The Health Promoting Potential of Interactive Art

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Abstract. In this paper, we argue for the *value of participatory* and *interactive art*, to *increase the quality* of *health* and *health promoting technology*, for children with special needs. UN states through several conventions that everyone has a *right* to take part in art and cultural experiences, also children and people with disabilities, because art is an important value in our society. With technology, we can make art *accessible* to people with special needs in completely new ways. By building on the *participatory art* tradition, in *combination* with *new technology*, we can develop *new forms of expression* and groundbreaking *experiences*. By incorporating knowledge about *health promotion* and *universal design*, we can create new health promoting technology and *artistic empowering experiences*, by making them more *engaging*, *inspiring* and *participating* for children with special needs. This opportunity has in too little extent, been recognized within Assistive Technology. The paper is based on our research and experience from testing an interactive art installation, with children with special needs at six schools within the Norwegian national school art program.

Keywords: Health promoting technology · Art · Design for diversity

1 Introduction and Framework

Art is a Valuable Right. The UN Declaration of Human Rights (UDHR) states "All human beings have the right to participate in cultural life, enjoy art…", later in the Convention on the Rights of the Child (CRC) including children and persons with special needs in the Convention on the Rights of Persons with Disabilities (CRPD). This shows the importance of art and culture, on an individual and a social level. To meet these UN-demands, several countries, such as Norway, have created cultural programs to offer children art and culture activities at school. As a consequence of the ratification of CRPD in 2013, the Norwegian national art program, the *Cultural Schoolbag* [1], has from 2015 also offered a unique "Accessible Program" for children with disabilities.

The value of art has been formulated in many ways: As a *breathing space* in our society, a *free voice* that *challenges established thinking* and *prejudice* and provide an *alternative understanding* of the world. A source that provides experiences that can be decisive in order to develop the individual's *identity* and *quality of life* [1], a *strong subject* that invites us in and mobilizes our own subjective *will* to *create* and *express* [2], *connects* and challenges our *minds* [3], and helps our *communities* to grow [4].

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Health and Health Promotion. WHO states that "Health is a state of complete physical, mental and social well-being and not only the absence of disease or infirmity…". Traditionally within health research, we divide health in two main areas, the *biomedical* and *humanistic* [5]. The biomedical health approach focuses on the patient's diagnoses and disease, where the humanistic on the person's resources, not his weaknesses, and on *strengthening these resources*, i.e. *health promotion* [4, 6].

Designing for Health promotion represents a much more ambitious and complex design challenge than the traditional 7 Principles of Universal Design [7]. Among other things, it represents that design has to offer the user; *many roles to take,* many *positive experiences* to make in every situation, where there are *no wrong* actions or failing possibilities, and *few dependencies* and no closed paths. It has to offer many ways to *express oneself,* act and *build competence* over time. Further, it has to offer many ways to develop and *build relations* to things, people and actions. In other words *many ways* to share, relate, participate and create meaning over time [8].

Participatory and Relational Art is art where the *audience participate* in creating the artwork in various ways, outside traditional art institutions. The artwork becomes a process, a *reflective awareness* act or exercise.

Interactive Art is art where the *audience create* in an intelligent technical *interactive medium*, which can be both digital and physical. It reminds of a computer game, but has an *expressive intent,* instead of a gaming goal as a guiding idea. In doing so, the artist uses *artistic rhetoric*: a strong and *engaging language* and a *seductive tone* of voice to shape a clear character and *consistent, aesthetic qualitative* experience [2].

Art in Therapy. Art has an important role in therapy forms such as Art Therapy, *Music Therapy* [4] and Psychodrama. Art Therapy has to a very little extent used technology, where Music Therapy traditionally use acoustic music instruments, but also electronic instruments and tailored, *accessible switches* for individual users. The RHYME project, which is the basis for this paper has taken this much further [9, 10].

The State of the Art in this Area. There are a number of interactive installations, but few have health promoting goals. There are a lot of health technology, but with limited art qualities (see above), such as the therapy seal "Paro" [11]. "Vocal Vibrations" (MIT) is a meditative art installation, which is static and do not adapt to users' ability or musical taste [12]. "Reactable" is a tactile musical social tabletop used to train social abilities of autistic children [13]. It is too complex to use and thereby risks to cause fatigue [14].

2 Methods

4th Generation of PAR. The ground for this paper is the testing of the interactive installation "Polly World" through the Cultural Schoolbag *Accessible Program* at 6 schools in Norway. Polly World is the *4th generation* of tangible technology developed in the research project RHYME [10], where the goal was to create health promoting musical tangibles for children with severe disabilities, based on *Participatory Action Research* (PAR) and *Research-by Design* methodology [10].

The Polly World installation consists of many parts. The version we tested here have 3 body sized wireless interactive objects with diverse shapes: A soft "ball", a "banana shaped cushion" (Fig. 1-1) and a "hybrid blanket". They have touch, bend (Fig. 1-2), microphone (Fig. 1-3) and RFID-reader (Fig. 1-4) as input sensors and light and sound as output. In addition, there are many RFID-tagged familiar artefacts and music-tunes, that play when the tag is close to the RFID-reader on the interactive object [15]. An interactive dynamic video projection on the whole wall, made the familiar school environment into a wondrous magical world.

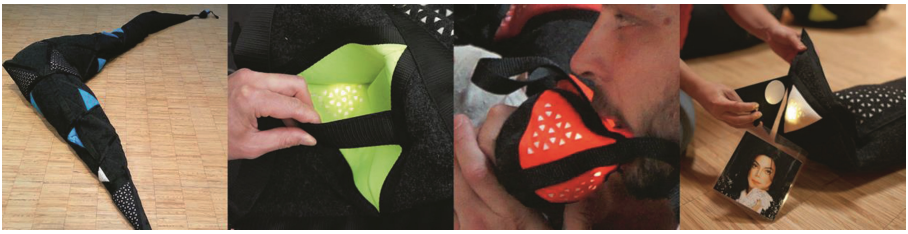

Fig. 1. Parts of Polly World: 1. Banana shaped Interactive object, 2. Bend sensor, 3. Microphone, 4. RFID-reader and music-tune RFID-tagged cover (Michael Jackson).

Participatory Observation. We *videotaped* all user sessions when we toured with Polly World as part of the cultural program, in total 6 schools. 78 children with *multi-functional disabilities* (physical, cognitive, social), from the age of 7 to 18 tested the installation. The children tested in diverse *group constellations,* and diverse *object selections,* to change and *improve* the *user experience*, from session to session in an *action-based* manner. We did additional *interviews* with the teachers.

3 Observations and Findings

We observed that children preferred to start by exploring *alone* to get an overview and to know us and the Polly World installation, *before* interacting with *others*. Later, when they could choose freely, they formed groups of 2–3 to co-create together. As the *groups grew* in number, the communication got louder and the children got more passive and *tired*. In the start, they choose a *familiar artefact* (RFID-tag), e.g. a soft toy and a familiar music-tune to play with (Fig. 1-4). The familiar picture of the singer on the *music-tune cover* with a physical RFID-tag, motivated them to change music. Quickly they mastered to *record* their voice, with the lighting microphone (Fig. 1-3), and playback sound through the speakers, by interacting with the *input sensors* (Fig. 1-2). The children showed low interest in interacting with non-familiar artefacts, until they could master the *RFID-reader* and tags. Then they wanted to explore much more.

Children selected familiar music-tunes and was enticed by the seductive process of *repeating* elements and re-playing them. Just as 10 year old John insisted on playing the "Itsy bitsy spider" tune over and over again, while performing rhythmic hand movements to the lyrics where the spider climbs up and the rain falls down. As John laughed and comforted himself with choreographed movements to the rhythm of "Itsy bitsy

spider", he *regulated* his *feelings* of stress and comfort through altering the *volume control* (RFID). John also used rhythms in the music and movements in the tune to connect and co-create with other kids, teachers and us. The algorithmic composition rules made the music, video and the whole interactive environment repeat and vary, changing dynamically with the user interaction. The algorithms created a constant push and insisting atmosphere that motivated the children to continue interact. The music and the physical design created a social arena, inviting the children into a new world of experiences. The children experienced being in *control*, when moving the interactive objects without wires. Because the possibilities to *stage*, *include* and *exclude* sensory stimulating objects and experiences, the environment challenged the children's whole register of actions and expressions, based on their sensory profile. It made them take risks they normally did not and provided comfort when needed. The diverse children used many *different ways* to access the sensors. Anna was flipping the motion sensor in the big arm back and forth to change the pitch of her voice recording, while John stepped on the same motion sensor arm to get a short sound feedback on his action. David was lying with his ear on the speaker in the soft interactive object, speaking and singing into the microphone. He collaborated with one of us that played back each of his sayings by interacting with the arm with movement sensor. We observed that input-tag and sensor should have *equal and consistent sensory form* (tactile, sound, visual) to provide users with diverse impairment with consistent interaction form (Fig. 1-4). For instance, Maria that is blind found out how to use her hands to *sense* the triangular *shape* of the RFID-reader and triangular RFDI-tags, which made it possible for her to find and play all sounds, change music-tunes, and thereby master the whole environment, where others related the colour to each other (Fig. 1-4).

4 Conclusion

In this paper, we argue for the *value* of *participatory* and *interactive art*, to increase the *quality of health* and *health promoting technology*, for persons with special needs, based on our comprehensive testing of an interactive installation as part of the national school art program in Norway. Art is not only a UN stated *right*, an environment for ground-breaking experiences, but has also great *health promoting potential* if *shaped* and *staged* in a *suitable way*. Participatory artworks should have a strong *subjective voice*, *consistent aesthetic quality*, *evoke* and *connect* with the audience, *inviting* them into a seductive, mental and physical awareness experience, and *insisting* them to interact and *co-create* along with the artist and the artwork.

We show that participatory art thinking has potential to increase the quality of traditional health technology, for instance by changing the focus from disease, weaknesses and difficulties to an artistic *seductive experience*, built on *artistic rhetoric*; *By creating* interactive installations with a user interface that the children can *manage on their own terms*, regardless of disability, without failing possibilities. *By including familiar elements* the children can *relate* to and use as *guides* into new experiences, first to *master alone* and later *co-create together*, to make the art installation a rich imaginative unique *arena for participation* and new creative mastering experiences.

We observed how the children experienced to engage and *evoke positive* emotions, the *ability to master*, feeling *self-efficacy* and *ability to self-regulat*e feelings and their experiences. Further how they *built relations* to each other on equal terms.

The art thinking and its qualities can open up to *innovations* and *collaborations*, within the field of health promoting technology. This requires that the *artists* take the *health promoting*- and *design for diversity-requirements*, into their work. Further, that *technicians* open up to what *qualities art* can offer, to *improve health technology*. Technology that currently has a measurement and tool oriented focus, because of its biomedical roots. We hope this paper is a small contribution to this development.

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