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Creative arts in the national museum of computing

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Abstract

Families of children with autism and other special educational needs may often feel excluded from social activities and/or report on lack of quality family time. Some museums offer individual booking times for families outside their regular public opening hours. Such relaxed openings in museums present opportunities for families to participate in leisure activities that suit their sensory and social needs. However, further exploration of the meaning of such programs to families is needed to enhance the inclusive offer of museums. This research study evaluated the feedback and reflection of creative workshops conducted in The National Museum of Computing during its relaxed openings for families with children with autism and other special educational needs. The findings of the project highlight the benefits of the creative workshops with sensory-friendly aspects, evidenced by the observed engagement of children and families in the activities and interpreted through data from child and parental questionnaires and facilitator reflective log.

KEYWORDS

autism, creativity, inclusion, museum, participation, special educational needs

INTRODUCTION

Visiting museums may present a challenge for some families with children with special educational needs especially due to the high intensity of the experience with regard to the rules of social conduct and the potentially overstimulating environment as atypical sensory processing was present in 82%–97% of individuals with autism with a significant impact on adaptive behavior (Dellapiazza et al., 2018). Therefore, to support access and participation

of families of children with autism, some museums offer modified programs through specific opening times and adjusted environmental conditions (Troshanska et al., 2018). *Relaxed* opening hours refer to the dedicated museum opening time during which the number of visitors is limited, and which is intended primarily for families with children with disabilities and their siblings. Mulligan et al. (2013) emphasized that specialized materials and the presence of trained staff were crucial in adapting the museum offer to meet the needs of a diverse spectrum of visitors. Creating more inclusive public spaces is paramount in ensuring equity of access to opportunities in a diverse society. Antonetti and Fletcher (2016) reported that families of children with autism visited museums three times less than other families and experienced three times more negative emotions connected with the museum visit. For those with special educational needs who have differences in sensory perception, a visit to a museum may be especially challenging. Sensory processing difficulties can cause a person to feel overwhelmed, because information perceived through the senses is not filtered (modulated) enough by the central nervous system (Kilroy et al., 2019; Lane et al., 2019); therefore, the environment can feel too intense, repeatedly novel, confusing, or threatening. This is not an isolated issue as 90% of individuals with autism have specific sensory needs (Robertson & Baron-Cohen, 2017, p. 671) and the prevalence of children with autism is about 2.25% of the school population in the United Kingdom (McConkey, 2020). Potential visual, tactile, or auditory hypersensitivity (Schaaf & Lane, 2015) means that busy, crowded, and stimulating environments might be difficult to manage. Overlooking sensory needs may lead to meltdowns with some children exhibiting challenging behavior due to increased anxiety levels (Mazurek et al., 2013).

In addition to environmental challenges, families may be facing barriers in the social aspects of a museum visit. Kulik and Fletcher (2016) discovered that parents were worried about what other visitors would think of their child behaving differently and expected frustrated reactions which led to apprehension of a negative experience. Considering the potential added stress, families with children with special educational needs are less likely to visit museums, despite the museum offering topics that might belong to the special interests of the child. Isolated and very specific areas of interest are typical for 75%–88% children with autism (Klin et al., 2007). These are often associated with physical and mechanical aspects of the world as opposed to social (Turner-Brown et al., 2011) including computers (Grove et al., 2018). People with autism may engage in more than one special interest and following these interests contributes to higher subjectively perceived well-being and satisfaction with social life and leisure (ibid.). Museums, and specifically technology-oriented museums, therefore, comprise unique opportunities for meaningful free-time participation, learning and gaining in-depth knowledge on the subject of special interest. It has been evidenced that incorporating special interests of children with autism into the teaching and learning practice has positive impacts on educational attainment and social engagement (Gunn & Delafield-Butt, 2016; Wood, 2021). However, for this purpose to be fulfilled, museums as spaces of joyful learning need to be accessible and adjusted to the needs of all visitors. Families of children with autism can benefit from museum visits, both because of the opportunity to spend time together as a family and because of the child's specific interest. They may pursue a trip to the museum with the aim to provide their children with a practical learning experience as well as a challenge of experiencing something new, yet in a contained, safe, and protected environment (Lussenhop et al., 2016). Research evidence suggested that participation in the museums' adapted educational programs positively influenced cognitive skills and social behavior of children with autism (Deng, 2017). Appropriately adjusted environmental conditions and the museum program increased visitor satisfaction, provided a pleasant atmosphere, encouraged children's learning and, ultimately, the social inclusion of children with autism and their families (Mulligan et al., 2013).

PROJECT DESIGN

The aim of this project was to enrich the visit to The National Museum of Computing (TNMOC) during the relaxed opening hours by providing interactive art-based activities for children with special educational needs, their siblings, and parents/carers, focusing on children with autism and their families. The museum already had experience with relaxed openings and provided autism awareness training to their staff and volunteers. The existing offer of interactive activities in the museum was of a technical nature such as air traffic coordination simulator or playing computer games on old computer models. The museum's educational programming manager proposed a collaborative project focused on offering creative, art-based activities that would provide children with more opportunities to explore the technical topics through creative multisensory means—following the children's interests and broadening their behavioral repertoires and experiences at the same time. Similar strategies of connecting art-based activities and educational purpose of museum visits were used by other museums supporting engagement of underserved visitor audiences (Fletcher et al., 2018) by overcoming the layered stresses of sensory and social challenges (Clément et al., 2022). Based on personal contacts from previous collaborations, TNMOC approached the University of Northampton to collaborate on the project. The purpose and the aims of the project were planned at several levels with benefits and impact on different stakeholders. The museum was interested in enhancing and broadening its offer with attractive interactive activities that would promote the museum as an inclusive space and lead to sustainability of the relaxed openings offer. The partnership between the museum and the university strengthened local networks in joint efforts to create inclusive environments and promote equitable access to leisure and educational activities for families with children with special educational needs and disabilities. Similarly, Thayer and Bloomfield (2021) evidenced the potential creative activities have in promoting meaningful participation, support regulation, engagement, and communication. The major impact of the project was expected for the families themselves. Offering inclusive activities for families was answering the demand for suitable leisure and educational opportunities that would match the children's interests and respond well to their sensory needs. The project was therefore aimed at delivering the creative art program as well as collecting participant feedback, contributing to evidence-based museum practice.

Organization of the program

The art-based activities were offered as part of the relaxed opening hours organized bimonthly by the museum. Families were required to register in advance for attending the relaxed opening, and this was organized by the museum. There was no requirement to register for the art-based activities, nor were they specifically advertised. From experience of the museum educational programming coordinator, the relaxed openings were mainly attended by families with children with autism and the museum staff had basic autism training. The art-based activities were offered on three consecutive relaxed opening days—in February, April, and May 2019 and were attended by different families on each occasion. The activities were designed by the researcher in consultation with the museum educational programming coordinator and a colleague from the university. The sessions were facilitated by the researcher, who was accompanied by an assistant in the first session and by their university student in the third session (Table 1). The researcher is a therapeutic pedagogue with background in expressive arts and inclusive education with 12 years' experience in practice and as an academic. Therapeutic pedagogy implements a holistic bio-psycho-social perspective of child development (Bronfenbrenner, 1986) with emphasis on functional approach to special educational needs and disability (WHO, 2001), applying occupational therapy and creative arts

TABLE 1 Session overview.

	Timeline	No. of participants	Facilitators
Session 1	Feb 2019	11	Researcher and Assistant
Session 2	Apr 2019	4	Researcher
Session 3	May 2019	2	Researcher and Student

therapies theories and methods in early intervention, educational, and social care settings (Kováčová, 2014). The researcher's professional background informed the programming, selection of activities, and directed their communication style with children and families. The assistant had 20 years' experience in working with children with diverse needs. The student had 3 years' experience in working with children and studied early years education.

Thematic sessions

The requirement of the museum was a clear connection of the topic or activities with the scientific and technical focus of the museum. Three thematic meetings were held—the first two held the theme of *Robots*, the third one was about *Spaceships*. The decision to repeat the theme based on an assumption that the same families would not register to visit the museum on two consecutive dates and the first session was considered a success, so the offer was repeated in the second session.

The rationale behind the selection of activities was based on the principles of systems theories of creativity, considering extrinsic and intrinsic motivation to create (Csikszentmihalyi et al., 2018). By directing participants to a specific topic and providing structured frameworks of types of activities task motivation was enhanced. Choice, physical environment, available materials, facilitator guidance, and the topic itself provided opportunities for deep involvement in the artmaking. These principles aligned with the SCALE—Support for Creativity in a Learning Environment developed by Richardson and Mishra (2018, p. 50), which highlights components supportive of creative processes such as: (a) the physical environment (variety of available resources, examples of work appearing in the artmaking space, variety of work areas to choose from, comfortable furniture allowing flexible rearrangements); (b) learning climate components (tolerating messiness and noise, promoting active discussion, collaborative, friendly, caring and respectful learning community, facilitator as co-explorer, and valuing differences); and (c) learner engagement components (intrinsic motivation, open-ended tasks involving choice, authentic, relevant, project-based tasks, promoting multiple viewpoints and solutions, encouraging mistakes and risk taking, flexible pace, time to develop ideas, and to reflect on learning).

The content of the activities was shaped by the professional background of the facilitator/researcher, drawing on applied uses of drama, supported by principles of stemming from role theory (Bololia et al., 2022; Landy, 2009). Role theory encompasses four components of a person's personal developmental journey: hero, obstacle, guide, and goal. Thus, in their artmaking, the fictional story a child created served as a mirror reflecting everyday life. The components of the hero's journey were reflected in the creative worksheets, for example, in the task to design their own robot, participants were encouraged to define the robots name and special skills (hero), think about its function or mission (goal), potential technical difficulties (obstacle), and ways of supporting power (guide). Based on principles of projection through aesthetic distancing (Mayor & Frydman, 2021), exploring these parts allowed holistic stories to emerge that were metaphorically relevant to children's lives, therefore supporting deep engagement with the creative process, individual introspection, and social interaction. For leisure and educational activities to be relevant to the children with special educational needs as well as all

family members, these components were considered crucial, because they allow for individually relevant creative processes to happen alongside joyful mutual interaction. Shared interest and deep involvement in the same topic and activity are accompanied by space for individual inner thinking and creative processes. Similar principles were identified by Kumpulainen et al. (2014) in their Kids, Museums, and Technology Programme, highlighting multimodality of interaction, promoting personal and collective engagement, and celebrating imagination and play. Role theory here serves as an example of how professional frameworks can become integrated in collaborative practice and inform educational programming. Similarly, to the Trowsdale Art-Making Model for Education (Trowsdale & Davies, 2022) derived from evidence of collaborations between artists, teachers, and learners, this project was enhanced by the collaboratively created design and cross-pollination of theoretical frameworks informing the practice.

Autism-specific modifications

The program followed principles of good autism practice (Charman et al., 2011), for example: (a) creating a structured and visually clear environment, (b) allowing choice and control, and (c) being aware of sensory needs.

Visually structured

The environment was visually structured to support orientation and focus, and thus create a feeling of safety in the physically organized space. The topic was marked on a whiteboard with examples of creations and questions for discussion. Each type of activity was laid out on a separate table allowing several participants to sit around the table and engage with the artmaking. Children were encouraged to explore the room and select an activity that they were interested in. In addition to verbal guidance provided by the activity facilitator, tables were visually marked noting the type of activity, making it easier for parents and children to navigate. As opposed to the rest of the computing museum, the activity room had no screens running and no overhead lights were turned on, providing what Clément et al. (2022) refer to as sensory friendly zones allowing for better participation without being specified as spaces created for individuals with special educational needs.

Providing choice

The program provided opportunities to make choices of participation in general and in the selection of activity type. Placing control over situations into children's hands was promoted in order to empower participation as freedom of choice to engage is crucial in creating equitable inclusive environments. The activities had an open-door policy; families were encouraged to enter and leave the room as they wished, which was informed by research confirming that some children with autism benefit from a low-demand approach (Shillingsburg et al., 2014). The design of the program included a choice of several creative activities. The offer included drawing, painting, creative writing (Figure 1) and arts and crafts making, design, and construction activities (Figure 2). The diversity of potential visitors, children with special educational needs, especially children with autism, their age, level of skills and needs were taken into consideration and demonstrated by varied complexity of activities enabling involvement of both younger and older children, providing differentiation in the amount of instruction and modeling. Another area of choice related to the social needs of participants by encouraging
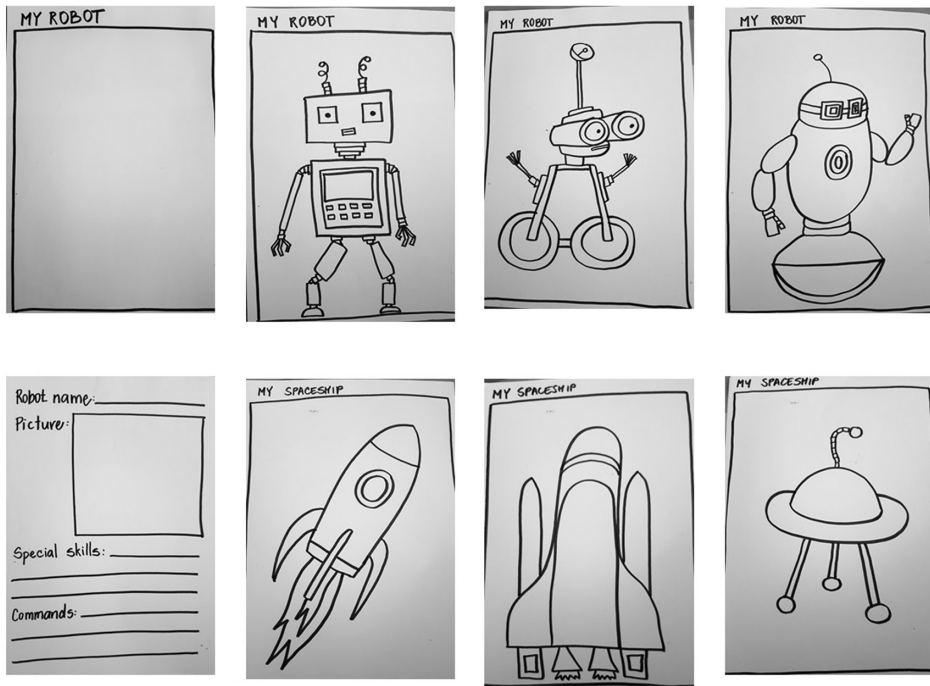
FIGURE 1 Samples of worksheets.

individual or group work for families. Activities were simple so that children who preferred to work alone could follow the activities on their own, however, if they wanted to work in pairs with their siblings or parents, the activities allowed for that to happen. Moreover, the activities were attractive to the adults too, so their engagement was genuine, not just stemming from the need to help their children.

Reflecting sensory needs

Children with autism and/or other special educational needs may be visual or tactile learners with a special interest in different materials (certain colors, glitter, and fluffy materials), and especially children manifesting repetitive behaviors might be seeking tactile sensory inputs (Foss-Feig et al., 2012). Offered sensory modalities included in the project were: visual (colors, shiny, glittery materials, and drawings), auditory (music in the background, conversation, and making sounds of robots and spaceships), tactile (wool, paper, sandpaper, glitter, glue, feathers, various fabrics, seashells, and chestnuts), proprioceptive (drawing, cutting, threading, motor planning to create robots, moving chairs to create appropriate spaces, and several types of chairs to choose from including high turning chairs and low soft seats), and marginally smell (natural materials, glue, and paint). More proprioceptive (muscle activation, physical activity) and vestibular input (movement of the head to regulate level of activity) was provided if a child was seeking it—movement in the room was possible and encouraged through questions about how the robots or spaceships moved, enhancing embodied work, however, only some children moved from their chairs. Eating and drinking (providing olfactory and gustatory stimuli) was allowed, although no food was presented in the session. The offer of multisensory activities was there to provide stimulation for those who seek it, but

FIGURE 2 Demonstration of created products.

without an obligation to engage to avoid overstimulation of those with heightened sensitivity. Understanding of staff that children with autism may have specific sensory needs meant that children were supported in their choices to interrupt activities, leave and come back as they felt suited their needs. Auditory hypersensitivity is now recognized as one of the predictors of autism (Jussila et al., 2019), therefore being aware of the noise levels and managing them can be very useful in promoting participation of children with autism by adjusting the auditory stimulation in the environment. Similarly, tactile defensiveness is typical for children with autism (Green et al., 2015; He et al., 2017), meaning crowded environments can present a challenge of accidentally being touched by others. Allowing children to sit where they feel protected from sudden touch is a helpful strategy that can promote a feeling of safety and consequently participation.

METHODS

In answering the research question of "How do children and parents evaluate their participation in creative art-based activities in the computing museum?," the research applied a case study approach in the analysis of the program (Creswell, 2014). Data were triangulated using three sources: observation, rating scales, and feedback questionnaires. Observations were captured via debriefing sessions and reflective logs of the workshop facilitator/researcher. Questionnaires for parents and children collected quantitative and qualitative data in parallel (Mertens & Mclaughlin, 2004) using rating scales and written feedback.

Research instruments

The aim of the research element of the project was to evaluate the program in order to contribute to increasing evidence-based practice (Royse et al., 2015) with regard to the experience of families of their participation in creative workshops through collecting feedback from parents, children, and facilitators immediately after the program. The overall purpose of collecting the feedback was to engage in transforming the practice based on the responses received; informing future program choice and approaches based on evidence provided by the families and captured in the research findings. Due to the researcher being in the double role as a facilitator of the program too, and expected large numbers of participants in the short 2-h window of the relaxed museum opening, questionnaires were chosen to capture feedback from all willing participants. Questionnaires had to be short to encourage participants to engage with them and to enable their completion in a timely manner. Questions included basic information about the participant (their role in the family—parent, child, and other family member and their age); captured the type of activity they participated in (making, drawing, writing, or building Lego) and form of participation (alone, with someone else or in a group); a 5-point scale of rating the activities offered (I hated it, I did not like it, It was alright, I liked it, and I loved it); a multiple choice question if they would participate again (Yes, No, and I do not know) and two open questions asking for their thoughts on the activities and any further comments. The feedback questionnaires were developed in two versions, for children and for adults. The children's version contained questions asked in a simple way using a visualized answer sheet (Figure 3)— answer options utilized visual symbols in addition to words for types and formats of activities, and emojis for expressing how they liked the session on the feedback scale. This was again based on guidance for working with children with autism using visualization as a strength in learning (Charman et al., 2011). Boxes allowed enough space to tick or draw a picture. Some children wrote their answers into the boxes. The last question in the questionnaire for children was phrased as follows: "How could we make the activities better? Your ideas: …" leaving a blank space for children to express their thoughts freely.

After each session, the facilitators conducted a debriefing meeting where they verbally shared their feedback about the session, highlighting what went well and why, what needed to be changed or adjusted for the next session, and any specific observation about the participants with the aim to understand the impact of the program. The main facilitator/researcher took written notes of the debrief meetings and kept an open unstructured reflection journal log. These were then processed using an inductive approach to thematic analysis with a focus on identifying core components of the program through open coding that would add value to the interpretation of the findings from the questionnaires using the principles of data complementarity and expansion (Brannen & O'Connell, 2015).

Ethics

The research study was ethically approved by the University of Northampton Ethics committee and followed the BERA guidelines (2018). For data collection, questionnaire feedback sheets were placed on a separate table and clearly visually marked. Written research information leaflet was pinned on a cabinet in an easy-to-read position near the table with the feedback forms as well as printed on each questionnaire. The workshop facilitator/researcher verbally invited parents and children to fill in the questionnaires. Some parents did not need to be invited, due to clear visualization, they reached for the feedback forms without being specifically asked to do so. The facilitator explained the purpose of the feedback and how the information would be used. It was emphasized that participation was voluntary for parents and children. Open questions were used in the invitation to participate, such as "Would you

FIGURE 3 Questionnaire for children.

like to write here how it was? / how you liked it?" Questionnaires were anonymous and parents and children were reminded not to write their names on the feedback sheets. If children or parents wanted to leave a question blank, they had the opportunity to do so and this was clearly communicated to them at the beginning or throughout if they had any questions about the survey. After the participants filled in the questionnaires, they were asked again if they were happy to return the feedback sheets assuring their right to withdraw if they wished to do so. If children did not feel like filling in the forms, they were told it was alright and the same was repeated to the parents so that they would not feel any pressure to persuade the child to

respond. Moreover, the visual feedback sheet allowed children to engage with a full range of responses without being guided by an adult. The fact that the facilitator/researcher was present in the room while families were filling in the questionnaires could have caused that children and parents might have felt obliged to provide positive feedback. This risk was mitigated by the facilitator/researcher stepping back to a different part of the large room and verbally encouraging participants to express what they liked and did not like so that the program could be improved for other families.

The reflective log notes addressed evaluations of the process, reflecting back on the art-based activities and their implementation. If an observation of participant behavior or a response was noted in the reflective log, it was anonymized.

Participants

About 30 participants were expected to visit the museum during each of the relaxed openings, however, the numbers of visitors were lower. Almost all children and parents who attended the three separate sessions of activities took part in the research (Table 2). Participating children ($n = 10$) ranged in age from 6 to 12 years (mean age was 9 years) and included children with special educational needs and their siblings. The mean age of the parents/carers ($n = 7$) was 35 years.

PROJECT RESULTS

Children and parents evaluated the creative workshops very positively, both verbally in informal feedback and formally in the completed questionnaires. The positive response of participants was also documented in the facilitator log referring to overall positive atmosphere and expressions of excitement and joy. Questionnaire data were analyzed using descriptive statistics, due to low number of responses, results are presented in form of frequencies. Facilitator reflection notes further revealed insights into the perceived outcomes of the project and its impact on the participants. After open coding of the notes, the emerged themes were clustered into initial categories that were then checked against questionnaire data, complemented, and expanded. The final themes related to program evaluation comprised of: Engagement, Choice and flexibility, Attracting all family members, Supporting interaction, and Enhanced learning.

Engagement

A fundamental positive result of the project was that families actively participated in the offered creative workshops, which suggests that the offer was attractive for both children and adults. A parent noted: "The staff were great and the children really enjoyed themselves." In previous studies, families tended to evaluate museum visits as successful based on the criterion

TABLE 2   Characteristics of the research set.

	Session 1	Session 2	Session 3	Total
No. of children	7	2	1	10
Age in years	7–12	6–9	9	
No. of adults	4	2	1	7
Age in years	30–37	36	38	

of *having fun* (Lussenhop et al., 2016) so the fact that families engaged for a sustained period of time indicates their interest and pleasant experience. Data from the reflective log indicated that there were families who visited the museum but did not join the creative workshop. Two variations of nonattendance appeared: (a) families peeked into the room and based on the decision of the parents did not enter, or (b) they entered the room, looked around and due to the child walking away from the activities and/or out of the room did not stay to participate in the arts activities. As Lussenhop et al. (2016) identified, families applied different strategies of navigating through museums, for example, some families let the child lead while others took turns leading. There could be many other factors influencing nonparticipation such as situational factors (order in which families encountered the exhibits and activities, physical aspects of the environment such as the air and smell in the room) or personal factors (tiredness, anxiety, and physiological needs such as thirst or hunger). The facilitator noted in their log that it could also be assumed that families simply were not interested in the activities. In a similar research, Langa et al. (2013) identified that children with autism evaluated their museum experiences as positive when they were attracted by the objects of their interests.

Another influencing factor that was identified from the reflective qualitative data, was an active verbal and physical invitation to participate from the side of the facilitator assistant that happened during the first session. The assistant moved around the museum, informing families about the creative activities, encouraging them to come and see the activities. The facilitator perceived such *marketing* and social engagement aspect of critical importance in the overall attendance of the creative arts sessions as evidenced in their reflective log: "Families talked about the room with their children and planned to stop by. The anticipated interest was increased, children were prepared for it and perhaps even excited about it as they entered the room."

During the second session, there was only the main workshop facilitator/researcher present leading the activities in the room, the social engagement and marketing aspect were missing. Although the door to the room was open and visually signposted with a thematic picture of a robot and an arrow pointing to the room, the number of visits and activity attendance was substantially lower compared with the first session. Only three families entered the room at the end of a two-and-a-half-hour period of the allocated time of the relaxed opening. They were interested in activities, however, at that point, there was no time for them engage in the activities as the museum was about to close for the day. The children were satisfied that they could take the worksheets and construction materials home, but there was no space for a shared experience or evaluation of the experience. Two facilitators were present at the third session (the main facilitator/researcher and their university student), both were present in the room with the aim for the student to receive feedback on their facilitation performance. Workshop attendance was low again as families were not aware of the program happening or that it offered creative activities.

Although when visiting museums families were interested in new and challenging experiences, some families preferred to plan their visit in advance (Lussenhop et al., 2016) as children with autism may prefer increased predictability of the environment and activities and may need support in transitioning between spaces (Charman et al., 2011). Having the opportunity to learn about the arts room with clarified expectations of what activities were offered there as happened during the first session was observed as a useful strategy. Timing and the possibility to plan timing for each section of the museum as also important for families during their museum visits (Lussenhop et al., 2016), therefore knowing about the art-based workshop in advance might have promoted engagement with the activities.

Choice and flexibility

The creative sessions were highly flexible allowing families to adapt their participation to accommodate the child's sensory needs. Delaying and rapidly changing or even abandoning activities is

sometimes necessary due to the child's sensitivity (Schaaf et al., 2011). Children (and their parents) could enter and exit activities, return to ongoing projects, or split up—some parents let one child work with a facilitator and went with the other child/children to see another part of the museum. The facilitator reports in their notes: "I think that such freedom supported families' positive experience with the programme, giving families the flexibility to fulfil the interests of all children/ siblings, not just the child with a disability." Children with autism may monopolize parental attention, marginalizing their siblings by forcing them to work independently (Schaaf et al., 2011).

Freedom of choice and self-directed level of participation proved to be important for children with autism themselves too. Reutebuch et al. (2015) reported that providing choice in activities increased the rate of task completion and retention, reduced inappropriate behavior, and improved the child's affect and interest. For example, in the first session, one child left the room and stopped their activity when the room was filled with other families and the noise level increased. After a while, they returned and finished their creation. Such flexible forms of working presented an important inclusive aspect. Families respected and supported the child's the freedom of choice. "I feel like we managed to deliver the message that it is OK to have this freedom… that the relaxed openings and the creative activities presented a *permission* to behave in a way that suits the families without feeling judged for being different or not following the rules" (Facilitator log). Similar results were identified by Deng (2017), stating that free choice, activities with real objects, and learning through exploration helps to meet the educational and social needs of children with autism when visiting a museum.

Attracting all family members

As families entered the room, the workshop facilitator explained and showed the possibilities of the activities. Children chose where they would sit and what activity they were interested in carrying out. Parents sometimes joined automatically, sometimes they were drawn in when helping children in creating and building, other times parents dared to be playful and creative only after being encouraged by the facilitator. Parents rarely did not join at all. The adult participants, who designed and constructed robots and spaceships, sometimes alone and sometimes with children, laughed and commented positively that the activity was fun. Participants' creativity was supported by the state of flow (Csikszentmihalyi et al., 2018) achieved through immersion in artmaking. Most of the participants finished their creations, which indicated that the activities were pleasant not only for their children, but also for the adults themselves. Having a goal of an art activity such as building a self-designed product supports creativity through behavioral principles of imitating an existing model and creating novel variations (Kubina Jr. et al., 2006). The fact that parents truly enjoyed the activities was an important result of the project, as it can be difficult for families of children with autism to find common leisure activities that are genuinely enjoyed by all members. Walton (2019) pointed out that although families with children with autism spent their free time together, their satisfaction with spending time together was lower compared to other families. According to Rodger and Umaibalan (2011), families appreciated when activities allowed them to function as a family unit rather than focusing only on the child with autism. Design-based and construction activities also attracted the fathers (not only mothers) of children, which was a positive result, considering fathers may often be excluded from caring for a child with autism (Preece, 2014).

Supporting interaction

The creative sessions provided space for social interactions at different levels, for children with special educational needs and their family members—within the family unit (child–sibling,

child–parent, parent–sibling), families among each other (children–children, siblings–siblings, children–siblings, and parents–parents), and families and facilitators (child–facilitator, sibling–facilitator, and parent–facilitator).

The sessions encouraged effective communication of adults (workshop facilitators) with children by focusing on getting to know the child and their interests, giving them space to be themselves, acknowledging their creativity and learning. These aspects are important because promoting self-awareness establishes the ability to relate to others (Emery, 2011). While constructing their products, participants' attention focused on the moment *here and now* without distractions, contributing to what Schweizer et al. (2017) called a shared experience. The fact that activities were attractive to all family members supported their shared joint attention on the artmaking and promoted social interactions within the family unit, contributing to a feeling of cohesion and belonging.

Parents also had an opportunity to engage in informal conversations with other parents. Similarly, Kulik and Fletcher (2016) confirmed that museum events adjusted to the needs of children with special educational needs provided families with a sense of community in an inclusive atmosphere.

Social interaction and communication skills of children were purposely supported by conversation prompts that adults (parents, carers, and facilitators) could use to encourage a discussion about the art process and products to develop children's creativity and self-expression (Table 3). The suggested conversation prompts followed the concepts of role theory (Landy, 2009) as explained in the program design.

Talking about the art product creates a feeling of safety through the esthetic distance that art activities offer (Bololia et al., 2022). Such feeling of safety is necessary for engagement in social interactions and encouragement of verbal communication (Clément et al., 2022). Children did not talk about their strengths and weaknesses directly, but rather indirectly through the expression of the strengths and weaknesses of their robots or spaceships. The ability to interact socially requires lowering anxiety (Simon & Corbett, 2013). Children with autism may feel direct questions as too intense causing heightened anxiety and leading to no response or *I don't know* answers. For this reason, facilitators encouraged open and esthetically distanced

TABLE 3 Examples of questions for leading a discussion with a child.

Session theme	Questions
Robots	What does your robot like? What does he like to do? What sounds does it make? How does it move? How does it gain energy? Does he ever sleep? What can he eat? What does he dislike doing? What doesn't he like? Does your robot have any enemies? Who helps him?
Spaceships	Where does your spaceship want to fly? Who is the captain of your ship? Does your spaceship have any enemies? Does he have any allies? Who lives on board the spaceship? What are they eating there? What are they doing there? What fuel is used to power your spaceship? How does it move?

conversations about the art rather than the child. This was helpful for parents too as they were inspired by the suggested questions and used them in leading conversations with their children. A note from the reflective log provides an example: "A mother/carer asked – Is that your favourite colour too? No answer. What do you like doing? No answer. She paused, looked at the board and read one of the questions: What does your robot like? Helping others, the child answered… Focusing the conversation on the art rather than the child themselves supports their communication as it takes away the pressure." However, it was especially important in conversations between the children and unfamiliar adults (the workshop facilitators) in creating rapport and trust. Children were able to feel safe in communication and social interaction, which was demonstrated by a quote of one of the children who said in their feedback sheet "It was the best with a really nice lady."

Through the artmaking as a mediated sensory-friendly communication tool, social connections were encouraged.

Enhanced learning

During the activities, parents spontaneously commented on the positive engagement of their children. Some were surprised that their child was absorbed by the activity, sitting on the spot and working independently, without the need for constant verbal guidance and prompting. The activities therefore met the requirement of supporting the child's independence, which was achieved through the visual structure. The activities did not require further explanation, the children knew what to do. This is an example of an eclectic toolbox approach to the learning of children with autism, in which the facilitator chooses the appropriate method according to the context (Charman et al., 2011).

Overall feedback

The results of the questionnaires indicated a positive impact of the project. Children and parents participated in several activities on offer (Table 4), including drawing and coloring, creative writing, and artmaking. The most popular were design-based creative activities such as the production of robots or spaceships from different materials. The activities made it possible to work individually, in pairs or in groups, all of which were engaged with (Table 5).

TABLE 4   Activities chosen by the participants.

	Drawing	Writing	Artmaking
Children	5	6	9
Parents	4	1	5
Together	9	7	14

TABLE 5   Form of activity implementation.

	Alone	With someone	In a group
Children	3	6	1
Parents	3	3	2
Together	6	9	3

TABLE 6 Qualitative feedback from parents.

Quotes from parents
"It was great."
"Our son liked the activity."
"The staff were great, and the children enjoyed it. We thank you."
"It was very good, a lot of ideas and materials. Good activities, well planned."
"Excellent selection of different sensory materials. Very pleasant environment."
"Pleasant activity in a quiet, peaceful environment with nice staff."
"Golden people. They were very aware of sensory needs."

All children ($n = 10$) and six out of seven parents indicated that they enjoyed the activities very much ("I loved it") and one parent chose the option "I liked it." All seven parents would take part in the activities again. In terms of improvements of the program, most of the children wrote that they would not add anything, or that the activities were very good ("All really good," "It was already the best"). Two children expressed they would have liked more materials to choose from and use ("Adding more stuff" and "More types of sticking resources"). Parents' comments were also positive. Several of the feedback statements of parents emphasized the importance of sensory adequacy of the offered activities. They appreciated the variety of sensory materials, ideas for activities, the approach of the facilitators, and positive atmosphere (Table 6).

STUDY LIMITATIONS

The study limitations are mainly concerned with risks connected to differences between the evaluation plan versus the reality. The first limitation stems from the size of the project and subsequently the sample size. The project was expected to include larger number of participants for each session and continue beyond the three initial sessions. Based on the preliminary expectations, questionnaires were selected as a data collection method. However, the relaxed openings were not booked up to their full capacity, resulting in low numbers of participants across the sessions. The program was perceived as beneficial; however, further data collection would be helpful, including more details about the participants, such as the ability levels of the children. The small sample presents a difficulty in generalizing, especially with regard to children with autism as every child with autism and every family is different and may have different needs and preferences. The questionnaire itself was very simple, with the adult version mirroring the visualized children's version. The reasoning behind the simplicity of the tool was to facilitate children's participation. However, in the evaluation of future programs, it would be more useful to engage parents in more detailed, or complex data collection (either through a more detailed questionnaire or through in-depth semi-structured interviews or focus groups).

Another layer of the study limitations stems from the mixed role of the facilitator/researcher. With the double positionality, participants might have felt pressured to provide positive answers to appreciate the facilitators' work and the efforts of the museum to provide such programs. However, even with the participants' responses potentially skewed in such way, their positive answers could also be interpreted as their wish for similar family-oriented inclusive opportunities to continue.

CONCLUSION

The evaluation of questionnaire feedback and facilitator reflective log data evidenced that creative art-based workshops were meaningful and pleasurable for children and their families.

The results indicate that art-based methods support engagement of all family members in a shared experience and the sensory-friendly environments facilitate their participation. While other research focused on evaluating the needs of museum visitors with autism including adjustments of sensory aspects (Hoskin et al., 2020) or art-based programs in museums to support reflection and meaningful expression of children with autism (Woodruff, 2019), the approach applied in this project was innovative in evidencing the enhanced effect of the joint intersecting aspects of creative art-based methods, sensory-friendly environments, and whole-family focus. The design of the program was explained in detail in order to serve as an inspiration and allow for replicability of the fine characteristics of the program design that could make a difference in children's and families' experience.

Findings derived from the literature and operationalized by the lessons learned from delivering and evaluating the art-based program for children with special educational needs and their families in TNMOC are summarized in the following considerations for similar programs in other museums:

- Offer innovative and interactive activities to encourage engagement with the museum theme through multiple sensory channels, building on children's strengths and interests—creative art-based programs present a suitable means of leisure and educational activities in the museum environment.
- Promote the program and verbally invite families to take part, allowing them time to prepare for the experience.
- Consider adjustments to the sensory aspects of the environment and the activities such as preparing visually structured spaces, workstations, and instructions, monitoring noise levels and preventing overcrowding of the spaces available.
- Assure freedom of choice and a flexible approach in selecting types of activities, their duration, and form of realization.
- Focus adult conversations with children on the artmaking process and art products to remove the pressures of direct verbal communication about oneself, and yet, to allow and support self-expression and social interaction, which are important areas of development for children with special educational needs.
- Provide staff training in special educational needs and autism awareness.
- Design activities with whole families in mind, providing opportunities for families with children with special educational needs to spend time together meaningfully in activities that are attractive and relaxing for all family members.

Leisure and educational programs such as the one presented in this study provide evidence of museums becoming more inclusive by allowing children with autism and other special educational needs, and their families to attend and participate in public spaces in ways that suit their sensory and social needs. Moreover, by museums mastering this approach, they can become frontrunners in establishing inclusive societies that cherish equitable participation of all and empower families that might otherwise stay on the edge of the society. Funding for such programs is thus vital for social inclusion of families with children with special educational needs and disabilities. This study provided insights not only about the benefits of art-based programs within museums but of their importance for engagement and participation of children and their families more widely. The principles of art-based activities including their multisensory, intra- and interpersonal aspects that were analyzed in this study are transferrable to other leisure and educational environments and situations, promoting evidence-based inclusive practice, impacting children and families as well as the service providers on a systemic level.

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