Chapter 6
Using Mobile Technology to Facilitate Engagement with the Arts for Children with Autism and Their Families

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Abstract This case study discusses the research project *Show and Tell* and provides an example of how collaboration across different creative disciplines, and within a field nominally unrelated to art and design, can yield successful results by applying creative perspectives to an existing problem. *Show and Tell* was a collaborative research project which used mobile technology to increase engagement with the arts for children with autism and their families. The research team comprised a community circus (Circus Starr), an app developer (Therapy Box) and an academic researcher (Dr. Tracy Piper-Wright). The aim of the project was to enable a child with autism to enjoy a supported, positive experience at the circus, which in turn would give him or her more confidence and inclination to explore other arts and cultural opportunities. The project was conceived as part of the UK Digital R&D Fund for the arts which sought innovative ways to increase engagement with the arts through technology. The project had several objectives: firstly, to create a visual story which would provide sufficient familiarization with the circus environment to encourage a visit; secondly, to design a mobile app that would be suitable for the delivery of that story to an autistic child user, and thirdly, to test the efficacy of the app and the visual story in real time with the audience for Circus Starr's Autumn 2014 tour. The project took place in a research and development context in which experimental approaches to the problem of disabled audience development were explored. For this reason, the project exposed some key issues for researchers, app developers, and arts organizations who might be exploring similar territory. Four main issues arose during the project: how to design effectively for a specialist user group; how best to involve those target users in the design process; how to engage research participants from 'hard to reach' demographics, and how to manage the conversation between different fields of expertise in a multi-disciplinary collaboration.

Keywords Mobile technology · Creative collaboration · Visual story · Disabled audiences · Autism-friendly design · Adaptive strategies · Technology interfaces

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6.1 Introduction: The Research Context

Circus Starr is a charitable organization which brings the contemporary acrobatic circus to audiences across the UK. Their main target audience is families who are disadvantaged financially, socially, or through disability, and tickets for shows are distributed to organizations who support these groups. Circus Starr received very positive feedback from parents and organizations who reported unusually high levels of engagement and enjoyment with the circus by children with autism. It appeared that the accessible nature of the Big Top alongside the friendly, interactive, and 'relaxed' character of the show created an environment in which children with autism felt comfortable. However, whilst the show itself was 'autism-friendly,' there was a barrier to participation for those children who were still too anxious to make it inside the Big Top. The *Show and Tell* project was conceived to provide a preparation for the circus and to give advance warning of particular sensory features of the environment which might be encountered. Fear of the unknown is the leading cause of anxiety for autistic children so this form of preparation enables the child to previsualize the event and to develop coping strategies for situations which may arise.

The project also contributed to the debate about access to the arts for disabled audiences. Disabled audiences are frequently excluded from many cultural opportunities due to their specific needs, and in light of reports [1] which suggested that audience numbers for arts events are decreasing, it is pertinent to consider accessibility and audience reach for the arts in the twenty-first century. According to the National Autistic Society, there are 700,000 people with autism in the UK and 2.8 million (wider families) directly affected [2]. While there are a number of adapted performances in theaters and cinemas, the number of art events catering specifically to an autistic audience is low.

6.2 A New Approach: A Visual Story Delivered Through Technology

Because of the preference of children and adults with autism for schedule, repetition, and routine, the prospect of a new event or activity can cause anxiety. There are many adaptive strategies in use amongst families and professionals to help with this and the visual story is one of these. A visual story is designed to help a child access an activity or event and has been used in the UK in relation to the arts since the Relaxed Performance Project [3]. A visual story not only prepares for the event, but can also become an aid in remembering that experience and can encourage a second visit with real memories attached. Parents are highly skilled at providing material for a foretaste of a situation to be encountered, but this can be time consuming because the visual story has to encapsulate all aspects of the event in order to be fully effective. Autism support organizations and parents do not necessarily have access to images, sounds, or detailed environmental information that

would build a comprehensive previsualization of a situation to be found in a theater or performance space.

A readymade visual story will therefore always be preferable to the child and family. Presenting a story through computing technology further increases the accuracy of the story because live sounds, photographs, and video can be incorporated. Providing a visual story on a mobile device was therefore of primary importance to the project as it expanded the possibilities for an already tried and trusted form of support for autistic children.

The use of technology amongst children and adults with autism is widespread. Technological interfaces are visual, consistent, and predictable and therefore circumvent the complexities of social interaction and communication that those on the autistic spectrum find difficult. Technology interfaces are stable and facilitate repetition which makes computers and tablets ideal formats for the delivery of a visual story [4].

The *Show and Tell* app included two aspects of the visual story—preparation ('Plan My Visit'), and remembering ('After My Visit'). The visual stories used a mixture of text and image with links to audio and video content. The app also contained a repository of images, videos, and audio tracks which evoke the sights and sounds of Circus Starr. Figure 6.1 shows the Show and Tell app home page.

Early slides in the 'Plan My Visit' story prompt the user for content which personalizes the story for them and adds realistic detail such as the date of the circus

Fig. 6.1 Show and Tell app homepage

trip. Further slides familiarize the child with aspects of the circus which might require preparation, such as noise, queuing to get in and waiting times, using images, audio spoken by the ringmaster, and simple text captions. Latter slides preview the circus acts and link to video clips of the acts.

'After My Visit' consists of five slides which prompt the child to recount their visit and to record which acts they enjoyed by inserting either their own picture or a picture from the app's image bank.

'Welcome to The Circus' is a repository of images, video clips, and audio files which can be accessed independently of the visual stories. This feature enables users to enjoy highlights of the circus performances and to view this material separately if additional familiarization is required.

Several research projects have explored how autistic children make use of technologies designed for them (Keay-Bright 2007; Shaughnessy 2013; Walker et al. 2012; Fletcher-Watson 2013, see further reading). These projects informed the approach taken in the development of *Show and Tell* and validated the use of app technology with autistic children for creative and social benefit. However, investigating visual story and technology use by autistic audiences in relation to the arts and arts engagement was entirely new.

Much existing research into autism and technology is focused on social skills development or tasks which are designed to improve or modify some behavior [5]. Much of this research is carried out on a small scale, using two to three participants, often in a clinical or education context. While *Show and Tell* could be seen as modifying behavior (in this case anxiety behaviors), it was primarily envisaged as a way to get children to engage with an exciting and unpredictable art form.

Furthermore, the project focused on facilitating a leisure time activity that others might take for granted. For children whose lives are heavily scheduled and monitored, entertainment, play, and relaxation are often not factored in. However, they are as important to a child with autism as any other [6]. By developing a project within the context of entertainment, the needs of children with autism were addressed beyond the conventional clinical or education settings. Experiencing the arts in childhood has the potential to create lifelong patrons and practitioners. The project recognized that autistic children come with families and that enabling them help all the family enjoy an activity together [7].

6.3 Challenges Encountered During the Project

6.3.1 Designing for Autism: Engaging Target Users in the Design Process

The app was designed in collaboration with a National Autistic Society consultant who was able to advise on accepted protocols of autism-friendly design [8]. These adaptations included using clear and literal language, simplifying images and

avoiding animation, sound effects, and other potential sources of sensory disturbance in the app.

With this knowledge, the team produced a first build which had simple swipe navigation, images and text placed centrally and minimal background graphics. This version of the app was tested with a small focus group in a relaxed after-school setting where several children were able to use the app with their parents.

The focus group was a solution to a problem that was faced quite early on in the research process: How to include autistic children in the design process effectively while acknowledging that engaging with 'testing' or 'research' could itself be a barrier for someone who found unknown and unexpected environments and activities stressful?

The focus group, therefore, had to tread a line between being sufficiently relaxed to engage the children effectively with us and the app and consistent enough to provide useful feedback which could be used to develop the design.

The focus group produced some challenging results. While the children enjoyed the ability to edit and personalize the visual story, they were critical of a perceived lack of 'fun' in the app: what they saw as a lack of 'circus-feel' in terms of animation, sound, and interactivity. This flew in the face of what we had been told about designing for autism, but what it did highlight was the need for differentiation in design. The focus group included proportionately more children who could be characterized as 'high-functioning' and therefore better able to cope with the stimulation of contemporary technology and more used to it due to their use of apps aimed at a general user.

Modifications were made to the app subsequent to this feedback and a greater level of clarification in menus, and more interactive elements were included as well as accessible sound and video files of the circus. The ability to access these aspects of the app at will and to turn off animation and sound features made the app more generally accessible to a wider user group while going some way to include the features which the app appeared to lack. However, ideally, the app would have been tested with several focus groups of children of differing ages, abilities, and diagnoses in order to create a more fully rounded set of feedback from target users.

Feedback received from the final rollout of the app concluded that the relative simplicity of the app content and features continued to be a drawback to older and abler children. Feedback suggested that a more diverse range of activities or actions for the user would enhance the desirability of the app and promote repeated use and would also better reflect the excitement and dynamism of the circus.

It is highly likely that the increasing use of apps by autistic children which are not designed for them has created a higher tolerance for features which designing for autism would normally resist. It is likely that accepted wisdom on animation and interactivity needs to be rethought in the light of an 'iPad generation' of autistic children who have grown up with rich interfaces and are able to navigate a more complex interactive online world. In the context of leisure and entertainment, the *Show and Tell* app perhaps lacked the excitement that users felt should associate with that context, and it was interesting that feedback from research participants

commended the app as providing a template that could be used to prepare for a range of other situations—such as school transition, doctor visits, or holidays.

Designing for 'one size fits all' is problematic, and a solution would be to create an adaptable app which would have features differentiated from the outset according to age and ability. Future projects would benefit from thinking about the autistic user in a more nuanced way and to include differentiated levels of complexity and content in a design so it meets the needs of different users. Consideration would need to be given to how to engage users who find working in new contexts stressful in order to include them in the design process, but the first step would be to recognize that autism is a highly individualized diagnosis and as such terms like 'autism-friendly' can imply a homogeneity that does not exist in reality.

6.3.2 *Bringing Research into the Real World: Encouraging Research Participation*

Recruiting parents and children to trial the *Show and Tell* app was a challenge. The research team were aware of the 'hard to reach' nature of the audience being targeted, and accommodated this in their recruitment plan and tools. However, the main barriers to participation were access to appropriate technology, particularly in low-income areas, and reluctance to commit to new activities which in themselves could be a potential source of stress to the autistic child.

While research and anecdotal evidence suggested that iTechnologies were popular amongst families with autistic children, it became evident that the locations in which Circus Starr was performing had fewer participants who had access to this technology. Several families were disappointed at not being able to participate in the research due to having Android devices. Rollout to Android platforms would have required a far longer development time than the 18 months of our R&D project allowed, but it was an appropriate reminder that the relative inexpensiveness of Android tablets and phones was of key importance to families with autistic children with limited financial means.

The complexity of the lives of parents with autistic children was brought home to the research team during the follow-up interview stage. Parents discussed the extensive forward planning that needed to occur on a daily basis, and how unpredictable situations and events were best avoided. While there was a relatively good return on questionnaires and interviews, the project team worked hard to encourage the completion of, or participation in, these activities throughout the data collection period. In hindsight, it was apparent that more opportunities for face-to-face interaction with parents and children, such as dropping in on preexisting community support group sessions, would make the activity of completing questionnaires or carrying out interviews more easily achievable and thereby increase the quantity and richness of data.

While steps were taken to accommodate the research to the needs of the participants, the research team learnt that in future situations it would be important to go much further in order to facilitate engagement in the research, and that increasing opportunities for the researchers to enter the participants' daily life (rather than the other way round) would be a more successful strategy to engage 'hard to reach' audiences.

6.3.3 Multi-disciplinary Collaborations: Language Barriers and the Importance of Dialogue

The process of designing and testing the app was very rapid due to the nature of the R&D project which demanded a product to put before audiences to test as part of this research. The multi-disciplinary team drawn from circus arts, autism research, app development, and academic research meant that drawing together the conversation was sometimes complex.

While the arts formed the basis of the connection between all parties, it was clear that structural aspects of the project were sometimes in tension. The developer had to produce a template at the early stages of the project in order to meet build deadlines; however, this meant that the design was 'locked in' at an early stage before it had been user-tested. While alterations could be made, these occurred within the existing template rather than working through a process of iteration in which aspects of the app could be reimagined as the project progressed. Lacking in-depth knowledge of the app development process other members of the team were not able to factor this into their research plan and hence opportunities that might have been explored were missed.

Sometimes barriers to effective collaboration occurred due to differences in the nature of the discipline in terms of its methodologies and timescales. While the research team would have ideally pursued a number of ways to generate input from end-users, this was complicated by the lack of access to specialist groups over a long enough period. The project had to fit in with an existing tour schedule which meant there were no other opportunities to test the app in a circus environment until the final launch. With the collection of data occurring at the end of the project rather than during, the research was left to report on the user experience but not to use these findings iteratively to create improvements during the project.

Due to the geographic distance between collaborators, conversations often took place via email or Skype, and this sometimes magnifies differences in perspective and priority. The design, testing, and development stages of the *Show and Tell* project were relatively condensed, and this created pockets of intense activity on the project at key times, one of which was the final development stage before the app went live in the App Store.

During this time, it became apparent that evaluating the responses to the app from the focus group needed to be given careful consideration so that the team

could reflect effectively on what was being learnt and how this was best translated into design decisions. For example, a hasty decision almost led to the removal of a key element of the app; a situation which was rescued by the quick thinking of another member of the team, but which could have had a negative impact on the final product.

While remote communication methods such as Skype, email, and telephone were extremely useful during the project, it was apparent that the times when the project team could meet face-to-face enabled better discussion and decision-making to take place. Opportunities for this were rare, but during the final design development, an all-day meeting resulted in some significant, transformative changes to the app interface and content.

The most significant and lasting developments were made during face-to-face meetings such as these which included time for 'noninstrumental' discussion and conversation between the project team. During these conversations, differences in perspective and goal were exposed, and solutions or compromises found more effectively. Face-to-face meetings provided time for productive conversations between partners, in which ideas were tested, analyzed, and refined in a short space of time, with all partners contributing in real time to the design process.

6.4 Project Results and Impact

The response to the *Show and Tell* App from research participants was overwhelmingly positive. The research found that an engaging preparatory visual story, delivered via an interactive technological interface, had a measurable impact in encouraging an autistic child to attend an arts event which they may have previously avoided. The visual story provided a good level of familiarization with the event, enabling users to devise coping strategies and then look forward to their trip to the circus. This reduction of the 'unknown' had a significant impact on autistic children's engagement with and enjoyment of the circus.

According to research participants, the most valuable features of the app were the accuracy of the preparatory visual story, which was comprehensive and detailed enough to cover the majority of sensory aspect of the circus environment; the 'After My Visit' feature which was useful in promoting recall and speech for autistic children and the potential transferability of the app template to other art and everyday situations.

Families and autism professionals reacted positively to a project which was specifically targeted to autistic children [9]. This response was particularly welcome due to the lack of expert autism knowledge amongst the project team at the outset. Sensitivity to the needs of users and a willingness to explore methods which were nontraditional enabled the project to devise an innovative solution which had the potential to be adapted for other situations and other users. In this way, the approach taken did not start by seeing autism as a barrier, but instead as an opportunity to design for that specific audience from the ground up. This proposes a

different way of designing for disability: not as a secondary process of modifying existing designs, but as a primary process which prioritizes accessibility and from which adaptations for general users can be made.

6.5 Lessons Learned

- Include as many opportunities as possible to gain feedback on the technology or product being developed from its eventual users. Incorporating the user into the design process can provide valuable insight at an early stage which is just not available to the project team. This might mean risking open-ended design decisions at the start until a clearer picture of the intended outcomes and user needs is gained.
- Be mindful of the world outside the project for the participants, particularly if they are from 'hard to reach' demographics. While the new product or idea may be beneficial, and people keen to help, their lives are full of other competing demands in which your research is simply one other job to complete. The research needs to integrate with the participant's life in order to encourage their engagement, and this requirement is likely to be increased depending on the extent and severity of their personal barriers.
- Effective communication is vital to successful multi-disciplinary collaborations. Factor in time to discuss the project 'in the round' without too many assumptions and deadlines at the start. Keeping an open, questioning dialogue going between project partners and appreciate that discipline specialities will lead to epistemological standpoints that may be at odds. Identifying where potential conflicts may lie at the outset will help the team navigate these and create better, collaboratively envisaged solutions.
- Arts researchers can make valuable contributions to research in an unrelated discipline. The insights brought to the subject from an alternative perspective can often lead to a new interpretation of an existing situation and the development of innovative responses.

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