

The Emotion Toward the Ocean

Designing for visitors' empathic experience
in SEALIFE Helsinki Aquarium

Jing Zhu

Master of Art Thesis 2020

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Department of Design
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ABSTRACT

The ocean is vital to human survival, but it is under severe threat from humans, such as overfishing and unsatisfactory waste management. Raising people's empathy for the ocean is helpful for them to take action to protect the marine ecology. Direct contact with nature is an effective way for people to empathise with nature, and the aquarium is one of the ways for contemporary people to contact the ocean.

The purpose of this project is to explore how aquarium service experience could support visitors' empathic resonance with sea life. In the literature review, this thesis research the studies in the field of co-design, service design, empathy and aquarium in order to build the theoretical framework for practical research activities and state the theory for supporting the proposal. The research project conducted interviews with the curator and designer of SEALIFE Helsinki Aquarium, field observation, and held the experience workshop and co-creation workshop. According to the findings and insights derived from the research activities, a proposal containing three measures was proposed by taking service design as the primary method, it includes design principles, empathy engagement activity and the toolkit for the aquarium and designer. The proposal was taken to the feedback workshop with aquarium staff to collect suggestions and feedback.

The research discovered different typologies of visitors in the SEALIFE Helsinki Aquarium from the perspective of empathy, which is adults alone, couples, parents, children, and adults with friends. Research has shown that a series of factors in the service system of the aquarium influence the empathy of visitors, including visitor density, multiple sensory experiences (such as the sound and smell of the ocean), material selection, moving methods, expression of information, distance, connection with life, undesirable service touch-points and the motivation and companion of visitors. The sensitivity of the different types of visitors to different factor is different, only information expression and the distance with the marine life shows have a remarkable influence on almost all kinds of visitors.

This thesis demonstrates that service design can contribute to supporting visitor's empathy with nature, and explores specific service methods to achieve this. It can be part of sustainable future design, however, this thesis offers only a glimpse to the topic, and the long term influence of the study and its impact is to be seen out of the frame of the thesis.

KEYWORDS Aquarium, service design, empathy toward the ocean, designing for empathic experience, sustainable design

1.0 INTRODUCTION

1.1 Background of the Topic

In March 2019, I had the opportunity to engage in a field research trip to the Swen Loven Centre for Marine Science in Kristineberg, Sweden. It was a practice-based project about the empathic experience; each of us had one species that represent ourselves started from the first day of our arrival. In the next few days, we learnt about our species and took a small number of our species back to the laboratory for research. We needed to understand the role of our species in marine ecology and the impact of environmental pollution on the species. In this project, our research team visited the local aquarium and explored how we can make visitors feel empathy with the ocean in the context of the aquarium. Our research team put forward several preliminary proposals, but no aquarium visitors participated in the design process at that time.

The ocean covers 70% of the earth's surface and is essential for the economy, environment and society. It provides crucial and biodiversity habitats and is an essential source of food (DEFRA, 2009). The ocean is exceptionally vital; however, it suffers a multitudinous anthropogenic impact, such as marine pollution and overfishing (Wyles et al., 2013). It is valuable to help people build empathy for the ocean to address ocean sustainability issues since human behaviour plays a central role in this. Specifically, I investigated how the services provided by the aquarium could support visitors' empathic resonance to the ocean. Empathy here refers to our ability to be emotionally affected by others' situation, which enables us to feel like others, care for others, and concern about others (Stueber, 2013).

If people want to build up environmental ethics, then spending time amongst nature is crucial (Mayer et al., 2009). Aquariums and zoos need to be dedicated to making every visit like an exploration for visitors and create a sense of wonder for them (Falk, 2014). Furthermore, building significant contact with nature has many benefits for human physical and mental health and health of the planet (Mayer et al., 2009; Moss, 2012). The aquarium is one of the important places for contemporary people to experience the ocean. Therefore, it may be valuable to explore how the aquarium can provide visitors with the service that supports their emotional experience to the ocean.

1.2 Project Cooperative Aquarium

How can we create a sense of wonder about nature for visitors? How can aquarium improve its service to support visitors' the empathic emotion to the ocean? What are visitors' needs for aquariums? These questions were part of the genesis of this thesis project.

In November 2019, I visited the SEALIFE Helsinki Aquarium and had a series of conversations with the aquarium curator. The challenges aquarium faced were how to increase visitors' time spent in the aquarium and what should they actually do to make sure visitors feel that they learn something. In the first meeting, the curator of the aquarium confirmed that it is appropriate to explore the research question in SEALIFE Helsinki Aquarium. And the aquarium believed this research might have the effect to help them solve the problems they were facing.

Thence, the cooperative partner of this thesis is SEALIFE Helsinki Aquarium; it is a part of the largest public aquarium chain SEA LIFE. This aquarium is owned by Merlin Entertainments Group and the Children's Day Foundation of Finland. SEA LIFE Helsinki Aquarium showcases a wide range of marine life and aims to raise awareness about marine conservation by providing visitors with a fun and amazing experience. It is Finland's leading aquarium and one of Helsinki's most popular destinations (www.merlinentertainments.biz; www.sealife.fi).

2.0 THESIS OBJECTIVES

2.1 Thesis Objectives and Research Question

The research objective of this thesis is the visitors' empathy and its related services of the SEALIFE Helsinki Aquarium. The primary purpose of this thesis is to investigate how service touch-points could trigger empathy of visitors in aquariums. Furthermore, propose solutions to trigger the empathy of visitors in a meaningful way through service design.

A research question was raised to achieve this purpose:

- How can aquarium service experience support visitors' empathic resonance with sea life?

This research question leads to the other two problems that need to be investigated and solved:

- What are the visitor categories?
- What factors influenced visitors' empathic resonance with sea life in the aquarium?

Based on these research questions, the project process of this study is threefold: 1) to establish a baseline for empathy identification in the aquarium environment by reviewing the literature, 2) to find out the service touch-points influence people's empathy with marine life in the aquarium, and 3) to create a proposal to help with the empathic experience for visitors and provide practical guidelines.

This study focuses on three main matters: aquarium, service and visitor's empathy towards nature. This project intends to co-design future empathic aquarium and seek out what elements in the aquarium influence visitors' empathic experience. The aim of the project is to design the service in the aquarium to support visitors' empathic resonance to sea life. Such services are for enhancing the visitor's understanding and interests for marine life and raise visitor's awareness of marine conservation.

2.2 Thesis Structure

This thesis consists of seven chapters. The first chapter is an introduction to the thesis project to help readers understand the context of the project. It briefly describes the origins and partner aquarium of the project. The next chapter outlines the objective of this thesis, including the goals and research questions that need to be answered. The third chapter is a literature review, which reviews the existing literature and theories in the field covered by this thesis. This part helps to establish the theoretical framework of this thesis and guides the subsequent research method selection and proposal development.

The fourth chapter introduces the research process and the research methods. Chapter five discusses the findings and insights of the research and a few assumptions based on feedback from study participants. These findings and insights help to form design criteria that guide the proposal design. The sixth chapter expounds the design proposal; this chapter outlines how proposal solves the design problem and introduces the solutions of this project. After that, the SEALIFE Helsinki Aquarium gave feedback on the design proposal and the design process. According to the comments and suggestions from the aquarium, the design proposal was improved. The final chapter summarizes the design process and explains the limitations and future possibilities of the design project. It also responses to research questions and gives the conclusion of the project.

3.0 LITERATURE REVIEW

The positioning of this thesis can be interpreted from several perspectives. When analysing the topic of this thesis, it can be situated to service design, and the methods applied in this thesis is co-design and participatory design. The environment of this study is in the aquarium; thus, it also needs to follow the aquarium standards and its educational objectives. Furthermore, the research of the visitors' empathy involves knowledge of psychology: several specific studies of empathy in humanity.

According to this guidance, participants in this thesis would conclude aquarium designer and all types of visitors of the aquarium. The age range of participants in the aquarium research activities is broad, including children whose first language is not English. Moreover, 30% of the aquarium's visitors are children. In order to provide this group which may have a weaker ability to express and understand empathy, this chapter also studies how to include children in co-design projects.

In order to comprehend the context of the research and features of aquarium context, it is necessary to review the state of research on the domain. So this chapter reviews the educational role of the aquarium and how current researchers study the impact of aquariums on visitors. The literature in this chapter is the foundation of the research methods used in this thesis to explore what factors influence visitors empathy in the aquarium and what visitors expect for the future empathic aquarium.

3.1 Service Design and Co-design

This project is set in the aquarium, which involves several types of visitors and the aquarium management team. In order to deeply study the different feelings and ideas of all stakeholders, it is essential to choose appropriate research methods. Co-design is a design method widely used in various design fields; this thesis mainly discusses co-design in service design. This section gives an overview of service and co-design and methodologies of them.

Service design is construed as the design of experience that interacts with people by various touch-points, and the experience will occur over time (Sangiorgi, 2009). The content handled by the service design has gradually developed, service design has begun to face various organisations. As the complexity of the process and the goals of the design increase, designers begin to collaborate with more stakeholders and experts (Sangiorgi, 2009; Pacenti and Sangiorgi, 2010). Service design is different from traditional user-centred

design and marketing; it designs with people rather than only for people, people here include the customers and users who related to the service process, service providers, the organisation and its member (Meroni and Sangiorgi, 2011; Polaine et al., 2013, p.34). Service design improves the quality of service, the interaction between the provider and its users, and the experience of users by organising people, base installation, communication, and staff of a service (Mager, 2008). This more collaborative way of designing requires designers to provide new technologies and methodologies to support the process. Since service design focuses on relationships rather than products, it requires good visualisation skills to make the invisible substantive issues visible and tangible (Brass and Bowden, 2008). By understanding the connections and common challenges between stakeholders, service designers find opportunities for design intervention (Brass and Bowden, 2008).

The service is far from intangible, in some cases, it can be social, material, relational, and temporal. Because when time and space change, different users, customers and stakeholders are having interaction with service providers through the artefacts and people in the service (Kimbell, 2011). Service design provides some tools and methods to understand how the behaviour and experience of people in the service context are formed, especially how to involve participants in the process through empathy tools and approaches (Wetter-Edman et al., 2014). The main method of completing experience-focused services is to systematically manage and design customer experience by attentive planning the touchable and untouchable service factors of a service system (Pullman and Gross, 2004). The findings of qualitative research, such as people's needs, behaviours, and motivations, can become the foundation for designers to solve design problems. Qualitative research helps service designers gain a deeper understanding of seemingly chaotic behaviour and emotions (Polaine et al., 2013, pp.38-40).

Touch-points are the contact point between a service provider and customers, they are essential to the customer experience because they link the service provider and the customer (Clatworthy, 2011). Touch-points is identified as important factors to understand the experience of users. By analysing the service process and whether the touch-points are in the right position, we can find out whether the specific service embodiment, including the visual, olfactory, auditory and tactile, is suitable for the service itself and brings the user a valuable experience (Erlhoff and Marshall, 2007, p.356). Therefore, it is regarded as the object and a very important innovation field for service design (Clatworthy, 2011; Secomandi and Snelders, 2011). Material artefacts, environment, and interpersonal interactions, these multiple touch-points between a service organisation and its customers are created by service designers (Secomandi and Snelders, 2011).

Touch-points contain artefacts support the service interaction, making service interaction more effective and desirable (Penin, 2018).

Using co-design when designing for services will bring benefits for both the for-profit and non-profit sectors (Mager, 2009). Co-design can generate ideas to improve the creative process, improve the outcome of the project, improve project management, and improve the longer-term outcome of market or society projects (Steen et al., 2011). Participants in co-design projects should understand the purpose of service projects at first and then make sure their co-design activities and its benefits keep same with these goals (Steen et al., 2011).

The origins of co-creation in the field of design can be traced back to the 1980s; the Participatory Design movement took place in Scandinavian countries involved workers in the innovation of new framework in the workplace (Ehn and Kyng, 1987, cited in Lee et al., 2018). Participatory design is widely used in multiple areas, such as products, service, space and system design, allowing people who are closely related to design to join the design team when designing what is important to them (Erlhoff and Marshall, 2007, p.291).

It believes users can join the design process as "experience experts" (Visser et al., 2005), but designers need to provide them with the appropriate tools to express themselves in order to help them competent for this role (Sanders and Stappers, 2008). Besides, the convenience of the design process is an important new goal for design projects, as more and more non-designers are involved in the project process (Hatami and Mattelmäki, 2016).

The main approach to involve stakeholders in the design project is to organise affairs with identifiable stakeholders within the organisation. In this process, designers need to pay attention to power relationships and provide resources to strengthen the capabilities of disadvantaged and marginalised groups (Bannon and Ehn, 2012). When designers are planning design activities, choosing approach, translating materials, and making decisions, it is essential to understand the roles of participants accurately (Halskov and Hansen, 2015, p.90).

3.2 Co-creation with Children

The guidance on participants selection exists in co-creation and participatory design. From the perspective of co-creation, designers should try their best to invite participants with different knowledge and different interests, and giving participants equal rights to express themselves (Lee et al., 2018). This section studies how to involve the disadvantaged group children in the design project.

The participation level and form of children in design projects are continually evolving. In the traditional research methodologies, children appeared in the process merely as the object of research; this approach was criticised because it was not “research with children” (Barker and Weller, 2003). After that, four ways for children to participate in the design were discovered, children as user, tester, informant and design partner (Druin, 1999). Later, children’ role as co-designer was also proposed (Van Doorn et al., 2013). Children jointly determining the direction and outcome of the design process as co-designers, they are active participants rather than passive search objects. To support this process, technologies and design methods should be adjusted according to children’s needs (Dindler et al., 2005; Gielen, 2008; Moser, 2012; Van Doorn et al., 2013; Van Mechelen, 2016).

New methodologies have been developed to support children’s participation in the design process, including drawing, focus group discussions, observation, spider diagram, resource mapping and seasonal calendar (Young and Barrett, 2001). Drawing is especially suitable for children who are not good at writing and speaking, and it is interesting for children (Young and Barrett, 2001) In the follow-up analysis of children’s drawings, researchers should pay attention not to misunderstand children’s drawings or impose adult interpretations in the painting (Punch, 2002). Systematically ask children in an open way what their painting meant to them and why they chose to draw the content is a more appropriate method (Punch, 2002).

In order for children to participate in the co-design activity of the aquarium environment, we should pay attention to some guidelines of how children participate in the process of design. To focus on children’s engagement in the design process, the designer should pay attention to four special aspects:

1. Use the environmental context that the children are familiar with.
2. Remind the children of the activities that have happened before.
3. Express in the methods that children are familiar with.
4. Use the appropriate way to collect information (Kelly et al. 2006. p.367).

Some common points have been defined of the participatory design project that involved children; these definitions can be used as guidance and framework when working with children:

1. Children have the right to listen and participate.
2. Children are experts in their own lives.
3. Children should participate in the projects that are closer to their actual life to remain their motivation to participate.
4. The method should be explained in detail, according to the child's personal needs.
5. The purpose of children's participant in design is to improve the quality and happiness of children's lives.

Throughout the process, designers should accompany children in an actual environment rather than in a laboratory environment, and children should be given the opportunity to influence design decision (Halskov and Hansen, 2015; Lee, 2019).

3.3 Empathy Towards Animal in the Aquarium

People's empathy level is potentially related to their environmental behaviour, so helping tourists build empathy is becoming one of the main goals of environmental educational organisations, such as aquariums and zoos (Berenguer, 2010; Chawla, 2009; Young et al., 2018). This section mainly reviews the research on human empathy for animals and how environmental education institutions can participate in helping visitors establish emotional contact with animals and nature.

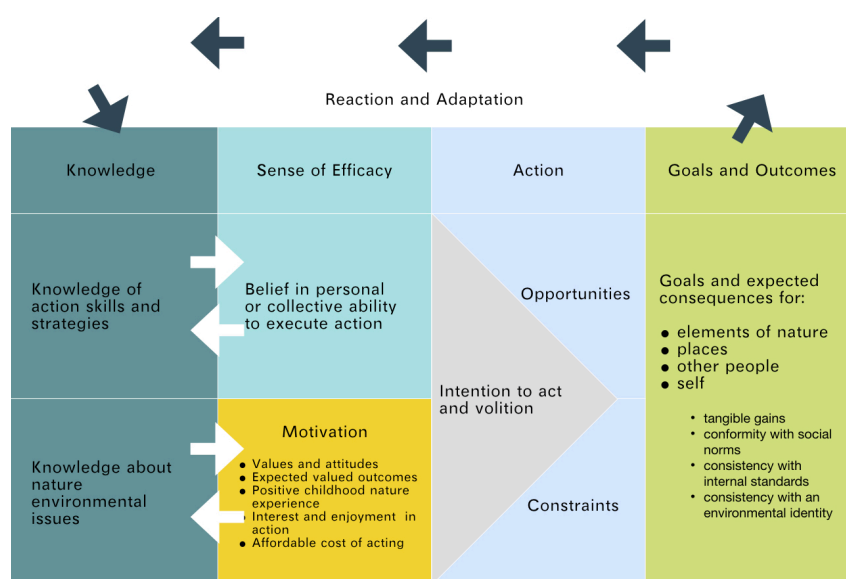


FIGURE 1

Factors associated with action for the environment (Chawla, 2009)

Compared with people were told to maintain an objective attitude, people who concerned for animals damaged by contamination cared more about the environment (Schultz, 2000). As shown in **FIGURE 1**, action on the environment is sometimes driven by empathy and compassion (Chawla, 2009) Research proved that participants who show a high level of empathy provide more moral reasoning evidence than those with low empathy. When the object of empathy is an animal, the moral argument of ecologically-centred nature increases (Berenguer, 2010).

With the development of research in this field, later studies have found that the extent about how people involved in the activity that triggers empathy can predict their willingness to donate to the Environmental Association (Young et al., 2018). These findings support conservation psychology because they are the basis of empathic research that can help with environmental conservation.

The theoretical connection between empathy and behaviour was established, aquariums and zoos provide a place to foster environmental identity, which would lead human to care and concern for animals (Clayton et al., 2011). Environmental education organisations like aquariums and zoos are playing the role of building a bridge between animals and people because empathy may become a new effective emotional motivator and can help predict human' environmental behaviour (Young et al., 2018). These organisations provide people with opportunities to develop intimacy connections with animals, which is a key part of fostering empathy (Young et al., 2018).

In the current conservation work of aquariums or zoos, the most important thing is to build the connection between humans and nature through learning experience; such connection leads to pro-environment behaviours (Luebke and Grajal, 2011). Emotional intentions such as empathy toward nature and comfortable feeling have an important influence for predicting responsible environmental behaviours (Ramsey and Hungerford, 2002, p.152; Luebke and Grajal, 2011)

In informal learning experiences, researching the impact of educational experience sometimes can be difficult. One method thinks that the impact of zoos and aquariums on empathy inferred by finding the existence of research-supported best practices. Six best practice categories now appear in research and literature. In previous research and literature, six best practice categories generated (Owen and Seattle Aquarium, 2019).

Framing

The way aquarium frames their conversation about the animal, and the words they choose have an important influence on children's empathy (Owen and Seattle Aquarium, 2019). Moral educators, such as parents, also play a key role in the process of children's empathy development. For this kind of moral education, it is an effective way to emphasise the possible harmful consequences of the behaviour and the suffering of the victim (Chawla, 2009; Owen and Seattle Aquarium, 2019). The language and behaviour of the educator have the influence to discourage or encourage children's empathy (Chawla, 2009; Owen and Seattle Aquarium, 2019).

Framing also includes the environment, how people interact with the animal, and so on. In short, any treatment of animals by staff at an aquarium or zoo, or by researchers involved, may inadvertently help children and visitors develop a more positive relationship with the animals (Owen and Seattle Aquarium, 2019).

Modelling

This moral learning of animal attitudes and emotions is established through modelling, relationships, dialogue, practice, and confirmation (Bergman, 2004; Owen and Seattle Aquarium, 2019). Adults with strong environmental morals thought are their childhood role models affect them (Chawla, 2007). Educators and parents are essential in the development of children's empathy (Chawla, 2009; Owen and Seattle Aquarium, 2019). Educators or caregivers could physically simulate the empathic behaviour they want students or children to perform when they get their attention (Owen and Seattle Aquarium, 2019).

Increasing knowledge

Cognitive empathy believes that people's cognition, the experience of life, and apprehension of their feelings are helpful in understanding animal emotions (Myers, 2007). Students increase their understanding of their emotions and the experiences of others then they can more accurately perceive the feelings of others (Myers et al., 2009; Owen and Seattle Aquarium, 2019). The media also plays an increasingly important role in it. The positive caring pictures show in the media may be absorbed and learnt by children, to support children's caring for animals and people (Arluke, 2003; Owen and Seattle Aquarium, 2019).

By understanding the subjective experience of animals better, we can improve empathy by combining knowledge and sensation, and using the power of sensation to improve empathy (Hill, 1995; Owen

and Seattle Aquarium, 2019). For instance, sharing information about why animals behave in a certain way and sharing the position of individual animals in an aquarium (Owen and Seattle Aquarium, 2019).

Providing experiences

People can build a connection with nature through spending time on it or have interactions it (Cheng and Monroe, 2012; Owen and Seattle Aquarium, 2019). Adults who care about nature mostly spend their childhood in nature (Chawla, 2007, 2009; Owen and Seattle Aquarium, 2019). The aquarium and zoo provide visitors with the chance to watch and touch the animals, or they show how the animals eat and comb their hair. Those kinds of natural experiences will lead to visitor's deeper connections with animals. Animals interacting with visitors in the exhibition will also build deeper emotional connections, especially when there are no staffs (Owen and Seattle Aquarium, 2019).

Practice

The practice provides people with the opportunity to triumphantly practice empathy and get positive comments when they are observed (Owen and Seattle Aquarium, 2019). Where many visitors already have empathy feeling towards animals, affirming their positive environmental behaviours will help visitors to build their ecological identities (Myers et al., 2009; Owen and Seattle Aquarium, 2019). People's participation in caring for animals may have an effect on empathy development (Arluke, 2003; Kohl and Wenner, 2012).

Activating imagination

Stimulating imagination can also help people better understand others' position. In social work and medicine field, perspective-taking activities take a core role for empathic development (Gerdes et al., 2011; Owen and Seattle Aquarium, 2019). Emotional-based experiential learning can help students develop empathy in class (Gerdes et al., 2011). The educator asks "How do you think it would feel if someone did that to you?" is also a common way to stimulate empathy (Owen and Seattle Aquarium, 2019).

There are many other ways to inspire empathy:

- Role-playing is a good method, and the people be involved need to imitate the identity of animals. To successfully achieve this goal, people need to observe the species they play and understand the knowledge of the species. This allows people to experience the feeling of being animals and foster their empathy for animals (Owen and Seattle Aquarium, 2019). Children imitate

animal postures and movements. Such role-playing shows that animals have different lives and emotions than people. Some researchers think that this is a bridge between humans and other species (Chawla, 2009).

- People enjoy storytelling to create empathic responses when they identify with the characters (Owen and Seattle Aquarium, 2019).
- Children's connection with animals can be increased by telling stories about the lives of that animal (Owen and Seattle Aquarium, 2019).

We can find that these best practices are basically aimed at how educators, researchers and staffs could do to guide and develop children's empathy properly. A few research put children and adults on the same platform to explore how to create an empathic bond. It is a meaningful attempt to explore the way to support empathic resonance that is effective for both children and adults.

Another important thing is, the above six best practices are mainly about people; what educators, parents, researchers, and staffs could do to emerge children's empathy. Services are complex systems composed of artefacts, people and their organisations, interaction and communication, and environments (Sangiorgi, 2011). Rarely research explored the influence of other factors on the empathy of visitors; this is what this project would do.

3.4 The Educational Role of the Aquarium

The ocean is significantly vital for human; however, it is suffering multitudinous anthropogenic impact (DEFRA, 2009). Educate people about marine knowledge and develop an apprehension of human influence and possible behavioural solutions is a way of reducing human influence on the marine (Wyles et al., 2013). Moreover, research has shown that it is more effective to experience nature first-hand than to receive knowledge of scientific principles in a classroom environment (Dewitt and Hohenstein, 2010). The aquarium is one of the environment that can provide the first-hand experience to improve people's understanding of the ocean. The institutions like aquariums provide visitors with chances to see sea life, educate them about environmental conservation, and inspire more behaviour of environmental protection (Patrick et al., 2007).

The main effect of aquariums and zoos is to promote animal and habitat protection since the 1990s (Wyles et al., 2013). European law requires aquariums to cooperate with educational activities, research activities, and conservation activities (EAZA, 2016). Therefore aquar-

iums and animal associations need to set clear educational objectives. **CHART 1** shows educational objectives for two organisations.

CHART 1 The educational objectives of animal associations

WAZA (World Zoo and Aquarium Conservation Strategy)	"The educational role is to interpret living collections to attract, inspire and enable people from all walks of life to act positively for conservation." (WAZA, 2005)
EAZA (European Association of Zoos and Aquaria)	"To create an urgent awareness among the many millions of European zoo visitors of the fact that the long-term survival of a thriving human population on earth is fully dependent on the rapid development of sustainability on a global scale. And, through the creation of this awareness, to evoke individual and collective political action aiming at reaching global sustainable levels of all human activities within the next three to five decades." (EAZA, 2008).

However, there is a blurring between educational goals and measurable educational outcomes (Moss and Esson, 2014). Although people once thought that the growth of knowledge can affect people's attitude towards science. But in fact, teaching scientific knowledge cannot be directly translated into changes in people's scientific behaviour (Jensen and Wagoner, 2009). It cannot be assumed that the increasing knowledge of visitors is equivalent to changing the behaviour of visitors (Moss and Esson, 2014). Visitors build their meaning of the visiting based on the knowledge, attitudes and motivations they had before (Falk, 2005).

Accurately evaluation of the relationship between aquariums and zoos and their visitors is essential. However, this thing is not as simple as giving the visitors question (Jenson, 2014). There are several scientific methods for research aquarium and zoo's impact on tourists. One regulation methodology is pre and post-test. This method uses the same questionnaires to collect data on visitors' motivations, knowledge, attitudes and protective behaviours before and after people's visiting of the aquarium or zoos. Follow-up interviews are conducted simultaneously after the visit to record changes in people's protection behaviour (Hughes et al., 2011).

For children, the above method is not advisable. One way to measure children's gains in aquarium and zoo visits is asking children to draw a place where animals live in the wild. Researchers can study

whether their understanding of nature has changed by comparing the content of their paintings (see **FIGURES 61-62**) before and after the visit (Wagoner and Jensen, 2010). Painting allows children to express their understanding, this method is more suitable for young children and those people whose first language is not English but participate in research that conduct in English (Jenson, 2014). This method can only measure children's knowledge and understanding of wildlife. One point should be noted that the increase in knowledge does not represent the change of emotion or behaviour.

The knowledge and attitudes that aquariums and zoos should convey to tourists have also transferred during the years research. Experimental exhibitions pointed out that visitors were ready to accept complex information at the level of wildlife learning (Sickler et al., 2006). Therefore, contemporary aquariums and zoos should not pay too much attention to basic information. It may be more worthwhile to spend time on specific conservation measures or natural history information (Falk, 2014).



FIGURE 2

A child's painting of the place where animals live in the wild before and after her visits (Jensen, 2014, p.1009).

3.5 The Trigger Indicator of Empathy

The theory of empathy dates back to the nineteenth century; German aestheticians believed that people could obtain emotion from an object, especially architectural or natural; they used the word *Einfuehlung* or 'feeling into' to describe it (Eisenberg and Strayer, 1990, p.18). Although the word 'empathy' was initially used to describe the feeling of oneself reading or feeling objects. Empathy was originally defined as fairly instant sensory and emotional sharing, but this definition used only a short time in history. Later it more referred to the point of view understanding, role-playing, social sensitivity and human perception (Strayer, 1990, p.218). Now its more common usage is the ability to experience other people's or animal's feelings cognitively and emotionally (O'Connell, 1995; Phillips, 2009, p.47)

Empathy can help develop people's sympathy for animals; it no longer focuses on animal suffering but encourages visitors to take action to focus on improving animal life (Young et al., 2018). Developing human's empathy to animals has been the contemporary device to inspire tourists of aquariums and zoos to conduct environmental protection behaviour (Knudson, 2019). Based on this, this thesis argues that we can help visitors to promote animal welfare awareness by understanding how people's empathy in aquariums is triggered.

Empathic response is the most commonly used term in the literature that refers to the result of emotion determination and the influence sharing process (Phillips, 2009). Under the standard definition of empathy, we need two criteria to judge whether the empathiser is in empathy. The first is that the empathiser correctly identifies the emotional state of the target, and the second is that the empathiser shares the emotional state of the target. If the empathiser does not accurately judge the target emotional state, then even the empathiser shares the state of the target they judge, we believe that they do not meet the standard definition of empathy (Bird and Viding, 2014). Therefore, in the process of conducting aquarium research, we need to make sure that the participants correctly recognised the situation of marine creatures before we identify participants shared the emotional state of marine creatures.

In Australia, a research group designed and analysed interactive installations for six orangutans to understand the form of empathy in the human experience by watching the animals interact with technology. The team developed four interactive applications for animals and found three specific methods for elicitation of empathic responses from visitors: (1) enabling visitors to watch the animals' instinctive behaviour in the near distance attentively; (2) enabling visitors to see the cognitive ability of orangutans; (3) allowing visitors to watch the differences attentively in the behaviour and preferences of individual

animals (Webber et al. 2017).

After that, the team spent four weeks on conducting semi-structured interviews with 25 visitors to discuss aspects of the process. The interview question includes whether they had learned something from experience and how their perception of the animals was affected. In semi-structured interviews, the team rewarded with feedback such as "they seem to enjoy it", "she is interested in using the back of her hand to play with patterns" and " I kind of love them. So anything that helps them, I think, is fascinating." The authors believe that the various forms of empathy they observed in the process are apparent. Whether it is cognitive empathy or affective empathy, the interview evidence all prove them (Webber et al., 2017). In this case, the method of confirming the occurrence of empathy was cognitive compassion or emotional compassion appeared in participants expression.

The current definition of empathy emphasises a series of cognitive, emotional, and physiological mechanisms (Neumann et al., 2015). The effective empathy content in this research is derived from the eight conceptualisations Batson proposes, including:

- Empathisers understand the emotion and cognitive state of others.
- Empathisers match the posture or nerve response of others.
- Empathisers feel the same as others.
- Empathisers think about being in another's situation.
- Empathisers imagine the feeling and thinking of others.
- Empathisers understand how to think and feel in another's situation.
- Empathisers feel distressed for the experience of another.
- Empathisers feel another's suffering (Batson, 2009, pp.16-28).

4.0 METHODS FOR RESEARCH AND DESIGN

This thesis is based on a practical project to explore what factors in the aquarium affect the visitors' empathy towards nature. Its main output is a proposal of how to support visitors' empathic resonance in the aquarium. Because of the complexity and particularity of the aquarium background, the research approach of this project is progressive and iterated. In this process, I complete one-step research, harvest and organise the research results, and then determine the research method for the next step.

The research process conforms to ethics and research norms. The data collection of the research involves photo-taking, recording and notes taking; these actions are conducted with the permission of visitors and participants. Workshop participants signed the consent form to give the authorisation to use their data, photos and recordings, and children participant' guardians signed the consent form for them. The literature review in the previous chapter helped design and establish this research process. For instance, how to identify the empathy of visitors in the aquarium environment, how to scientifically let the participants report and state their emotions and empathy.

At the first step of the research, I conducted interviews and field observations. The information from this part helped me build an understanding of the design context and users. Then I identified a list of participants for the research activities and made sure that this list included all types of aquarium visitors. The literature research was carried out concurrently with the above ones; the theoretical knowledge I gained helped me to establish the theoretical framework of this thesis. The theoretical framework guided me to design the main part of the research activity: experience workshop and co-creation workshop. These two workshops helped me understand the experience, interaction, emotions, and ideals of the five types of visitors in the aquarium. By studying the different experience processes of the five types of people and their design concept of the future aquarium, I obtained a series of insights and established a solution proposal to solve the research problems. In the end, I designed a proposal which includes three measures and took it back to the aquarium and invites the staff of the aquarium for a feedback workshop. The feedback workshop involved the aquarium management team in the design process and gave me feedback and ideas to iterated and optimised the design results.

I divided the entire research process as the problem exploration phase and the solution development phase. During the problem exploration phase, I conducted interviews, field observations, and

experience workshops. During the proposal establish phase, I held a co-creation workshop with visitors and a feedback workshop with the aquarium staff. For this research project, these methods were chosen to gain a comprehensive understanding of the SEALIFE Helsinki Aquarium and encourage the stakeholders to express their feelings and opinions.

In the co-creation workshop, the data was collected mainly through audio recordings and photos. Recordings were transcribed and analysed after each research activity. While conducting field observations and the experience workshop, I took notes, photos, and some videos to record the behaviour and environment of visitors. After each research activity, I transcribed, organised, and analysed the data. After one phase of research was completed, I established and generated the research results.

4.1 Problem Exploration Phase

4.1.1 Interview with Aquarium Curator

I organised the first meeting with the curator and designer of the SEALIFE Helsinki Aquarium in the mid of November 2019. The purpose of this meeting was to collect the necessary information about the aquarium, such as its design concept, challenges and concerns. This interview had a prepared outline, including visitors, environmental protection, educational goals and some other aspects of the aquarium. The focus of the interview remained broad to capture a general overview of the aquarium.

This interview was the first time this project met the aquarium, and it also assumed the functions of self-introduction and the introduction of this project. It was also the first step in establishing a trust and co-operation relationship with the aquarium.

The participant of the interview was Mr Markus, who understand all aspects of the aquarium and also is the aquarium designer. The SEALIFE Helsinki Aquarium has a simple organisational structure, and the regular meeting holds on each Monday, in which they report and discuss information between departments. So there is a situation that the curator knows and is familiar with all the matters in the aquarium.

This interview consisted of four topics; the selection of them was based on the literature review. These topics were:

- Basic Information
- Future
- Education
- Project cooperation

4.1.2 Field Observations

At the beginning of the problem exploration phase, I conducted two field observations in December 2019 and February 2020 in the aquarium. Each field observation lasted one to two hours. The choices of the observation time were the regular and peak periods of the aquarium, in order to reduce the impact of visitor density on visitor behaviour. The observation aimed to build a deeper understanding of the visitor and the aquarium. In this session, I observed how different visitors have different behaviour in the aquarium and recorded some data, including visitor types, typical behaviour, age, gender, and background.

The SEALIFE Helsinki Aquarium is an aquarium with a fixed itinerary. If the visitors do not return along the original road, their visiting sequence will not change. In this process, different types of visitors will not lead to different tour routes, but they may have different preferences and neglected places.

I made sure to observe several different types of visitors, including couples, families with children, tourists, and individual visitors. The scope of the observation also included Finnish visitors and international visitors. Some behaviours occur unconsciously, so I attempted to stay in a far enough distance from the observed visitors to ensure that their behaviour was as unaffected as possible. What I wanted to observe was where visitors stayed for a longer time and where they took pictures to record.



FIGURE 3

Photo from the field observation.

4.1.3 Experience Workshop

In order to gain feedback from visitors about empathic experience in the aquarium, I designed an experience workshop. The time of the experience workshop was at the beginning of February 2020; this time was the transition between peak season and low season of the aquarium. During this period, the aquarium was not too empty or too crowded, and this is the most common scene of the aquarium. The design goal of this research project was repeatedly emphasised in the invitations sent to all participants and before every design activity started. I tried to ensure that everyone in the research process conducted the design activities with the understanding of the project objectives.

This workshop consisted of two parts, first was an experiential activity and then was a semi-structured interview. I made sure that participants of the workshop included as many types of visitors as possible: families with children, couples, adults come along and adults come with friends. **CHART 2** shows the list of participants. The whole process was around one hour and forty minutes; the time to experience the aquarium was about one hour and ten minutes, and the interview process lasted around thirty minutes.

It was essential to prepare the appropriate tools for participants to understand their empathy emotion and experience about empathy in the workshop. Therefore, in the experiential activity, I designed a species empathic package which included a task card and a species sticker. The task cards and stickers had six different species that live in the aquarium. After participants entered the aquarium, they needed to choose one task card to identify the species associated with them. Then participants needed to attach the species sticker on their body and imagine they were the species itself during the aquarium tour. Moreover, they also needed to complete three tasks on the task card, these three tasks were the same to six species; they were:

1. Find your species and start to know yourself.
2. See if there is a species related to you.
3. Find out what humans can do to protect your species.

After participants chose the task card, I explained in detail to the participants what they needed to do and answered their questions. However, after they entered the aquarium, I conducted shadowing observation and did not communicate with them to avoid affecting their behaviour patterns. The main observation object was when participants would empathise with the marine life in the aquarium, what kind of behaviour they had, where they stayed for a longer time, and what kind of dialogue occurred between them.

After that, the same participants sat together to discuss and share their feeling about the experience they had in the aquarium. The purpose of this section was to gather feedback, comments and suggestions from participants. This section had two main topics: experience and empathy. In the experience part, participants talked about their previous aquarium experience, why they came to the aquarium, and the moments when the aquarium made them unforgettable or upset. In the empathy part, participants discussed what empathy meant to them, whether such activities made them feel connected to the species, and whether their aquarium experience was different from previous experiences.

After the discussion, I conducted semi-structured interviews with each participant to confirm the occurrence time, objects and forms of empathy of them in the aquarium. The previous chapter helped me with developing the method of confirming the occurrence of participants' empathy in the aquarium tour:

- During the experience workshop, participants talked with their peers about cognitive compassion or emotional compassion.
- During the aquarium tour, I recorded the places where participants had evident emotion expression and confirmed the causes of that in the semi-structured interview.
- In semi-structured interviews, the visitors described their experiences and self-reported the occurrence of empathy.

CHART 2 Basic information of the participants.

Group	Parents			Children			Couples						Adults			
Name	Gero	Molly	Nick	Johannes	Bernie	Linden	Bach	Shushu	Yankin	YanJun	Visser	Xuerong	Xiaoyi	Xuyang	Xin	John
Age	45	43	43	10	4	3	28	28	25	24	28	28	24	25	28	30
Gender	Male	Female	Male	Male	Male	Male	Male	Female	Male	Female	Male	Female	Female	Female	Male	Male

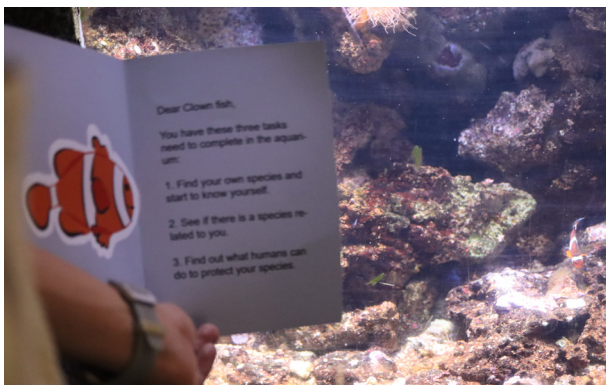


FIGURE 4

Task card of the experience workshop.



FIGURE 5

Photo from the experience workshop.



FIGURE 6-8
Photos from the experience workshop.

4.2 Solution Development Phase

4.2.1 Co-creation Workshop

After participants participated in the experience workshop, I invited them to continue this co-creation workshop. This workshop aimed to gather their ideas about future empathic aquarium. The participants of the co-creation workshop were the same as the experience workshop, which were a total of 16 people from the four types of aquarium visitors. The workshops held at the cafe and the beach room of the aquarium.

In this workshop, firstly, participants needed to fill out an information card, and then they imagined what kind of aquarium they would design for their visitors if they were an aquarium designer. During this process, I provided participants with coloured pens and A3 blank paper. They could draw their dream aquarium by themselves or with the people who came with them. After that, participants shared and introduced their aquarium ideas and discussed them together. In the end, I asked participants if participating in the workshop had inspired their empathy, and what was their feedback to this workshop. The co-creation workshop lasted about 40 minutes.

When participants found it challenging to start painting, I gave more specific questions for them. For example, what kind of species they wanted to show to their visitors, which way they wanted their visitors to feel connected with the ocean, and how to let their visitors realise that they need to protect the ocean.



FIGURE 9

Photo from the co-creation workshop.

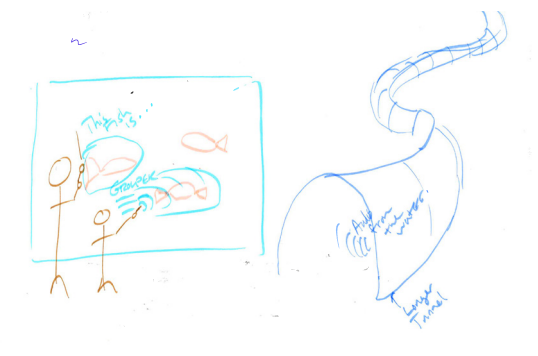
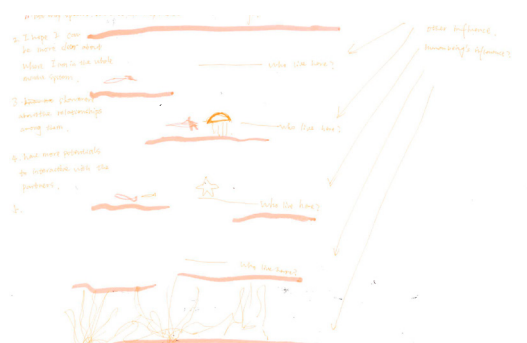
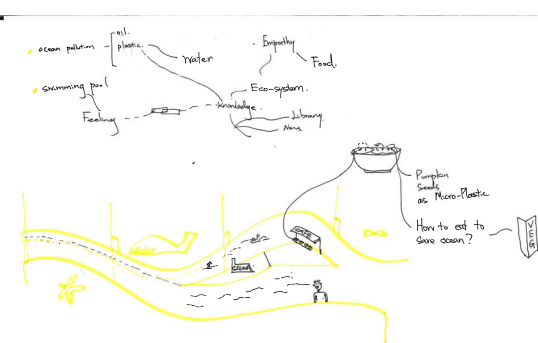
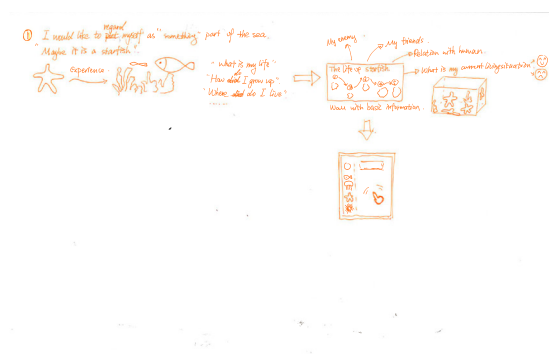
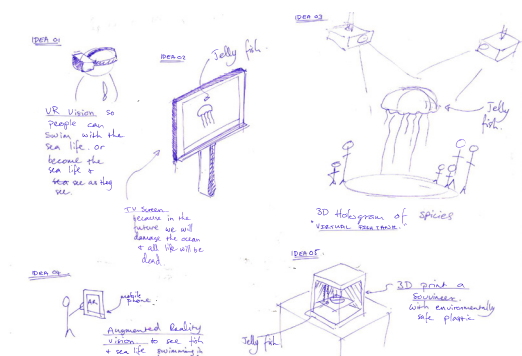
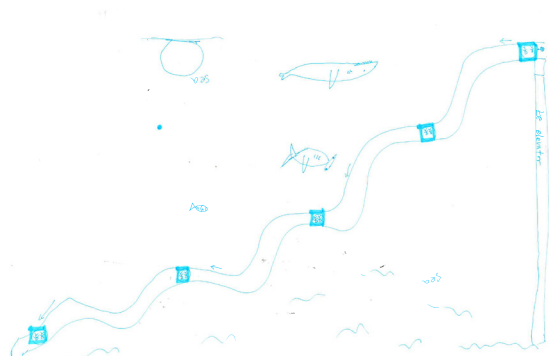
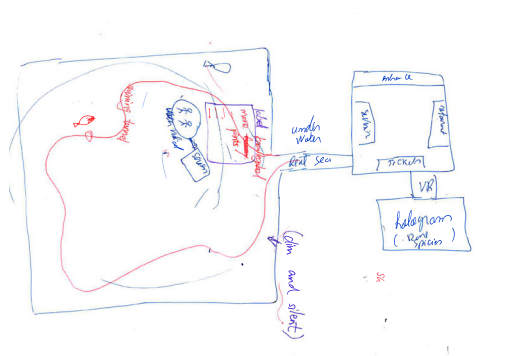
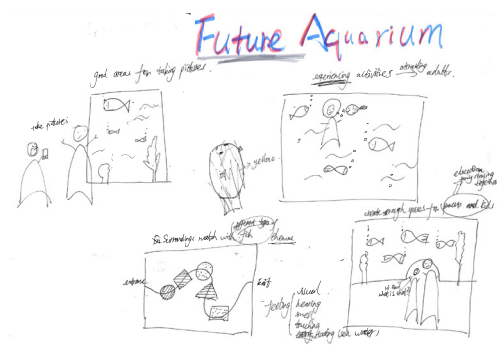


FIGURE 10-19
Paintings from participants at the co-creation workshop.

4.2.2 Feedback Meeting with the Aquarium

In order to better optimise the proposal and make the proposal more suitable for the SEALIFE Helsinki Aquarium, I hold the feedback meeting with the curator of the aquarium. After the interview, field observation and two workshops, I proposed a proposal which including design principles, empathy engagement activity and the toolkits for the aquarium. In the draft of the proposal, the second part had two activities, origami exhibition and jellyfish tour.

The feedback meeting was taking place at a corona-virus time in Finland, and the aquarium has been closed for a month. Therefore, the feedback meeting was conducted remotely. At the feedback meeting, I showed the curator of the aquarium my research process, research findings and insights, and proposals. And he gave comments and suggestions for each part in the meeting. Then the curator shared the proposal in the internal meeting of the aquarium and passed some suggestions from other departments of the aquarium to me by email.

Here is some feedback from the aquarium:

Technologies like VR are not suitable for small aquariums. Small aquariums like the SEALIFE Helsinki Aquarium do not have enough space for multiple VR devices. If the number of VR devices is too small, visitors who want to try will be kept waiting; it will lead to dissatisfied feedback. Technologies such as interactive walls that allow multiple visitors to experience together are more suitable for small aquariums.

It is better to arrange more activities for people to stay in the sea laboratory. Firstly, there is a blank in the ocean laboratory, and the aquarium is seeking for things to put in it. Secondly, the fish Mikko living in the sea laboratory feels sometimes depressed because it wants to see people.

Put more interesting things in the final part of the aquarium tour. When visitors enter the aquarium, they feel excited. But when the tour is about to end, they begin to feel bored. Putting interesting and attractive things in the second half of the tour route can help to keep visitor's interest in the aquarium.



FIGURE 20

Photo from the feedback meeting.

4.3 Analysing and Mapping

The data and information obtained in the research process were multi-dimensional, so I used several methods to analyse them. Before analysing, I aggregated the data and information from every separate research activity.

First of all, I developed a user preference map (see **FIGURE 22**) based on the user journey map. This map not only shows the journey of visitor in the service process but also shows the preference of each research participant for each tour section. This map assists the subsequent analysis of the visitor typologies and also shows which section in the aquarium have attracted most visitors.

In the process of analysing visitor typologies, I used the chart (see **FIGURE 21**) to show every participant's behaviour, feedback, and ideas about empathic aquarium at first. Then summarised the characteristics and concerns of each tourist; from the result, I found five different types of visitors among the participants. In the end, I used the Venn diagram (see **FIGURE 23**) to summarise and present the characteristics of these five types of visitors and their common points.

As for getting insights, I used an affinity diagramming (see **FIGURE 24**). I categorised the participants' similar feedback, behaviours and ideas, and then gave them titles. Finally, I got research insights which support the proposal development through this.

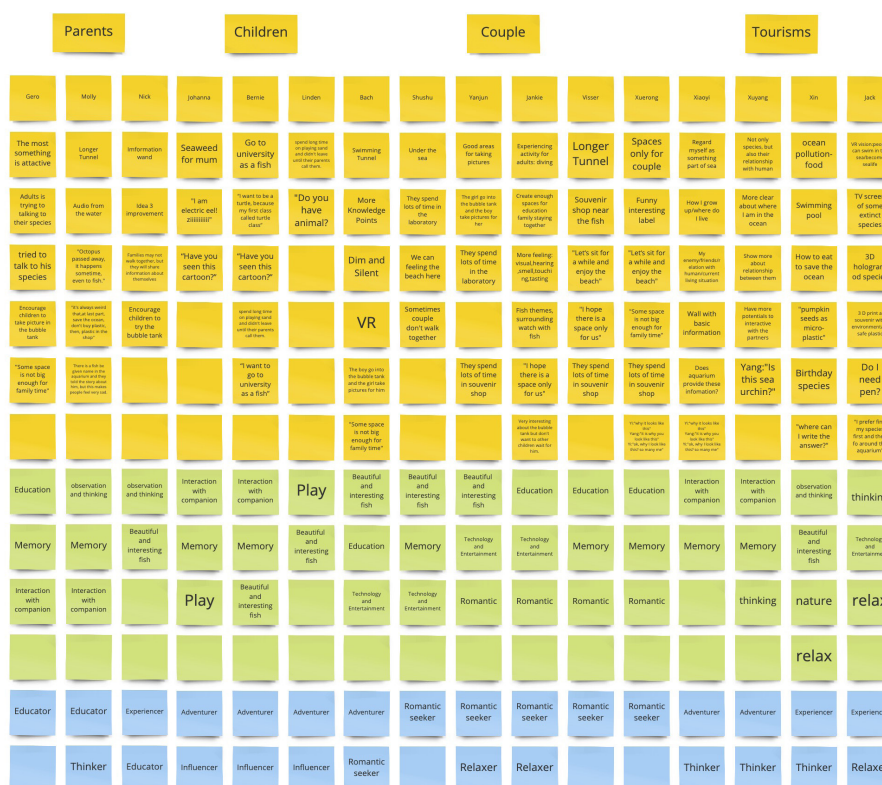


FIGURE 21
Chart of participants' behaviour, feedback and ideas.

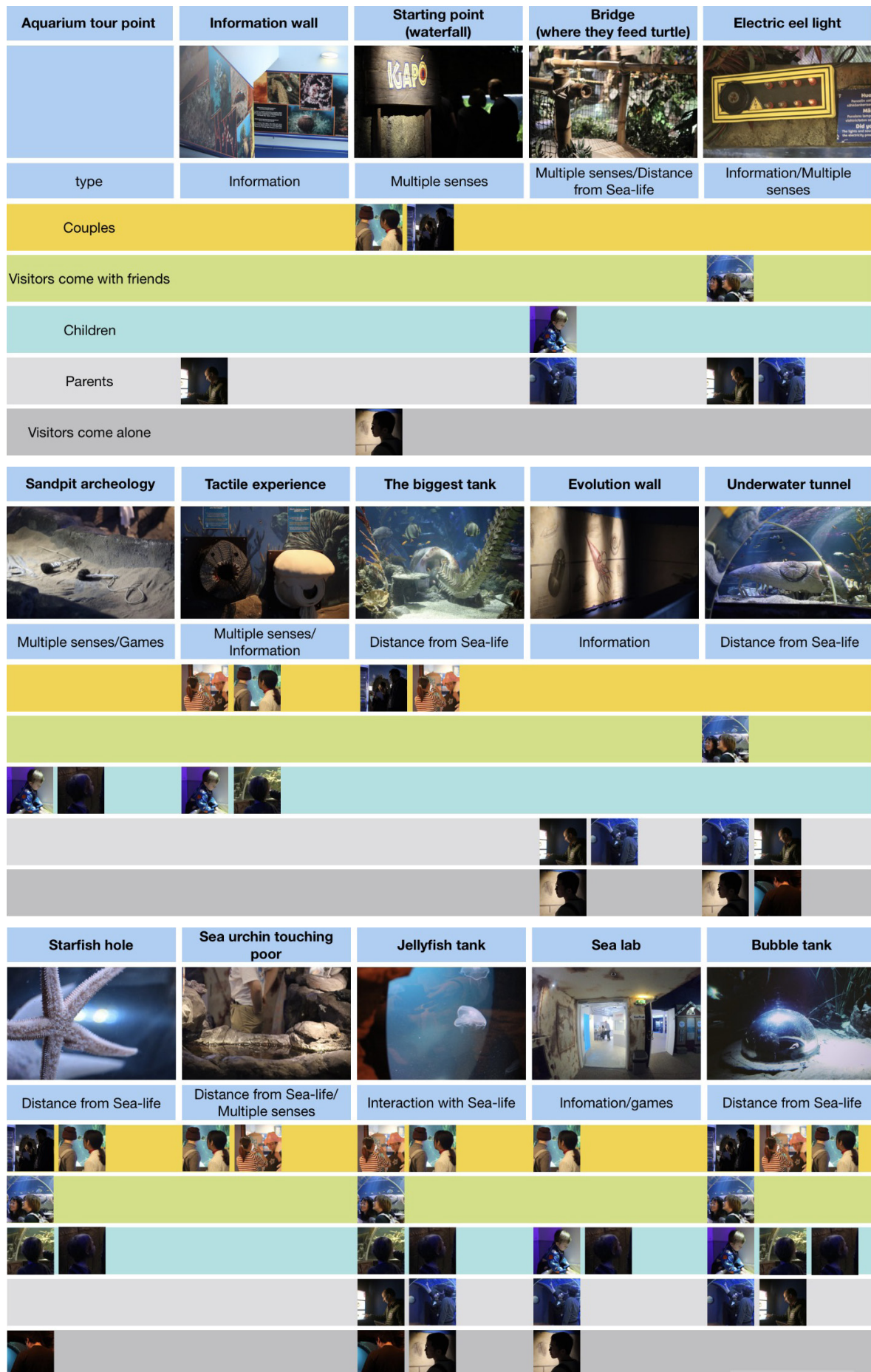


FIGURE 22
User preference map.

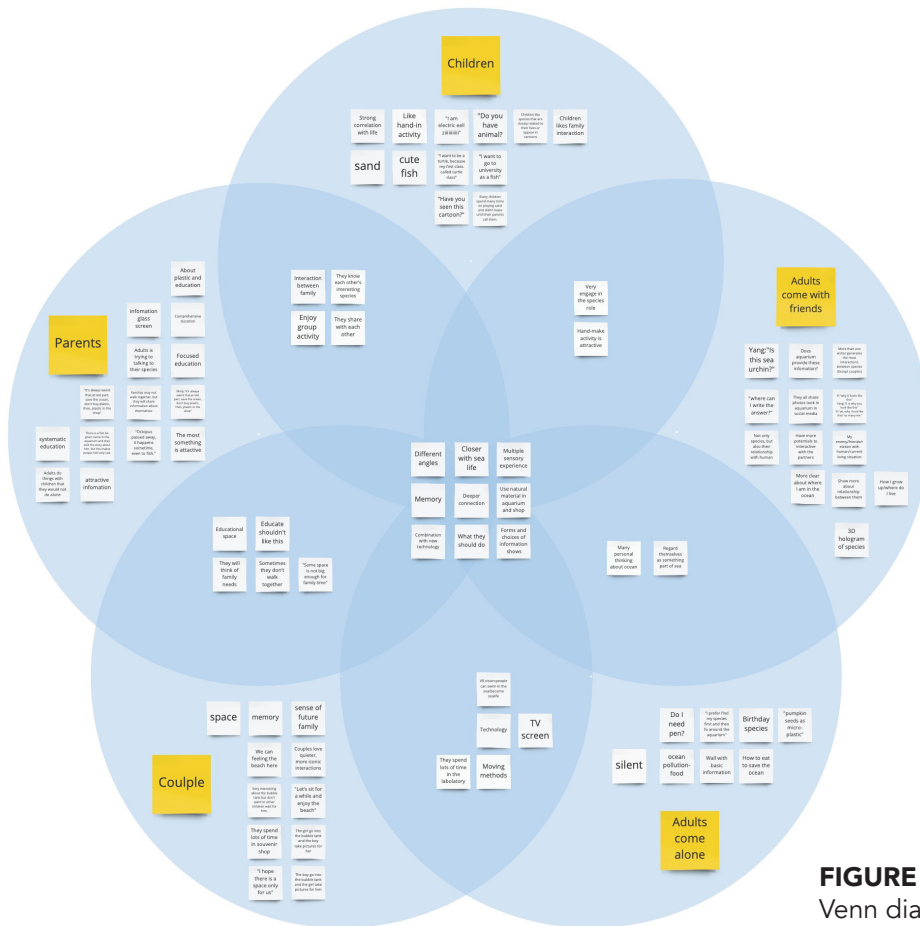


FIGURE 23
Venn diagram of visitor typologies.

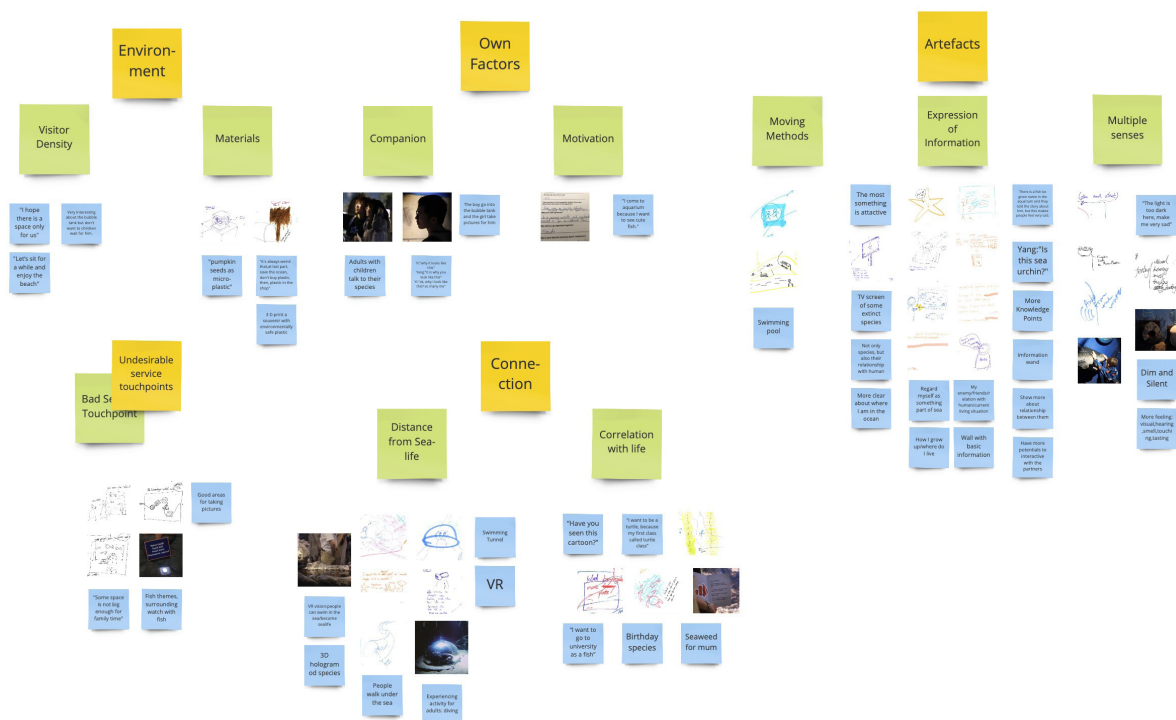


FIGURE 24
Affinity diagramming.

4.4 Limitations and Opportunities

This research project aimed to understand how designers can support visitors' empathy to marine life in the aquarium. In the research process, I explored the typologies of the visitors from empathy perspective and different types of visitors' vision for the future aquarium.

The visitor group of the SEALIFE Helsinki Aquarium is children from school trips, families with children, couples, and tourists. According to the regulation in Helsinki, conducting research in primary school requires the permission of the Helsinki education station, so the school trip group was missing in the research process. Although the research still had children participants in the family group, children's behaviour patterns may be different when they with peers from with their parents.

Participants in this research project were Finnish, German, American, Chinese, Australian, Malaysian and Indian. The research was conducted in English, but most of the participants were not native English speakers. Therefore, sometimes the participants may not express themselves accurately, and sometimes the participants used their language to communicate, and I could not catch it well. The language problem may delimit the research.

Furthermore, only young couples participated in this research project. In the research plan, I set the couple participators as multi-aged couples and sent the invitation to a total of seven couples. Unfortunately, three couples who responded to the invitation and participated in the research were all under thirty years old. Although from the perspective of participant classification, they all belong to couples, but different ages may cause different behavioural patterns and feedback. There was a lack of information and data from middle-aged and older couples in the process of establishing the user typologies.

Additionally, the aquarium had different activities every day. Although the four workshops all held in the aquarium, they were not in the same room. The workshop environment may affect the participant. In this research project, due to objective constraints, this variable was not well controlled.

5.0 RESEARCH FINDINGS AND INSIGHTS

This chapter begins from introducing findings and insights based mainly on the primary research, including the experience workshop, semi-structured interview, observations and co-creation workshop. The findings include visitor typologies and the factors that influence the empathy of visitors in the aquarium. This chapter also discusses participants' feedback on the species empathic package used in the experience workshop, which is the important support for the empathy engagement activity in the final proposal. It ends with the limitations and the opportunities of the research process.

5.1 Visitor Typologies

In this research project, the establishment of user typologies was an iterative process, which kept getting closer to the target in a step-by-step research process. The initial user classification came from the interview with the curator of the aquarium. The aquarium has a clear understanding of its user group; they are families, school children, couples, local adults and tourists. The proportion of these five types of users is similar, accounting for 20% of the entire user group.

The research which concentrates on the differences of tourists found that different tourists prefer different factors of the experience in the zoo. One of the reasons for the difference is the family; family visitors pay attention to child-related facilities (Sickler and Fraser, 2009). Different visitors benefit from visiting the aquarium in different ways, this mainly depending on their background of knowledge and interest (Falk et al., 2008). Therefore, we have reason to believe that when we classify visitors for different research purposes, the types of visitors will be different.

During the field observations, I observed the different behaviours of these different visitor groups in the aquarium. Then based on the preliminary user classification, I invited all types of visitors to participate in two workshops. These two research workshops found that the visitor's classification is different from aquarium customer classification when we look at the problem from the perspective of empathy. According to visitors' different sensitivity to different conditions that trigger their empathy and their different expectations for future empathic aquarium, I divided the visitor group into five categories. The five categories are: adults alone, adults come with friends, parents, children, and couples.

At the same time, these five types of visitors have some same characteristics. For example, almost everyone said that their empathy emotion is more evident when they are closer to marine life. And

almost all participants from the workshop said the underwater tunnel and the bubble tank where they could be surrounded by sea life, made them feel like they are sea life. Almost all adults believed that they already knew knowledge about species and the ocean, but they wanted to know what they could do to protect the ocean. Regarding the expression of information, almost everyone was easily attracted by such information as the most dangerous species, and this type of information left them with a prolonged impression. The following section introduces the differences between these five types of visitors.

Couples

Couples have special characteristics, and they share some similarities with both parents and adults alone. This group is introvert about showing caring for its associated species in front of their lovers. They like the more subtle factors that support their empathy to sea life. For instance, the sound of running water at the aquarium entrance, couple participants said it helps them get into the role of sea life.

Cognitive empathy was more effective for them, saw what happened to marine life in a polluted environment in the sea lab helped more than half of the couple participants feel the suffer from marine life and the importance to take action to protect the ocean. Elements in the environment can help with couples' imagination. One group of participants sat near the sandpit of the aquarium and imagined that they are sea life living near the beach.

The factors that support their empathic resonance to sea life are environment and multiple sensory experiences. They prefer a space where they can be alone to experience the ocean. At the same time, almost all couples showed a desire to use high-technology in future aquariums to support visitors' empathic resonance to sea life.

Education and taking photos were two of the most important elements for their aquarium trip. The educational ability of the aquarium was valued for couples. The three couples participators in workshops were all unmarried and childless, but these three couples have shown anticipation about their future family trip to the aquarium. They cared about whether the environment of the aquarium was suitable for family education. They also tried to find the place in the aquarium that was suitable for taking the joint photo to save their memories; taking photos was essential for their aquarium journey.



FIGURE 24

Photo from experience workshop. Couple participants were sitting in front of the sand pit of the aquarium and imagining that they are sea life at the seaside enjoying the beach.

Parents

Parents group has unique characteristics in the context of the aquarium and shares some similar characteristics with both children and couples. When parents are with their children, they do some things they would not do alone. For instance, parents participants engaged in having interaction with their species and share information about their species to their children.

Their companion, the children, are the effective influence factors of their empathic experience in the aquarium. Parents participants understood that they should be models to their children in the aquarium, so they encouraged children to learn about species, to engage in species role-playing, and to understand marine conservation concepts. Moreover, parents were more likely to be influenced by the undesirable service touch-points to interrupt their role-playing and empathic states, especially touch-points about ocean conservation and education.

This group care about interacting with their children and also like the place where provide families interaction activity in the aquarium. Parents participants liked the experiential activity in the experience workshop, and they thought that such family activities allowed them to spend a joyful time with their children and made it reasonable to ask their children to learn some knowledge about the ocean.

This group is also valued the educational role of the aquarium. Participants in this group paid attention to whether the aquarium conveyed the message of environmental protection well, and also pointed out the deficiencies of the aquarium from this perspective.

"It's always weird that, at last part, save the ocean, don't buy plastic, then, plastic in the shop."
—Parents participants at the experience workshop



FIGURE 25
Photo from the experience workshop. Parents participant was sharing his species information with his child.



FIGURE 26
Photo from the experience workshop. Parents participant was trying to say hello to his species.

Children

In the aquarium context, children participants have unique characteristics, while sharing some same characteristics with parents and adults come with friends.

Their empathy is easily triggered by the species associated with their lives. If the species is directly related to their life, or the species is their favourite character in the cartoon, then that species will stimulate their empathy. When children participants' empathy were triggered, they said they want to be the species, perform behaviours of the species, introduce the species to others as a friend, volunteer to learn about the species, and expressed sadness when being told that the species had died.

From the field observation and the experience workshop, it could be seen that children were interested in hands-on activities. The areas where they spent a long time in the aquarium was the archaeological sandpit, the interactive machine, and the treasure chest with a button to control.

At the same time, this group is also interested in the interaction with their families in the aquarium. Children participants liked places where they can play with their families and take pictures with their families. They also considered family as one of the influential factors when designing future empathic aquariums.

"I want to be a turtle, because my first class called turtle class"

—Children participant at the experience workshop

"Have you seen this cartoon?"

—Children participant at the experience workshop



FIGURE 27-28

Photos from the experience workshop. Children participant was enjoying hands-on activities.

Adults Come with Friends

The group of adults visitors who come with their friends has unique characteristics and some common characteristics with children and adults alone. This group highly got into the species role-play. They cared about whether there was a relationship between their and their friend's species in the experience workshop. They frequently simulated conversations between species and reminded each other when they forgot to play their role.

For them, artificially establishing some connections between them and the aquarium species is an appropriate way to support their empathic resonance with sea life. After the relationship was established in the experience workshop, they were interested in information about their species and thought that the expression of information is a good way to help them develop empathy with the species. They wanted to treat every creature equally and regarded the species as a friend. Several participants said aquarium do not provide enough information about species, and they wanted to know what their species eats, where it lives, and how it grows up.

This group is interested in using social networks. Every participant in this group shared experiences and pictures of the aquarium tour on social media after leaving the aquarium.

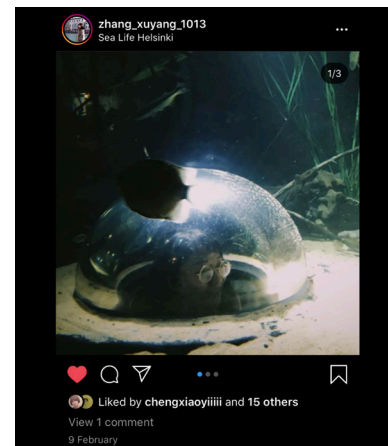


FIGURE 29

Photo from the social media of one adult participant who came the aquarium with friends (published with the permission of the participant).

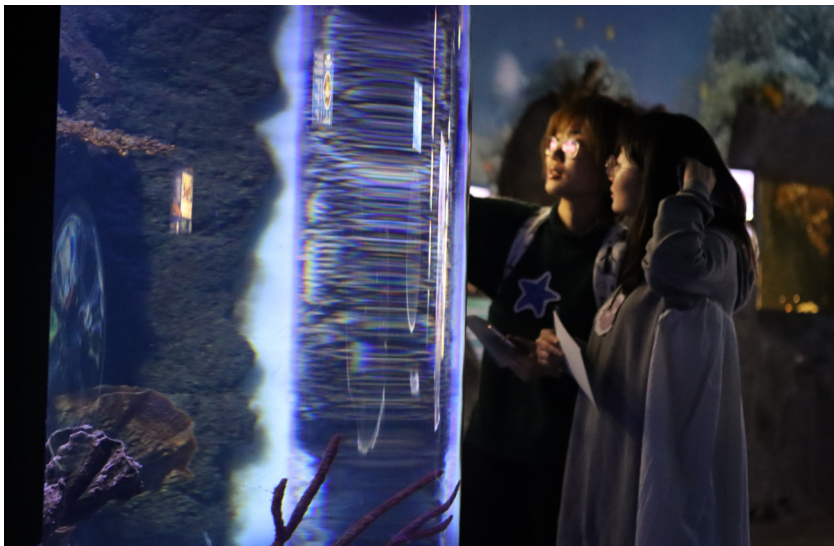


FIGURE 30

Photo from the experience workshop. Adults come with friends were playing their species roles in front of the species' tank.

Participant 1 : "Why it looks like this?"

Participant 2: "It is why you look like this."

Participant 1: "OK, why I look like this? So many me."

—Adults come with friends at the experience workshop

Adults Alone

Adults who come aquarium alone have unique characteristics and have some similar points with couples and adults who come with friends. Because this group visited the aquarium alone, they did not have communication throughout the role-play activity. Information of their empathic experience mainly from their self-report in semi-structured interview and ideas in the co-creation workshop.

During the experience workshop, they rarely showed they were imagining themselves are marine life. However, they were sensitive to information and environment. From their perspective, it was not necessary to build a relationship with a particular species to trigger their empathy. This group build up their emotional connections with the species by understanding and thinking about species, and the various information expression methods are suitable ways to support their empathic resonance.

The aquarium's environment and multi-sensory experience are also the main factors affecting empathy for them. One participant said the aquarium saddened him due to the internal environment of the aquarium was too dark. Another participant said he wanted to be closer to the sea life and better understand their experiences. He gave some examples, like swimming when enjoying sea life (The swimming place for human and the pools for sea life are entirely separate, which more like a combination of natatorium and aquarium), or eating some food that simulates plastic sea pollution food to understand the feeling of living in a polluted ocean.



FIGURE 31

Photo from the experience workshop. Adults come alone was meditating in front of the image of species evolution

5.2 How Environment of Aquarium Influence Visitor's Empathy

5.2.1 Multiple Senses

Multiple sensory experiences can trigger participants' empathy for the ocean in the aquarium. The supporting evidence for this insight comes from the participants' conversation, design ideas for the future empathic aquarium and semi-structured interview. Smell, sound, taste and vision were the primary senses mentioned by participants.

In the experience workshop, participants believed that the sound of water of the small waterfall at the entrance of the aquarium made them feel the change of the environment and they were entering the ocean world, but the sound of water only appeared at the entrance. In the co-creation workshop, participants mentioned that the current aquarium lacked the experience of smell, sound and taste. They thought that the smell and the sound of the ocean could help visitors empathise with the ocean. One participant said he wanted to taste food that simulates the plastic pollution of the ocean in the cafe of the aquarium to understand sea life's feeling of eating the contaminated food. Another participant mentioned that the light in the aquarium was too dark, gave him a sad feeling.



FIGURE 32-33

Photos from the co-creation workshop. Participants' idea about multiply sensory experience to trigger their empathy in aquarium.

5.2.2 Materials

The selection of materials in aquariums has an influence on the emergence of visitors' empathy. The supporting evidence for this insight is derived from semi-structured interview and participants' design ideas for the future empathic aquarium.

Participants in workshops believed that natural materials should be used in aquariums to support visitors' empathic resonance with nature. At the same time, participants believed that designers should use environment-friendly materials as much as possible in environment educational association that are responsible for delivering marine conservation. One adult participant said the selection of material in the aquarium represents the environmental awareness of the aquarium's organisation. If the environmental educational association themselves failed to implement their educational concept, it would make their visitors doubt the concept. One child participant said he preferred the wooden bulletin board because he liked the texture and smell of the wood.

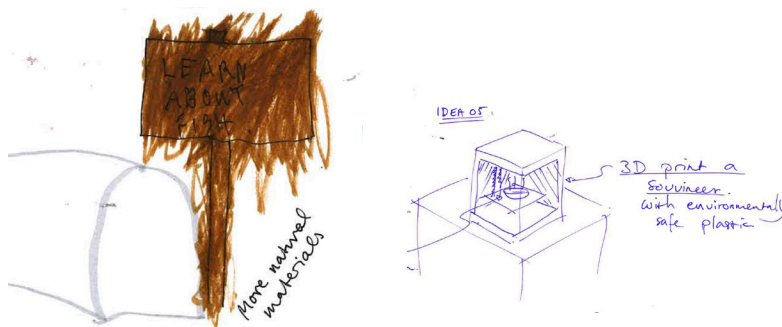


FIGURE 34-35

Photo from the co-creation workshop. Participants' idea about using environment-friendly material in aquarium.

5.2.3 Visitor Density

The density of visitors in the aquarium affects the emerge of empathy. The supporting evidence of this insight mainly comes from the observation of participants' behaviours in the experience workshop and semi-structured interview.

The influence of visitor density on participants was not directly. In the environment of high visitor density, it firstly showed a decrease in participants' stay time, which means their stay time at each possibly empathic emergence point be shorter. The shorter stay time led to participants in high visitor density was harder to emerge empathy than participants in low visitor density. At the same time, in crowded environments, it was difficult for visitors to interact with the sea labs' game device or other installation like this. Besides, no evidence showed that a low visitor density would affect visitors' empathy.

One participant was interested about the bubble tank but did not want other children to wait for him, so he gave up to try that.

—Observation from the experience workshop

"It would be better if there is a space only for us, thus we can enjoy the fish quietly"

—Participant at the experience workshop



FIGURE 36

Photo from the experience workshop. Couple participants in a high visitor density environment went through the underwater tunnel quickly.

5.3 How Artefacts of Aquarium Influence Visitor's Empathy

5.3.1 Moving Methods

The moving way of participants in the aquarium influences the emergence of their empathy. The supporting evidence for this insight comes mainly from the semi-structured interview and participants' ideas of the future empathic aquarium. Related literature also supports this, mimicking another's movement and role-playing another's experience will support our empathy for them, this is kinaesthetic empathy (Varkey et al., 2006; Owen and Seattle aquarium, 2015).

Participants proposed some new ways of moving that they wanted to try in the aquarium(see **FIGURE 37-38**), and they thought that these ways of moving could help develop their empathy for marine life. Several participants put forward that they wanted to swim while enjoying the marine creature, but they also believed that the swimming place for human and the pools for sea life should be entirely separated (see **FIGURE 39**). They just wanted to be able to understand marine life in the same moving way and did not want to disturb sea-life. One participant said diving around the sea creatures could emerge empathy feelings for him. One group of couple participants proposed that ocean bubble cars would provide a quiet and private environment and supported their empathy towards the ocean.

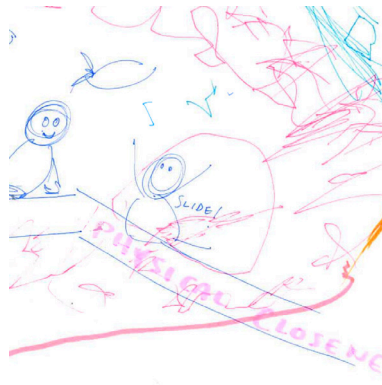


FIGURE 37-38

Photos from the co-creation workshop. Participants' idea about different moving methods in aquarium to trigger their empathy to ocean.

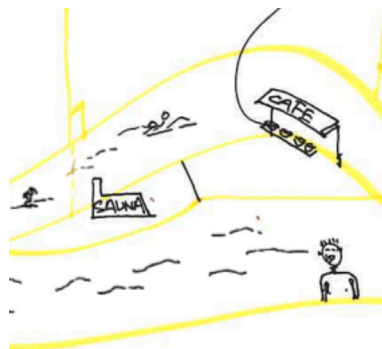


FIGURE 39

Photo from the co-creation workshop. Participant's idea about swimming in the aquarium. The swimming places for human and the pools for sea life are entirely separated.

5.3.2 Expression of Information

The information expression methods in the aquarium can influence the empathy of visitors. The primary supporting evidence for this insight comes from observation, semi-structured interview, and participants' design ideas for future empathic aquariums.

In the Sea Laboratory of the aquarium, there is a fish named Mikko; aquarium introduces why it stays here and its life story. The narrative information and the fish with a Finnish name triggered empathy among more than half participants. There are some techniques in narrative empathy, such as the fact that first-person narratives elicit more emotional responses than third-person narratives situations (Keen, 2006, p.214).

Information board of the species at the SEALIFE Helsinki Aquarium like **FIGURE 40** shows, it includes basic information about species. Some special species have small tags on their tanks, such as "the most dangerous species in the aquarium". The participant believed that basic information was nothing about their empathic emotion, and they wanted to know some other kind of information, like what is their role in the ocean. In fact, this kind of information plays an important role for empathy since people are more inclined to empathise to animals by recognising their human characteristics (Butterfield et al., 2012).

At the co-creation workshop, more than half of the participants drew new methods to present information for their future empathic aquariums. For instance, one participant drew a hologram to show extinct species. Another participant drew a guider to introduce the most interesting and attractive information about sea life.

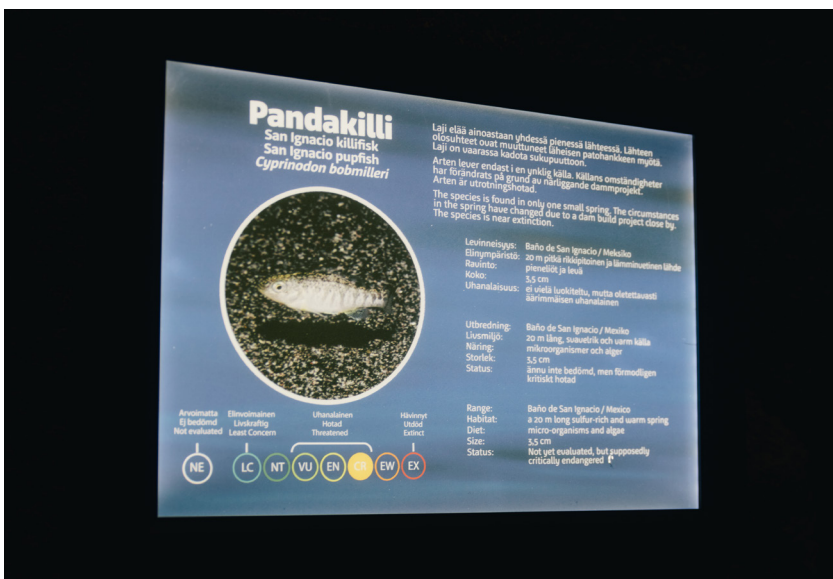


FIGURE 40
Photo from the aquarium. Information board of the species at the SEALIFE Helsinki Aquarium.

"The story of Mikko makes me feel very sad."
—Participant at the experience workshop

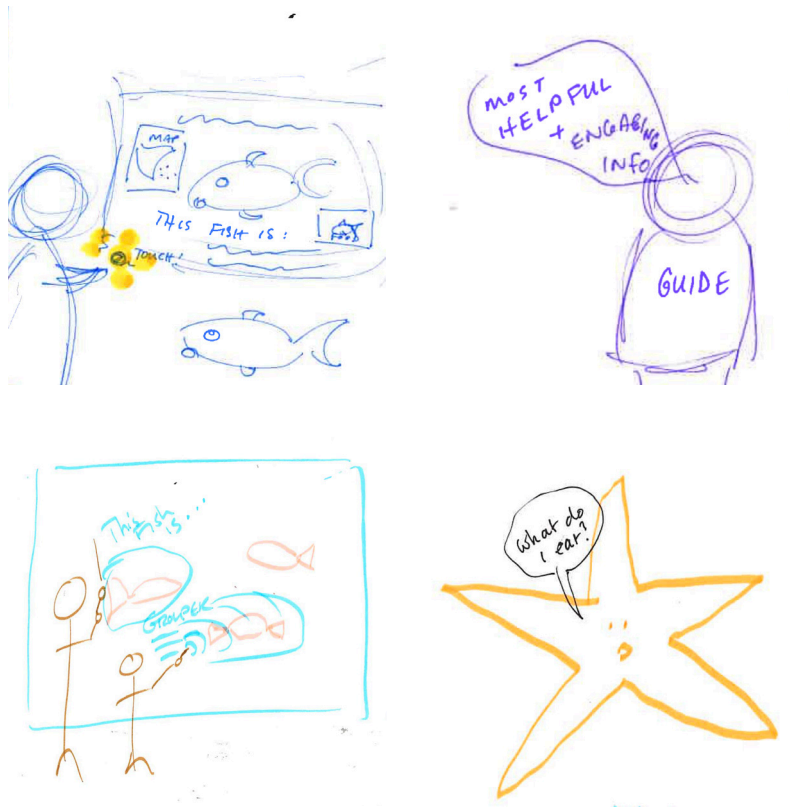


FIGURE 41-44

Photos from the co-creation workshop. Participants' idea about various information expression ways to support their empathy in aquarium.

5.4 How Connections Between People and Marine Life Influence Visitor's Empathy

5.4.1 Distance from Sea Life

The distance between marine life and visitor can affect the visitor's empathy. The main supporting evidence for this insight comes from observations, conversations between participants, semi-structured interview, and design ideas for future empathic aquariums.

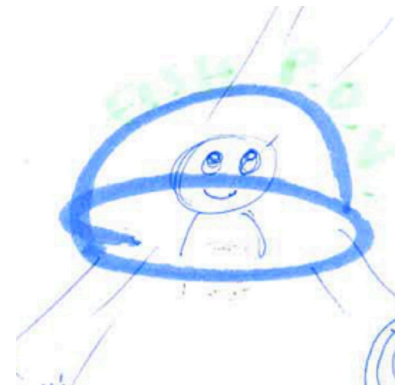
The distance from marine life here does not only mean the straight-line distance between marine life and visitors. The interesting observation angle and the magnifying glass tank will also make the visitors feel closer to marine life.

In the experience workshop, one participant touched sea urchin under the guidance of the staff, and he said the wonderful feeling makes him want to know more the creatures. About half of participants who entered the bubble tank of the aquarium said that they felt they were parts of the ocean when they were inside of the bubble tank (see **FIGURE 45**).



FIGURE 45

The bubble tank in the aquarium. Visitors can climb in and enjoy sea life from a special angle.



IDEA 01



VR Vision so people can swim with the sea life. or become the sea life & sea are as they



FIGURE 46-48

Photos from the co-creation workshop. Participants' ideas about shortening their distance with the sea life to support their empathic resonance to sea life.

5.4.2 Correlation with Life

When children encounter a species in the aquarium that is relevant to their lives, their empathy will be triggered. The main supporting evidence for this insight is the conversations of participants, semi-structured interview, and their design ideas for the future empathic aquarium.

Children actively seek species in the aquarium that are relevant to their life. For example, one child participant said his first primary school class was called turtle class, so he tried to find turtles in the aquarium, and said he wants to become a turtle to go to university. Another child participant designed a kelp forest in the co-creation workshop because his mother worked with algae, and he hoped his family could walk in a kelp forest.

One child participant's parents brought his favourite cartoon character toy to the aquarium, which was a marine creature. He tried to find that species in the aquariums and talked to the sea life toy. He also introduced this toy as his friend to other people.

At the same time, the species empathic package, which I used as a research tool during the experience workshop, is also a method to build connections between visitors and sea life. From the perspective of visitor behaviour, this approach increased participants' interest and attention to their corresponding species. And from an empathic perspective, it worked more effectively for children, parents and adults who come with friends. Therefore, it is feasible to improve this method as an optional service provided by the aquarium to support visitors' empathy to sea life.

"Have you seen this cartoon?"

—Child participant at the experience workshop

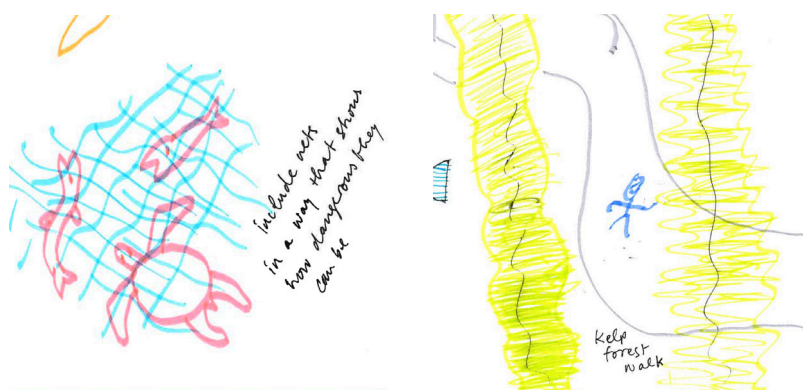


FIGURE 49-50

Photo from the co-creation workshop. Participants' idea about showing species have correlation with their life to support their empathic emotion to sea life.

5.5 How Undesirable Service Touch-points Influence Visitor's Empathy

Undesirable service touch-points can influence or interrupt visitors' empathy. The discovery of the undesirable services touch-points mainly from the observation, the conversation between participants and their companions, and the semi-structured interview. These undesirable service touch-points cause frustration, confusion, and dissatisfaction; they could make the emerge of empathy to be interrupted. In this research project, no enough evidence to support that every good service touch-point will trigger the empathy of visitors, but almost every undesirable service design touch-point had a negative impact on people's empathy state.

During the experience workshop, the undesirable service touch-points discovered and reported by the participants were:

- A control button which reminds people to try, but participants found nothing happens after press it (see **FIGURE 51**).
- Plastic goods piled up in souvenir shops.
- The bubble tank which allowed people to climb into the tunnel was so small that it could not hold two people. However, many visitors said they want to be able to enter it with their companion.
- The sea urchin touch pool, which could touch the sea life after washing hands and with the help from aquarium staff. It often happened that there was no staff at the touch pool. Visitors wanted to try it but unwilling to do it without the staff's permission and guidance.
- There was no good place for people to take joint pictures in the aquarium.
- The entire aquarium tour takes more than an hour, but the aquarium toilets are only on the opposite side of the ticket office and the exit cafe. After the children entered the aquarium, if they want to use the toilet, they needed to back to the entrance or reach the exit to go out.



FIGURE 51

Photo from the experience workshop. A control button which asks people to try, but nothing happened after participants pressed it.

5.6 How Visitor's Own Factors Influence Their Empathy

5.6.1 Motivation

Visitors' empathy towards sea life is related to their motivation to come to the aquarium. The supporting evidence for this insight comes from the analysis of the information cards filled out by participants in the experience workshop, the observation and the semi-structured interview.

The main reasons for the participants came to the aquarium were: they wanted to see the lovely fish, they wanted to come here to spend enjoyable time with their companions, or their companions wanted to come. At experience workshop, participants who came to the aquarium because of their companions barely showed their emotion to sea life.

One visitor from field observation said he came to the aquarium because that day was rainy and the aquarium is a good place to avoid the rain. He sat in the aquarium for 10 minutes and then took out the mobile phone to play for about 20 minutes. After heard about ten minutes tour guide, he began to walk in the aquarium.

The figure shows two photographs of information cards filled out by workshop participants. The left card is for participant 24 and the right card is for participant 25. Both cards ask the same questions: 'Have you been to the aquarium before? How many times have you been to the aquarium?', 'Why you visit aquarium?', 'Who will you go aquarium together?', and 'What is your favorite memory about aquarium?'. The answers are handwritten in cursive.

Participant	Have you been to the aquarium before? How many times have you been to the aquarium?	Why you visit aquarium?	Who will you go aquarium together?	What is your favorite memory about aquarium?
24	No	have a look	kids	
25	No	To have more pieces of sea	my girlfriend kids	Looking at jellyfish.

FIGURE 52-53

Information card of the workshop participants. Participants had different motivations to visit the aquarium.

5.6.2 Companions

Companions of aquarium visitors may have an influence on their empathy emotion. The supporting evidence of this insight comes from the observation and the semi-structured interview.

At experience workshop, parents participants did things that adults who have not come with children would not do, such as talking to sea life; their empathy was also more likely to be triggered than adults without children. Moreover, adults who came with their friends and families were more involved in sea life role-playing. Two groups of couple participants said they felt shy to express their emotion to sea life in front of each other, so they tried to have rational thinking when they were enjoying species.



FIGURE 54

Photo from experience workshop. One group of couple participants was searching for more information about their interesting species in the phone since they were shy to express their emotions towards the animal in front of each other.

5.7 Comments Received for Species Empathic Package

In order to understand the participants' views on the activities that support their empathic resonance to sea life, this section discusses participants' feedback and suggestions for the species empathic package (see **FIGURE 54**).

The species empathic package was given positive feedback in terms of their potential for increasing imagination and attention for sea life. Parents participants commented upon the species empathic package to "it gives our family a chance to have more interaction, and I love the way to let the child think in the sea life way, this may help me with the environmental education to my child." Adults who came with friends commented: "When I first got the package, I felt puzzled and curious about the purpose of the task. However, when I began species role-playing with my friends, It brought joy and surprise to our aquarium tour. There is many starfish in the aquarium, which was my species; I enjoyed seeking for them, knowing them, and taking pictures for them to share with others". One participant shared photos of her role-played species in social media after the aquarium tour (see **FIGURE 55**).

It was commented by several participants that tasks given by the species empathy package made them feel nervous and worried about if they can not achieve them. Similarly, one problem pointed out by a few participants was that holding the task card all the time seemed not necessary, but there was no suitable place to put it. Besides, several participants said only species sticker was not enough for them to imagine themselves to be sea life. And one point from my observation, since the inside of the aquarium was very dark, it was hard for participants to read the task card.

Several participants suggested that it would be better if the package could offer more potential interactions between them and their companions. Some participants also mentioned that if aquariums could display more anthropomorphic information about species would support their empathic emotion to the species (e.g. the relationship between species).

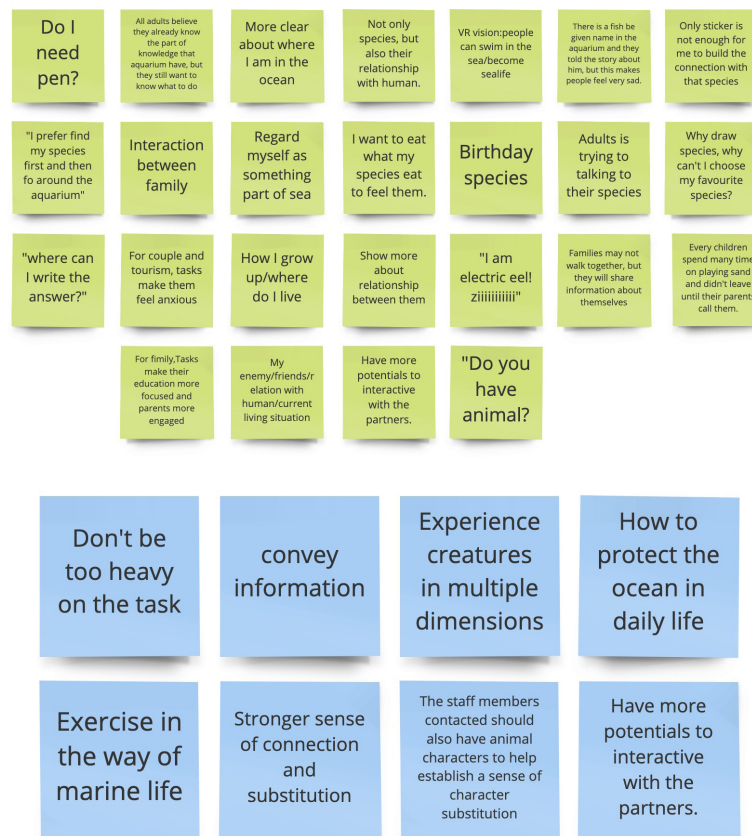


FIGURE 54
Feedback and comments received for the species empathy package.



FIGURE 55
Photo from the social media of a participant. She shared her related species photo after aquarium tour (published with the permission of the participant).

5.8 Design Criteria and Proposal Development

Findings and insights from research activity were discussed in previous sections. These insights demonstrated that the emergence of visitor's empathy in the aquarium is a process affected by a variety of factors. Many service touch-points support empathic resonance, and many interrupt or prevent it. Considering all service touch-points of the aquarium as a system will help the designers to make design choices.

Different types of visitors showed different sensitivity to different factors that triggered their empathy. So when designers are designing an aquarium that supports visitor's empathy, they need to consider different methods for every group. Getting closer to the sea life by various methods is a good way because it is useful for almost every type of visitor. However, this work is challenging because designers and aquariums also need to keep marine life safe and respect the rights of them.

Moreover, the literature review of empathy, service design, and aquarium helps to understand the empathy between humans and nature in aquariums and provides information and inspiration for potential solutions. Besides, the future empathic aquarium ideas drew by the participants in the co-creation workshop are also components of the design proposal.

The two elements that constituted the design criteria are:

- Reducing and eliminating the service touch-point which interrupt or impede visitors' empathy in the aquarium.
- Considering more different methods to support visitors' empathic resonance in the aquarium. At the same time, give priority to the ways that adequate to the majority of the visitor.

These two elements must be accomplished concurrently to be effective.

From the insights and findings of the research, we can found that some factors that support visitors' empathic resonance need to be taken into consideration before the construction of the aquarium(e.g. the distance between marine life and visitor and material of the aquarium). It is difficult to change the water tank and decorative materials in an already built aquarium. The lacking of those service touch-points is a result of designers have not considered supporting visitors' empathic resonance as a way to achieve the educational goal of the aquarium. Therefore, It is feasible to provide tools to help designers incorporate empathy into one of their design principles.

In summary, the proposal for this project has two orientations:

- In SEALIFE Helsinki Aquarium, controlling the scope of the project and keeping the solution within the capabilities of the aquarium management team, supporting the visitors' empathic resonance to sea-life.
- A toolkit helps the aquarium to consider empathy as one of the design elements during the problem investigation phase.

6.0 PROPOSAL

6.1 Proposal Part 1: Empathy principles

Build the Connection

Artificially help visitors build connections with species. Help children realise that marine life is their friend by establishing a connection between the ocean and life. For instance, apply species adventure package for children or cooperation with popular cartoon.

Engagement Environment

Establish a more engaging environment for visitors, appropriately increase the sound, smell, taste and tactile experience in the aquarium to provide an empathic environment. For example, ocean sound, sea breeze corner and ocean smell.

Information is a Bridge

Transform the way information is presented in the aquariums, so that information becomes an emotional bridge between people and sea life. Anthropomorphic information can support visitors empathic resonance for marine life, as well as showing common points between humans and marine life. The first person narrative of marine life can also evoke more emotional depth than the third person. Providing a platform for visitors to explore the information they are interested in freely is also a suitable method.

Technical Breakthrough Distance

The closer distance to the ocean allows people to have stronger emotion resonance for it, but blindly reducing the straight line distance will bring danger to sea life in the aquarium. It is better to use technology to shorten the gap between marine life and visitors, for instance, interactive wall and 3D hologram.

Eliminate Undesirable Service Touch-points

The negative feelings caused by undesirable service touch-points have a negative impact on the empathy between the visitor and the ocean. To create a better empathic experience for visitors, let us eliminate the undesirable design contact points in the aquarium.

6.2 Proposal Part 2: Empathy Engagement Activity

6.2.1 Jellyfish Tour

This is a special aquarium tour, which includes a jellyfish hat, anthropomorphic information tags on the tank, exhibition and interactive games in the sea lab, and a jellyfish environmental-friendly souvenir.

Visitors who choose to have this experience need to wear a jellyfish hat and imagine they are a jellyfish for an aquarium tour. In the aquarium, they will see some information tags on the tanks of jellyfish and species related to jellyfish. Then in the sea lab, some games and exhibitions related to jellyfish and marine conservation are set up. At the end of the tour, the visitor will receive a jellyfish bag as an environmental-friendly souvenir.



FIGURE 56

Usage scenario of the empathy engagement activity.

6.2.2 Elements Introduction

Jellyfish Hat

The jellyfish hat is made of thin paper. When people wear it, they need to walk at a slow speed like a jellyfish, because the hat is very light and loose. At the same time, when wearing the hat, people will see the jellyfish tentacle made of paper surround their body. When people are walking around, the paper jellyfish tentacles will float with the wind like a jellyfish in the ocean.

The jellyfish hat changes the way visitors move in the aquarium, allowing people to understand jellyfish better through kinaesthetic empathy. From a visual experience perspective, people can see paper jellyfish tentacles surrounding them, helping them to work in the role of the jellyfish. At the same time, the jellyfish hat is also a costume, the use of costumes in rituals allows one to escape from the mundane world and feel like another self (Fron et al., 2007).



FIGURE 57
Prototype of the jelly fish hat.

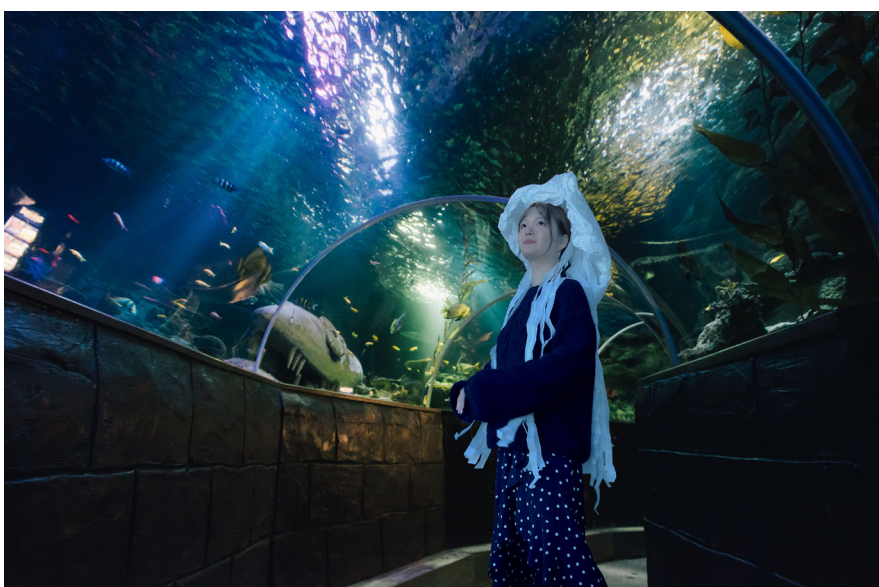


FIGURE 58
Usage scenario of the jellyfish hat.

Information Tag

The aquarium puts anthropomorphic information tags on the tank glass of the jellyfish and its related species. These tags use marine life as the first-person to introduce species information in order to better support people's emotional resonance. At the same time, the information tags share what the species has in common with humans to enhance visitors' empathy to the species. The tag is in the jellyfish shape to help the visitor who joins the jellyfish tour to notice them.



FIGURE 59

Usage scenario of the information tag.



FIGURE 60

The information tag.

Installations in the Sea Laboratory

In the sea laboratory of the aquarium, the staff will prepare games and exhibitions with the theme of marine conservation that related to jellyfish. The exhibition in the sea laboratory is a comparison of the jellyfish and the plastic bag in the ocean (see **FIGURE 61-63**). The game setup is an interactive wall (see **FIGURE 64**). People need to distinguish jellyfish from the plastic bag and pick up all plastic bags by touching them to protect the ocean. The installations in the sea laboratory will direct visitors' empathy to jellyfish species to the concept of marine protection.

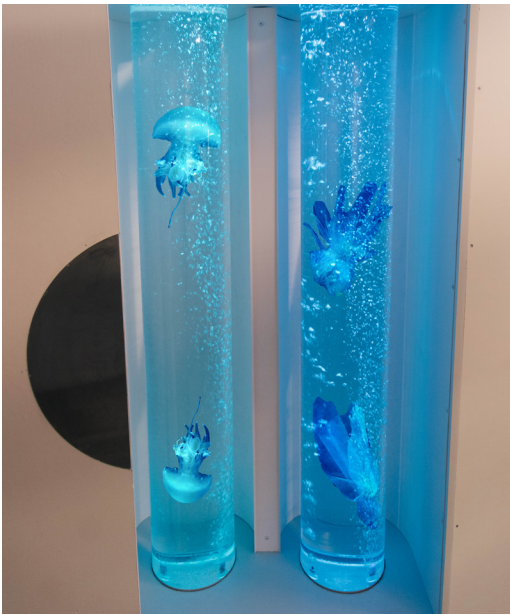


FIGURE 61-62

Example of the jellyfish and plastics bags exhibition.

FIGURE 63

Usage scenario of jellyfish and plastics bags exhibition.



FIGURE 64

The interactive game on the wall.

Jellyfish Bag

Jellyfish bag is a bag made of fabric with a small jellyfish in the corner. When people using it, it is a bag with a small jellyfish at the corner. When people do not need to use it, they can tuck the rest of the bag into the body of the little jellyfish, so that it becomes a jellyfish toy. This jellyfish bag is a souvenir designed to reduce the use of plastic bags in visitor' daily lives. It will also be a recall of the aquarium and jellyfish tour for visitors.



FIGURE 65
The jelly fish bag.

6.2.3 Why Jellyfish

There are four reasons for choosing jellyfish as a role-playing object. First of all, visitors love them. According to the user preference map obtained from the experience workshop (see **FIGURE 66**), the jellyfish tank was one of the places where most participants stayed for a long time. On the information card, a participant wrote that his favourite memory in the aquarium was watching jellyfish. The second is the position of the jellyfish tank. In the SEALIFE Helsinki Aquarium, the position of the jellyfish tank is in front of the sea lab. The visitor's journey will be seeing the jellyfish tank and then entering the sea lab. This location is conducive to directing visitors' empathy to jellyfish species to the concept of marine protection. The third is the visitors' enthusiasm for taking pictures of jellyfish. From the field observation and the experience workshop, jellyfish was a species that can inspire visitors to take pictures for them (see **FIGURE 67-68**). Several participants from the experience workshop said they like to share this kind of beautiful and attractive species on social platforms. Fourth, some tourists thought that the jellyfish have the characteristic of marine life and thought it represents the ocean.



FIGURE 66

The jellyfish tank part of the user preference map.



"It is so mysterious and beautiful, watching it makes me feel calm"

—Participants at the experience workshop

"It looks very 'sea life' "

—Participants at the experience workshop



FIGURE 67-68

Photos from the experience workshop. Participants was taking pictures for the jellyfish.

6.2.4 User Journey Map

The empathy engagement activity starts from the ticket office and will not end even visitors leave the aquarium and return home. Visitors collect jellyfish hats at the ticket office. They will wear the jellyfish hats until the end of the tour and return the jellyfish hats at the exit. So they wear jellyfish hats throughout the aquarium tour and always imagine they are jellyfish during the tour. Information tags begin to appear from species related to jellyfish until the jellyfish tank at the end of the aquarium. It helps enhance visitors' empathic resonance to the species. From the jellyfish tank to the marine laboratory, visitors will experience some exhibition and interactive games. These help to direct visitors' empathy to jellyfish to the concept of marine conservation. When visitors are leaving the aquarium and returning jellyfish hats, visitors will receive their souvenirs, jellyfish bags. Jellyfish bags help with visitors' behaviour change after returning home from the aquarium, such as reducing the use of plastic bags. The use of jellyfish bags in daily life is also a recall of their trip to the aquarium.

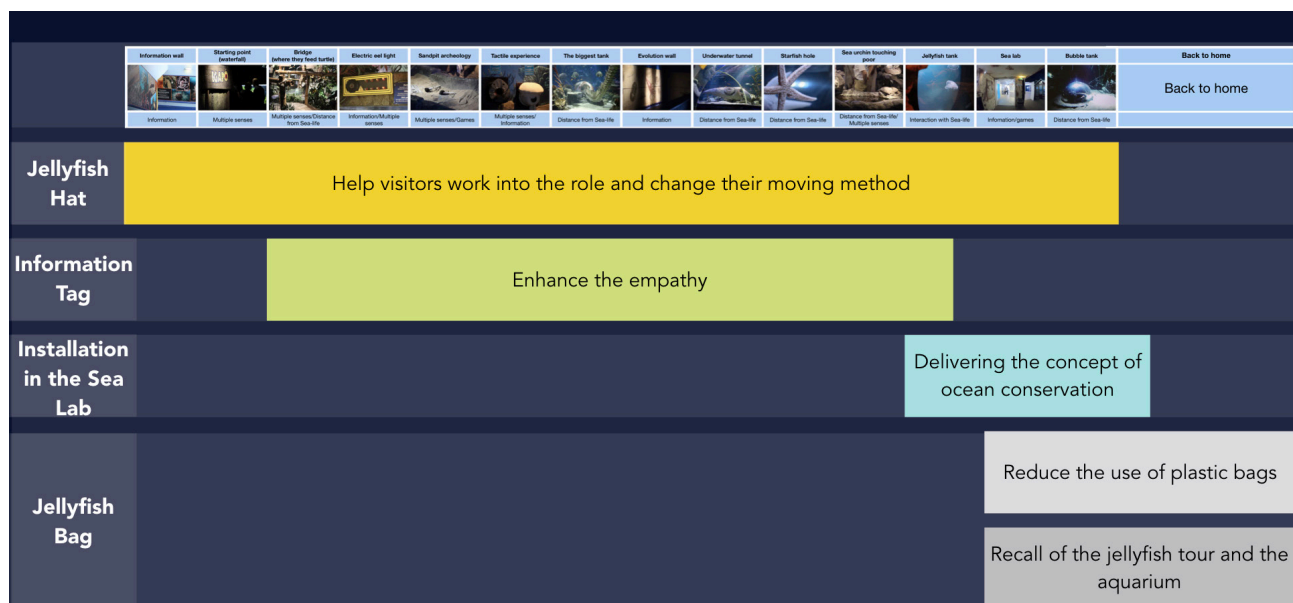


FIGURE 69

The user journey map of the empathy engagement activity

6.3 Proposal Part 3: A Toolkit for the Aquarium

The third part of the proposal is a toolkit for the management team and designer of the aquarium. This toolkit contains 36 cards and an aquarium map (see **FIGURE 75-76**). The 36 cards include 25 cards with specific creative content, 5 cards have idea title but no content, and several totally blank cards. Ideas and titles in the card come from the co-creation workshop, feedback meeting with aquarium and my thoughts about the empathic problems in the aquarium.

There is an aquarium with many functional zones on the aquarium map. Some functional zones already have the theme, and some blank functional zones are waiting for participants to give them a theme. The management team of aquarium and designers can play this game with their target users. Under the background story, participants use cards to create empathic aquarium in their dreams. Participants can also draw their own ideas on blank cards to create new zones for the empathic aquarium. This toolkit of the creative game may help aquariums and designers to understand users' feeling and ideas.

The game process: Participants read the background story of the game, imagine that they are an aquarium designer. And then they use the idea cards on the table to create an aquarium that meets the design goals for their target users. Participants can draw their own ideas on blank idea cards.

Number of Players: Two to eight

Background story: Hey player! The family of the tiny vaquita porpoise (*Phocoena sinus*) living in our aquarium is facing extinction, only 107 left in the world. The leading causes of this are seawater acidification and marine plastic waste pollution. Now, as a designer of the aquarium, you need to discuss and build the aquarium with your companions. The design goal of this aquarium is to make your visitors feel the harsh environment marine life is facing and support their empathic resonance to sea life. And encourage them to take action to reduce the using of plastic products and start a low carbon living.

FIGURE 70-74

Target user photo cards

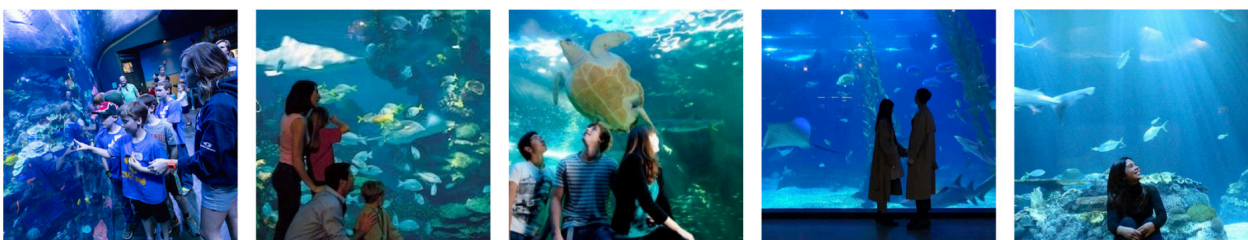


FIGURE 75

Idea cards.

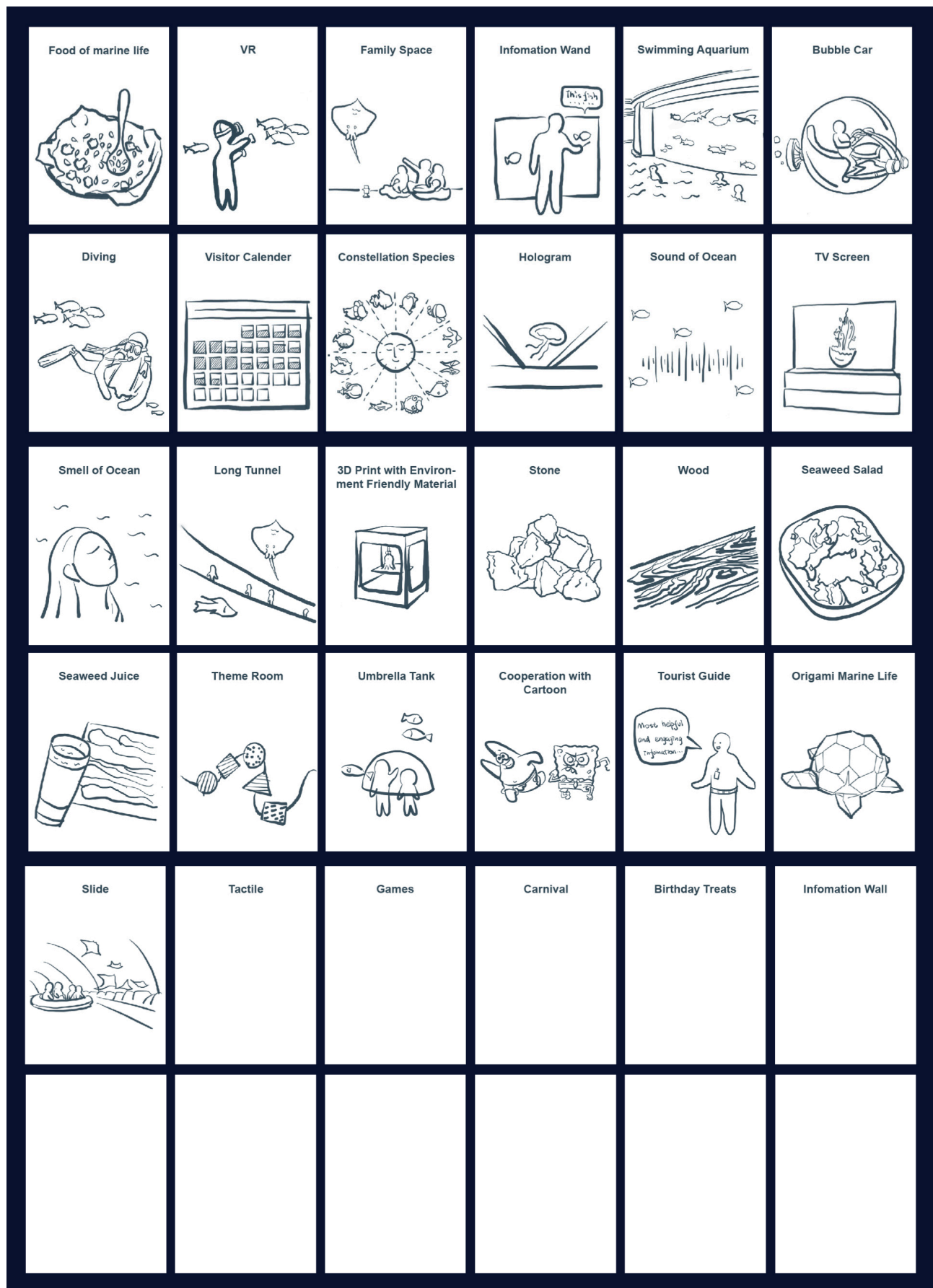


FIGURE 76
The aquarium map.



7.0 CONCLUSION

7.1 Limitations and Next Steps

Participants

The participants of the two workshops were responders of invitation; there were critical limitations in the study sample. Although invitations were sent to people with different backgrounds and ages wanted to have an aquarium tour. More than half of the participants come from design backgrounds. This was due to the fact that the time-frame. And designer colleagues were accessible for the purpose of the study.

Participants with design background know which undesirable service touch-points were objective and difficult to change in the design implementation. So they seldom reported the influence brought to them by such situations, and they subjectively tolerated the existence of such conditions. Participants from non-design backgrounds were more likely to notice and report such cases. Besides, participants with a design background already knew many popular ideas in services design and interaction design; they prefer to choose such methods in the co-creation workshop. Non-design background participants put forward their opinions more freely in the co-creation workshop.

This research has a lack of middle-aged and elderly samples. Except for the parents group, all participants were under 35. Behaviours and expectations may differ depending on the different age, so it is valuable to include their ideas about the empathic experience in the research. Efforts should be made to involve these groups in future studies.

The Nature of the Study

The study followed an exploratory co-design approach that allows uncovering insights during and after the process. Throughout the study, the main conclusion supporting information comes from self-reports and feedback given by participants in semi-structured interviews, a small part from observations, and partly from paintings created by participants and discussions within the group. We acknowledge this when participants report the thing. But in reality, this is not an experiment with strictly controlled variables. Because of realistic factors, the research not able to allow the same participants to have twice experiences with only one factor changes to compare different feelings.

For instance, a participant reported that he felt that the density of visitors in the aquarium made it difficult for him to have empathic emotion with the ocean; I consider this situation may exist. Because of realistic factors, the experiment not able to allow the same participants to experience twice in the different visitor density. The entire study took place in the presence of changes in various variables, and I mainly believed the observation and visitors' self-reports on emotions. However, the effect of not strictly controlling the variables on the experimental results also exists to a certain extent.

This research is an exploratory study; I did not know which factors would affect the empathy of the visitors before analysing the information obtained. So this research was not targeted in verifying the validity of some particular conditions. In future, it is worthwhile to have targeted research for several factors that support visitors' empathic resonance. For instance, the sound in the environment and the connection between species and daily life. Testing in an environment that highlights a particular factor may get more accurate and targeted information.

7.2 Suggestions for Future Research and Design for Aquarium

Alternative Methods for Controlling Project Scope

Some suggested ideas in the co-creation workshop were challenging to implement in the already built aquarium. And some suggested ideas were suitable for implementation in large aquariums but not appropriate for small aquariums such as SEALIFE Helsinki Aquarium. In order to adapt to the environment of SEALIFE Helsinki Aquarium and control the scope of the project, we can try to find alternative solutions for those ideas.

Many participants from the co-creation workshop proposed to change the way visitors move in the aquarium to support their empathic resonance to marine life. However, changing the way of moving is a method with a high workload and cost. At the same time, some moving methods mentioned violate the project original intention, marine conservation, such as diving in the aquarium.

It would be better to explore how to archive the idea in other forms. The proposal in this project attempts to help visitors feel the movement concept of jellyfish through jellyfish hat, a hat that visitors can only move slowly like a jellyfish when wearing that. This is not the only way; more potential solutions can be explored and discovered in the future.

The environment in the aquarium, including the materials selection, light, sound, smell and taste, is also a field worth pondering. Participants in the research reported that they wanted to experience the smell and sound of the sea. Some participants commented that the excessively dark light in the aquarium affected their emotional experience. What kind of interior design in the aquarium can support visitors' empathic resonance to sea life? This question involves the architectural interior design and possibly exhibition and furniture design, has not academically explored in this thesis.

About Empathy and Practical Behaviour Guidance

This thesis mainly explored which service design factors in aquariums will affect people's empathy towards the ocean and how to support the empathic resonance of visitors. About how to lead the generated empathic emotion to effective environmental protection, this part is mainly supported by the literature. In the aquarium research, some participants reported that they want the aquarium to tell them more about how to protect the ocean in their daily life. According to this, we could speculate service design may also be able to help in the process of leading the visitors' empathy to sea life to environmental behaviour change. The project has not yet explored how to do this, which is a feasible direction for the future.

7.3 Answering the Research Question

The main research question was:

How can aquarium service experience support visitors' empathic resonance with sea life?

Designers should be consistent with the educational concepts of the aquarium in terms of design specifications. Visitors believed that the environment in the aquarium and the products in the souvenir shop should use environment-friendly materials, this is because they hope that the aquarium organisation and the designers and employees of the aquarium make exemplary actions in marine conservation. For children, the main reason for this is that they love nature; they want to see natural materials in the aquarium. They also think about why the aquarium uses unsustainable materials and whether these materials will affect the fish (especially for senior students in the primary school). Visitors who are concerned about children's education think that since the aquarium guide people to take action for marine conservation, they should not do anything contrary to this concept. In the adults' opinion, the choice of materials represents the concept of the organisation hidden behind the material. When they feel the staff behind the services are doing things that not environment-friendly, they will no longer believe in the authenticity of the aquarium. Therefore, in the process of designing, constructing and providing services for the aquarium, designers, staffs and organisations related to the aquarium should always be carried out following the marine environment-friendly guidelines.

For children, during their aquarium tour, they need more outside help to establish the connection between the beautiful ocean and the need to protect the ocean. Children want to see beautiful and cute fish in the aquarium; here they do not think sea life is something same as them if we don't provide extra connection. Helping children recognise the connection between marine life and them is one of the main things designers should do. Designers can achieve this in many methods, including design activity and technology support. Information is an essential bridge; we could display more information about species' natural enemy species, close species, special skills, and favourite foods. Using this kind of personification information instead of professional species knowledge is better for supporting children's empathy to sea life. Designing special aquarium excursions for children is also appropriate; role-playing and hands-on activities have proven to be useful for attracting children's attention and helping them to engage. And it is also worth trying to connect sea life in the aquarium with cartoon characters which children love in real life.

Some methods effectively encourage visitor' empathy towards nature may be difficult to implement in the aquarium environment. Designers could try to make these challenging methods possible. The ways hard to achieve in the aquarium are: using the same movement method as the sea life, getting closer to the sea life, having more interaction with the sea life, and taking care of the creature. However, if we can use design activities or technology cleverly: interactive wall, hologram, projection interaction, we may be able to make challenging things possible. An aquarium in Japan has tried this; children could draw their favourite fish, scanning the fish they painted with technology to project them into tanks and using motion sensing to allow the projected fish to interact with visitors (www.teamlab.art). At the same time, if technologies are used to achieve the design goal, the designer should try to hide the traces of the computer and make the interaction more natural in the event design process.

At the final steps, designers should strive to ensure no undesirable service touch-points interrupt or influence visitors' empathic emotions. Undesirable service touch-points would cause visitors to have negative emotions, such as confusion and dissatisfaction. The generation of these negative emotions will replace empathy in the visitor's heart, and they are easier remembered by visitors. These negative emotions make visitors focusing on lousy service experience and forgetting other parts. So when the design for the aquarium is complete, designers should test the service process to find the existence of undesirable service touch-points in the service system and eliminate them.

7.4 Conclusion

The thesis investigated what factors affect visitors' empathy in aquariums and explored how to support their empathic resonance through service design. Research has shown that a series of elements of the service touch-points in the aquarium influence the empathy of visitors. They include the density of visitors, multiple sensory experiences, material selection in the environment, moving methods of visitors, the expression of information in the artefact, the distance and the connection to life between humans and marine life, and almost all undesirable service touch-points. The research also found that when we look at the aquarium visitors from an empathic perspective, the aquarium visitors typologies are parents, children, couples, adults with friends, and adults alone. Different types of visitors have different sensitivities to various factors that trigger their empathy, and a few factors work well for all types of visitors, including the distance between the visitors and sea life and the expression method of information.

The project explored what service design can do to support visitors' empathic resonance to sea life in the aquarium, which is an environmental education organisation. The service provider and designers should set their educational goals as the guideline when designing for aquariums and providing services in the aquarium. Building a connection between ocean and life for the children is also an appropriate way. Besides, designers need to be creative to help the feasible empathic theory be realised in the specific aquarium environment. After that, they also need to eliminate undesirable service touch-points in the aquarium. The aquarium and the designer should pay attention to as much as possible factors that affect visitors' empathy to sea life at the same time and systematically design the aquarium service.

The final proposal is proposed based on insights and findings discovered in workshops, ideas from participants, feedbacks from the aquarium and my thoughts of the project. The proposal consists of three parts, design principles, empathy engagement activity, and a toolkit for the aquarium. Design principles guide the aquarium to provide empathetic services. The empathy engagement activity aims to support visitors' empathic resonance to sea life by role-playing, changing the way visitors move, multiple methods for showing information, interactive games, the exhibition, and an environment-friendly souvenir. The third part of the proposal is a toolkit for the aquarium and the designer, which could help with the involvement of visitors in the design process.

The research also found that when we design services in the aquarium, non-human beings such as marine life are also stakeholders. Different marine creatures also have different preferences. Some marine creatures like to watch people, but some marine creatures do not. Although it is difficult for the sea life to express their “thoughts”, most of the time, breeders can tell us. Putting attractive designs near sea creatures who like to see people is a way to make them happy. Of course, when designing, it is important to be careful not to let the proposal interfere with the life of sea life.

This thesis demonstrates that service design can contribute to supporting visitors’ empathic resonance to sea life and explores specific service methods to achieve this. It can be part of sustainable future design. However, this thesis offers only a glimpse to the topic, and the long term influence of the study and its impact is to be seen out of the frame of the thesis.

7.5 Critical Reflection

I choose to conduct research for the aquarium mainly because of my interest in animals and the ocean. I hope that I can make a little contribution to this field through the major I studied, and also hope to further develop my capacity as a service designer by accomplishing this project.

In this project, I need to use the skills and knowledge I acquired in the Master of Collaborative and Industrial Design programme and need to understand the aquarium operations and marine conservation education. Interestingly, this project is a bit different from the service design project I have worked with before. The stakeholders are not only tourists, aquarium managers, designers and various experts but also the marine life living in the aquarium. Some designs also affect the mood of marine life (this is usually derived from the feedback of the breeder). Some designs will make marine life happy, such as arranging attractive projects next to marine life that likes to see the crowd. At the same time, we also need to be careful not to let the design bring negative effects to marine life.

The purpose of this project was to support visitors' empathic resonance to sea life so that they can understand the situation of sea life well, be interested in marine life, and have the intention to take action for marine life to live better. And I hope that future research can find solutions that transfer these understandings, interests and intentions into visitors' behaviour change in daily life.

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IMAGE CREDITS

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FIGURE 10-19

Participants' painting at the co-creation workshop, 2020. [Painting, scanned by author]. Used with permission from the participant

FIGURE 29

Zhang_xuyang_1013 (February 9, 2020). [Image, screenshot by author]. Used with permission from the Instagram user

FIGURE 32-35

Participants' painting at the co-creation workshop, 2020. [Painting, scanned by author]. Used with permission from the participants

FIGURE 37-39

Participants' painting at the co-creation workshop, 2020. [Painting, scanned by author]. Used with permission from the participants

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Participants' painting at the co-creation workshop, 2020. [Painting, scanned by author]. Used with permission from the participants

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Participants' painting at the co-creation workshop, 2020. [Painting, scanned by author]. Used with permission from the participants

FIGURE 55

chengxiaoyiiii (February 9, 2020). [Image, screenshot by author]. Used with permission from the Instagram user

FIGURE 61-62

Tiancheng Wang, 2020. [photograph]. Used with permission from the photographer

FIGURE 64

[For the image used in the interactive game design] Serkan Culfa, 2019. VR Ocean Aquarium 3D. [image online] Available at: https://play.google.com/store/apps/details?id=com.sculfa.vroceanaquarium&hl=en_US

FIGURE 70

Georgia Aquarium, 2004. School. [image online] Available at: <https://fieldtripdirectory.com/destinations/georgia/atlanta/georgia-aquarium/>

FIGURE 71

UK school trips, 2018. Blue Planet Aquarium Cheshire. [image online] Available at: <https://www.ukschooltrips.co.uk/directory/blue-planet-aquarium-cheshire.html#photography-filming-audio-restrictions>

FIGURE 72

Capetown magazine, 2018. [image online] Available at: <https://www.capetownmagazine.com/discover-a-unique-two-oceans-aquarium-in-the-waterfront>

FIGURE 73

Nayana Nair, 2018. "End Our Tiring Travel". [image online] Available at: <https://itrainsinmyheart.wordpress.com/2018/07/16/end-our-tiring-travel-nayana-nair/>

FIGURE 74

Shedd Aquarium, 2017. citypass. [image online] Available at: <https://www.citypass.com/articles/chicago/need-to-know-visiting-shedd-aquarium>

Appendix A: Consent form for adults



CONSENT FORM

Introduction to Research Project

The Research Project is part of Aalto University, School of Arts, Design and Architecture master thesis. The project is carried out in collaboration with Helsinki Sealife aquarium.

Date of Workshop: 2 February 2020

In order to gather feedback, information, opinions and thoughts useful for the project, one workshop is organized. During the activity, participants will experience the aquarium and sit together to talk about their ideas. One researcher will facilitate the discussion, whereas another researcher will take notes.

Informed consent to participate in the Research Project

I agree to take part in this workshop. I have been informed that the researchers will take notes and record the session. I am able to ask questions about the research anytime during the workshop or afterward by contacting the researchers.

I give permission *[please tick]*:

☐ to be recorded on video, photo and audio for the duration of the activities.

☐ for the data collected to be used within the research & any other research-related activities.

☐ for the results of the activities to be included in any future portfolios or publications by the researcher.

I understand that participation in this workshop is entirely voluntary and I can withdraw my consent and discontinue participation in the research at any given moment before its completion. I am also aware that the data collected up to the point at which I might withdraw will be used as part of the research data.

I give my consent to participate in this research.

Email Address: _____

Name: _____

Please fill-in with **BLOCK LETTERS**

Signature: _____

Date: 2 February 2020

**Collaborative and Industrial Design
School of Art & Design, Aalto University**

Appendix B: Consent form for children



CONSENT FORM

Introduction to Research Project

The Research Project is part of Aalto University, School of Arts, Design and Architecture master thesis. The project is carried out in collaboration with Helsinki Sealife aquarium.

Date of Workshop: 2 February 2020

In order to gather feedback, information, opinions and thoughts useful for the project, one workshop is organized. During the activity, participants will experience the aquarium and sit together to talk about their ideas. One researcher will facilitate the discussion, whereas another researcher will take notes.

Informed consent to participate in the Research Project

I agree my child to take part in this workshop. I have been informed that the researchers will take notes and record the session. I am able to ask questions about the research anytime during the workshop or afterward by contacting the researchers.

Name of child: _____
Please fill-in with **BLOCK LETTERS**

I am the parent/legal guardian of the the child named above. I have received and read the consent form regarding the research my child participate in Helsinki Sealife aquarium and agree to the following:

I give permission for my child *[please tick]*:

- ☐ to be recorded on video, photo and audio for the duration of the activities.
- ☐ for the data collected to be used within the research & any other research-related activities.
- ☐ for the results of the activities to be included in any future portfolios or publications by the researcher.

I understand that participation in this workshop is entirely voluntary and I can withdraw my consent and discontinue participation in the research at any given moment before its completion. I am also aware that the data collected up to the point at which I might withdraw will be used as part of the research data.

I give my consent to my child participate in this research.

Email Address: _____

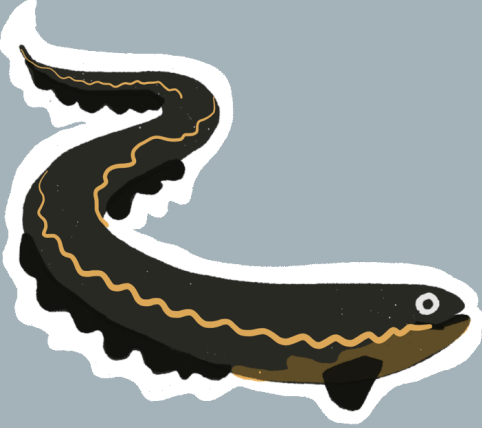
Name of parent/legal guardian: _____
Please fill-in with **BLOCK LETTERS**

Signature: _____

Date: 2 February 2020

Collaborative and Industrial Design
School of Art & Design, Aalto University

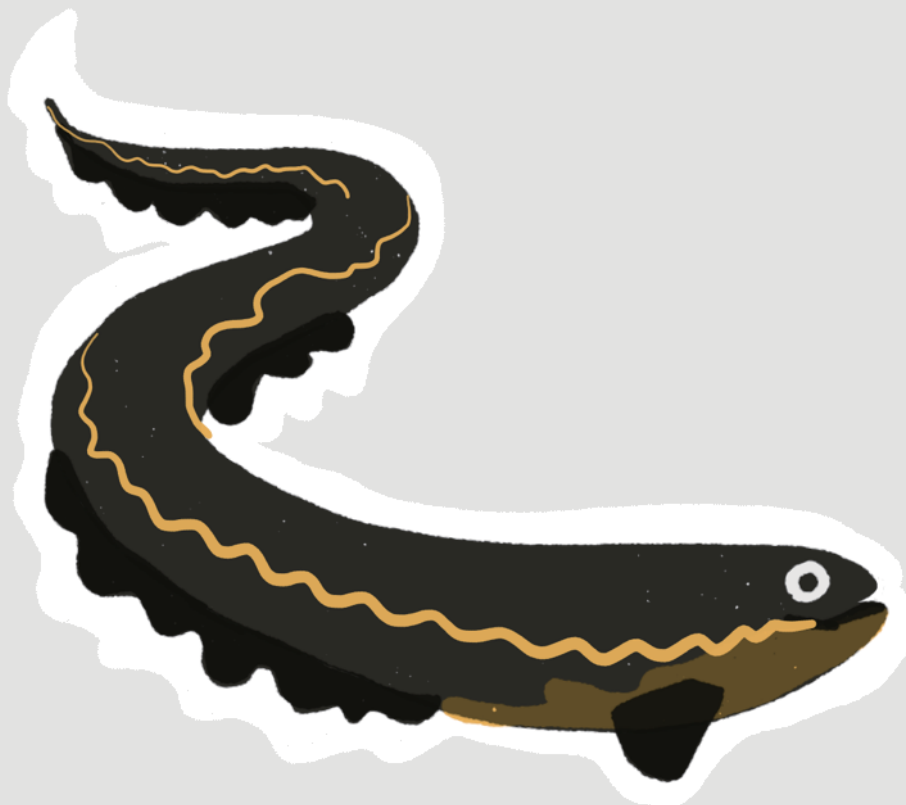
Appendix C: Task cards and species stickers in the experience workshop



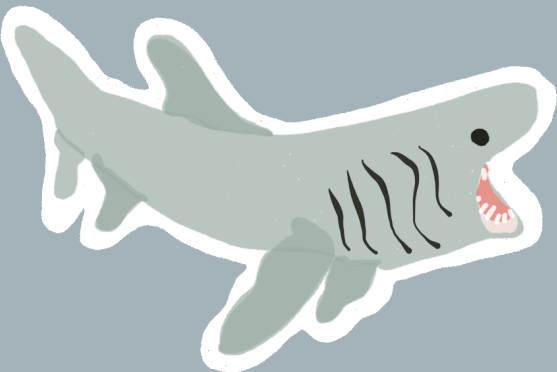
Dear Electric eel,

You have these three tasks need to complete in the aquarium:

1. Find your own species and start to know yourself.
2. See if there is a species related to you.
3. Find out what humans can do to protect your species



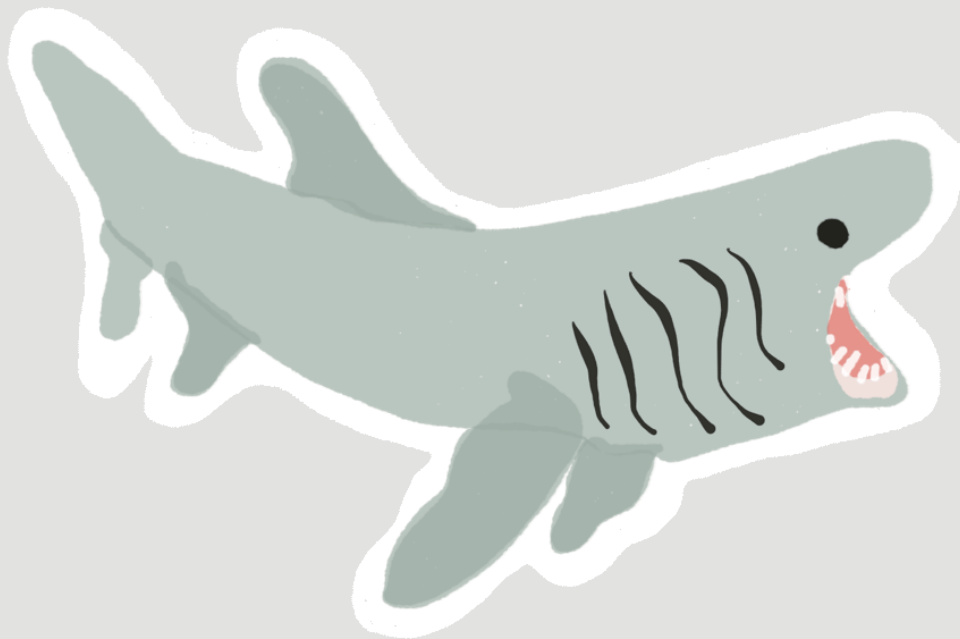
Appendix C: Task cards and species stickers in the experience workshop



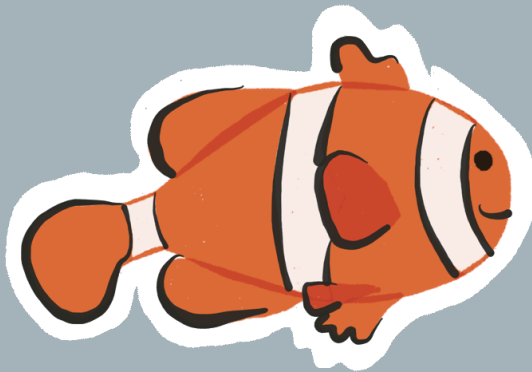
Dear Shark,

You have these three tasks need to complete in the aquarium:

1. Find your own species and start to know yourself.
2. See if there is a species related to you.
3. Find out what humans can do to protect your species



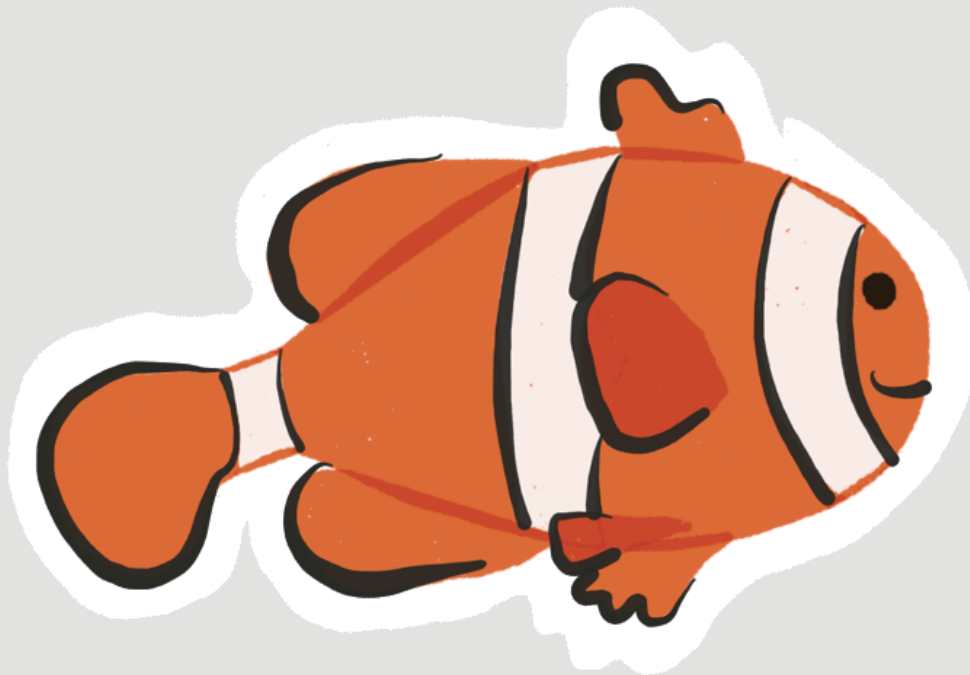
Appendix C: Task cards and species stickers in the experience workshop



Dear Clown fish,

You have these three tasks need to complete in the aquarium:

1. Find your own species and start to know yourself.
2. See if there is a species related to you.
3. Find out what humans can do to protect your species



Appendix C: Task cards and species stickers in the experience workshop



Dear Starfish,

You have these three tasks need to complete in the aquarium:

1. Find your own species and start to know yourself.
2. See if there is a species related to you.
3. Find out what humans can do to protect your species



Appendix C: Task cards and species stickers in the experience workshop



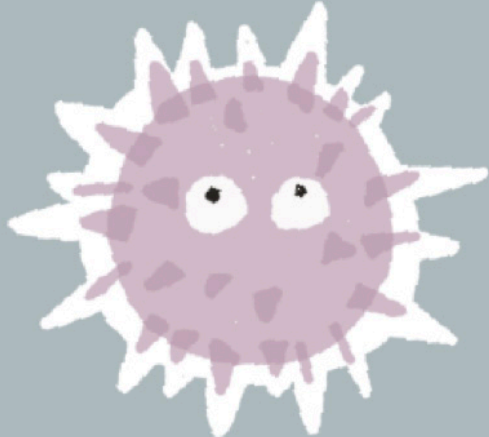
Dear Jellyfish,

You have these three tasks need to complete in the aquarium:

1. Find your own species and start to know yourself.
2. See if there is a species related to you.
3. Find out what humans can do to protect your species



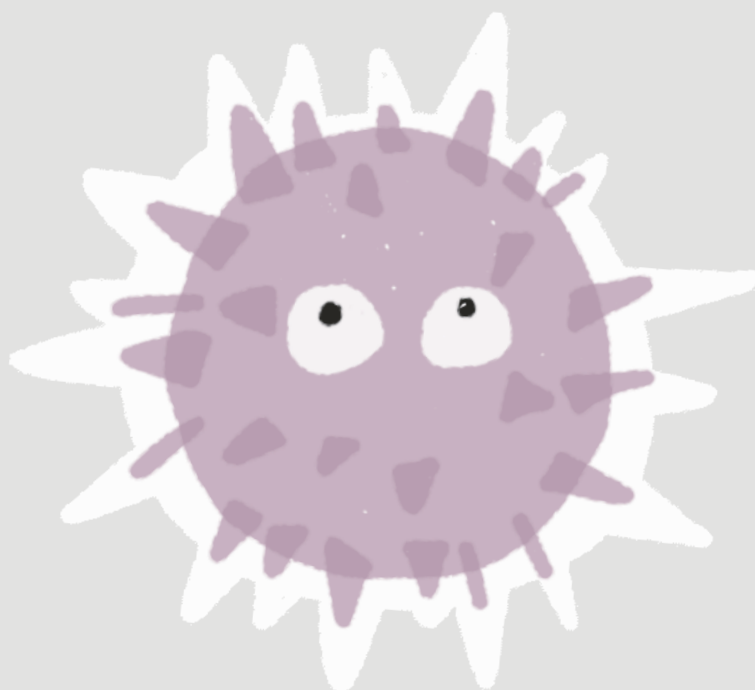
Appendix C: Task cards and species stickers in the experience workshop



Dear Sea urchin,

You have these three tasks need to complete in the aquarium:

1. Find your own species and start to know yourself.
2. See if there is a species related to you.
3. Find out what humans can do to protect your species.



Appendix D: Information card in the experience workshop

Hei
thank you for taking part in this
research!

This will be a great help for me
to understand how to create
empathic experience for people
in aquarium.

Would you mind telling me a bit
about yourself to get started?

What do you want me to call you.

If I may ask, how old are you?

Have you been to the aquarium before? How many
times have you been to the aquarium?

Why you visit aquarium?

Who will you go aquarium together?

What is your favorite memory about aquariums?

