‘My special, my special thing, and my camera!’ Using GoPro™ as a complementary research tool to investigate young children’s museum experiences.

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Abstract

This paper discusses insights derived from a small-scale ethnographic study designed to explore young children’s (aged three to six) everyday, lived experiences within a participatory family museum in southern England. Inspired by the child-centred work of Kirk (2014) this paper begins by examining the effectiveness of photo-elicitation interviews in accessing ‘snap-shots’ of children’s perspectives of their museum visits. In the current study this method is complemented by the use of chest-mounted GoPro cameras to provide a first person and more holistic perspective of children’s museum visits. 12 children’s visits were filmed in total. During three of these, children were also carrying child-friendly digital cameras. As this was part of a larger study the data collection was designed to compare the utility of GoPro technology being used in tandem with both photo and drawing-elicitation. In response to these initial findings a photo-map of the museum was created to prompt discussion with the final six participants. Recruitment was purposive and there was no contact with the participants prior to them arriving at the museum. The video captured by the chest-mounted Go-Pro cameras is particularly illuminating when analyzed in the context of the post-visit interview data. Although the photo-elicitation and drawing-elicitation interviews do reveal some important details about the children’s experiences and perspectives, the video footage highlights the difficulties with relying on these methods in an everyday museum setting. For example parental involvement in the children’s photography is far more pervasive than might be expected, and the degree to which the camera affects the nature of the children’s visits is notable. The video also reveals how easy it is to misinterpret children when relying solely on their recollections in an interview situation. This paper finishes with a discussion of the strengths and weaknesses of using Go-Pro technology as a complementary tool in the exploration of young children’s museum experiences.

Introduction to the research setting

This paper is based on the findings and insights derived from an ethnographic study into young children’s experiences in a small museum based in a university town in southern England. The case study museum’s participatory and immersive exhibitions are designed to promote children’s literature. At the time of data collection the exhibitions consisted of immersive environments intended to provide sensory and emotional links to story.

A developing research focus

There has been a recent interest in exploring children’s perspectives in a variety of forums, including museums (Dockett, Main *et al*., 2011, Kirk, 2014). The recognition of young children and their families as an increasingly important and widespread audience in museums (Graham, 2008) has meant that research in this area has gained significantly more attention since the millennium (Kirk, 2014).

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In tune with the above, Kirk (2014) noted that research with young children tends to focus on what children are, or should be, learning in museums. Contrastingly little research has been conducted on what children seek or value from their museum experience (Johanson and Glow, 2012). It is timely therefore for research focusing on young children in museums to adjust its focus from the narrower, instrumental lens of learning to a wider more inclusive lens of experience. There are very few studies that manage to capture the everyday experiences that are representative of most young children's museum visits (Kirk, 2014), although several do come close (e.g. Dunn, 2012, Hackett, 2014, Hackett, 2016). Of recent note are exploratory posthuman analyses of young children's experiences within museum spaces (MacRae, Hackett *et al*., 2017). Kirk's (2014) study of young children in a natural history museum championed this change of focus, documenting young children's museum experiences using photo-elicitation as a means to access young children's perspectives in an attempt to capture the essence of an everyday museum visit. Kirk found photo-elicitation to be very effective in gathering rich data in a natural history museum context, although it is important to acknowledge this is likely to be context specific (Kirk, 2014).

Kirk's innovative method is underpinned by the Reggio Emilia philosophy of 'listening' and is an adaptation of the Mosaic approach (Clark, 2005) to a natural history museum context. 'Listening' from a Reggio perspective is a process that is open to the many creative ways (for example 'graphic, plastic, musical and gestural' (Rinaldi, 2006, pg. 67)) in which young children construct and articulate their views and experiences. Memorably Loris Malaguzzi, Reggio Emilia's founding pedagogical director reminds us in his poem *No way. The hundred is there* (Cagliari, Castagnetti *et al*., 2016) of young children's communicative potential in the phrase the 'hundred languages' of children (Cagliari, Castagnetti *et al*., 2016, Clark and Moss, 2011). Building on this philosophy, Clark and Moss (2011) developed the Mosaic approach, with its central aim being to listen to young children's perspectives of their daily lives. This is a participatory, and multi-method framework that recognizes children and adults as co-constructors of meaning (Clark and Moss, 2011). Kirk (2014) adapts this framework to collect rich data from participants involved in 'everyday' visits to the Oxford University Museum of Natural History. In order to avoid participants' visits being overly disrupted, and to (as far as is possible) retain the 'everyday' nature of the trip, engagement with the research process was, out of necessity fleeting and there was no further participation planned after their visits concluded (Kirk, 2014). Therefore it is important to emphasize that Kirk's photo-elicitation method is more representative of young children having an 'active' or 'creative' (Kirk, 2014, pg 44) role in the research process, in contrast to being participatory and reflexive in the sense advocated by the Reggio concern for listening which is then echoed in the Mosaic approach. As a consequence (and although children's views were listened to, and taken seriously during the research process) Kirk acknowledges that she inevitably had both a greater stake in the outcomes of the research, and more power in the relationship between young children as participants and herself as researcher than would be the case in a less time constrained methodological framework such as the Mosaic approach (Kirk, 2014).

> This light-touch' approach developed by Kirk, although illuminating, has several interesting limitations. Firstly, it depends on the children's choice of what to capture with their own photographs in combination with their verbal accounts prompted by these visual records of their visit. Although the photographs may provide an aide memoire for young children, it is well established that children's accounts are not always reliable and that younger pre-school aged children are more likely to provide erroneous or incomplete memory reports in contrast to older children (Cordón, Silberkleit *et al*., 2016). Secondly, it also relies on the premise that the children themselves were responsible for taking the photographs that are used in the elicitation interviews and that these visual records are a reflection of their interests during the visit (Cook and Hess, 2007).

It may be, as Kirk (2014) suggests, that the finer details of the children's museum experiences may have become more apparent if she had accompanied the children during the visit. She had to make the assumption that the covert observation data that she triangulated with the photographs and the interviews represented the experience of visiting participants.

The idea of physically accompanying the children has its own limitations; it is well documented that an awareness of being observed can affect behaviour in a number of ways, including, for example, encouraging a more formal atmosphere (Merriam and Tisdell, 2015). This was of particular concern in the museum setting where this current research was conducted: there were few clear lines of sight and exhibits were often small and intimate, therefore initial attempts at visitor observations were often constrained as the researcher had the sense that he was awkwardly intruding on visitors' space and therefore affecting naturalistic visitor behaviour. In order to go some way to address these points this research adopted a complementary method to give insight into the everyday visits of young children, via the use of chest-mounted GoPro cameras. This method was designed to continue in the spirit of being 'light-touch' in that it has as little as possible impact on the focus and nature of participants' visits and time, whilst additionally providing rich data reflecting young children's museum experiences. It was also the intention to continue in the spirit of actively involving participants in the research and knowledge creation process, albeit subject to time constraints imposed by the recruitment of one-off, everyday museum visitors. Although not without its own limitations, this technology provided an effective alternative to accompanying the children and their families in person, or conducting participant observations. It was trialled in combination with the use of photo-elicitation, drawing elicitation, and a photo-map of the museum.

Data collection

In this small-scale study, twelve children's visits were captured using GoPro HERO session™[1] chest-mounted cameras. These cameras are small (approximately 3.5 cm^3) and light (74g). Eight participants were girls and four were boys (Age range: three to six years, mean age: four years and eleven months). Any names referenced in this research are pseudonyms. The participants were free to explore the entire museum, and were treated like any other everyday visitors.

Data collection consisted of three elicitation conditions. As this was part of a wider study the aim was to identify the most effective means of eliciting rich data from participants during the post-visit interviews to complement the GoPro footage. During the first phase of the data collection three children (mean age: four years and nine months) carried child-friendly digital cameras in addition to wearing the GoPro cameras. They were asked to take photographs of anything that interested them during their visit. In order to minimise influence from others, children were asked to choose for themselves what to photograph and to be the only ones taking pictures (Kirk, 2014). During this first phase, there was an additional drawing-elicitation condition in which three children (mean age: four years and eleven months) also wore GoPro cameras. In the second phase of data collection, in response to shortfalls identified in the photo and drawing-elicitation conditions, a photo-map was developed that was used to elicit discussion from six children (mean age: five years and two months) in post-visit interviews. These children also wore GoPro cameras during their visits.

Participant recruitment

The children were recruited purposively because they were in the correct age bracket and were members of a family group rather than part of an organized visit such as a school trip. Recruitment was conducted on the day, as visitors arrived at the museum. As this study is concerned with the 'everyday' nature of museum visits there was no prior contact with participants before their arrival at the museum. This minimised any researcher or project influence as to the 'right way' to conduct themselves during their visit, and contributed to making the visit as naturalistic as possible, in terms of preparation at least.

In order to avoid exerting any pressure on visitors to take part, a flier detailing the nature of the research was given out to adults (accompanying children in the appropriate age group) at reception by a member of the museum staff. If interested in taking part visitors could then approach the researcher in a clearly signposted room. In order to avoid any perceived unfairness, or disappointment at not being chosen for a particular condition, participants for the photograph, drawing and photo-map conditions were recruited on separate days. It was vital that the children were comfortable with taking part and careful consideration was taken in terms

of explaining what the research entailed and that they were free to opt out at any time. Age appropriate language was used in order to explain to the children the nature of the research. Due to the age of the children any signs of non-verbal dissent were also carefully considered (Robson, 2011, Yamada-Rice, 2014), and acted upon if necessary. For example, there were a few times after initial recruitment took place, when parents were keen for their children to participate, however the children themselves appeared reluctant (e.g. looking slightly forlorn or uneasy). In this situation the researcher discouraged the family group from taking part. The children who took part in this study were keen and happy to be involved. Enthusiasm for the use of digital equipment by young children in research has also been noted by Dockett *et al*. (2011) who suggests this may reflect the novelty of the experience (Punch, 2002) and the pleasure of using the equipment (Hill, 2006).

Participant Interviews

Once visits were completed participants were asked to return the equipment and spend a short time discussing their visits with the researcher. These interviews were semi-structured, typically ten minutes in length and conducted with all 12 of the participants. In the first three interviews children's photographs (taken during the visit with a hand held camera) were used as prompts for discussion. In the following three interviews children's drawings (of what interested them during their visit) were used to initiate discussion. In the last six interviews a photo-map of the museum was used as a prompt for discussion. The photo-map was developed in response to issues encountered during the initial photograph and drawing elicitation interviews. The photo-map consisted of a series of photographs charting visitors' most likely route around the corridors and rooms within the museum. Volunteers at the case study museum's entrance were expected, as part of their day to day responsibilities, to suggest that visitors make their way to the top of the three-storey building that houses the exhibitions and work down to the bottom floor. This, in combination with the small and intimate nature of the case study museum's exhibitions made the route the participants took around the museum relatively predictable. These photographs could then be scrolled through on a laptop computer taking directions from the children as they recalled walking around the museum during their visits. If the children's routes differed from the original photo-map sequence it was also possible, because of the small scale of the spaces, to quickly scroll forwards or backwards to photographs of different areas of the museum.

Data Analysis

Although this paper's main theme is the utility of GoPro cameras as a research tool with young children in museums it is worth further considering the methodological framework within which these data were analyzed. There is much precedent now to use elements of Grounded Theory and ethnography within a research project without following the entire process (Bamkin, Maynard *et al*., 2016, Kirk, 2014). With this in mind, and in order to avoid being constrained by preconceived categories, the initial analysis of the GoPro footage and interview data drew on a systematic, open approach as advocated by Grounded Theory. The analysis then turned to an ethnographic approach to interpret these rich data (Kirk, 2014) using the available literature to provide the basis with which to interpret the children's multi-modal articulations of their experiences within the museum, while closely listening to their voices during the '…on-going flow and complexities…' of everyday life (Greene and Hogan, 2005: 15). Then, in keeping with Grounded Theory the GoPro footage allowed triangulation with experiences gleaned from the participant interviews. This is, as Kirk (2014) explains, borrowing first a system from Grounded Theory that is both flexible and methodical, and secondly from ethnography, a focus on (and interpretation of) rich data as expressed by the voices of the participants.

A review of the literature: the use of chest and head-mounted cameras in museums and beyond.

Although GoPro cameras were initially developed to capture extreme sports' footage, their promise for use in social research has not gone unnoticed (Chalfen, 2014). Myrvang Brown *et al*.'s (2008) research on adult mountain bikers and walkers' multi-sensory ways of knowing and experiencing landscape has explored the potential of using head-mounted video cameras to move beyond the verbal and the textual and to provide insights into a more realistic multi-sensory social world. In other words bringing '… a new dimension to exploring how bodies, senses, technologies, thoughts and feelings become entangled in the experiences of places, spaces, landscapes and environments' (Myrvang Brown, Dilley *et al*., 2008: 8).

The literature reveals that the use of GoPro cameras in research with children is scarce. Kindt (2011) used head-mounted GoPro cameras to capture what he considers to be a close approximation of secondary school pupils' perspectives of a lesson. He records that it also provides an excellent record of teacher behaviour and student interactions including clear audio especially that of the wearer, those in close proximity, and the teacher. There are two published examples of GoPro technology being used in museums, but none with young children (aged one to five). Rehm and Jensen (2015) used GoPro camera footage to assess the level of engagement that children (aged six to twelve years) had with exhibits during a treasure hunt. Mulcahy's (2017) research examining liminal spaces of learning in a Melbourne museum incorporated chest-mounted GoPro footage to capture what children (aged eight to 16) said and saw during the course of a visit. There is very little discussion in these papers as to the utility of GoPro besides that it captures learning 'on the fly' (Mulcahy, 2017) and that it allowed the researcher to assess engagement when data logging was not possible (Rehm and Jensen, 2015).

Only two published studies, to date, have been identified that use GoPro cameras with young children. Mortlock *et al*. (2014) used a GoPro camera to film young children's (five to seven years) mat time[2], however the camera was static and mounted to a whiteboard providing a bird's-eye view of the mat and children's interactions on it. Only Green's (2016) study used GoPro cameras as a means to gain access to young children's perspectives. She developed a sensory-tour approach, which entailed young children (aged three to six) wearing head-mounted GoPro cameras during a forest walking tour and afterwards discussing aspects of the tour with the children to elicit insights into their perspectives. To date it appears there are no published examples of research using GoPro cameras with young children in museums.

Green (2016) makes the assertion that GoPro technology is an underdeveloped research tool which has the capacity to capture young children's unique perspectives of the world, allowing an insider's view on what they hear, say, touch and their interactions with others.

It is evident from the literature that the use of GoPro technology to explore young children's museum experiences is an underexplored topic that warrants further investigation and discussion.

Some insights provided by GoPro cameras in research with young children in museums

This discussion will focus on the ways in which the GoPro footage informs an understanding of young children's articulations of their museum experiences and the methods that are used to explore them.

A window on photo-elicitation

The footage recorded by the GoPro cameras offered an insider's view into the unfolding context of three children's visits in relation to their use of photography in the museum. Although a small sample, the findings are indicative that the nature of the children and the social context of their visits affected their interactions with others and the museum's exhibitions. For example the children's respective enthusiasm for using the camera is illustrated by the number of photographs taken: Una took ten photographs, James 25 and Wilbur 31. Each child's visit lasted approximately an hour and a half.

All of the children, at times demonstrably, enjoyed playing with and using the camera, although this enthusiasm waxed and waned over the course of the visit. It was with a real sense of pride, which the following passage of conversation illustrates[3], that Wilbur[4] (four years six months) began his visit, clutching his camera and wearing his GoPro.

> Wilbur: I've got my special, my special thing and MY camera
>
> Mum: The man said you can take photos of anything you fancy. That's pretty cool isn't it?
>
> Wilbur: Click, click, click, click, we got to go through here [Imitating the sound of the camera taking photographs and moving towards the exhibition entrance.]
>
> Mum: Now we need to leave our buggy over there
>
> Wilbur: Oh
>
> Mum: I'll just pop this there, wait, wait, wait
>
> Wilbur: I'll just take one picture
>
> Mum: You take as many as you want darling

This enthusiasm was particularly noticeable during the initial stages of the two boys' visits. In contrast a girl (Una – five years and three months) using the camera was more reserved, and took her first photograph approximately two and a half minutes after entering the exhibitions following some prompting by her father. Different social contexts could also account for this difference in the frequency of early photographs taken: Wilbur and James[5] being part of much smaller family groups in comparison to Una[6]. The temptation to interact, play with and impress other older group members seemed to act as a significant distraction to Una, especially at the beginning of her visit, therefore drawing her attention away from actually using the camera. This same pattern was also found during several other participants' visits. For example Louise[7] (aged five years seven months) began her visit with her mother. They met two friends during the visit. This prompted the mother to comment on the effect that having friends (two boys of a similar age) with her daughter had on their museum experience:

> As I say one child is different … is already so different, like I say … her with friends is a totally different experience for me.[8]

This needs to be understood in the context of previous comments in the post-visit interview from Louise and her mother indicating that much rushing around was taking place which shifted the children's focus away from the activities on offer as part of the exhibitions. This is illustrated by the following remark made by Louise:

> Oh very tired because when I went with my friend in there in that same place we tried to play and we just messed up and things.

The GoPro footage confirmed that the introduction of two friends into the visit after approximately ten minutes initiated a lot of racing around.

This indicates that, during an everyday visit, the use of photography as a representative means to elicit young children's perspectives is perhaps more likely to be effective when visitor groups are smaller.

During the initial stages of James and Wilbur's visits they took photographs of some of the first things they encountered. For example Wilbur photographed the legs of a large cut out figure positioned on the stairs on the way into the exhibitions. James took a photograph of the back of a parked car, his father eating a grape, and the lift that is positioned just through the door to the main exhibitions. When seeing his first photograph during the interview, Wilbur's

mother commented '… that was like your test shot wasn't it?' to which Wilbur nodded. It is worth noting that this overt sign of assent from Wilbur may not be representative of actual agreement with his mother; instead it could perhaps constitute a reluctance to disagree with her. Of course these photographs could represent things of real interest to the children, although the implications are that they are testing out, becoming familiar with, and eager to experiment with the equipment that they have recently acquired. As a result the author would suggest caution in assuming that photographs taken in the opening stages of a museum visit are necessarily representative of a child's interests. This is especially apposite to consider if a child (e.g. Una) only took a low number of photographs, meaning that the first few photographs could represent a significant proportion of the photographs taken during their visit and consequently discussed in a post-visit interview.

Although a demonstration of how to operate the simple camera controls were given to all the children by the researcher, the GoPro footage shows that adults accompanying the children needed to support the use of the equipment during the initial stages of their visits. Previous research has suggested that practice with a camera can help reduce the novelty of using new equipment for young children (Pyle, 2013). Therefore, allowing a child to spend a few minutes practising taking photographs with the camera before embarking on their visit might go some way to mitigate the initial lack of autonomy and perhaps confidence in using the camera that was highlighted by the GoPro footage in this study. In contrast to the above, it has been suggested that the novelty of using a camera is a strength of the method: engaging young children's interest (Dockett, Main *et al*., 2011). The author would suggest that some initial practice with the camera is not likely to affect the attraction of using a camera during a museum visit, however, it might just temper the enthusiasm that young children might have to take an early flurry of pictures.

Interestingly Wilbur spent a significant amount of time playing with the camera, imitating the noise it made when it took a picture ('click, click, click') and pretending to take photographs, rather than actually capturing images of the things that he was looking at. This indicates that frequently during his visit he considered the camera a toy to play with, rather than a device to record his interests, even after he had mastered using the equipment and had taken a few photographs unaided. It is interesting to note the way in which a camera can become part of the fabric of a visit for a young child, but not necessarily in the way the researcher intended. This will inevitably alter the authentic (a visit not impinged upon by the research tools or process) nature of a museum visit, especially in an immersive and multi-sensory (Golding, 2009) environment that encourages children's interactions with the exhibits. This effect may be lessened in a museum that is more collection-based, because the emphasis is more on viewing than touching, smelling and playing. It has been suggested that photography can act as an alternative means to touch by which young children can engage with their environment (Kirk, 2014). The GoPro footage reveals that carrying a camera did not altogether prevent touching within the museum as Kirk also noted, however it did, on occasion, affect the children's social interactions with others and their interactions with the museum exhibits themselves as described by the vignette[9] below.

> 12 minutes into his visit James walked into an exhibition clutching his camera. 30 seconds later his father asked him if he'd like to take part in an interactive activity. He says 'no'. He then turns away from the exhibit and sees a mirror. He walks towards it saying 'Daddy', in such a way as to encourage his father to follow. He then raises the camera and aims it at his reflection. In the background his father joins him, and waves into the mirror. James takes a photo (see Figure 1), and says 'there', 'can you see it on the back here?' A boy (of a similar age to James) sees the camera and looking interested wanders over. He leans over and glances at the back of the camera. James turns away. When he turns back the boy leans over and says 'boo!' The boy then walks away. James follows him with his camera for a few seconds, as if to take a photo. He then turns away without taking one.

Figure 1. Screenshot of James taking a photograph of him and his father in a mirror

The scene described above firstly illustrates how the act of taking a photograph can be of more relevance to a small child than taking part in an activity that is the intended focus of the exhibition. While it might be the case that the everydayness of photography for children (Fidler, 2011, Kirk, 2014), e.g. taking tourist photographs in a museum context (in contrast to a school setting) lessens its impact on the everyday nature of a child's visit (Kirk, 2014), the footage described above is illustrative of how a camera, being carried by a young child can appear as a novelty to others. In this example, it acts as a catalyst for social interaction between the child carrying it and other members of the public: in this case a boy of a similar age. Without the GoPro footage this brief moment in time would have been lost, as would other examples of the subtle ways in which carrying a camera can steer the nature of a young child's visit experiences.

Kirk (2014) also makes the point that using a camera could affect social relations within a group. As she was not present during the children's visits her comments are derived from anecdotal evidence from the elicitation interviews. She suggests that there were times when family members influenced what was being photographed, and notes one occasion when a sibling shared the camera with the participant. Contrastingly, the GoPro footage provides an array of examples of how carrying a camera can affect social relations within a group:

a) At the beginning of a visit, parents needed to scaffold children's operation of the camera.

b) It was evident that parents either felt an obligation to the researcher to encourage camera use or were keen for their children to take photographs when children's interest waned, sometimes even using the camera themselves to take photographs (See Figure 2).

c) Parents were asked to carry the camera when children became bored of carrying it, or needed their hands to take part in an activity, thus impacting on the parents' own visit experience.

d) In a larger family group a younger child became centre of attention for short periods of time due to other family members (who were not present during the recruitment) expressing interest in the equipment they were carrying.

Figure 2 (Screenshot of Wilbur's mother taking a photograph)

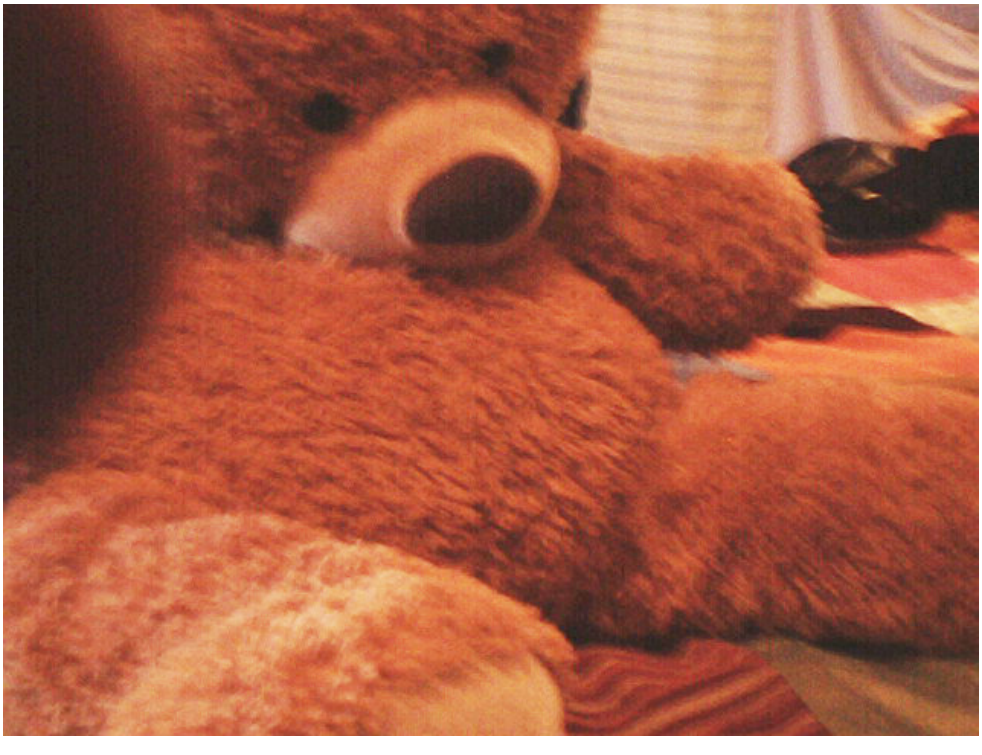

Figure 3 Photograph taken by Una of a teddy bear

Following on from above, the GoPro footage discussed below provides unique and detailed access to the social contexts that influenced the taking of two of Una's photographs.

Kirk (2014) noted that children's photographs are artefacts of the social fabric (Fasoli, 2003) of children's museum visits, and as such some interference from other group members is inevitable. She also remarked that it is relatively clear from the elicitation interviews which children were heavily guided, allowing this to be accounted for in the analysis. Contrastingly whether or not the children were guided was not at all clear from these interview data: especially the extent to which the social context influenced when photographs were taken, and what they were taken of. The vignette below illustrates how important an appreciation of the background context is to glean some understanding of why the pictures were taken. The only clues to the context described below, in the post-visit interview, was that her father suggested that she waited a long time for people to move out of the way before she took the photograph, and that she only wanted the teddy bear and the bed in the picture (see Figure 3). Una agreed to both these points, but did not elaborate any further. The video helps to piece together a rich description of the events surrounding the photography, although this is interpreted through the eyes of the adult researcher not directly by the child themselves.

> Cousin: Una can you take a picture of ... and Anne ... me just putting the big bear. Me just putting the big bear like that. Not of me
>
> Una: I won't it's just the big bear I'm doing. Hold it still. Done it ...
>
> Cousin: Good, do another one
>
> Una: Ok

The conversation above[10], transcribed from the GoPro footage, records Una's nine-year-old cousin prompting her to take a photograph. The video captures her cousin suggesting that she takes a photograph of a teddy bear and her baby sister, moments after Una left her father who was reading her a story. Una does take some ownership with respect to the contents of the picture: declining to photograph her baby sister Anne who was being held by her older teenage cousin just outside the shot. In this particular example, the photograph, in combination with the GoPro footage, provides an interesting insight into Una's visit experience. Although leaving her sister out of the photograph could be simply a matter of whim, it became apparent after watching the rest of the video that Una's visit was tinged with a slight undercurrent of jealousy regarding the attention her sister was receiving, not uncommon in families with a recent new arrival. These emotions are not easily expressed by a small child who is likely to find self-reflection (Piscitelli and Anderson, 2001) in an interview situation tricky. These emotions are therefore unlikely to be voiced in an interview situation. This vignette also provides another example of photography, in becoming part of the fabric of the visit, diverting a child's attention away from engaging in an activity (in this case a father reading his daughter a story) that the museum exhibit is trying to promote. As Kirk (2014) did not accompany the children during their visits she could only speculate that photography will inevitably have an impact on a child's visit. It was not possible for her (Kirk, 2014) to judge accurately the extent to which it influenced, for example, the touching and interaction with exhibits. The GoPro allows intimate access to these moments during the ebb and flow of a museum visit.

The GoPro cameras also provided some insight into times when the cameras were not in use. The interactive, participatory nature of the case study museum meant that there were times when the cameras were put down or given to an adult to look after. These often corresponded with times when the children were most engaged with activities. For this reason, aspects of the visit that the children were most engaged in (and therefore arguably most interested in) were not photographed, and therefore not central to discussion in the photo-elicitation interviews.

It was also apparent that on a number of occasions when children experienced a sense of heightened emotion, such as excitement, trepidation or when their curiosity was piqued on entering a new exhibit, the camera was forgotten for a time. These fleeting moments, although a salient part of the rich tapestry of young children's museum experiences, proved to be

tricky for the young children in this sample to express verbally in an interview situation. The GoPro footage, however, allows an intimate appreciation of how the children may be feeling, by recording sharp intakes of breath, tentative peering around a corner, or brief moments of stillness or indecision as they decide whether to follow their friends or go it alone. Although passing comments alluding to some of these emotions were picked up during the interviews—their significance was only made clear after watching the corresponding video. This is a real strength of the GoPro footage: it allows intimate access, without overt researcher interference, to other modes or 'hundred languages' (Cagliari, Castagnetti *et al*., 2016) with which young children express themselves during their visits. This therefore allows for an informed translation of the children's interview comments.

It is also evident from the video footage that children's enthusiasm for using the camera fluctuated during their visits. A pattern emerging from these data is that an initial peak in enthusiasm during the first 15 minutes of a visit gradually tapered off over time. There were moments when, due to parental intervention or a renewal of interest, that attention returned to the camera and more photographs were taken. Although it is acknowledged that photographs provide only snapshots of a museum visit (Kirk, 2014), Kirk made the assumption that they are relatively evenly spaced snapshots over the duration of a visit: only recording the length of the visit and the frequency which the photographs were taken. These data indicate that the photography observed in this museum context is initially more frequent and becomes increasingly sporadic, often petering out entirely before the end of a visit. This could skew the focus of an analysis or interview discussion towards areas of the museum that are first encountered, rather than the entire visit. This pattern could be tricky to identify, without tracking the participants, particularly if there are a variety of routes that it is possible to take around a museum from a common starting point.

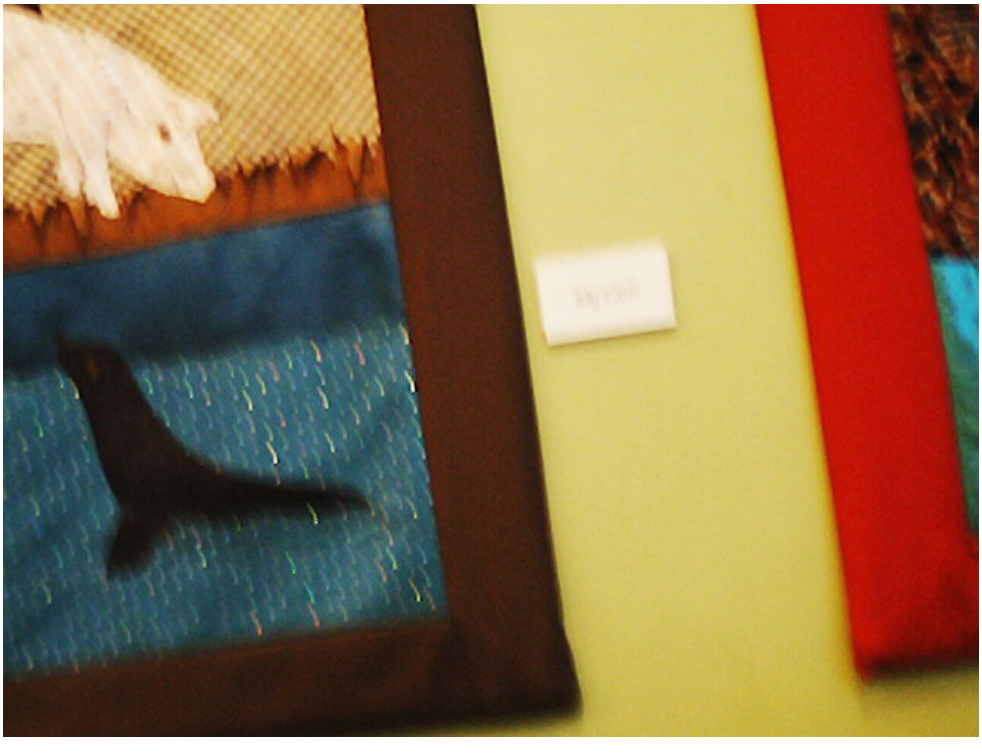

Figure 4. Photograph of a 'bowhead whale's' tail taken by James

There were times when the GoPro footage did support the assumption that children's photographs reflected their interests during the visit. For example, when four-year-old James left his father for a few moments and looked around a room that had a number of pieces of tapestry displayed on the walls, he homed in on one particular artwork and carefully aimed the camera at a corner of it and took a photograph. During his post-visit interview[11] he decided he would like to talk about this particular photograph (see Figure Four). He clearly linked it to his personal context (Falk and Dierking, 2012), in this case the children's television program *The Octonauts* (Meomi, 2010), as a result, giving some insight into his unique meaning making and experience of the museum that is otherwise likely to have been overlooked:

> Interviewer: Are there anymore you'd like to tell me about?
>
> James: That one
>
> Interviewer: What this one? (pointing at a photograph)
>
> James: A bowheads whale tail, I like bowheads whales
>
> Interviewer: Where have you heard about bowhead whales before?
>
> James: In Octonauts

This unlikely connection is typical of the unpredictable links that children may make to artefacts within a museum environment. Kirk (2014) also noted this unpredictability when she found that a girl spent around a minute and a half talking about her photographs of mice and rats because, as her father revealed, her nickname was 'Mouse'!

On a few occasions, the GoPro footage captured children wandering off and taking photographs without their parents' knowledge. In one interview, on seeing a photograph of something he did not recognize, the father was surprised, saying:

> I didn't see that, is that when you walked off … didn't you? I didn't know where you'd gone?[12]

In this particular case, Una had taken a photograph of a display case containing toy figures similar to the ones the interview later revealed she enjoyed playing with at home. Kirk (2014: 145), describing a similar parental expression of surprise concerning a photograph taken by their child, suggested that this implied close collaboration between the two during the rest of the visit. The video footage, in this case, shows that although this may well have been the case concerning a number of the photographs taken, it certainly was not always the case during the visit. The child spent time on their own, and with a variety of other family members (not always the father), meaning that, as every visit is unique, close collaboration, although possible, cannot be assumed.

The GoPro footage has provided a behind-the-scenes view of children's photography during a museum visit. It illustrated that during the three visits discussed here the 'what and where' of the photographs were powerfully influenced by social context, be that the involvement of parents or other members of the group. This may, as Kirk (2014) suggests, not undermine the method, but be a reflection of the social nature of young children's museum visits. However the GoPro footage reveals that an appreciation of the context in which the photographs were taken is crucial to providing an informed interpretation of the scene photographed, and the children's corresponding interview comments. This complementary window into the children's visit experiences proved to be particularly useful considering the limitations that young children have in terms of verbal expression (Clark and Moss, 2011) and accurately recalling past events from memory (Cordón, Silberkleit *et al*., 2016). In combination these two methods provide access to a richer and more nuanced picture of children's museum experiences than photography alone.

What else can GoPro cameras offer research with young children in museums?

It is of value to pause here and briefly compare a GoPro camera's research utility to more traditional uses of video, for example, third-person observer views that have been more frequently used in research with young children in museums and other educational contexts. For example Hackett (2016), in her year-long ethnographic study exploring very young children's (aged between 24 and 36 months) multi-modal meaning making within a museum, used a handheld video camera in an unstructured way to record anything of interest that occurred during the children's visits. Pálmadóttir and Einarsdóttir's (2016) study investigating young children's lived experiences during free-play time in an Icelandic preschool used a handheld video camera to record small groups of children. As these studies show, this third-person perspective can be effective in offering insights into young children's bodily expressions, language, movement, interaction with others and the ability of an individual to participate in another's lifeworld (Hackett, 2016, Merleau-Ponty, 1962, Pálmadóttir and Einarsdóttir, 2016). It is important to appreciate that the video footage captured in these studies represents, owing to the video camera being an extension of the body of the person carrying it, not only a view of what is in front of the camera but also the relations the person behind the camera has with the world (Johansson and Løkken, 2014, Pink, 2009).

With this in mind, a significant difference that GoPro has from its more traditional counterparts is that it removes the researcher from the actual point of data collection. In other words there is no need to wield a handheld video camera, or position a video camera at a particular vantage point – both meaning that the researcher in some way chooses what, when and where to film.

Although it is impossible to entirely remove the presence of the researcher from these data, (considering he needed to be present to recruit, explain the nature of the research and attach the GoPro) the fact that the author was not accompanying the children during their visit is likely to have allowed them (and their families) to behave in a more authentic fashion. In addition, as the GoPro camera is secured via a chest harness to the children the choice of what to film is removed from the researcher, and entrusted to the child, therefore reducing the unequal power relations that are so often present in traditional video research (Robson, 2011). The GoPro footage therefore provides an interesting first person articulation of the children's everyday relations with the world during their museum visit, and those in it.

Another advantage is that after turning the GoPro on, it films continuously, removing the need for the child to make decisions about what is of interest to capture, and allows them to continue their visit in a more business as usual mode. As young children do not have to make decisions about what to film the temptation to please the researcher and/or their parents and other group members is alleviated. To a certain extent the choice to interfere with the filming is also removed from the accompanying adults; although both children and adults were made aware of how to turn off the camera if needed, during, for example, a toilet visit. The GoPro Hero Session is very straightforward to operate needing only one press of a button to turn it on and off. The only problem that occurred during data collection was that the camera was turned off and the button pressed twice to turn it on again. This meant that the GoPro collected timelapse footage instead of video. During the twelve museum visits filmed there was only one occasion when an adult deliberately stopped the filming, and this was to allow for a bathroom visit. This is in stark contrast to adults and other group members' involvement in the children's use of the camera in this study.

The continuous nature of the filming provides a more holistic view of the children's museum visits than one that relies on snapshots, be those photographs, video clips or observations. Rewatching the video also allows the researcher a return to the scene retrospectively armed with new information or theory, meaning that the question of what to observe is not so immediately crucial or final (Merriam and Tisdell, 2015).

The GoPro footage indicated that the children very quickly forgot that they were wearing the camera in the museum. In agreement with (Green, 2016) all the children that took part indicated that the chest harness was comfortable and enjoyable to wear. There were a few times during visits that children's attention was drawn to the fact that they were wearing the cameras:

a) The flashing red light that indicates the camera is recording drew the children's attention (albeit only briefly) in the darker spaces of the museum.

b) When there were dressing up clothes to wear a few children decided they could not do this because the camera was in the way. This happened twice during two different visits and on both occasions parents decided that this was not a problem and helped their children wear something that could be put on around the camera. Although this did interfere for a short period with the naturalistic nature of children's visits, it was only short-lived.

Figure 5, photograph showing perspective

At other times the children gave the impression that they had forgotten about, or at the very least were unaffected by, wearing the camera. Nasiopolous *et al* (2015) in their recent study, found that wearing an eye tracker produced a short-lived (less than a few minutes) social prescence effect that lies dormant, and is sensitive to reactiviation if attention is drawn back to the equipment. Nasiopolous *et al* (2015) suggest that their findings are likely to be applicable to wearers of other monitoring technologies, and this study supports that conclusion. It was interesting that many of the parents acted very much in the vein of 'facilitators', as described by Falk and Dierking (2012), trying to help the children to take part in the perceived educational benefits of the museum: adults often persisting even when the children had their attention drawn elsewhere. This juxtaposition may well just be a natural part of the social fabric of a young child's museum visit, but it also could be indicative of the parents being conscious that their actions were being recorded. This conclusion is supported by other studies that suggest children, unlike adults, become quickly accustomed to the researcher and the camera (Pálmadóttir and Einarsdóttir, 2016).

As noted by Green (2016), the GoPro footage provided a real sense of perspective (see Figure 5) in terms of the size of adults in relation to children.

In a museum space that is full of nooks, corners and immersive exhibit spaces the GoPro camera allowed privileged and intimate access to a child's world of exploration, movement, self-talk and social interactions with friends and family. For example the scene[13] depicted below describes two five-year-old friends with their two younger sisters (aged three and four) huddled together watching a video clip in a small space that an adult would struggle to stand up in. The short cartoon was showing a comic highspeed train chase. The girls are all watching the clip

and laughing sporadically together, feeding off each other's energy. The video footage also showed that the girls' parents were chatting together outside the room, in sight but not involved.

Joan: Poor doggy

[They all laugh together except Laura].

Laura: there's going to be another one.

Joan: Poor penguin

Laura: Not a poor penguin, he, he's going …

[Laughter from the other three girls].

Laura (more loudly): If you watch it again he's going to be really horrible.

Joan: Who?

Laura: The penguin.

Joan: Why?

[A new clip begins … distracting Laura].

Laura: this one's another one.

The footage allows access to authentic peer interactions (Green, 2016) within a museum, illustrating the ways in which the girls were intuitively empathising with characters in the cartoon. Laura clearly had some extra intelligence about the penguin, which meant that she was reluctant to have any sympathy with the character. She was keen to share this with the others. The scene described above was transcribed from footage recorded by a GoPro camera worn by Laura. Apart from recording the children's conversations it also recorded the hum of the adults conversations outside the room, and gave an impression of the closeness and collegiality amongst the children. Others have noted that video can act as a mimetic medium stimulating other sense memories (e.g. sound evoking texture) potentially engaing audiences as participants (Pink, 2009). Marks (Nelson, Gaudreault *et al*., 2001) describes this as 'narrative identification,' where video can evoke sense experience through intersensory links. The first person perspective also, at times, evoked other senses not recorded on the video, for example when one four-year-old boy spent ten seconds fiddling with his wristband (see Figure 6), it was easy to imagine the texture of the material, especially when combined with the sound of it rustling to his touch. Of course the researcher cannot claim to actually be experiencing the world like a child, however the GoPro footage certainly provides an evocative and nostalgic window into a child's world.

The GoPro footage was particularly effective in providing insights into young children's movement within the case study museum. The young children tended to be energetic and exploratory in their movement; examining minutiae, touching, feeling (see Figure 6), peering around corners or through gaps in fabric, running, walking, creeping, dancing, to the furthest corners of a room and back again, following their friends, leading or checking their caregivers were close by and then, when confirmed, moving on again. It has been suggested that this type of movement in museum spaces is, rather than simply being a desire to rush around, a form of 'cognitive mapping' (Worthington and Paull, 1987) that represents a powerful desire to discover what is new in this space (Weier and Piscitelli, 2003). Comparable movement has been found in children (aged 24 to 36 months) in museums by Hackett (2016) and is considered to be an important part of lived experience and meaning making within a museum.

Figure 6. screenshot showing Wilbur playing with his wristband

Kirk's observations (2014: 131) also noted a type of 'undirected Brownian motion' pattern of movement in four and five year old children in her study. Preliminary analysis shows that this movement tended to be exacerbated or speeded up when the children were moving around the museum with friends of a similar age.

The scene described below takes only 20 seconds, but it illustrates both the ephemeral nature of a young child's attention, and the energy expressed in their movement (See Figure 7).

> Joan spends a few seconds packing away a tea set that she has been playing with in the back of a room housing an exhibit. Her friend then calls out to her, before moving quickly towards the door.

Figure 7. photograph of Laura running towards the door.

Laura: Come on Joan, let's go. It might be …

[Her younger sister can be seen running to join Laura at the room door.

Joan turns to follow her friend, quickly moving a few feet towards the door. She pauses and momentarily turns to her right distracted by an activity on the table. She reaches out with her hand to touch a piece of paper. Noticing her friend is at the room's door and just about to leave, she quickly jerks her hand away. She then calls out to her friend.]

Joan: Oh I like tea parties!

[She then moves rapidly towards the door, briefly slowing down she turns her body to the right and then very slightly to the left, perhaps noticing a few things of interest, but she does not pause. She then walks out of the door and stops as her friend, who is a few metres away, says:]

Laura: wait for everyone to come up the stairs.

[Joan's mother then walks out of the door carrying her baby. Joan follows saying:]

Joan: I am really sc …

Laura: Scared?

Joan: Nooo!

[She then accelerates to quickly join her friends.[14]]

Drawing on the work of Ingold (2008), Pink makes the point that place can be considered as being 'constituted through movement, the movement of persons, things, the intangible flows of energy, the weather, the sunlight, and of emotions' (Pink, 2015: 245). In this context the GoPro footage provided an effective means to trace children's movement through the museum spaces and, as illustrated by the vignettes above, to a certain extent provides an impression of the sensations and feelings that accompany them.

It should be remembered that in this research the GoPro camera was attached to the child using a chest harness. A chest-mounted camera provides a front-facing view that is below eye and ear level and does not account for head or eye movement. Therefore it cannot be assumed that the camera shows what the child sees or hears, although at times it can be assumed that it is a rough approximation. For example Land (2004, 2006) has demonstrated that for gaze rotations (the movement of an individual's line of sight on the horizontal plane) greater than 140° the trunk (with camera attached to the chest) has to become involved. In the case of freely moving participants (as opposed to those, for example, sitting in a car seat), especially during locomotion, trunk turns can occur with gaze rotations of any amplitude. On the horizontal plane, however, the eyes are capable of rotating ±50° and the neck can turn the head through about ±90°. It should also be appreciated that eyes rotate faster than the head, and the head faster than the body (Land, 2006) meaning that the child's gaze is likely to have reached its target before the camera fixed to the front of the trunk catches up. The GoPro camera provides a surprisingly wide view of the scene in front of a child, and is effective in low light. The audio is clear and crisp, although there are times when voices fade in and out as people move away or towards the camera. However, when a child moves close to an object the view can be obscured. For example when a child climbs onto something or sits down at a table the view can be less than ideal. This may be particularly problematic if the filming is happening in a collection based museum where display cases may be above chest level for a young child. As has been discussed earlier, the GoPro provides valuable context

to a child's museum visit that can help elucidate information gleaned from an interview. This context however is far from complete: the footage rather than capturing a context in its entirety, provides a trace through it, giving enthnographers a new perspective with which to engage with young children's unique utopias (Kirk and Buckingham, 2013) or likely otherwise hidden museum experiences (Pink, 2015). As Lahlou (2011) suggests, experience should be recorded 'on the fly, in the flow of actual activity, and from the perspective of the actor.' With this in mind, the GoPro footage allows access to 'hot and sweaty' moments when young children are fully engaged (both in body and mind) in play in the museum (Piscitelli, Everett *et al*., 2003: 14) .

GoPro footage (as with any other media) does not provide a transparent window on a young child's museum visit (Rose, 2007), or an objective factual record of social experiences—it provides a culturally constructed representation of a wearer's experiences that can be used to evoke a sense of a person's subjective experiences (Myrvang Brown, Dilley *et al*., 2008). The researcher is not a child and therefore cannot expect to experience the world through a child's eyes; he or she can only provide an interpretation of the representation of the child's museum experiences as shown by the film footage and corroborated in the interviews.

Although this is a small scale study, it is becoming increasingly clear that GoPro video, while not capable of providing full access to a young child's sensory environment, interior thoughts and emotions (Pink, 2015), does have great potential, especially in combination with other methods (Green, 2016, Pink, 2015), to provide rich data about young children's museum experiences. Although not in a museum context, Green's (2016) study supports the complementary utility of GoPro cameras in research with young children. These methods are likely to be context specific (Kirk, 2014); for example in this case study museum this study indicated that photo-elicitation, although providing some interesting points for discussion, was subject to misinterpretation without the context provided by the GoPro footage. The effectiveness of drawing elicitation as a method for collecting rich data concerning children's museum experiences was also put under scrutiny by the GoPro footage. Drawing is often seen to provide an effective strategy to engage with young children; giving them the opportunity to express their views and experiences as they draw (Einarsdottir, Dockett *et al*., 2009). Similarly to Kirk's (2014) findings the drawing-elicitation proved to be the least successful method of collecting rich data about the children's museum experiences. One salient reason for this was that the children tended to focus on the largest (Piscitelli and Anderson, 2001), and most likely easiest to draw, object in the museum (in this case a large bed). This was in contrast to Kirk's (2014) study where she found that children drew objects they could see during the interview. This difference in findings may well be the result of the interviews in this study being conducted in a private room in contrast to Kirk's being within the museum exhibitions themselves. Although the interviews did elicit some interesting snippets about the children's museum visits (not least the fact that they very much enjoyed this part of the experience), it was apparent that the interviews were overally focussed on one area of the museum. The corresponding GoPro footage highlighted the myriad of other experiences that the children could potentially have talked about but were overlooked because of the intense spotlight provided by the focus of their drawings. The photo-map proved to be the most effective elicitation technique in this context. The map allowed a more holistic and sequential discussion of the children's visits. This gave the opportunity to listen to the children's perspectives on a greater proportion of the time during their visits captured by the GoPro footage. This particular method is likely to be context specific considering the layout of the case study museum's exhibitions.

In order to keep the method 'light-touch', video-elicitation using the GoPro footage was not employed, as the time taken to download the video, and the volume of footage that would need to be trawled through, would unnecessarily impinge on the participants' time during their visit. However this combination may well be effective and justifiable in other museum research contexts, for example those that involve participants over a longer period of time.

This article set out to illustrate how chest-mounted GoPro cameras can complement and offer insights into the use of photo-elicitation and other complementary elicitation techniques to explore young children's museum visit experiences. The evidence indicates that the use of GoPro video in combination with photo-elicitation can provide valuable context to the photographs and elicitation interviews, as well as providing a multi-sensory trace through a museum's exhibitions. Drawing elicitation proved to be the least effective elicitation technique

to be trialled in combination with the GoPro. In response to the photo-elicitation and drawing elicitation trials a photo-map was developed that enabled fuller discussion with the participants. This study illustrated that the GoPro footage, although not without its own limitations, has the potential to provide intimate insights into young children's museum visits, including priveliged access to self-talk, exploration, movement, perspective and social interactions with friends, family and other museum visitors, all of which, to some degree, contribute to shaping the nature of young children's unique museum experiences.

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Notes

1 http://www.fullcompass.com/common/files/25096-GoProHERO4SessionSpecificationsSheet.pdf, accessed 15th July 2017

2 Mat time refers to 'an event where the majority of the class is present together on the mat for the purposes of sharing, discussion, instruction, games or other similar activity.' (Mortlock *et al*. 2014: 191)

3 Transcribed from a GoPro Hero Session video recorded at the Story Museum in Oxford (October 2016).

4 Wilbur (4) was visiting with his mother and baby brother. It was their first time visiting.

5 James (four years five months) was visiting with his father

6 Una (five years three months old) was visiting with her baby sister, father, mother, aunt, uncle, nine year old male cousin and female cousin who was 14 years of age.

7 Louise (five years and seven months) visiting with her mother

8 Transcribed from a digital voice recording of a post-visit interview recorded at the Story Museum in Oxford (December 2016)

9 Vignette taken from GoPro video filmed at the Story Museum in Oxford (October 2016).

10 Transcribed from GoPro Hero Session video filmed at the Story Museum in Oxford (October 2016).

11 Transcribed from a digital voice recording of a post-visit interview recorded at the Story Museum in Oxford (October 2016).

12 Transcribed from a digital voice recording of a post-visit interview recorded at the Story Museum in Oxford (October 2016). Una (5yrs, girl) and her father present.

13 Scene transcribed from GoPro Hero Session video recorded at the Story Museum in Oxford (October 2016).

14 https://www.dpreview.com/articles/9489190812/gopro-hero4-session-review, accessed 15th July 2017

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