Engaging through Co-design in the Science Museum

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Abstract

A co-design process that holds the potential to facilitate museum engagement is the topic of this article. I report from a series of workshops titled Science, Identity and Belonging, during which a group of museum professionals worked together with young people to co-design a museum activity. My attention here will be upon on engagement, and how it materializes in the meeting between museum staff and youths, in a creative development process consisting of a digital installation made in parallel to an exhibition. The co-design process in this case led to a product: a digital sound installation that complemented and connected to the exhibition *FOLK – From Racial Types to DNA Sequences* (2018–2019). I will explore engagement throughout the co-design process, looking closely at challenges and possibilities, while considering how both museum professionals and young people brought their investments into the process. I argue that this way of working may expand the understanding of what engagement for a young person at a museum can be, and what the role of a museum professional can entail. My findings lead me to conclude that co-design provides an opportunity to engage in joint actions that in turn strengthen the relations between the young people, objects, themes, and museum staff.

Keywords: co-design, engagement, science museum, sound installation, interdisciplinary, dialogue.

Introduction

As part of the Science, Identity and Belonging (SIB) project I collaborated with a group of 22 individuals – consisting of both young people and museum colleagues – in a process of co-designing a digital sound installation, connected to the temporary exhibition *FOLK – From racial types to DNA sequencing* (2018–2019) (henceforth *FOLK*). Co-design was used as a method of research for designing the eight workshops described and examined here, as well as an approach to broadening the understanding of the connection between visitor and design processes within the science museum (Macdonald 2007). I ask if a co-design approach can broaden our understanding of engagement at a science museum when moving the process behind the scenes to the inner workings of the institution, especially when this process involves museum professionals and researchers collaborating with a group of young people.

Engaging teenage audiences is a challenge for museums (Black 2012; Dindler et al. 2010). This age group typically views museums as irrelevant, and participation in educational programmes is often not recognized as an activity outside of compulsory education (Dawson, 2018).[1] For science museums, the challenge is magnified, as science as a topic also fails to attract teenage school children (Hadden and Johnstone 1983; Osborne et al. 2003; Vossen et al. 2018). One solution suggested to tackle this challenge has been to focus on user context while designing activities, as well as recognizing the implications of motivation, control, challenge, and collaboration (Durose and Richardson, 2015). Furthermore, co-design rests in the tradition of other collaborative practices such as co-curation, co-creation, and co-production. Overall, these practice facilitate the voice of those in society who do not have a

place to be heard due to their age or other hindrances (Druin and Kolko 2017). Co-design focuses on blurring the distinctions between the actors in the collaborative endeavour, as well as on taking into consideration the difficulties in properly understanding the users´ needs, values, and cultural and societal assumptions (Ciolfi et al. 2016; Mygind et al. 2015).

In this paper I explore the formation of a longer-term relationship between staff at the Norwegian Museum of Science and Technology – Norsk Teknisk Museum (NTM) – and a group of teenagers. Together with other NTM staff, I worked with a group of young people between sixteen and twenty-three years of age, as well as external partners, using a variety of design methods and tools to co-design both an on-site digital activity, and in-person museum activity related to the *FOLK* exhibition (as shown in figure 1). The design activities were structured across eight design workshops and sit at the centre of my reflections on museum engagement, and what it means in the context of co-design.

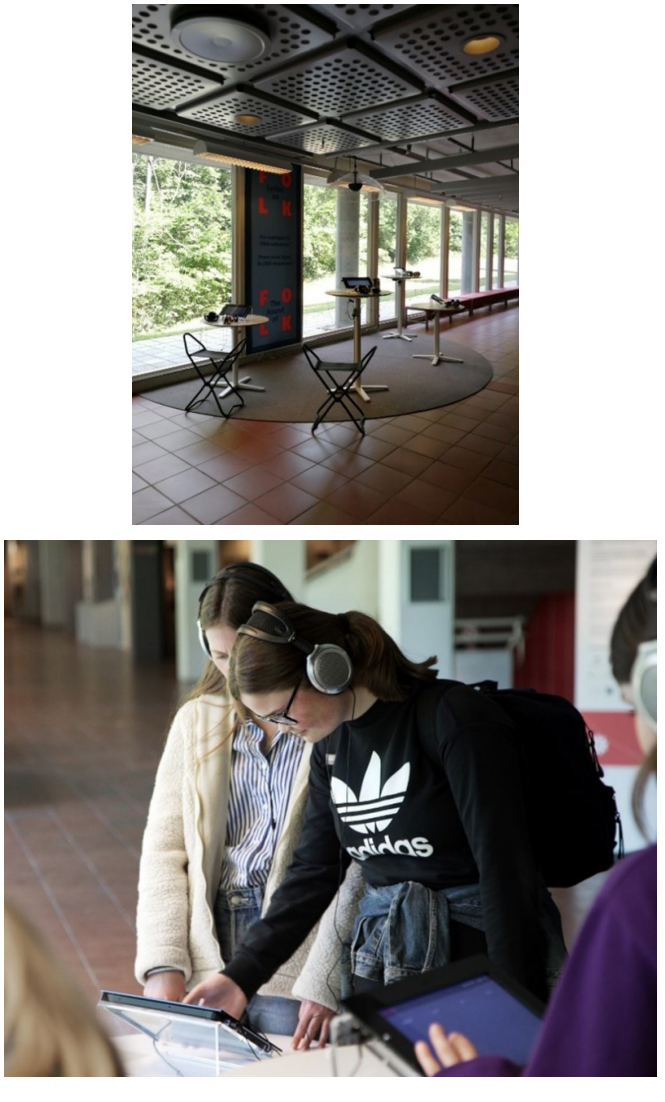

Figure 1: The 'Sound of FOLK' installation near the entrance to the FOLK exhibition. Photographs: Torhild Skåtun (top) and Håkon Bergseth (bottom).

My research material includes the documentation of the workshops through film, voice recording, and photography. Additionally, keywords were noted in a notebook and shared with the museum team. Five participants answered a questionnaire evaluating the process and outcome during the last workshop. Thereafter, six participants were interviewed – two by phone and four in person, of which two were interviewed together. With one of my fellow staff members from the museum team, I kept logs of the research all the way through the collaborative process. Finally, I produced a podcast,[2] as a practice report, together with the museum team and two of our young partners. In this paper, I will share anonymized quotes and responses articulated in three of the semi-structured interviews. The paper is structured as follows: section two discusses the engagement potential of co-design and its associated methods and techniques with specific reference to science museums; section three presents background information on *FOLK* and SIB the co-designing partnership, as well as the co-designers feedback; section four discusses the project in light of relevant museum literature; and section five concludes the paper by summarizing the main findings, before suggesting how these could enrich our practices of engagement.

Engagement and co-design in the science museum

Encountering a science museum can be a somewhat chaotic experience in which visual, textual, and audio material compete for attention. Graham Black (2012) argues that one way of increasing the outcome of meaningful interaction within exhibitions, workshops, and learning activities is to design several layers of knowledge and several possible approaches. This rests on an understanding of visitor engagement based on the social contexts of their visit (Falk and Dierking, 2000), and sees the visitor as a person with a set of competencies, knowledge, and motivations in the face of new experiences. Analysis of engagement in museums often focuses on learning experiences, fuelled by an understanding of museum visits as meaning-making experiences that involve interactions with exhibitions and programmes (Hein 2002; Hooper-Greenhill 1999). For example, Bitgood's (2013) attention-value model tries to capture learning within informal science spaces and frames the stages of engagement as incremental, eventually leading to deep engagement and learning. DeWitt et al. (2019) take a different approach to analysing engagement, focusing instead upon ways of strengthening connections between a visitor's understanding of the displayed artefact and the stories told. In a similar vein, Humphrey and Gutwill (2005) argue that to support visitor engagement, museums should allow visitors to discover on their own and to feel in control of their experience. With this is in mind, what is it that we ask visitors to engage *with* in science museums? The scientific concepts and principles that are demonstrated in interactive displays and interpretive panels are some of the main intended objects of engagement. Communicating science is complicated, as different perceptions of science and society exist simultaneously, and no single correct understanding of science is beyond question; rather, understanding of science exists in relationship with culture, citizenship, and identity (Davies and Horst 2016; Reiss 1999)**.** Nevertheles, a science museum, among other things, is an arena in which problematic issues regarding science can be highlighted, both historically and in the contemporary age. Within these spaces furnished with objects and stories, collaborative design processes may expand the conversations beyond an educational programme, and allow scientific nuance and uncertainty to emerge. Arguably, the objects, themes, and exhibits held by a science museum, have the potential to engage with contentious themes beyond the scientific community (Alberti, 2017).

The museum's responsibilities go beyond collecting lived lives through things and memories (O'Neill 2006; Spitzer and Fraser 2020).[3] Today these institutions are seen, even if this is not without controversy, as spaces for dialogue, with the potential to take a role as activists pushing for societal change (Brekke 2018; Sandell 2016). Themes and collections can develop along various dimensions, each story carrying a distinct significance. To build such safe spaces for dialogue, the science museum needs to acknowledge and address the existence of power relations, which may manifest in a space that is considered respectful and candid (Katrikh 2018). A science museum thus holds the potential to be an inclusive space, where new voices can speak for themselves if viewed as a contact zone: a shared space not owned by the museum, but co-habited by museum staff, and as in this case young

collaborative partners (Clifford 1997; Kidd 2011);[4] a space that for all participants represents a diversity of opinions and agendas. Such sharing of power and decision-making is at the core of a participatory process, which requires one to ask who makes the decisions. This differs from a planned learning activity in which the participants are on the receiving end of museum practice. Participatory practices provide the possibility to support meaningful experiences through engagement (Bunning et al. 2015), and can be viewed as a process in which the group works together towards a common, but not pre-specified aim (Smith and Iversen 2014). This does not mean that the museum can simply take a step back and let the process unfold; management and facilitation of the process are necessary.[5] Indeed, the participatory shift in museums is often described as an ongoing process, related to the shift towards openness in the field of cultural heritage – as well as within society – that has been brought about by social media as a platform for sharing (Birchall 2017). When designing *with* and not *for* visitors, it is important to make sure that the process is rewarding for all participants. One crucial aspect of this is to recognize participants as equal partners, and in many respects as experts, who play a vital role in generating knowledge and understanding (Miles and Gibson 2016; Modest 2013; Stuedahl and Skåtun 2018; Tzibazi 2013). Engagement in participatory practices of exhibition design can be understood as a form of collaborative exploration, in contrast to traditional curation, which is often a one-way design activity. Participation is a process in which one investigates, reflects, creates, and shares, and in which mutual learning has the potential to happen between participants (Sørensen 2021).

For over half a century, participatory design (PD) has been widely used as part of the practice of designing user interfaces for digital applications and environments. It can be traced back to the Scandinavian democratization of the workplace in the 1970s, a change that aimed to create better working conditions, and give workers the possibility to extend their skills through the "computerization" of work (Simonsen and Robertson 2012; Stuedahl and Lowe 2013). A comparable shift in approach is taking place in museums today, whereby visitors become active agents in the design process, and are viewed as experts about their own experiences (Taxén 2004). Science museum visitors often expect to find simple, definitive answers to complex scientific questions (Dillon 2017; Rock et al. 2018). To bring forward questions that do not have simple, true-or-false answers, but rather have answers that can be placed on an axis of "good" or "bad", depending on their moral/ethical framing in the context of co-design, can present a more thorough pedagogic approach to highlighting difficult scientific issues around the understanding of race, both historically and today (Eikeland 2020; Pedretti and Iannini 2020). Participatory processes allow time for participants to engage more thoroughly with the theme, and when they extend over a long period, other connections occur (Olesen et al. 2020). Even so, viewing co-designers as beneficiaries of learning, assigns the museum the role of teacher, and may compromise the agency of participants (Winstanley 2018). This consequently means that a delicate balance must be maintained between playing the role of the organizer and playing the role of an equal partner. The above discussion points to a conceptualization of co-design in the science museum as an act of moving visitor engagement behind the scenes through a production phase; a dialogic process that can blur the boundaries between the collaborative members and outcomes as well as process (Brandt et al. 2012).

Assigning teenagers semi-professional work in museum development provides a task that bridges a real-life challenge. In the SIB project, co-design supports a route for engagement with the content of the *FOLK* exhibition that is different to that provided by an ordinary learning programme. By orchestrating processes that present uncertainties in aim and direction, young people gain a space to engage with the science museum in a more complex way. The situation encourages teenagers to be in control of their own experience within the museum and with its professionals. To examine the conceptualization of co-design we invited a group of young people to come behind the scenes at NTM, and to enter a process of exhibition making. We initiated a co-design process that incorporates the perspectives of young people on the content of *FOLK*, utilizing the medium of sound for assistance. Moreover, we were not only open about the process and the outcomes, but also negotiated and adjusted actions along the way to create a more structured proceeding that could lead to an outcome. In the following section, I will describe the co-design process and how it was organized, placing an emphasis on the actions, the dialogue, and the reflections that

surfaced along our route to co-designing a digital sound installation. This will be followed by an account of the feedback of our co-designers, and a discussion that highlights issues of control, insecurity, and connectivity.

The Sound of Folk: An exhibition and co-design project

The exhibition *FOLK – From racial science to DNA sequences*[6] juxtaposed historical race science with contemporary genetic research on human diversity; the vision for the exhibition was to become an inclusive arena for the public to discuss such issues (Stuedahl et al. 2021). The exhibition confronted visitors with research from on biological differences from earlier periods in history – scientific racism – and the impact this has on racism in today's society (Sontum 2018). In Norwegian public discourse the term "race" is absent (Bangstad 2017; Kyllingstad 2017); as in other European countries, race in Norway is a shifting concept, which often hides behind the term "ethnicity" (Balkenhol and Schramm 2019).

The making of *FOLK* involved a cross-departmental group of 11 people, including two curators specializing in the history of science, as well as technicians, museum pedagogues, a visitor programme manager, and object conservators. The co-design project Science, Identity, and Belonging discussed in this paper was born out of the exhibition project. It aimed at contributing to the challenges of displaying difficult and sensitive heritage for visitors that *FOLK* presented; in doing so, it engaged young participants with the very essence of the issues that the exhibition explored (Stuedahl et al. 2021). Originally, the objective of the co-design process was to develop a learning programme for *FOLK* in collaboration with a group of young people, using sound and digital media (Messenbrink 2018). However, the fluidity of the participatory process resulted in a completely different output to the one the exhibition team had envisioned: a sound installation called 'The Sound of FOLK' (see figure 1), which was put on display to accompany the *FOLK* exhibition, allowed visitors to compose a soundscape that represented an emotion of their choice. The on-site digital sound installation was aimed at encouraging reflection on the diverse and similar ways we express our emotions as responses to acoustic environments. The participants in SIB, and the development of 'The Sound of FOLK', included a group of three museum staff, one external researcher, and 11 young people from the Grorud Youth Council (Grorud is a multicultural district of Oslo). Our partners were engaged as youth advisors for the district council, a position that is paid and includes certain responsibilities. Each participant received an honorarium for every workshop they participated in, in the same way as they received a fee as delegates to the youth council of Grorud.

NTM is situated on the outskirts of Oslo. Around 50,000 schoolchildren visit the museum each year, two thirds of whom participate in learning activities. All of our young collaborators had visited the museum with their school on several occasions previously. Only one of them had visited with family. The interdisciplinary team behind the making of the 'Sound of FOLK' consisted of one of the curators and project leaders involved in original *FOLK* exhibition: Dr. Ageliki Lefkaditou, museum technician and Master's student of informatics at the University of Oslo Tobias Messenbrink; myself, a museum pedagogue working with NTM who was also working upon a PhD research project at the University of Leicester, UK; and Professor Dagny Stuedahl, a museum studies researcher from Oslo Metropolitan University. We worked alongside a group of young people, including members of the Grorud Youth Council. Additionally, three university students were engaged in the final phase. Over 11 months, this interdisciplinary team facilitated eight workshops outside museum opening hours, on Tuesday evenings between 5pm and 8pm (see figure 2). Arranging the workshops at the museum meant that the co-design activities were detached from school life – engaged in an activity that was part leisure, part school work. All workshops took place at the NTM, apart from workshop five, which was held at the Intercultural Museum of Oslo (IKM) for reasons that I will explain shortly. In advance of meeting the young people for the first time, the museum team expressed a strong preference for using the medium of sound to support meaning-making making (Messenbrink 2018; Skåtun 2023). The museum team thought that sound would work well in juxtaposition to the predominant visual language of the exhibition, not least the photography used to capture assumed biological differences between human

groups (figure 3). Our co-designers knew one another but were not as close as a group of classmates would be. There were age differences within the group, and they all attended different schools. Attendance in the workshops varied throughout, both in terms of who came to each workshop, and what time they arrived. For example, at the first workshop, six young people arrived between a quarter to five and half past five: this presented some challenges, as there was no clear starting point and conversations had to be summarized and repeated. This pattern continued throughout the workshops. In addition to this, new people were joining the group and others were dropping out.

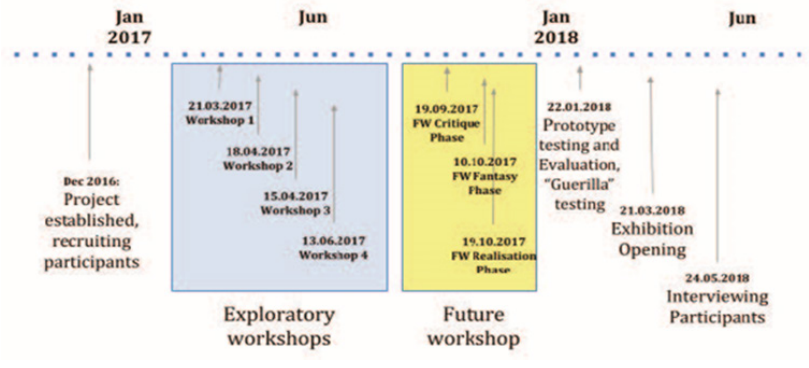

Figure 2: Workshop timeline from project establishment until prototyping, 2017-2018. Illustration: Tobias Messenbrink.

Figure 3: Wall of Soldiers, 1920. Display at the FOLK exhibition.

Exploratory workshops 1–4

The first workshop was dedicated to getting to know one another and the topic at hand. Figure 5 below shows the introductory activity we used, in which participants were asked to write

down what they associated with the terms “identity”, “belonging”, and “ethnicity”. We chose to exclude the term “science”, recognizing that a good starting point for engagement would be eliciting perspectives that are recognizable and connected to participants’ everyday lives (Mygind et al. 2015). Words such as “upbringing”, “how I look”, “feelings”, “passport”, “education”, “exclusion”, “colour”, “residence”, “tradition”, and “beliefs” were among the concepts that were recognizable to most. In the second workshop, the activities and conversations revolved around sound, and our technician Messenbrink introduced non-linear audio editing and sonic interaction. We learned about editing audio material utilizing a simple, nonlinear multitrack audio-editing tool on an Apple iPad, exploring the expressive qualities of interaction with sound. After these introductions, our co-designers worked in pairs on the task of creating a layout for soundscapes. In our third workshop, all groups created soundscapes using multitrack audio editing software on iPads. Each soundscape was different in content and storyline, revolving around themes such as “life”, “equality”, “war’, “birth and death”, “reasons for moving”, and “likeness despite differences”. Sound, object, and space were experimented with in workshop four, during which objects and archive photos were placed across a table, encouraging all participants to take pictures on mobile phones. One participant had recorded his reading of a text as a commentary to the archive photo of a female adult (see figure 5). He connected this picture to his grandmother, thinking her life resembled what was pictured as the simple life that he thought his grandmother would have had in her home country. However, his interpretive emphasis was on the technological elements surrounding her, such as a typewriter.

Figure 4: Making associations with concepts of identity, belonging, and ethnicity. Photograph: Tobias Messenbrink.

Figure 5: Kristine Bonnevie, writing outside her cabin in the Norwegian mountains in 1931. Kristine Bonnevie was a zoologist and Norway's first female professor. She was appointed director of the Department of Heredity Research in 1916, a time in which the study of human genetics was strongly interwoven with eugenics. Photograph: Museum for University History, University of Oslo. Unknown photographer.

Future workshops 5–8

Eight months before *FOLK* was due to open, there had been an underlying interest in seeking out possible connections between the learning programme and exhibition. This eventually led to a shift in the goal for the sound activity towards the design of an on-site, publicly available sound activity. We the museum staff now needed to find a way forward in the participatory project, after four explorative workshops focusing upon how to connect a sound activity with the exhibition. We chose to use the future workshop (FW) method (Jungk and Müllert 1987; Muller and Kuhn 1993; Vidal 2005) to facilitate a more structured engagement with the museum content. FW consists of four stages: firstly, the preparation phase, during which the task to be solved is decided; this is then followed by a critique phase, often through brainstorming, scrutinizing, and framing the problem; then comes a fantasy phase, in which there are no constraints regarding possibilities and funding for solving the problem; the last phase consists of implementation, when the ideas are evaluated based on their practicability. Our first meeting after the summer took place immediately after the first school term had started, and before the Grorud Youth Council had held its first meeting. The oldest participant in the group was about to start university, and their assignment as part of the advisory board was about to end. We therefore invited three new participants into the group: one was a Master's student in museology; the two others were university students, both 22 years of age, who worked both as explainers and at the front desk for the NTM. They were asked to participate given they were close in age to those within the Grorud Youth Council.

Figure 6: Exploring the Typical! exhibition at the Intercultural Museum (IKM) in Oslo. Photograph: Tobias Messenbrink

Considering that the FW preparation phase had been conducted through the four first workshops, the newcomers were thrown right into the critique phase. We met at the IKM in Oslo, where an exhibition called *Typical!* was showing, exploring a topic that overlapped with those in *FOLK*, addressing themes such as otherness, categorization, and prejudice. Focusing on interactive aspects of the exhibition, we identified things we both liked and disliked. As can be seen in figure 7, all of us spent time noting down on a paper keywords that described the experience with the spaces, stories, films, interactives, and usage of sound. The session was followed by a conversation that used the keywords as a starting point to discuss what we liked and disliked. Three weeks later the FW fantasy phase took place at NTM in the Makerspace Area, a workroom for hands-on activities that make use of both modern and traditional technology. Everything was allowed; we pretended to have all the money in the world and that there were no physical laws, imagining that sound could easily be sent to the exhibition from all over the world. This time three participants from our original group, the Grorud Youth Council, came to the workshop. We placed them in three different groups, working alongside one of the museum team and a student. A design was proposed for three user scenarios in which interaction with sound on a digital platform was central. During the implementation phase

Figure 7. Fantasy phase: creating future digital sound scenarios with equipment from the Makerspace toolkit, including straws, pen, paper, and both Lego and Playmobil figures. Photograph: Tobias Messenbrink.

we focused upon the ideas that had materialized during the former workshops. We built on one of the three proposed user scenarios: the futuristic sound dome mode, a space for sounds from all over the world, shared and mixed. After a while, we figured out that having visitors supply their sound was rather complicated, and we decided to use a sound archive as a tool of expression through sound. Additionally, the connection between sound and how one feels, what makes a person happy or sad, became pronounced during the conversations. Messenbrink made a prototype of the sound installation, based on two main elements from the workshop – the futuristic dome and the connection between sound and emotions. We had one last meeting, to prototype, test, and evaluate. During this phase, the action plan was monitored, and changes were eventually made. During the co-design project, this was the last workshop. We carried out an early version of prototyping when we facilitated a sound activity in the third workshop. Using a web solution, the sound activity was set up: first choosing an emotion, then a sound, uploading the sound, and subsequently editing and sharing (see figure 8).

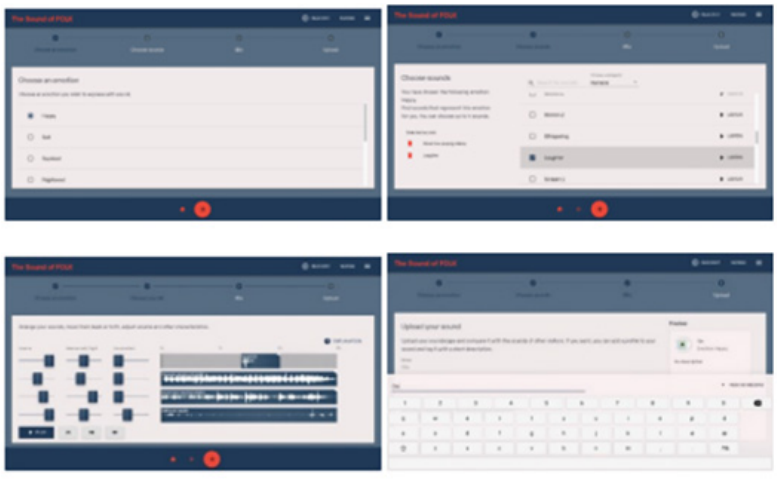

Figure 8. The 'Sound of FOLK' tablet interface. The user chooses a feeling, then a category such as home or nature, and then four sounds from the archive, which are uploaded to be edited and shared. Copyright: Tobias Messenbrink.

A year after the *FOLK* exhibition launch, I embarked on a new co-design adventure related to the exhibition. I asked two young men, who had taken part in nearly all the workshops and had also accepted the offer to work as assistant explainers and front desk personnel at the museum during the summer of 2018, to join me. In cooperation, we planned and facilitated a co-design process with younger children, a project that we discussed in the podcast.

Co-designers feedback

Most participants agreed about finding our semi-structured approach more informal than they expected and descriptions like "fun", "challenging", "engaging", "talking", "doing", "feeling", and "learning" surface as I read through my notes, the questionnaires, and interviews.

> At the same time, several participants offered critical views:
>
> I think there has been a lot of fun in this process. Did feel that a lot happened between the workshops and sometimes I wished I could contribute (because it is fun) or receive some updates along the way (interview participant one, 18 years old).

Here attention is paid to planning work in which our young co-designers were not involved.

While I recall that the museum team was wary of not taking too much of our partners´ time with messages about planning, or at times wondered whether they took on board such exchanges, such quotes show a wish for more involvement. For the museum team, it was interesting to see how collaborative partners understood the messiness of the process – and the blurriness of the result – as an advantage for participation: 'I think that at the start we were able to decide a lot and that we had a lot of influence, but in the last months we didn't have as much influence as at the start' was one questionnaire response. However, during this process, the workshops became more scaffolded as the museum team planned, organized, evaluated, and prototyped in between the workshops. This was also noticed and commented on by our collaborative partners. For example, 'I think the last workshops have a lot of influence in contrast to the first classes' was another questionnaire response. Here we see that the experience changed when the outcome began to take shape, and many small decisions were made that had a direct impact on the tablets´ interface. Another issue that our partners raised related to the aim of this whole process. In the following short comment we can see that the relationship between the museum activity and the exhibition was not clear enough: 'we imagined that we would work on how the exhibition would look', said interview participant two, who was 18 years old. It seems that the physical exhibition was more intriguing to work with than the connecting activities. The following comment given in a questionnaire further highlights how the exhibition took center stage in their reflections: 'exciting to see what the process of developing an exhibition is like, and to see all the considerations that must be taken. The room should be open for everyone to be accessible'. Even if these two comments appear to say very different things, they both point to a desire to a desire to become part of the behind-the-scenes running of the museum, and thus influence what visitors will see on the museum floor. In a similar vein, one young person commented that despite being comfortable engaging in dialogue, he or she asked for more insight into the whole exhibition project:

> I don't feel that I have had a very big influence, but I do feel that my ideas have been heard and discussed. For me to feel that I had a greater impact, I would have needed a greater understanding of what the exhibition was about and what you were looking for (questionnaire response).

This comment points to the challenges we encountered in creating a shared ownership of the exhibition, and an understanding of the process. At the same time, while some asked for more information and understanding, others lost interest. This may be due to the fact that several of the activities resembled those that would take place in school, as was expressed by one participant who was interviewed: 'you must take some responsibility if you work and feel like doing it a little properly. In the beginning, it was a lot of us sitting around a table and just talking, then you quickly drifted off' (interview participant two). Here we see that our co-designers would like to take responsibility, but it was not always easy to know which role to play: 'there are many of us. So, then it is difficult to agree. After all, there were more than 10 of us [...] You don't agree quickly when there are so many of you' (interview participant two). Our partners were open to tasks and conversations, to the nuances, even if the way forward was not entirely clear:

> There were very large distances between those work processes, so there wasn't much thought, for example, let me bring this from that process. But perhaps it has happened a little without you thinking about it, that you have taken with you what you have (interview with participant two).

Even so, for the museum team the process was as important as the outcome. However, it is difficult to imagine something that is not there, and to continue in an explorative mode. This applies to both the young people and the museum team, despite the latter´s experience with museum work.

Discussion

Conducting a co-design process is about letting go of control while simultaneously staying on course within a specific direction (Graham 2016; Taher et al. 2022). The young people

that engaged with the museum, ranging between the age 16 and 23, made up a group of varying levels of educational attainment and experience. This naturally had implications for the dynamic and levels of engagement within the group. As the feedback from the young people pointed out, the exhibition medium was dominant, and how to engage in co-designing the connecting activities took time to establish. For both the museum team and the young people, it was difficult to picture something that was not there. This also applies to creating the *FOLK* exhibition, an ongoing parallel process in which the involvement of the young people went beyond the core objectives of the assignment to make an exhibition.

When facilitating action, interaction, and dialogue during a co-design workshop, it can be difficult to manage engagement that is a little "out of control", in the sense that it may also generate little response in terms of silence as well as noise. At the same time, taking part in a co-design project that goes beyond the time-frames common for museum learning programmes, provides the possibility of engaging with museum objects, themes, and museum professionals on a deeper level, and scientific nuances are able to be articulated and discussed. We tried to stage a shared space where young people and museum professionals were all encouraged to speak and act in co-designing 'The Sound of FOLK' installation. When emphasizing social interactions, with themes and objects in close proximity, participation and engagement for young people can be seen as an exercise in democracy (Wals 2019). This might provide an engaging entry to knowledge sharing, and provides opportunities for several ways of interacting with the objects and themes, as well as between people. Participatory projects, like this co-design process, can create an awareness of direction , pluralization, and stabilization, framed as a caretaking of people and situations (Lynch 2017; Morse 2020). We lost some participants when the fall semester started, and the group had to be put together again with new participants. One key competence when planning and conducting co-design workshops is flexibility: being able to alter both the content in the collaborative task, as well as the timeframes (Rock et al. 2018). This may influence the personal engagement of the whole co-design team both in positive and negative ways. In our case, changes in group composition not only contributed to fuzziness, but conceivably also to the fact that we lost some young people along the way: for example, the three individuals who were assigned as board members of Grorud Youth Council did not show up. Still, we can view the explainers' and students' engagement in the last workshops as valuable. Our interactions had a direct impact on the tablet design of the Sound of FOLK. However, looking at the films and reading my research logs from the workshops shows that incorporating a newcomer into the process takes time. Consequently, the engagement of young people slips a little, and they do not express themselves as much as one would expect, despite having been part of the co-design project for nearly eight months, and now having inside knowledge of the exhibition theme and content of the digital activity we were about to create.

I recognize that the co-design process was experienced as closed, as was pointed out by participant one. The museum team made the plans for how to go forward, which contributed to making the museum the teacher and the young people the pupils. We could have suggested that the participants lead part of the workshops, letting go of the museum authority to a greater extent (Achiam 2019; Modest 2013; Stuedahl and Skåtun 2018). Although such an activity might offer potential for participants feeling a stronger sense of ownership, none of the research material suggests that young people felt exploited, or that we were harvesting their thoughts to make the best sound installation. However, if they were not allowed to earn money, the picture might have been different. Our project competed with other paid engagements such as homework assistance or part-time positions in grocery stores. Remuneration may also have played a role in balancing the engagement between experts and non-experts, as museum personnel recorded working hours. Some of the experiences were remembered by the participants as engaging, even though they were originally received with lukewarm interest – the making of sounds at an early phase within the process was remembered as a particularly engaging experience, possibly because it was a task that manifested in the jointly produced 'The Sound of FOLK' installation. The process underlined the shift from recipient to participant, where the participants assumed an authoritative voice, reflecting as experts on their own experience (Humphrey and Gutwill 2017). In retrospect, one could understand the design process as dialogic in the interplay between doing and reflecting, or as Brandt (2012)

would put it, tell-make-enact. As one of our co-designers expressed in the questionnaire, 'I do feel that my ideas have been heard and discussed'. As the co-design processes extended over time, the relationship between the museum staff and its users evolve; all members begin to appear as individual human subjects and become active agents in the co-designing; and new engagements surface. This commitment was recognized, and we continued to work alongside two young partners after the *FOLK* exhibition had opened, assigning them as workshop facilitators and youth explainers.

Our project was in some ways very ambitious. We strove to be open-ended, and to use the engagement of young participants as a point of departure when planning next steps and methods. This sometimes resulted in the participatory exercises being attended by either too many or by too few. Our participants noticed that at some points we did not know which way to go forward, which in turn created engagement. This contrasts with other learning activities in museums that are planned in detail and often have clear aims. However, the co-design situation is similar to everyday school life, and so too is participating in an educational programme at a museum with your class. Consequently, it was a challenge that made it easy for the youths to fall into the role of pupil, waiting for new approaches and initiatives.

Conclusion

Long-term collaborative engagements with museum users encompass and reinforce a connection between museum and society. We observed that engagement within museum spaces and interaction with museum content offer different perspectives for various individuals, whether they are young people, researchers, or museum professionals. In our case, the structure of the co-design process drifted and changed along the way, both regarding the composition of the participants, and the directions of the assignment. The most stable factor throughout the eight workshops was the museum team, and their engagement in planning the process, as well as the facilitation of and participation in the workshops. Young people brought with them knowledge and competencies to this explorative process, and as responses to questionnaires and interviews indicate that these interactions were perceived as engaging. In essence, the pedagogues and curators must dare to embrace the uncertain and the unfinished in museum project collaborations, while nurture and care for the engagement that young people, as well as museum professionals, bring into the collaborative design process. Under these circumstances, the museum staff must to a great extent rely on the dialogues and interactions in producing outcomes that are not predefined.

Elements of the co-design process, such as facilitating engagement when making something together, can be implemented through a museum programme that invites children and young people, and can be part of a science museum's pedagogical offer – an offer that does not have predefined aims and outcomes. Co-design challenges museums to relinquish power and responsibility and expand the role of our audiences. It involves fewer participants than a group taking part in a learning programme. Potentially closer connections between people can be fostered, and new collaborative openings can transpire. In our case, a new co-design initiative surfaced. Furthermore, co-design processes create the potential to link to the lives of young people; they can also disrupt the museum's understanding of its mission in society as a learning institution. However, at the same time, moving engagement beyond concrete exhibition-making presented clear challenges. The exhibition medium in the young people's minds is dominant, and to be creative beyond it, as well as work with connecting activities, took time to understand. In further co-design projects, I would be less worried about keeping the group and the project commitment together from beginning to end, and rather see the co-design within the science museum as a space for mutual engagement with people, objects, stories, society and museums.

Acknowledgements

I am deeply grateful to my co-designers Grorud Youth Council, Tobias Messenbrink, Ageliki Lefkaditou, and Dagny Stuedahl; without them, there would have been no PhD thesis or article. My sincere thanks to Giasemi Vavoula for her continual support and guidance. I would also like to thank the Norwegian Museum of Science and Technology for supporting the Science,

Identity, and Belonging project. Special thanks to my colleagues Phil Loring, Nina Bratland, Thanushiga Rahja, and Ageliki Lefkaditou for their valuable input. The feedback from my peer reviewers and the editor of Museum and Society has been instrumental in the editing process.

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