September

Group of the #care4youngteeth<3 project five facilitators for each day

My group 5 students, 12 years old

Purpose: To map the dental hygiene habits and routines of youth and generate ideas and learn about children's context & needs and how they orient themselves around dental hygiene and oral habit, and explore some of the barriers that hinder or motivate oral health.

The material was some A3 papers and some illustrations and text collage to the rolling papers, and some sharpies and sticky notes for each group.

The fictional persona was around their age to see themselves in this character. This person has a problem forgetting to brush his teeth. We have asked children some questions about this persona to see how would they help this person.

After the workshop, we analysed the content we got and summarised the day together.

We went to the SINTEF office and got all the ideas and reflections together.

Reflections:

The material: printed A3 papers and some illustrations and text collage to the rolling papers

Post-its for adding notes and answers to the questions and

activities.

Varying materials, sizes, shapes and colours. It might feel like different activities. So they forget about Kåre.

They Forgot to talk about Kare and referred to themselves. Kåre was not in the centre of attention.

Affected by others in the group, they tend to follow one person and repeat their idea.



Figure 50: Workshop 1 reflections

APPENDIX B.4 - WORKSHOP-2 NOTES

When: 1st November from 15:00 to 15:50, after school

Where: Ablemagic meeting room

With who: 2 friends, two facilitators

Two girls, 12 years old, no parent in the meeting room

Not limited time

body language: hands under the table, around the neck or playing with her hoody. Sometimes whispering with each other.

They were interacting and talking to the facilitator and each other. In the beginning, I asked them if it was ok for them to speak English. During the workshop, it was clear that they were more comfortable speaking Norwegian. In general, they were shy and not willing to say out loud.

What do they ask or say? In the o phase, they almost didn't talk unless the facilitator asked them yes or no questions. There was some debate on choosing a name for the cup and the gender.

In phase A, one said, "Maybe a game, more fun".

For the intervention cards, they talked about a game they have that shows teeth, and the player must clean the teeth.

After picking a mini-game card for their game about dental health cards, the facilitator asked them if that was possible, and they said, yes, we have a game that has so many games inside it, and one showed the application on her phone. And she talked about the game and how it works.

Which part of the activity do they ask? They did not ask anything
How long does it take for them to become comfortable? (break the ice) I found out that they were the same from the beginning to

the end in terms of their extraversion.

How much time does the participant use? How is their user journey? Participants were passive throughout the whole process. The facilitator asked them and picked the cards for them.

To what extent can the user create something unique/something of their own? They have added, edited and created their idea of a game.

To what extent is it fun and engaging? To what extent is it boring? Long pauses during the game. However, the cup was interesting for them. "That was so cool." one participant said.

To what extent is it simple? To what extent is it difficult? It felt quite right in terms of difficulty and simplicity.

To what extent is it intuitive? Do the participants understand the activity? By themselves, by facilitator explanation, by explanation sheet? The game and activities were understandable for participants after the facilitator explanation.

What works and what doesn't?

To what extent can the participants express themselves, and do they want to share their creations?

How is the communication between facilitator and player? An ongoing conversation between facilitator and participants. The facilitator mostly pushed this conversation. Communication was thought the whole activity and not at the end of the game.

How much do they open up? It was hard to make them talk about their ideas or explain their opinion.

What is the story they tell? They said we think a game is good for children and play it with friends. They choose a happy face and a sad face to give the game a character. One of the participants mentioned that “Yes if we lose, we receive a sad face”. They have thought of sharing with friends, and maybe playing the game with the teacher supervision would be nice. Another idea was to play the game in the waiting room before visiting the dentist. They collect the “reminder card” as a reminder of playing the game! They want to receive feedback from parents.

At the beginning of phase A, they chose “TV show” and “game” cards from the intervention category with the supervision of grownups. Learning the new facts card was under the game card but then felt that fits better for the TV-show card, so they changed it. But after all, they ended up only having and evaluating the game, and they didn’t like the tv show idea anymore.

We finished the workshop by asking some questions about the whole process. Was the game boring or difficult? Would you like to do this again? They both said, yes, yes, we would do it again.

Was it too many cards or not enough cards? They said, no, it wasn’t too many, it was just the right amount of cards.

Would you do some change if you could change this game because you can, and this is only a prototype, and if you tell me your opinion I will change it, like the shape of the cards, colours, rules? It was a tricky question, and they didn’t know how to answer, and they said no, this is good.

Which part of the game did you like the most? “The cup.” both said. “That was so cool.” one participant said.

APPENDIX B.5 - WORKSHOP-3 NOTES

Reflection before the workshop: to compare the situation with the previous workshop, I expect the participant to be comfortable and relaxed because it would be her comfort zone and her house. This workshop would be with one participant; therefore, I expect less time for the overall activity. My expectation as a facilitator is to try different strategies during the game to encourage the participant and engage her more.

The workshop day

When: 12/11/2021 after the school at 15:38 for about 30 min

where: participants' house, kitchen

With who: 2 participants, nine years old and 12 years old, one facilitator, the parent was in the location

Body language: comfortable, feet up on the chair, hands on the table, the younger was eating snacks. Sometimes the older looked at, the younger sister and laughed at her choices, not in a humiliating way.

I entered their house with their mother, and they were playing video games, and their mother asked them to go home and play a game with me. So all entered the kitchen and sat around the table. I started the conversation by asking them about their day and the weather. Then we started the workshop. I skipped the name game as an ice-breaking activity. It simply slips out of my mind.

The activity started by asking to give a name to the cup, is it they? I mentioned there is no right or wrong answer. They said it was a she and her name is Petroscha.

The younger sister made a disgusted face while I showed the nasty

teeth on the cup.

I handed them the cup and asked them to pick one tooth condition for the persona. Then I read out loud all the quotes.

I read all the cards aloud and put them in front of both participants one by one and each category at different times.

The younger sister quickly picked a game and then older choice tv and then the younger choice discussion at school. After playing “Led cards”, the older said about the tv show intervention that “that sounds like something I would do at school. We do that sometimes before we take a vaccine.” But, “we’ve done it more than once..”

About the led cards: doing a game with someone your age with a friend or someone you don’t know? “Maybe a friend because then they also learn about it.”

I repeated the persona once in a while to remind them that we were designing something for her and solving her problem.

The younger set a fact for the tv show immediately. The older chose to set a goal and said, “maybe like if you brush your teeth per week, you will level up” “if you get a certain amount of points, then you can like go to the movies.”

“When I think about mini-game, I only think about video games.”

The younger adds, “when you are brushing your teeth while you are being tickled”

They decided that the persona needed a reminder from parents.

The younger said: “Share the facts with the teacher and then the teacher you teach to the whole class.”

Which one would you choose if you could choose only one? the game

Doing the game at home, you usually can’t brush your teeth in the middle of the school.

I didn’t get the impression that it has too many cards.

The Led cards and the yellow cards were difficult and the younger
sad all the cards.

The most fun part of the game pink card

The younger liked the cup.

APPENDIX B.6 - WORKSHOP-4 NOTES

Assumptions: I am going to the same school as workshop 0, I am familiar with the place, and I worked with the same group of children who are participating, and children are in their own familiar and safe location. Because of that, we would feel comfortable and relaxed. This workshop is with five students at the same time in one group. I would expect a little haste and a hectic process. Being the only facilitator would make it even harder to control the situation. Another challenge I see is collecting all the information and observing them is almost impossible as the sole facilitator. With this number of students, I would need two facilitators to observe, take notes, and run the workshop.

The workshop day

The same place (music room), same children. Three boys, two girls. Surprisingly it takes only 40 min.

I started by explaining why they are here and what we want to do. Like the last time, I gave them a little introduction. We played the ice-breaking game. Then we sat around the table, and I explained the game's purpose to them. After wearing name tags, I read the characters' quotes and showed them different teeth conditions. Then asked them to choose one of each.

First, they argued that the yellow teeth match better with the one quote that says he forgets to brush his teeth. We didn't spend much time on this part of the game; most of them agreed then moved on. I then took out all the cards from the box and not all the pieces. I read aloud the intervention cards, and they immediately knew what they wanted. They took three cards: a podcast, something to read, and a game. "A poster in the bathroom, bedroom, he remembers." But, "if he could get a personal therapist," one said and wanted to write on the blank card." "in the podcast, they talk pretty much about health, and if I were this dud, I would listen to a podcast."

Then we moved on to the next step, the application cards. I read out loud all those cards as well. They took all of the cards. For "something to read", the card they chose was "read facts". "Lose and get points" for the game—both physical and digital games. One said, "the game gives us challenges like brushing your teeth over 2 minutes", "using floss", "make a board game with mini-games", "eat something every day", "eat an apple or something every day".

"Set goal" for the podcast. And then they said for a podcast; we can also learn new facts. What kind of podcast? I asked. "Motivational podcast"

They shared the poster with their parents, and one said: "if they don't know why it's there, they're gonna take it out". So one made a new character. See the picture. "To compete with someone" "if you say to the teacher they say to the whole class" "with the dining table we talk about everything with parents" "what if the doctor shares the game with you?"

They made another new character, the school nurse, and they made that by stacking teacher and doctor on each other and calling it teacher doctor.

We talked a lot about toothpaste and its taste. One said, “I like baby toothpaste; it tastes good.”

The other one was concerned about the microplastics in the toothpaste that are made for baby toothpaste. “when you spit it out, it goes down to the ocean.”

Before finishing the game, I rapped everything up by taking the character to each intervention card they chose and repeating what they had chosen for the character and how he might improve his teeth. Then I thanked them for helping him and finding the best solution. “We helped Leo (our imaginary character) survive with healthy teeth,” I said and gave them all a high five. Before handing them the gifts.

What do you think about the game? Was it fun? I asked. They all said yes.

If you could change the game, what would you do? I asked. “I would choose a new character” “keep on going until we have completed all the characters”.

APPENDIX B.7 - EVALUATION CRITERIA

The situation, Experience/ Participation, Design, Conversation, Outcome

Situation -Background data:

How old is the participant?

What is gender?

Is the parent in the location?

Where is the location?

How much time is given to participants?

How many participants?

Experience/ Participation -During the activity:

Body language: what is their body language in which stage of the activity

Do the participants interact? To what degree is it a social experience? With who?

What do they ask or say?

Which part of the activity do they ask?

How long does it take for them to become comfortable? (break the ice)

How much time does the participant use? How is their user journey?

Design -The activity:

To what extent can the user create something unique/something of their own?

To what extent is it fun and engaging? To what extent is it boring?

To what extent is it simple? To what extent is it difficult?

To what extent is it intuitive? Do the participants understand the activity? By themselves, by facilitator explanation, by explanation sheet?

What works and what doesn't?

Conversation -during the activity:

To what extent can the participants express themselves, and do they want to share their creations?

How is the communication between facilitator and player?

How much do they open up?

What is the story they tell?

Outcome - the method

Impact or outcome evaluations are undertaken when it is essential to know whether and how well the objectives of a project or program were met.

Did the method succeed in collecting valuable information?

Reflection - from participants

Was it boring?

Was it too many cards or not enough cards?

Would you like to do this again?

Which part of the game did you like most?



APPENDIX C

Appendix C.1 - Design game toolkit materials

Appendix C.2 - Documentation template

APPENDIX C.1 - DESIGN GAME TOOLKIT MATERIALS

Main Characters

Characters' quotes are listed below:

- I don't like to brush my teeth; it is boring. I want to go out and play football or other games.
- My parents always tell me to brush my teeth. I always forget and my parents tell me to do it on holiday.
- I don't mind brushing my teeth, but the toothpaste tastes strong. I don't like its taste.
- It is hard to get out of bed. Also, I don't find a time when I want to go out with my friends.

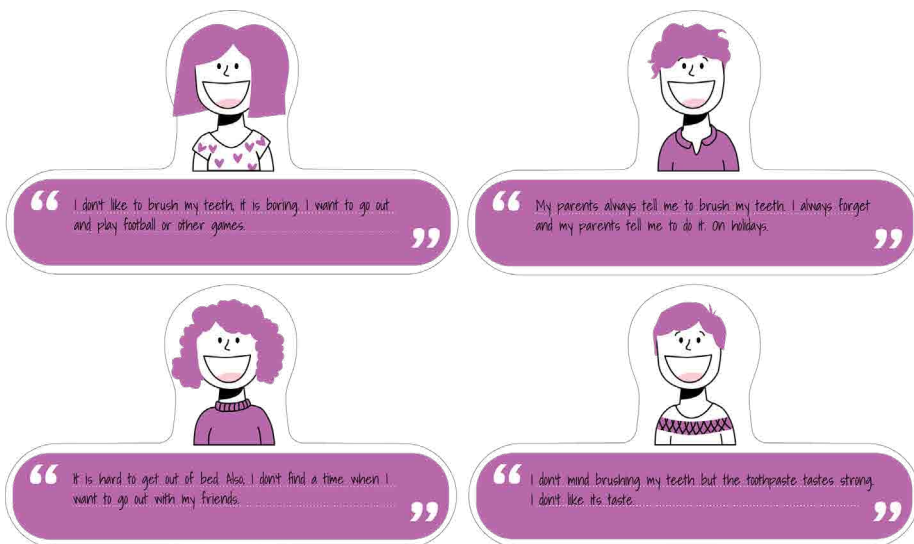


Figure 51: Main characters

Representative of characters

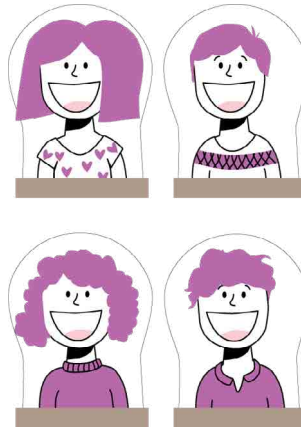


Figure 52: Representative of characters of characters

The Problem Board

There are 4 different illustrations of mouth and teeth. Each shows different situations of teeth (yellow teeth, bracelet teeth, broken teeth, bad breath).

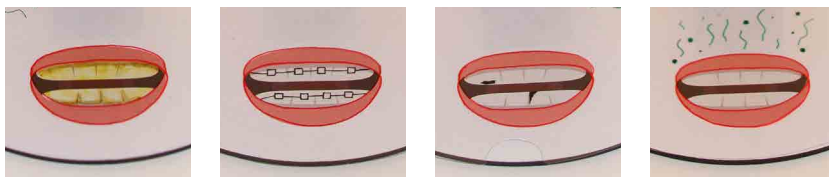


Figure 53 - 56: Problem board illustrations

Play Cards

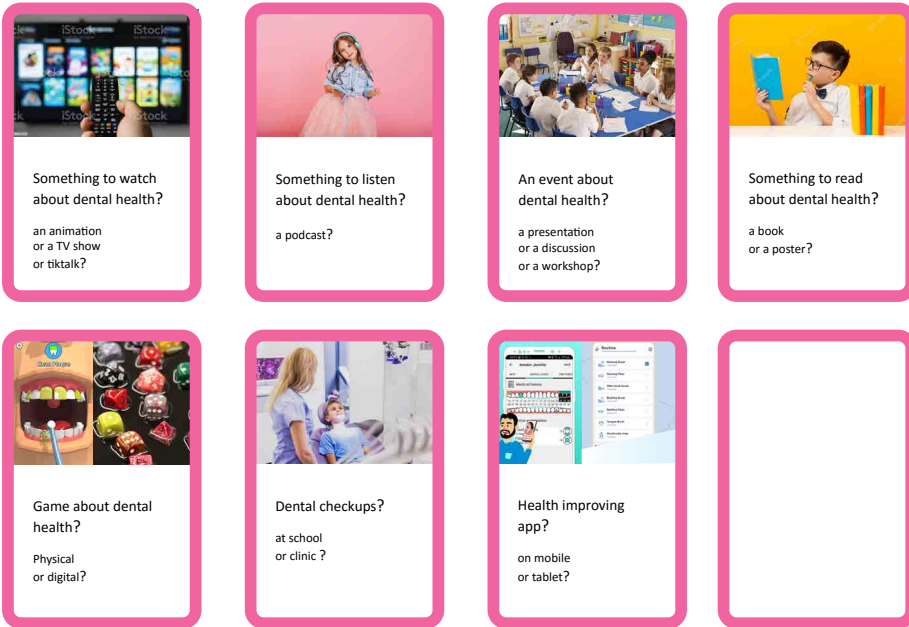


Figure 57: Play cards

Action Cards

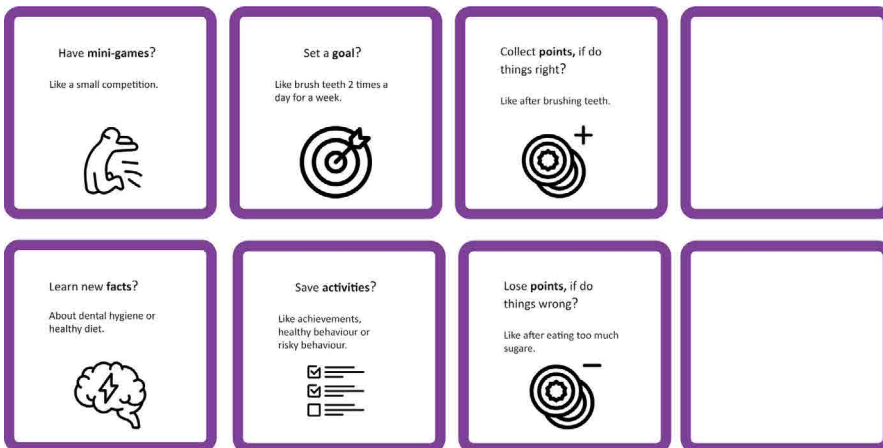


Figure 58: Action cards

Characters

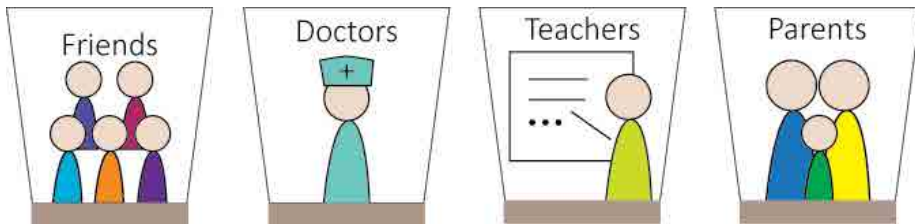


Figure 59: Characters

The Implementation Board

Locations:

Bed, bedroom, kitchen, bathroom, shower, livingroom, school, garden and car

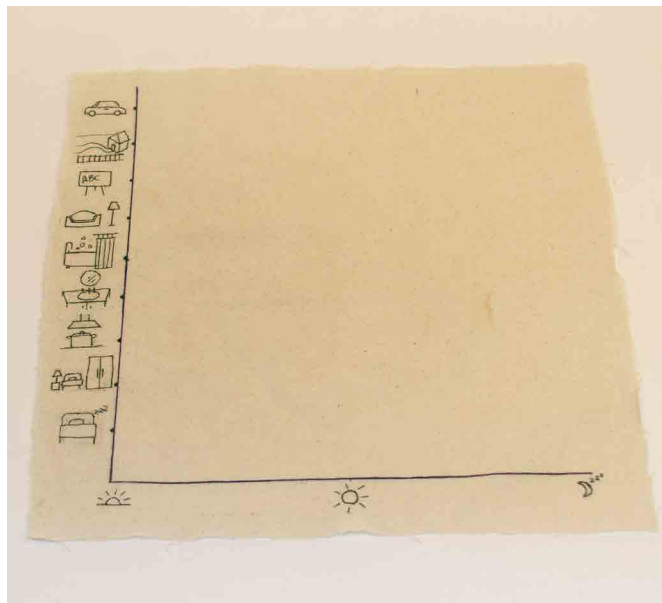


Figure 60: Implementation board

Layers of the package



Figure 61: Package layers

The package

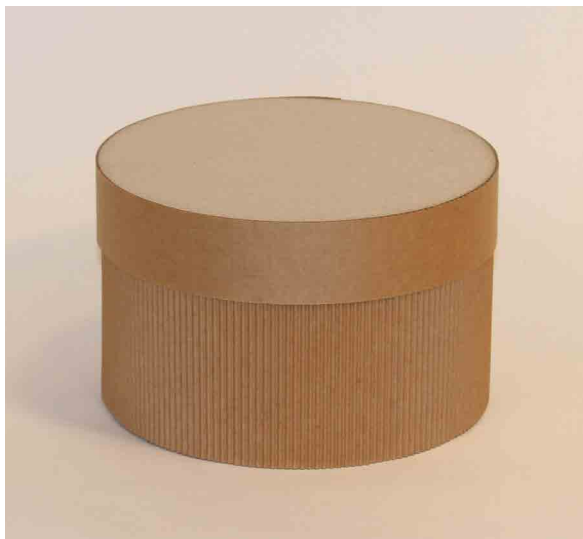


Figure 62: Package

APPENDIX C.2 - DOCUMENTATION TEMPLATE

Purpose:	
THINGS THE PARTICIPANT(S) SAID OR DID:	THINGS THE FACILITATOR(S) SAID OR DID:
THINGS THAT HAPPENED THAT LED TO IMPLICATION:	THINGS THE PARTICIPANT(S) DESIGNED:

Figure 63: Documentation template

