‘Let's go to the museum'

An investigation of the expectations and learning engagement of prior-to-school aged children and their families

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Executive Summary

RESEARCH OBJECTIVES

The aim of this research was to investigate the involvement and learning engagement of families with prior-to-school age children in museums. Specifically, it asked:

1. How museums can increase and sustain family involvement and learning.
2. How inter- and intra-generational learning can be fostered in museum spaces.

In contemporary society, many museums are striving to increase the involvement and engagement of visitors at all life stages. Therefore, sustainability of involvement is a significant issue as these museums seek to act as catalysts for life-long learning by engaging very young children and encouraging repeat visitations (Anderson et al., 2002; Everett & Barratt, 2009).

The present study is a result of a collaboration between researchers from the Department of Educational Studies, Macquarie University and three museum partners: The Australian National Maritime Museum, Museums Victoria, and the Museum of Applied Arts and Sciences. These museums wish to develop museum spaces and supports which reflect their shared view that learning involves citizens young and old in processes of inter- and intra-generational learning which happens within, and continues beyond, the physical location of the museum.

BACKGROUND

“The reflexivity of museums as they learn about the experience of visitors and then use what they learn to create and intensify the visitor experience, suggests that these cultural institutions have an evolving raison d’être. From preserving artefacts and teaching their meanings, museums have transformed into public spaces for live conversations that are inspired by (but not limited to) their collections” (Johanson & Glow, 2012, p.40)

Historically, museums played an important role in society as ‘custodians’ of collections and cultural knowledge. Recently, however, there has been a shift towards a community involvement approach which entails engaging the public, including children and families, in interactive learning opportunities (Enseki, 2007). Research has demonstrated that family conversations within museums are rich contexts for learning (Anderson, et al., 2002; Kelly, 2011). While this research demonstrates that parents and children bring specific teaching and learning behaviours which shape the learning opportunities, the findings either focus on families of school-aged children (e.g., Briseno-Garcon, 2013) or interactions in exhibitions specifically designed for children (e.g., Dockett et al., 2011; Shine & Acosta, 2000). The involvement and learning engagement of families of very young children in general exhibit spaces is largely unexplored.

This project combined socio-cultural and social-constructivist theoretical approaches to propose that learning is a collaborative and culturally mediated process (e.g., Lave & Wenger, 1990; Rogoff, 1990). Learning occurs through a dynamic interplay between individuals and social groups within a social and physical context, and is shaped by past and present experiences and evaluations. Evidence suggests that museum involvement and learning can be enhanced when individuals are encouraged and supported by experienced visitors (Everett & Barratt, 2009), and that engagement is impacted by a complex web of personal characteristics (e.g.,
interests, age), physical factors (e.g., exhibit design, resources) and situational factors (e.g., museum location, costs) (Ensieki, 2007; Kelly, 2011). While some studies focus on children's engagement, parents’ involvement, or broad enabling factors, few have explored how social, personal, physical and situational factors combine to shape families' learning experiences. Furthermore, little research to date has explored the expectations about, and evaluations of, the learning experiences of families with prior-to-school-age children in museums.

THE PRESENT STUDY THEREFORE AIMED TO ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

1. What expectations do families have in relation to visiting museums, and which factors impact on family re-engagement?
2. What learning potentials do museums attribute to their exhibit spaces, and how do these align with children's and adults' experiences?
3. What learning interactions take place between children, peers and adults in these exhibit spaces?

METHODOLOGY

Participants comprised 6 families (at least 1 parent/ caregiver & 1 prior-to-school child) from each museum: a total of 18 families. In addition to these families, each museum also nominated 1 (or more) exhibition developers to be interviewed. The participant families from each museum comprised:

- Two families with a family membership of that museum (hereafter referred to as ‘Member’ families), who each invited a family with at least one prior-to-school age child to accompany them to their museum (‘Guest’ families). The invited families had never visited that museum as a family unit before, hence were new to the museum experiences. The Member family thus comprised experienced visitors, while the invited family were ‘guests’ whose engagement, we anticipated, would be guided by the experienced family during their visit.
- Two families were recruited from a local early childhood centre. These 2 families were ‘Novice’ visitors who had not visited that museum as a family unit before, and traversed the museum unaccompanied.

Data was collected through interviews and video observations.

- Interview data was obtained from parents and, where appropriate, children immediately before they entered the exhibit spaces and within a week after the visit. The pre-visit interview focused on parents’ expectations about the visit, and the post-visit interview asked them to reflect on their family experience and on the learning engagement of their child. Interviews were also conducted with exhibit developers or curators to determine how they factored children’s and family engagement into the exhibit design.
- Video footage was obtained via Go Pro™ cameras, which captured footage from three perspectives – the child, the parents and an objective observer from the research team. Go Pro™ cameras were worn on a chest harness by children and parents in order to collect clear sound and visual footage while minimising disruption to engagement with museum exhibitions. The third Go Pro camera recorded from a distance to help provide additional detail.

SUMMARY OF FINDINGS

The data analysis presented a number of key findings relating to family involvement and children’s learning in museum spaces. These were grouped into the following three themes:
WHAT SUPPORTS OR CONSTRAINS MUSEUM VISITING FOR FAMILIES?

Interviews with families identified a number of key factors that served to either encourage or deter families from visiting a museum. These included the availability of family friendly facilities and general accessibility; spaces that were of interest to children in terms of age range and ability; guidance and support that would facilitate engagement; and the inclusion of special programs and inclusion of new exhibitions. These findings highlight that while the learning and engagement is important, families with young children also consider the useability of the space an important consideration in choosing to visit or revisit a museum space.

WHAT IS THE IMPACT OF VISITOR PROFILE ON ENGAGEMENT?

Familiarity and experience in the museum appeared to foster a deeper and more focused engagement with collections. This finding suggests a productive way to foster learning and engagement with Member families is to encourage re-visitation. Greater experience appeared to foster more independence in young children’s learning, but also appeared to reduce adult-child interactions and dialogue, which were pivotal in deepening children’s learning. It may thus be productive for museums to have more content that is aimed both at the child and adult level, such that parents can continue their own learning and dialogue with children about this.

WHAT LEARNING PROCESSES ARE EVIDENT IN MUSEUM SPACES?

Video data demonstrated that learning interactions frequently occurred between the parent and child, and to some extent between children as well. The analysis focused on features of sustained shared thinking, which is characterised by the intellectual and collaborative nature of learning interactions involving young children. Results revealed intellectual elements including the establishment of shared attention, use of questioning and explaining, depth of language, and making cognitive connections. Elements of the environment which supported sustained shared thinking included the presence of intricate detail, an ability to view from different perspectives, opportunities for interactivity, and the inclusion of multimodal displays.

SUMMARY OF RECOMMENDATIONS

The findings highlighted a number of potential changes and adjustments that could be made to encourage families with young children to visit museums, and also to facilitate interaction, engagement and learning whilst they were at the museum. These include:

RECOMMENDATIONS IN TERMS OF FACILITIES AND ACCESSIBILITY

- Ensure that facilities meet the needs of visitors with young children.
- Provide clear information sources that clearly target families to support parents as they plan their visit and then navigate the facilities and space once they arrive.
- Provide clear and visible information and marketing to reinforce to families that museum spaces are suitable and beneficial for young children. This includes ‘family and child – friendly’ signage in the museum, as well as ensuring the visibility of families with young children on the website and other marketing material.
- Ensure that families have access to facilities to rest and refuel.

RECOMMENDATIONS FOR ENGAGING CHILDREN AND FAMILIES WITH MUSEUM SPACES AND EXHIBITS

- Ensure that all exhibit redesigns and developments are inclusive of and responsive to young children’s interests, abilities and learning dispositions.
- Give careful consideration to the use of light and sound to ensure that these do not impede or detract from how children and families engage with museum spaces.
• Provide resources that support children’s active engagement with displays such as real and life-sized items that children can engage with, hands on experiences and displays that can be touched.
• Including games and family trails that will encourage family exploration and interaction.

RECOMMENDATIONS TO INCREASE THE INVOLVEMENT AND ENGAGEMENT OF DIFFERENT VISITOR GROUPS

• Undertake further research to develop a clearer understanding of the different visitor profiles and their needs in terms of navigating and interacting with the museum spaces and how to sustain this involvement over time.
• Create spaces that support children of Member or experienced families to be able to explore independently.
• Provide facilities that allow parents to supervise children’s independent learning while remaining close and available for interaction when the opportunities arise (e.g., close-by seating).
• Create a “Top 10 exhibits for young children (5 years and under)” guide for the whole museum site.

RECOMMENDATIONS FOR SUPPORTING PARENT INTERACTION AND IMPLICATIONS FOR MUSEUM STAFF

• Provide written information accompanying displays to contain short key points that provide parents with initial information to share with children and create shared interest and engagement.
  - Include provocation question as a means to encourage parents and children to think about and engage with the content.
• Provide professional learning opportunities to increase museum staffs’ understanding of how to interact with very young children and how to gain their attention and interest in displays.
• Investing in placing trained staff in galleries (not just in facilitated activities) to engage with visitors. For example, having ‘pop-up’ exhibition add-ons that provide hands-on experiences for family members of all ages to experience and engage with.

RECOMMENDATIONS IN RELATION TO HOW SPACES FACILITATE LEARNING

In the development and redevelopment of all exhibit spaces:

• Include elements where children can view exhibits from different perspectives.
• Use elements of multimodality and interactivity to encourage both children and parents to converse about the exhibit content.
• Include displays that contain intricate detail as a way to focus inquiry and attention (physical items and also diagrammatic displays).
• Ensure that digital technology is working and responds quickly/reliably to visitor interaction.
Introduction

Museums as social institutions have fundamentally changed over time. From their historical beginnings as elitist institutions accessible only to a chosen few, whose prime responsibility was to their collections (Hudson, 1998; Lehman, 2009), they have evolved into broader-based institutions which serve and engage the general public (Enseki, 2007; Hudson, 1998; Lehman, 2009). To remain relevant and maintain their integrity, contemporary museums must consider not only the impact and currency of their exhibits, but how they relate to the communities in which they are situated (Alba, 2005). Through their ability to strengthen the critical thinking skills of their visitors and address controversial issues, their educational activity may result not just in learning but also social consequences (Hein, 2006). As important contexts for informal learning, often intrinsically motivated and curiosity-driven (Ahmad, Abbas, Yusof & Taib, 2013), museums have increased their responsiveness to their audiences, and in particular families, a group who frequently visit (Kelly, 2011).

This introduction provides an overview of research findings derived from a comprehensive literature review on the involvement and engagement of families and young children in museum spaces. In particular, we summarise how children can be supported to become life-long museum learners and factors which have been found to support and constrain family engagement in museums. The comprehensive literature review can be found in Appendix 1 at the end of this report.

FAMILIES AS MUSEUMS VISITORS

Families are a key group of museum visitors. In some Australian museums, families constitute over half the total visitors (Kelly, 2011). Families who attend museums are predominantly middle to upper class, generally with a high education level (ABS, 2011; Downey, Krantz & Skidmore, 2010; Garner 2015; Kelly 2011; van Schijndel, Franse & Rajmakers, 2010; Whitaker, 2016). Diverse families and lower socioeconomic families have been less likely to engage in the museum space (ABS, 2011).

WHAT SUPPORTS OR CONSTRAINS/INHIBITS FAMILY ENGAGEMENT?

Whitaker’s (2016) literature review identified several categories of barriers which hinder families and children participating in museums. These include (i) practical barriers, such as availability of transport, availability of information, time constraints and costs including entry, transport, refreshments; (ii) social and attitudinal barriers which may be impacted by socioeconomic background and negative associations; (iii) pressures on schools and curriculum changes - many children only visit museums through school programs, however challenges can exist in arranging these; and (iv) limited consultation with young people – consulting with young people is considered important, but in many cases is inadequately undertaken.

To promote family engagement, many Australian museums have created spaces for families, and in particular, hands-on, exploratory learning environments catering to young children (Kelly, 2011). Children’s spaces are typically colourful, attractive and non-threatening (Mayfield, 2005). Presenting learning as a fun, active process which the whole family can participate in together may boost museum attendance (Enseki, 2007).

CHARACTERISTICS OF THE MUSEUM ENVIRONMENT THAT INVITE ENGAGEMENT

Museums are safe, family-friendly environments that allow children to explore, fantasise and learn in different and perhaps more engaging ways than they would in more formal, structured education environments (Downey et al., 2010; Kelly, 2011). Families should be able to identify, ideally via non-literate means of communication such as symbols and illustrations, which
exhibitions and activities are likely to engage them, thus enabling them to make discoveries in areas of existing interest and also explore new topics (Hansen, Montagu, Heumann, Gurian, Kamien & Robinson, 1987). Exhibits, displays and objects which were large in size featured strongly when children aged 4 – 6 years recalled their museum experiences (Piscitelli & Anderson, 2001).

When visitors move beyond being just a spectator by immersing themselves in an intense sensory experience which combines sight, sound and motion and unexpected effects and stimuli, their museum visit becomes more unique and memorable (Kotler & Kotler, 2000). However, the same level of intensity and immersion is not necessary for all exhibits, as a range of offerings can provide balance and variety (Kotler & Kotler, 2000). A significant challenge for museums is to re-engage families who have visited as this is likely to foster deeper engagement with and learning about the collection content.

YOUNG CHILDREN’S LEARNING IN THE MUSEUM CONTEXT.

Museums need to demonstrate that their learning experiences provide more than just an enjoyable fun family day trip and can in fact contribute to children’s early learning and social, cognitive and emotional development (Munley, 2012). Children’s learning in museums extends beyond facts and content, to encompass cause and effect and procedural learning (Wolf & Wood, 2012). Children’s engagement with exhibits and activities may result in a number of outcomes, including learning, play, creativity and social interaction (Puchner et al., 2001).

SUPPORTING CHILDREN IN BECOMING A MEMBER OF A COMMUNITY OF LEARNERS.

Experiencing positive family visits to museums from an early age has been shown to significantly impact on museum-going habits in later life. When young children visit museums with their families, the likelihood of them visiting museums when they are older is increased, allowing museums to meet a range of needs across the various stages of life (Everett & Barrett, 2009; Kelly, 2011). The learning supported by museums extends beyond teaching children about new concepts and developing their foundational skills to creating a broader appreciation our world (Munley, 2012). The social network formed among family members during visits can foster a lifelong love of learning (Briseno-Garzon, 2013). Connections may be facilitated between people who have common interests and values (Everett & Barrett, 2011). A positive first museum experience can lead the child on a pathway to explore broader educational and cultural opportunities and community connections (Enseki, 2007).

CHILDREN’S IDENTITY AS A MUSEUM LEARNER: CHILDREN’S COMPETENCE, CONFIDENCE AND AUTONOMY IN THE MUSEUM ENVIRONMENT.

Children believe museums provide many opportunities to learn and gain ideas, and perceive them as exciting, happy places (Piscitelli & Anderson, 2001). When children feel welcome in a museum space, like they “belong”, and can see that people with similar backgrounds are valued, they may feel more comfortable and their confidence about learning may increase (Enseki, 2007, p.37). An ongoing relationship with a museum may have a role in shaping personal identity (Everett & Barrett, 2011).

Children are increasingly considered to be competent to express their views and opinions and to actively participate in a variety of social and cultural contexts (James & Prout, 1997 as cited in Dockett, Main & Kelly, 2011). Children can be empowered in the museum environment through choice and opportunities for self-expression and control, for example, by allowing them to guide their peers or accompanying adults (Weier, 2004). Through active self-directed inquiry, they can learn about and respond to the objects they encounter and make a valuable
contribution by sharing their opinions, ideas, feelings, imagination and experiences (Anderson, Piscitelli & Everett, 2008; Hackett, 2014; Weier, 2004).

Families may be encouraged to attend a museum which is user-friendly, including services, facilities and exhibits which appeal to both children and adults (Mayfield, 2005). However, few of the studies reviewed examine the experiences of younger children and their families. This highlights the need for research that investigates how to increase and sustain family involvement and learning within museums. In particular, this research should focus on how to facilitate involvement and learning engagement of families with prior-to-school age children, with a view to promoting life-long learning by engaging very young children and encouraging repeat visitations.

Learning occurs through a dynamic interplay between individuals and social groups within a social and physical context, and is shaped by past and present experiences and evaluations. Evidence suggests that museum involvement and learning can be enhanced when individuals are encouraged and supported by experienced visitors (Everett & Barratt, 2009), and that engagement is impacted by a complex web of personal characteristics (e.g., interests, age), physical factors (e.g., exhibit design, resources) and situational factors (e.g., museum location, costs) (Ensieki, 2007; Kelly, 2011). While some studies focus on children's engagement, parents' involvement, or broad enabling factors, few have explored how social, personal, physical and situational factors combine to shape families' learning experiences. Furthermore, no research to date has explored families' expectations about, and evaluations of, their learning expectations/ experiences.

THE PRESENT STUDY THEREFORE AIMED TO ADDRESS THE FOLLOWING RESEARCH QUESTIONS:

1. What expectations do families with young children have in relation to visiting museums, and which factors impact on family re-engagement?
2. What learning potentials do museums attribute to their exhibit spaces, and how do these align with children's and adults' experiences?
3. What learning interactions take place between children, peers and adults in these exhibit spaces?
Methodology

To address the research questions a mixed methodology design was implemented, comprising the generation and analysis of observational and interview data. In this section, we summarise the participants and the design of the study.

PARTICIPANTS:

Participants comprised 6 families comprising at least 1 parent/caregiver & 1 prior-to-school child, from each museum: a total of 18 families. In addition to these families, each museum also nominated 1 (or more) exhibition developers to be interviewed. The participant families from each museum comprised:

- Two families with a family membership of that museum (hereafter referred to as ‘Member’ families), who each invited a family with at least one prior-to-school age child to accompany them to their museum (‘Guest’ families). The invited families had never visited that museum as a family unit before, hence were new to the museum experiences. The Member family thus comprised experienced visitors, while the invited family were ‘guests’ whose engagement, we anticipated, would be scaffolded by the Member family. By ‘scaffolded’ we mean that the family who is familiar with the museum guides the Guest family during their visit.
- Two families were recruited from a local early childhood centre. These 2 families were ‘Novice’ visitors who had not visited that museum as a family unit before, and traversed the museum unaccompanied.

DESIGN

The inclusion of families with different levels of familiarity and experience with the museum permitted the investigation of engagement and learning involvement of different levels of museum experience and expertise and processes related to inter-generational and intra-generational learning and teaching.

PROCEDURE:

The two family pairs (Member and Guest) and the two Novice families visited their respective museum. The three venues were: The National Maritime Museum, Sydney; the Museum of Applied Arts and Science at Powerhouse, Sydney and Museums Victoria, Melbourne. They were asked to visit two exhibitions identified by museum staff. Each museum had free selection of these spaces, with some chosen because they had design features that were expected to engage young children and their families, and others, because the museum saw the potential to make the spaces more engaging for families and young children. The following procedures were employed for each area of investigation:

*Family expectations:* Family expectations were explored through semi-structured interviews prior to the visit. These interviews were designed to obtain initial data, parental experience and expectations for the museum visit.

*Family engagement and interactions:* Family interactions were captured by video and audio footage, using small go-pro cameras. One parent and one child wore a go-pro camera on a
chest mount to capture sound and visual footage of their engagement and interactions in the designated exhibition spaces. A hand-held go-pro was also used by the researchers to capture external footage of the interactions and engagement.

Parents’ perspectives of the museum learning experience: In the days after the visit, each family was interviewed about their experiences. Parents were asked to recall their experience of the visit, and to explain aspects which supported and constrained their engagement and learning experiences. Also used was a video-stimulus methodology in which extracts showing sustained and reciprocal interactions between parents, their child and (where appropriate) their peer were shown to the parent. Using this stimulus, the parent was asked to freely narrate what he/she remembered about that event and provide a perspective on the engagement and learning that was occurring.

DATA ANALYSIS

Data arising from interviews, participation and engagement were analysed using a qualitative thematic approach in order to identify key themes and issues reflecting the participants’ perceptions (Bazeley & Jackson, 2014). Video analysis also involved the logging of child and family movements, including time on task and engagement.

In the following sections, we provide additional detail of data analysis techniques, as well as a discussion of findings.

- **Section 1**: What supports or constrains museum visiting for families with young children?
- **Section 2**: What is the impact of visitor profile on engagement?
- **Section 3**: What learning processes are evidenced in museum spaces?
Section 1: What supports or constrains museum visiting for families with young children?

This section addresses the research question of the expectations families have in relation to visiting museums, and which factors impact on family re-engagement. We provide an overview of the main themes which have emerged from the interview data that demonstrated characteristics which either supported or constrained museum visiting for families with young children. The data analysed consisted of the pre- and post-interviews of the families and curator / exhibition developers from the three museums.

DATA AND ANALYSIS

The interviews were imported into NVIVO 11 software to identify key themes and issues reflecting the participants' perceptions (Bazeley & Jackson, 2014). NVIVO is a computer program that supports detailed analysis of text-based or multimedia qualitative data which aligns with the data collected throughout this research. Data was organised thematically in terms of these two research questions: i) what supports museum visiting and engagement and ii) what constrains this. A number of themes emerged that included: provisions related to facilities; spaces that capture children's interests and ability levels; parents being able to connect exhibits to their child's previous experiences and/or knowledge; child friendly spaces that welcomed and accepted young children; as well as easy accessibility to the museum and within the museum space. These themes are discussed below, and extracts from the data are presented to exemplify the families’ perspectives.

WHAT SUPPORTS MUSEUM VISITING?

The interview data identified four key factors that support families with young children to visit a museum 1) family-friendly facilities and accessibility 2) spaces that capture the interest of a range of ages and ability levels 3) guidance to support both engagement within exhibit spaces and 4) special programs and changing exhibitions.

FAMILY-FRIENDLY FACILITIES AND ACCESSIBILITY

Whilst families in the interview data identified facilities and accessibility as a possible constraint to visiting a museum, the positive elements that facilitated visitation are worth exploring as they develop a clear picture of what young families consider important. Ramps, lifts, cloakrooms and parent rooms were all important for general accessibility, however longer engagement required other 'spaces' for children to refuel and re-energise. The Members’ lounge in one museum was described by several of the Member and Guest families as a highlight:

“...I have to admit, their Members’ room, I was like ‘Oh my gosh, this is amazing’. There’s volunteers in there serving you, and it’s also full of resources for the kids to play with and comfy chairs” (Guest parent, ANMM).

Many parents felt having access to outdoor spaces was important for young children and supported their ability to refuel and reenergise. Consideration of food was also identified as important and while cafés were seen as important as an option, most parents felt buying food from a café for the whole family was quite expensive. Parents also expressed concern that their children would not eat the food available from a café and that bringing their own food from home was a better option:
We would be happy enough to buy a coffee and maybe a sandwich but just in terms of kids you tend to bring all your own food because you don’t know what’s going to be there, you don’t know if it’s going to be appropriate, you don’t know how expensive it’s going to be and you’ve paid to get in” (Novice parent, MAAS).

Finally, clear signage was a structural element that could support a family to continue visiting a museum, not only for Novice parents but for more experienced families as well.

“…unless it sort of says play area or something underneath it, you wouldn’t necessarily work out that that’s for the kids to play in. Maybe it’s just because I’m asking for the obvious, but I think unless you can sort of get the jargon quickly you’re not really going to translate it” (Member parent, ANMM).

SPACES THAT CAPTURE THE INTEREST OF A RANGE OF AGES AND ABILITY LEVELS
Spaces that capture the interest of a range of ages and capabilities were reported by the majority of families to support the museum visit. For young children, active engagement was seen as vital and parents described their children needing tactile, hands-on experiences and that an “element of surprise” (Novice parent 6) was appealing. Increasing the modality and interactivity of an exhibit in a thoughtful manner had the potential to capture a wider audience:

“Yeah, I think for the little ones there needs to be more stuff that they can engage with so that adults can engage with things better, that’s probably the main thing for me. Because when there was something she could engage with it was great. She really got into it and it meant that I could read things and have a bit more of a chance” (Novice parent, ANMM).

Curators also commented on the importance of knowing the audience and thinking about how they interact with the space. For instance:

“Okay. So, going back to looking at the whole, what we did - so at the time, we had four audience behavioural segments identified…So it’s not so much about me as a person. It’s about me, how do I behave when I come to the museum in these contexts. So I would behave quite differently if I had brought my child versus I come by myself or I come with a friend or I come with my mum” (Curator, MV).

GUIDANCE TO SUPPORT ENGAGEMENT WITHIN EXHIBITIONS
Guiding families to engage in spaces was also identified as a supportive element. Some parents explained they were unsure of the exhibition content and a few families expressed that as they were not born in Australia they did not have the historical context of exhibitions with a strong Australian historical focus. Guidance took a variety of forms from more passive support, such as clear signage or a brief description of an exhibition, to more active supports including guides. Making the context of the space evident can be improved with a carefully thought out display that contains enough information for an adult to have a quick glance and then engage children, and then a more detailed version for older children and adults who want a greater level of detail. During one interview, two curators were asked about how to support families’ engagement to which they replied:

“…the two things are encouraging parents, yeah, and changing the labelling so we have more provocative questions. The parents could quickly grasp what the story was and ask a question for the kid…And...more tactile stuff for the children to handle as they’re going around” (Curator, ANMM).

This need for guidance was consistent with many parent voices. For example,

“I also felt that (there) was lots of words on all the bits to read, it was very detailed. There wasn’t really much that at a glance you could go, “Oh, that’s
what I’m reading about” or “That’s what it’s about.” So, you had to really commit what you were looking at and work it out rather than just going, “Oh, that’s good but they’re not going to like that, so we’ll move on” or “That’s good. We’ll definitely stop at this bit.” (Member parent, ANMM).

Providing two versions of information has the potential to support greater engagement between parents and young children whilst catering to a wider range of ages, abilities and interests. Although signage is important, other parents identified the staff at museums as important in fostering children to make connections with the exhibits. One Member parent said:

“I have to say, what they do well, is when they do have someone guiding the children around and having activities at different points to help them connect with what is in the exhibition” (Member parent, ANMM).

Helping children connect with the exhibitions was identified as important by many parents. Making connections often involved supporting children to connect via a previous experience or through personal histories. Personal histories were discussed by several of the parents and the curators. An example of a personal history connection was ‘migration’ and was expressed by one Member parent:

“I tell him that my parents came over on a boat, and it was like this boat and that’s one of my favourite parts of the exhibition, and you know the old toys. Yeah, I mentioned it I guess to my mum, she hasn’t been there and I think the exhibition that shows people’s stories about migration, I think she will enjoy that” (Member parent, ANMM).

Curators interviewed also described the potential for many visitors to connect with part of their personal identity and museum spaces.

“There’s lots of different nationalities represented in there and if the parent recognised something from their own story, or from their own life, that would be great because they could then share their own story with their child” (Curator, ANMM).

Provocations to support connections could include a brief description of the exhibit and an open-ended question to foster interactions, such as ‘Have you always lived in Australia?’ or perhaps the provision of some real-life artefacts. A Curator from ANMM provided an example:

“This is the real fishing boat and here’s the story about the people who are on it. They’re not the real objects in that showcase actually, but there’s the jelly sandal that they dropped off when they were running for the boat when they almost got lost” (Curator, ANMM).

This quote reflects the idea of having exhibits that connect to real life experiences of young children. For example, with the use of real-life objects, even simple objects such as a shoe to help connect people to the exhibit.

Curators also noted the importance of designing spaces that allowed for families and young children to interact and learn together. For example:

“So yeah, it was designed for kids to press buttons and work levers, but essentially in conjunction with their parents, so it’s not really an easy exhibition for a child to traverse on their own, and that was the ethos at the time, is that you went with your family and your parents sort of showed you, oh, you can get in there. You can press that button. Why don’t you do that? And it was kind by example” (Curator, MV).
SPECIAL PROGRAMS AND CHANGING EXHIBITIONS.

The final support for museum visiting that emerged from the interview data was the availability of special group programs for children and changing exhibitions. Special experiences included linking an activity to an exhibit, for example creating a rose for Dorothy’s rose garden exhibit. Programs specifically geared towards children, such as the ‘mini mariners’ program were also enjoyed. Spaces where the content changed regularly were also mentioned by some of the parents.

“...when the kids area is renovated, is reopened that will definitely be a drawcard for her. I mean, just having those little seating nooks is quite good, like that was definitely something that – even just there with the books I could see her kind of just parking there for half an hour or an hour. So that's particularly nice” (Guest parent, MV).

While changing the content of spaces was seen as a way to support children visiting a museum, a complete overhaul to spaces is not feasible on a frequent basis. Again, this supports the creation of spaces that cater to a range of ages, capabilities and interests.

WHAT CONSTRAINS MUSEUM VISITING?

Analysis of the interview data from each family type and the curators revealed both attitudinal and pragmatic factors influenced parents’ decisions on visiting or revisiting a museum. Attitudinal factors centred around the overall appropriateness for very young children in a museum space, whilst pragmatic factors included: general accessibility to the museum, accessibility within the museum (e.g. facilities) and structural elements that seem to negatively impact on young children’s experiences (such as height, lighting and sound) in particular exhibitions.

APPROPRIATENESS FOR VERY YOUNG CHILDREN IN A MUSEUM SPACE

 Appropriateness of museum spaces for children covered both concerns over children breaking objects and also whether a space could engage interest or whether it would be beyond a young child’s cognitive capacities. The data showed a slight inconsistency between what parents wanted for their child i.e. to actively engage in a space but also a concern that they could break something. As one parent said “…just the supervision I have to be watching them so that they’re not breaking something” (Member parent, MV). Another parent illustrated this inconsistency in thinking when they said:

“The fact that you can go in and touch things. I’m always so worried with the little ones “Don’t touch this. Come here” being really restrictive, but here it’s just so open and it’s purely for them, so I think that’s a real drawcard for the museum” (Novice parent, MV).

Increasing awareness of the appropriateness of museums for very young children could reduce parents’ feeling anxious within exhibit spaces. Awareness of the suitability of museums for children also has the potential to increase museum visitation.

GENERAL ACCESSIBILITY TO THE MUSEUM

General accessibility to museums was a pragmatic factor identified in the interview data. Some parents said they would like more parking, however, most parents were happy to take public transport in and around the city centres but noted clearer signage from the main train and bus stations could make the trip easier.

Accessibility within the museum including ramps, lifts, and facilities has the potential to either support or thwart museum visitation. For many young families, children are still in prams and even children who are capable walkers often need a rest in a pram during a long day out. Young children are toilet training or often need quick access to the facilities. Stairs and limited
access to toilets with change facilities are a clear constraint for young families. As one Member parent highlighted:

“They're (ramps) essential, I wouldn't go somewhere if it didn't have accessible ramps and stuff like that, because it’s just too hard. Yeah I just avoid places that don't have it” (Member parent, ANMM).

Poor access to and within museums is a practical factor constraining museum visitation. Clear identification of good accessibility in terms of ramps, lifts and clear signage to facilities could improve museum visitation for families with young children.

**STRUCTURAL ELEMENTS THAT IMPACT ON YOUNG CHILDREN’S EXPERIENCES**

Structural elements (height, lighting and sound) within exhibitions can restrict a child’s access and/or their ability to engage in a space. The majority of interview participants discussed the inability for children to see or reach exhibits. As one parent stated:

“...he's about 15 kilos and so I have to kind of hold him up and take him through all the animals and that becomes a bit onerous and I don’t necessarily want to put him down but just he becomes too heavy after a while. So like, if I mean, anything were to come of this [interview], we'd love... a bit more, like for at a kid height” (Guest parent, MV).

Several parents considered the darkness of particular spaces to be scary for their child “it just looked too foreboding” (Parent 1) or the space was too dark for their children to see the exhibit details clearly. One parent described that while he understood the darkness was part of the ambience he felt it did not support his child’s engagement in a particular exhibit:

“And I think the darkness, he didn’t like the darkness either; that was something he was not keen on. I think you said at the time it was meant to be like going into a ship or something but I don’t feel like you get that at all from the space; it just felt dark” (Guest parent, ANMM).

Sound and lighting features may be important in recreating a contextual space or time in history, however comments such as those above illustrate that this needs to be done in consideration of accessibility for young children and their families.

Curators also noted the importance of providing appropriate information and provocations that will draw families and young children in and encourage dialogue. For instance, two curators reflected that making these kind of connections could be problematic if provocations were not included in the specific exhibits.

“There’s lots of different nationalities represented...but I think you’d struggle in both of those galleries to get something out of each exhibit quickly enough to provoke a child into a conversation about it” (Curator, ANMM).

**SECTION 1 SUMMARY AND CONCLUSION**

This section unpacked both families and curators’ perspectives on expectations families have in relation to visiting museums, and which factors impact on family re-engagement. Families with young children noted the importance of accessibility to the museum and the spaces within the museum. This included access (transport) to the museum and easy access with prams and young children. Feeling welcome with young children was also an important consideration for families, including not “worrying” about their young child’s interaction within the space, for example touching exhibits, being noisy or active. Being able to interact in the space was also important to families with young children. This included spaces that allowed for interaction and connection, including being able to touch, feel and interact with artefacts and objects in the
museum space. Families also appreciated having guidance in the museum space. This could involve museum staff, pamphlets and maps that help them navigate the space as well as signage and text that could act as prompts for families to engage their child with the exhibit.
Section 2: What is the impact of visitor profile on engagement?

In this section, we compare the movements and engagement of the Member, Guest and Novice families. These categories were chosen because learning is thought to be primarily social and cultural, and therefore dependent on the prior experience and knowledge of the visitors as well as the relationships between them (Rogoff, Mejía-Arauz, & Correa-Chávez, 2015; Vygotsky, 1987). The group differences were thus expected to shed light on how social intra- and inter-generational interactions shape learning in museums.

DATA AND ANALYSIS

In this phase of analysis, the video and interview data were utilised to examine differences between the engagement of the different family types. The following steps were used:

1. First, the focus children’s movements around each exhibition space were documented onto an excel spreadsheet, noting the start and finish time of the engagement with particular exhibits, as well as the content of that specific exhibit.

2. Next, we conducted a ‘hot-spot’ analysis, in which we used the museum-provided plans of each museum space to plot each child’s movement. Different sized dots were used to represent the length of time that each child remained at each specific exhibit, and arrows represented their movement paths around the entire space. The ‘hot-spot’ analyses were then compared, both within each museum cohort, as well as between cohorts, to identify patterns of movement and time-engagement of the different family types.

3. Video footage was then examined to identify the qualitative characteristics of the child’s and family-member’s movement, interactions and engagement.

4. Finally, the interview data was examined to identify excerpts which provided contextual explanations of the families’ engagement qualities.

Through this process, we detected patterns of engagement and involvement generally associated with each family type.

MEMBER FAMILIES

Three main findings related to Member families. Their engagement appeared to focus more on favourite aspects of the exhibits, for longer periods, and children engaged more independently than Guest or Novice families. The behaviour of Member families is important consideration for museums both because motivating visitors to return may be a more cost-effective approach than attracting new visitors (Brida, Disegna & Scudero, 2014), but also because sustained engagement is likely to foster richer learning (Sylva et al., 2014).

In many instances across the three museum sites, Member families demonstrated their familiarity with the museum space by revisiting favourite parts of the museum. What families chose to visit appeared to be somewhat shaped by what children—rather than adults—were interested in. Many Member families focussed on a few places of interest for long periods. The data presented below links the visitor’s movement (as indicated by arrows) throughout the space, with analysis of the time spent in each space (as indicated by ‘hot spot’ analysis shown by the increasing sizes of dots). This is illustrated in Figure 1 and 2, which shows the visitation trajectories of a typical Guest or Novice (top images) and Member child (below images).
Figure 1 – Comparison of typical Guest (above) and Member (below) family visitation trajectories and time spent at exhibits (circles) at Melbourne Museum exhibition.

Figure 2 – Comparison of typical Novice (above) and Member (below) family visitation trajectories and time spent at exhibits (circles) Australian National Maritime Museum
Member families were sometimes content to allow their child to engage with the exhibits without their active involvement. For example, in many instances, adults stood at a greater distance and took more of a supervisory role when compared to the other two categories of families. On many occasions, Guest and Novice adults tended to stay closer and supervise their children's engagement to a greater degree than Member adults. On occasions, parents were observed chatting with each other or using mobile devices while children engaged with exhibits.

The supervisory role was evident when (a) when a Member child's engagement with the exhibit blocked other children’s engagement (see example below), or (b) when children appeared not to see how the exhibit was designed to be used. In some instances, parents indicated that they did this deliberately to allow their children the space and freedom to explore independently.

Sasha (Member child, MAAS) is experimenting with a trackball and an illuminated button below a display (‘Eye in the Sky’), unable to read the text instructions or figure out its operation. Her father had tried to help her earlier, but has stepped back after his advice (“If you roll the ball, maybe we can pick the suburb. Hold on! Op, you’re back to the original screen”) appeared to be less interesting than her own trial-and-error experimentation.

Shortly after, Vicky (Guest child), with her mother in tow, arrives and begins to reach over Sasha, pressing random buttons from the right, then the left. Vicky’s manipulation of the trackball over the top of Sasha soon elicits, “Don’t! I want to do that!” After some uncomfortable chuckles from the parents, Sasha’s father interjects, “What about sharing, Sash? Why don’t you do one while Vicky does the other?”

For younger (i.e., under three years) children, parents’ engagement was often only as a physical aid, such as lifting them up to see parts of the exhibit. As discussed earlier, one Member adult expressed the hope that exhibits could be developed to account for younger (shorter) children. This sentiment was carried through the other families in interviews with adults, who stated, for example:

“... if there was anything negative about it, I had to lift him up to see the movies, at the interacting part and he was thrilled by that, so that would be about it” (Novice parent, MV).

“I think because most of the things exhibited was a bit above her height, so if I didn’t see it and pick her up, she might’ve not seen it” (Novice parent, MAAS).

“It was dark, there was nothing interactive at all and even the fact, his height; he couldn’t even see into some of the spaces” (Guest parent, ANMM).

Thus, the adult interactions were less often related to the collection content and more often to pragmatic facilitation of children’s engagement than for the other visitor types. Experience and familiarity with the museum thus appeared to allow children to engage independently with content which, in some instances, may have reduced the number of adult-child interactions. This finding paralleled Member parent interviews, which suggested parents appreciated hands-on experiences so that their children could explore and play independently:

“He loved the submarine, the fact that that would go under the water and things like that was great. When we were on the big naval ship there was like a big chair that you could sit on that was the driving chair. I can't remember what it’s called, the captain's. They all loved that. So, I think it's anything that you can actually touch and do themselves that he likes” (Member parent, ANMM).

“What was the best bit for me? Any bit where they can get involved. I mean, the Wiggles bit is actually really good because they like - Zeke could cut stuff and
Owen could colour stuff and - any bit where they’re not just looking but they’re doing” (Member parent, MAAS)

Another finding from the Member families was the importance of content that was interesting to young children. Member families tended to have extended engagement with an exhibit (see Figure 3) driven by what the children were interested in. This often led to sustained learning about the topic of the exhibit, represented both in the length of engagement with particular parts of the space (see contrasted ‘hot spots’ evident in Figures 1 and 2).

![Average interaction duration by category](image)

*Figure 3 - Average time of engagement with exhibits for Member, Guest and Novice families*

Extended engagement was often characterised by explorations of the exhibit features, and often led to excitement that accompanied ‘light bulb’ moments of discovery:

With their mother behind them, Winona (Member child, MV) and her sister Georgia are using the touch screens below stuffed African animals. Winona touches the aardvark on screen, activating a pop-up window with information about the animal.

Mother: [reading the screen] Aardvark. [Pointing to stuffed animals above] Can you see an aardvark here in the exhibit? [Child looks around but her view of the aardvark is occluded by the touchscreen, so Mother lifts her up]

Winona: Woah, yeah, that’s the one like that [pointing to screen]! There’s a lion here right along [Pointing to stuffed animal then to touching the photo of it on screen].

Mother: Yeah, then look at this one [touching mandrill picture on screen]. A mandrill. And where’s the mand-

Winona: [interjecting, excitedly pointing to the stuffed version] Hey! There’s the- It’s here!

Mother: Yeah!

Winona: It’s like Rafiki! [reference to Disney’s Lion King].

While the data demonstrated a tendency for the Member families to revisit familiar parts of the museum space, another motivation for Members to repeat their visits appeared to be renovated spaces or features. This is exemplified in two excerpts from Member interviews about what attracted them to make another visit:
“I think just any sort of new experiences are good. ... She’s always a fan of the Wiggles, so it’s sort of a given. But yeah, just new experiences are great” (Member parent, MAAS).

“I think when they do the school-break programs and they have stuff in the big hall, they - it’s good when stuff is spread out because it’s a little bit - it can get very busy around that time” (Member parent, MAAS).

The idea that new exhibits attracted visitor’s attention was supported by the data. However, this did not detract from the overall finding that Member families had rich learning experiences as they revisited exhibits in which they had an interest. Renovating and updating spaces could therefore draw visitors to visit again, but that having extensions to existing topics may be more conducive to learning interactions than creating stand-alone exhibits. Although there was much variation between museums and visitors, these patterns appeared to align with findings presented in Section 3 of this report suggesting that learning potential was enhanced when there were longer discussions and repeated engagement with the same content.

**GUEST FAMILIES**

Guest families’ first visit to the museum as a family unit was recorded as part of the project. This visit was chaperoned with a Member family, resulting in some Member families being drawn to what the Guest children were interested in.

“It was really lovely to have someone else to share it with, and I think probably also the way Melinda [Guest parent] was interacting with the exhibitions was interesting, because there were things that I would have overlooked and that she was noticing. So that was probably the most enjoyable” (Member parent, ANMM).

Many Guest children demonstrated a sense of wonder or awe upon seeing exhibits for the first time. This was seen in the great number of “wow moments” when Guest families expressed awe at the scale of a dinosaur, the size of a train or the detail of a ship. Because the whole museum space was new to them, Guest children often explored the various features of the exhibitions for shorter times than Members (see Figure 3), and there appeared to be a greater coverage of space than seen by Member families (see Figures 1 and 2). In this way, what the Guest families visited was not purely a reflection of their individual motivations, but also of the task of visiting and being shown the museum space for the first time. The great similarity in visitation trajectories is seen in the overlap of the left and right sides as seen in Figure 4. Member and Guest children were often seen engaging with the content together, with Member children sharing their knowledge about collection content.

![Figure 4](image-url) – Overlap of Guest and Member families’ visitation trajectories at Melbourne Museum exhibition.
Another common trend was Guest parents switching between adult and child conversation more than Member families. There appeared to be discussion between Member and Guest parents that was facilitated by the occasion of scaffolding their visit, but Guest parents appeared to enter into more discussion with their children about the museum content. Presumably, this was because the content was new to both of them. This seems to imply that initially engaging children in museum content may be a way that families can enjoy an experience together, and it may be that it is not until visits are repeated that children engage with content independently of parents.

In summary, Guest families’ expectations appeared highly focussed on creating an interesting and engaging first museum experience for their child, and, resultantly, their learning appeared to be more explorative and experiential than Member families. Findings highlighted the importance of museum spaces attracting initial awe and wonder from this first visit as a way of encouraging return visits. One important consideration is what topics and exhibits will capture the interests of young children and inspire both children and parents to want to come back again to explore further and learn more.

NOVICE FAMILIES

Novice families were recorded on their first visit to the museum as a family. Typically, this meant the parents had never visited (or not visited for many years, over which many changes had occurred to the museum spaces). They were asked to visit whatever they liked within the two selected exhibitions, and then anywhere within the museum once data collection was completed. Findings related to Novice families were similar to those of Guest families. Their engagement appeared to be more experiential and fleeting than Member families, as were adult-child interactions. Young children appeared to want to explore the physical layout of the exhibition space before returning to specific points of interest. Typical engagement, particularly for families with children under three, was to explore the whole exhibition, seeing what there was to see. This was often an artefact of the physical properties and architecture of the space, which, as previous research has shown (e.g., Hackett, 2014), was as interesting and engaging as the exhibits themselves. Engagement was methodical in many cases, perhaps because their movement paths and exploration was being determined wholly by the cues from the museum space, rather than from another child or family (see Figure 5).

Figure 5 - A ‘flight path of a Novice Child in the Australian National Maritime Museum

Novice child engagement time at any one exhibit feature tended to be short, but these children would often return to a space of interest for further exploration, after they had explored the space entirely. What the researchers had not anticipated from the study design was the finding that the Novice families typically had more intimate engagements with the museum content than Member families, meaning that interactions between parent and child around the content,
while brief, occurred frequently. These interactions were generally descriptive, as parent and child identified and briefly discussed the most salient aspect of that exhibit feature.

Novice children tended to traverse the museum space in as much of an exploratory and undulating fashion as Guest children, if not more so. Because content was new to the family, there appeared to be a trend also of Novice children revisiting various parts of the museum that they found interesting. Longer interactions occurred when children returned to re-experience something, such as a large dinosaur projection captivating the viewer in a 'scary' way, or the experience of lying in recessed nook on the Wiggles ship. Methodical exploration of the space and revisitation of the key aspects are seen in the three visitation trajectories of Novice families in Figure 6.

In summary, Novice families were engaged in the whole museum space and by features of the exhibits that were immediately salient as they traversed the space. Parent-child interactions were frequent, but relatively brief, as the Novice families explored the space and what it had to offer.

FIGURE 6 – Visitation trajectories of Novice children at Museum of Applied Arts and Sciences and Melbourne Museum.

In summary, Novice families were engaged in the whole museum space and by features of the exhibits that were immediately salient as they traversed the space. Parent-child interactions were frequent, but relatively brief, as the Novice families explored the space and what it had to offer.

SECTION 2 SUMMARY AND CONCLUSION
This section examined the differences between Member, Guest and Novice family engagement at the three museums. Comparisons between the groups revealed qualitative differences, such
as the time spent at various parts of the exhibits and the types of adult-child interactions within them.

Familiarity and experience with the museum appeared to correspond to more focus on – and interest in – particular features of exhibits and longer interactions between the child and the exhibit feature. More of the adult-child conversations were related to collection content and experience appeared to result in deeper understanding of the displays. Findings suggest that returned visitations are a key site for deepened engagement with – and learning about - the collection content. All Members appeared to re-visit the museum because one or more aspects of the exhibit captured the child’s interest, suggesting this may be an avenue for museums to consider in their development of exhibit topics and content if they wish to draw young family visitors back in for repeated visits.

Rich learning appeared to be fostered when parents and children could share conversations about the collection content, rather than superficial aspects of the exhibit such as physical layout or exhibit functionality (e.g., how to operate interactive features, how to share children’s usage with other children in the interests of fairness). This finding suggests that providing information aimed both at a child- and adult-level may inspire important learning conversations between adult and child. The sharing of these experiences may increase chances that this learning will continue beyond the visitation, and into the home. Having content aimed at adults is also expected to encourage return visits as parents can share their own learning with children, thus inspiring children’s interest in museums and their content.
Section 3: What learning processes are evidenced in museum spaces?

This final stage of our analysis addresses the question of learning in museum spaces. Our initial proposal aimed to determine 'How inter- and intra-generational learning can be fostered in museum spaces'. We took the perspective that learning occurred through interactions, where parents, children and their peers could share and construct understanding. Specifically, we asked 'What learning interactions take place between children, peers and adults in these exhibit spaces?'

The idea that learning occurs through interpersonal interactions is not new in early childhood education. Spanning back to the theoretical writings of Lev Vygotsky, interactions are regarded as a conduit through which individual thinking is communicated between individuals, and is therefore open to negotiation, reflection and change. According to Vygotsky, learning interactions constitute social learning which necessarily precedes individual development or changes in thinking. He famously wrote:

Every function in the child’s cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological) and then inside the child (intrapsychological)” (Vygotsky, 1978, p. 57).

From this perspective, learning is necessarily collaborative as “what the child is able to do in collaboration today he (sic) will be able to do independently tomorrow” (Vygotsky, 1987, p. 211). This approach proposes a dynamic view on learning, which does not focus solely on the product of learning (i.e. the actual change in thinking or knowledge) but instead, on the processes by which children and others construct learning together.

In early childhood education, the concept of collaborative learning has most recently been framed as occurring through episodes of ‘sustained shared thinking’. Originating from a large study of effective early childhood learning and teaching methods in the UK, sustained shared thinking is defined as occurring “when two or more individuals ‘work together’ in an intellectual way to solve a problem, clarify a concept, evaluate an activity, extend a narrative etc.” (Sylva, Melhuish, Sammons, Siraj-Blatchford, & Taggart, 2004, p. 5) This definition foregrounds the interactive nature of learning, and identifies the interaction as intellectual or cognitive in content. Of equal importance, though, is the next part of the definition which stipulates that “[b]oth parties must contribute to the thinking and it must develop and extend the understanding” (p. 5). Sustained, shared thinking is therefore collaborative and bi-directional – the interaction constitutes a context for a ‘meeting of minds’ where the interactive nature of the exchange means that both parties introduce and extend ideas and knowledge and, consequently, learn together.

Sustained shared thinking evolved in the context of preschool education programs after analyses of interactions between qualified early childhood educators and children. This raises the questions of whether this concept usefully applies during family-based interactions in museum contexts and, if it does, what is the nature of learning processes associated with these kinds of interactions? Secondly, the aim of examining how learning can be fostered in museum spaces necessitated that we look closely at the features of the exhibit spaces that were associated with museum-based episodes of sustained shared thinking.
DATA AND ANALYSIS

In this analysis, we consulted both the video and the parent interview data. Our analysis followed the steps below:

1. We first used the ‘hot-spot’ analysis to identify sustained interactions in order to qualitatively analyse i) whether episodes of sustained, shared thinking, as described above, could be identified in the museum space, and then ii) the intellectual features of the interactions that demonstrate learning potential for young children.

2. Once episodes of sustained, shared thinking were identified, these episodes were analysed qualitatively to identify features of the museum spaces which were frequently associated with these learning interactions, and which appeared to draw out the intellectual features of the interaction.

3. At the same time, data from the post-visit parent interviews were analysed to determine aspects that these parents associated with their children’s engagement and learning within the museum spaces. These findings were then compared with the video analysis, thus adding validity to the video analysis.

FINDINGS

When compared with early childhood centre spaces, museum spaces are generally larger, and learning spaces are defined and delineated differently from those found in a classroom context. They are also dynamic spaces, providing opportunities for movement and exploration, with children and their families engaging with both exhibition spaces as well as the overall physical space of the exhibition halls and rooms. As highlighted in our previous analysis of the profiles of the different families, a large part of the family experience was the navigation of these spaces. The physical movement from exhibition to exhibition often consumed as much time as that spent exploring the collections within that space. Furthermore, it is important to keep in mind that, due to their different roles, parents and teachers vary in their expectations and agendas, and this variation will be reflected in the ways that they relate to the young children in their care (Degotardi, Sweller, & Pearson, 2013). We therefore cannot necessarily expect that learning interactions in a family and a museum context will demonstrate the same interactive features as those associated with sustained shared thinking in a classroom setting.

Regardless of the relationship context and the dynamic nature of the museum context, our analysis demonstrated that episodes of sustained, shared thinking did occur, with numerous examples of the focus children, their parents, and less frequently, their peers engaging in interactions which involved the collaborative sharing and extending of knowledge. These interactions predominantly occurred when children, their family members and peers remained at an exhibit space for at least 30 seconds, although the overall time that a child spent at any one space was not necessarily an indicator of the collaborative learning potential of that space. In some instances, children were content to explore spaces by themselves, and their parents allowed them to do this with little input or interaction. For example:

*Lana* (Novice child, MAAS) and her mother are in the Wiggles hall, and Lana has spotted the Big Red Car. She runs over to it, and climbs in, exploring the seat belts. Her mother is content to watch on, and takes a photo of her in the car.

*Lana continues to climb around the front car seat. At one point, Mother approaches, but when Lana sits back down, she retreats to watch again from a few meters away. After another moment, Mother walks to the car, and sits in the back seat. Lana looks at her, and then back at the screen in front of the car.*
Another child has joined her on the front seat and they silently watch the screen together.

Lana: Mummy

Mother: Leans forward “Do you want to sit here with me”. She picks up Lana and moves her to the back seat. “Want to see?” She points at the screen, and she and Lana continue to watch the screen together with very little interaction.

Writing about sustained, shared thinking in early childhood centre contexts, Touhill (2012) identifies a number of conversational features that indicate the learning potential of the interaction. These include

- Summarising and reflecting
- The opportunity to remember, recount and then and then elaborate on ideas
- Suggesting and wondering

Evidence of these features were found in our data, and could occur in relatively short interactions with even very young children, as evidenced in the example below:

Two-year old Ellie (Novice child, MV) is approaching the dinosaur display from one of the platforms:

Ellie: “Oh Look!” (she points at the skeleton)
Father: “That’s the dinosaur!
Ellie “That’s a dinosaur”
Father: “Is that the one we saw before?” (Referring to a previous experience in another space).
Ellie: “Yes”
Father: “What is he doing?”
Ellie verbalises to her father and then comments that the dinosaur’s “Eyes. Eyes - gone” (referring to the holes in the dinosaur skull)
Father: “His eyes are gone?”
Ellie: “Yes”.

Father: “I know. I wonder where they have gone?”

This example introduces the interactive nature of learning conversations, with Ellie initiating the interaction and volunteering information, her father summarizing and interpreting what is being seen, and then both parties elaborating on the information through commenting, answering and wondering. While the interactive nature of this conversation is clear, the learning potential is not necessarily evident. Therefore, in the next section, we identify key intellectual features of these interactions, to explain how these contribute to the children’s learning processes.

**WHAT ARE THE INTELLECTUAL FEATURES OF SUSTAINED SHARED THINKING IN MUSEUM SPACES?**

Our analysis demonstrated four key intellectual features associated with sustained shared thinking in the museum spaces - features that have all been associated with rich learning potential in the early childhood years. In this section, we explain these features, and draw on both video and interview data to illustrate their learning potential.
ESTABLISHING SHARED ATTENTION

The establishment of shared attention was fundamental to the occurrence and maintenance of sustained shared thinking. At its most basic, shared attention brings two interactants together, thus setting the scene for a learning conversation to occur. However, when attention is coordinated, rich learning opportunities arise. Tomasello (1999) summarises this potential as follows:

- Conversations around a shared referent point, such as an exhibit feature or an information source, draw each interactants' attention to specific features of that referent point. Ensuing conversations therefore share information about what is considered salient to the people involved.
- Once established, shared attention supports children’s developing understanding of new words and ideas, as children are able to more readily derive meaning by associating the spoken word with their direct perceptual experience.

In the dynamic museum space, establishing shared attention was often challenging, as the attention of children and their families could be drawn to multiple exhibits and the overall excitement of being in the space meant that children’s attention was often distracted by the sounds, movements and sights that were occurring all around. However, both children and their families were able to negotiate these challenges, with children often instigating episodes of shared attention:

Owen’s (Member child, MAAS) attention has been grabbed by a large car exhibit, and calls to his friend to “Look at this car”, stating to himself “We haven’t seen these before”. His attention is drawn to a small lighted recess which contains model cars.

Owen: (To Rick (Guest)) Look at all these cars.

Rick: Can I show my mum? (Rick runs back to find his mother, wish Owen in pursuit.

Owen: Daddy, daddy, come here …… Guys! Come. Look! There’s little cars in here.

Rick and both parents have accompanied him back to the exhibit

Owen: “There’s little baby cars”. Rick and Owen explore the cars together.

Other times, it was the parent who tuned into their children’s interests, either by picking up on the children’s cues, or by drawing on previous experiences to identify opportunities to converse about known topics. For example, during a lengthy interaction revolving around a touch screen exhibit of different animals, Matthew’s (Member child, MV) father draws his attention to a particular animal:

Father: “What else do you want to look at?” Matthew leans forward and points to a Polar Bear. His father asks “polar bear?”

Matthew: “Yak”. Matthew was leaning in to touch the polar bear, but his father pans up to the yak. Matthew points to the animal next to the yak and his father acknowledges “oh brown bear”.

Matthew touches the bear on the screen. He then indicates that he wants a different one. His father explains “One at a time – brown bear”

Matthew leans in to touch the yak

Father: “Oh, you want the yak?. We’ll close brown bear down, and click on yak.” His father opens the yak screen and reads the information to Matthew.
Matthew points to display and then back to the touch screen and says “What’s that yak”.

When commenting later about that experience, Matthew’s father identified that his knowledge of Matthew’s interest was an enabling factor in establishing this episode of shared attention:

“Yeah, so anything that growls he’s interested in. So the polar bear, he thinks panda bears growl which I may be incorrect but I didn’t think they growled. But whenever we point to the panda bear he always growls as well and so anything that’s like the yak is the new flavour of the month” (Member parent, MV).

**QUESTIONING AND EXPLAINING**

Another feature of sustained shared thinking is the presence of to-and-fro inquiry (Touhill, 2012). The reciprocal nature of learning conversations allows for meaning to be established, and information can then be shared and extended. The effective use of questioning has long been associated with this form of to-and-fro inquiry, as questioning can encourage children to express their understandings and provide opportunities for adults to prompt children to extend on their thinking:

*Braden (Guest child, ANMM) walks towards the ship display and his mother (1) and his peer and peer’s mother (2). Mother (1) says “Look! Braden wants to look at that boat”. They all walk across. Mother “Wow! Do you like it?” She labels parts of the model – “A huge sail. They haven’t got their sail up”. She then asks “What’s that, guys?” Child (1) answers “a ship”. Mother (1) confirms and repeats. She then asks “What does a ship have on board? … What does it have?” Mother (1) prompts “Can you see other little things on the boat?” Mother (2) “What does it have? Mother (1): “Let’s see what you showed me before” Child (1) responds “a window”. Mother (1): It’s got windows. Child (1) “And a cannon”. Mother (1) “And it’s got cannons It’s got lots of them. Look. It’s got hidden cannons. Why do they have to have those? Why do they have to hide them?” Braden: “Because they don’t want people to steal them” Mother (2): “The don’t want people to steal them. They’ve got more cannons around the other side. They’ve got little cannons on top – on top of the (unintelligible). And look what else they’ve got? They’ve got a big anchor. Do you remember the big anchor we saw up there?” (She is referring to the life-size anchor they saw at the front of the display area). Questioning was thus used as a way of determining what the children currently knew, as well as providing opportunities for both adults and children to explain and elaborate on their understandings. Questioning was also a way of drawing children’s attention to salient aspects in order to help the children to deepen their understanding. As mother (2) explained later:

“Ideally, like I always try and make the connection with – for example, there’s a big anchor upstairs and I just and make the connect that it’s a real anchor that...”
real ships have used, rather than just being something we walk passed – not make the connection that it’s real” (Member parent, ANMM).

DIVERSE AND TECHNICAL VOCABULARY
A further intellectual feature evident in the episodes of sustained, shared thinking related to the vocabulary features used by both parents and children. These learning interactions were frequently characterised by a use of a rich and diverse vocabulary to refer to items, with an inclusion of precise descriptive, or ‘technical’ words to identify and describe specific aspects of the exhibit. These vocabulary features are cognitively sophisticated, and are a strong predictor of subsequent language and literacy outcomes (Hoff, 2006) as children learn new words that enable them to express and refine their conceptual understandings to provide specific and detailed descriptions (van Kleeck, 2014). When children and their parents were deep in conversation, opportunities to express detailed conceptual understandings often arose. In most cases, it was the adult who introduced the technical language:

Winona (Member child, MV) and her mother are looking at the touch screen about the animal display

Winona: Looks at the screen and then points at an animal in the display. She calls out “That’s a (unintelligible) here!”
Mother: “Is that the Steenbok?”
Winona points and replies “There”
Mother: ‘Yes. It’s got horns. They’re quite pointy aren’t they.”
Winona: Points at another animal. “Mum. What’s this?”
Mother: “What’s this? Why did you press on that one? We’ll have to go and find that one. (Mother reads) A plains (unintelligible)?”
Winona: “Dibata? There it is. See the ...?”
Mother: “Ah yes “
Winona: “A hyena”.
Mother: “No that’s an African wild dog, like the ones we see at the zoo. You know they’ve got the big ears like that”.
Winona: “that’s like a hyena- it is a hyena”

On other occasions, the child also used precise and technical terms:

Owen (Member child, MAAS), Rick (Guest child) and Rick’s mother have approached the solar car exhibit.
Owen: “Oooh! It’s got energy.”
Rick’s Mother points at the photo that accompanies the physical exhibit. “It’s in the desert driving, ‘cause there’s lots of sun in the desert. So, there’s lots of energy.”
Owen: “And it’s so hot, and the sun gets in to the plane and it makes it more powerful”

Reflecting afterwards about this example, Rick’s mother explained:

“I don’t think he’s ever seen a solar vehicle and I thought, ‘Oh, this is a learning opportunity’. He’ll learn about the solar panels and I know he’s interested in the solar system, so he knows that the sun is really hot and you can get power from
that and then you get to go in the desert. So, then we got to talk about what it’s like in the desert” (Guest parent, MAAS).

**COGNITIVE CONNECTIONS**

Finally, children’s learning was deepened when their interactions involved opportunities to connect new information with their existing knowledge. Some parents recognised that their children’s engagement with the space may be a result of the connections that they were making with past experiences. For example, when reflecting with her child on his interest in, and animated conversation about, some model lifeboats in a ship exhibit, this mother explained:

“Well, we were actually on a cruise, weren’t we? A year ago today. And he was interested in the lifeboats on that and we have talked a couple of times about lifeboats and how they save people and everything, so that’s probably why he was interested in that” (Guest parent, ANMM).

Other parents explicitly pointed out these connections to their child during the interaction:

Ally (Novice child, ANMM) and her mother are in an area where indigenous music is playing.

Mother: “Do you remember when we went to Kakadu?”
Ally : “Yeah.”
Mother: “Do you remember when we heard lots of singing and things like that?”
Ally “Yeah.”
Mother: “Do you want to come and listen to this?” She leads Ally over to the Eora display and asks “Do you remember that sound?” – indicating the music playing over the speakers.
Ally : “What sound?”

*Her mother explains that the music they can hear is Aboriginal singing and clapping. Her mother reads the sign and says “Arnhem Land! That’s where we were.”
Ally : “Is that Kakadu?”
Her mother notices a digital screen display and recognises a name on it. She identifies the name and says to Ally “They’re the people who lived in the area of Kakadu where we were.”*

This kind of shared reminiscing is a powerful tool in children’s cognitive development and language development, with links to vocabulary development, their ability to form narratives, and their autobiographical memory (Neale & Pino-Pasternak, 2016). The mother in this example recognised the importance of shared memory in helping her child to understand and make meaning from the exhibit:

“... that's something else that I knew we've had experience before because we've looked at maps quite a bit, and I've shown her where Darwin is when we've travelled there, or Byron, or shown her where Sydney is, so that's why I thought that was a good thing to get her to engage with rather than the other images that were available because she wouldn’t have had any history with those” (Novice parent, ANMM).

**WHICH MATERIAL FEATURES OF THE MUSEUM SPACES SUPPORTED SUSTAINED SHARED THINKING?**

Our final question was to determine the features of exhibit spaces that appeared to support the occurrence of sustained, shared thinking. Four features were prominent in our data:
INTRICATE DETAIL
When exhibits included intricate detail, children and adults were drawn to examine and explore more closely, and this prompted rich, detailed conversations about these features. The presence of small, replica items, captured children's interest, especially if these were exhibited in a way that focused their attention, thus encouraging close observation and attention to detail (as in the model car example of Owen and Rick above - see Establishing shared attention). Intricate detail on models provided both parents and child with many topics to discuss, and opportunities to use detailed, technical vocabulary to extend their thinking:

Mother (Member parent, ANMM): “Look at how many little boats I can see.” She counts them while pointing them out. “There’s nine little boats on the side of the ship. And look at this. Look. What can you see on the outside of the ship?”

Marcus: “What?”

Mother: “They’ve got steps. When the boat moors next to the land, all the passengers can climb up the stairs, all the way up. Up into the cabin”

Marcus: “And when it gets to a station .... they go down again”

Mother: “Ah, yes. So, when they get to their stop, they will go back down the stairs – that’s right.”

Intricate detail not only related to the physical exhibit, but also to the accompanying written or diagrammatic material. This detail prompted parents to extend the conversation often to beyond what they child could see:

Mother (Guest parent, ANMM) draws the children’s attention to the printed display of the inside of the ship that accompanies the physical display. She explains that this shows what is inside the ship (not visible on physical display).

Mother: “Can you see down here (indicating to printed display). The people sleep inside and they have their food inside…. There’s not very much room is there?”

Later, the mother reflected on the intricate aspect of the exhibit when she talked to her son during the post-visit interview:

... Yeah, and it was the boat that had - remember, we could see inside the boat, couldn’t we, and we could see what was happening. We could see the people on the deck sweeping. Do you remember? There were little models, weren’t there? Yes? (Guest parent, ANMM).

DIFFERENT PERSPECTIVES
Being able to see exhibits from different angles and vantage-points provided opportunities to discuss different features of those exhibits. When they were able to do so, the children would walk around exhibit spaces to look at features from different angles. Many of the museum spaces also had ramps, bridges and viewing platforms, which all allowed children to gain different perspectives of exhibitions. The parent below reported how this sustained their child’s engagement in the space:

“I think the wild area, when we went over there from where I suppose where William could see, they were looking directly up, so it was either up or at level and they weren’t seeing anything in between, so when we actually went up the stairs, which we wouldn’t have known about if you guys hadn’t have said anything, and you can see it from above, that from me was a different perspective again” (Novice parent, MV).
It also allowed children to explore different features of the exhibits and make connections between items that were represented in more than one way:

Owen (Member child, MAAS), his father and their Guest family have climbed the stairs into the raised signal box. They have been looking at an exhibition of toy trains and aeroplanes.

Owen: “Look at that. Look at this aeroplane. Rick, come and look at this red aeroplane.”

Owen turns around to look out of the signal box window, and exclaims “And you can even see out here!” – he points at the life-size aeroplane which is hanging from the high ceiling. “You can see it here.”

Rick’s mother: “You can see on top of the train too.”

Owen: “You can … you can see on top of the train.”

Father: “Whoa! We’re right under the plane”

Owen: “What?” and rushes over to his father. “You can see right under the train … Wait …”

Father: “Hey – look up!”

Owen: looks up and sees another life-size plane. “Oh yeah! It’s so big …. So big.”

INTERACTIVITY

Not surprisingly, interactivity in the exhibit spaces was a key feature that increased and sustained children’s engagement. Interactive spaces included ‘hands-on’, active exploration opportunities (e.g. dismantling a robot), audio visual aspects (e.g. buttons to press to hear animal or transport noises), or play activities that accompanied the exhibition:

Lana (Novice child, MAAS) and Mother have entered the small cubby house which is part of the Dorothy the Dinosaur exhibit space. There is a hamper in the cubby which contains a tea set. Lana picks up some cups and a teapot saucers.

Mother: “You’re making me tea?”

Lana: “In this cup (unintelligible)

Mother: “OK”

Lana: “Cups.” She then puts a bowl in the hamper. “Um. Let’s pack mum” She places the other cups and bowls into the hamper “And now we carry a basket”

Lana closes the basket and handles the leather buckles. “How we close this mummy?”

Mother: Threads the leather straps through the lid. “I think this bit goes through here” Lana observes and also places her leather strap through the hole in the lid.

Lana: “…this bit through there. Now, how we carry it?”

Mother: “I think it needs to stay in here, ‘cause I think it’s (unintelligible) so it’s for in here really”

Real-life sized objects and real objects to walk on, crawl through, touch, pull, and push (e.g. large ships and trains) were also significant, as one parent commented: “So, when you’ve got the pirate ship and you sit in the hammock, they (the children) go, ‘Oh, this is how they used to
go to sleep.’” Being able to inhabit the same large object together provided opportunities for imaginative role playing in order to explore the functionality of the exhibit item:

“We were talking about who was going to be the train driver and was that the train driver’s seat and then she wanted to sit up…then we were kind of talking about…the fire pit…and then she insisted that I had a turn” (Member parent, MAAS)

Interactive touch screens featured heavily in the display, and prompted opportunities for shared explorations. In some instances, such as that described above between Matthew and his father (Establishing shared experience) and Winona and her mother (Detailed and technical vocabulary), the combination of written and visual interactive touch screen displays prompted rich conversations around the topic area. In others instances, however, the learning conversation revolved also around the use of the technology itself:

The Novice (ANMM) mother and Sophie notice a large table-top touch screen display which contained pictures of books.

Mother: “You can touch one … look” She demonstrates how the electronic book opened when its cover was touched. She holds Sophie’s hands to swipe it across the screen, thus demonstrating how to operate the display. “Look, you can go through the book”

Sophie touches the screen and her mother directs here “The arrow” Sophie swipes the screen again and her mother responds with “OK, you can do it that way.”

A conversation about the map follows, and then, as Sophie tries to operate the screen again, her mother reinforces “You can also use the arrow (she demonstrates) see – you go like that. Try pressing the arrow.” Sophie follows these directions “See. There you go!”

MULTIMODALITY

Finally, sustained shared thinking was frequently supported by exhibitions where content was represented in multiple ways. In some instances, this involved children being able to experience content through multiple senses – being able to touch, see and hear aspects of the exhibits which, when this piqued their curiosity, they were eager to find out more. Written material supplemented the physical aspect of the space, allowing parents to provide new information to their child.

Zac (Novice child, MV) has entered an interactive exhibit space of a malley fowl nest. Two eggs are exhibited at child height, clearly inviting children to reach and touch them. Zac does this, and rapidly withdraws his hands with an intake of breath. He pints at the eggs “Look mum!” He reaches and touches an egg again

Mother: “Oh, the eggs. Are they warm?” She reaches and touches one. “Oh! They’re warm eggs”

Zac. “Why are they warm?”

Mother: Because ... Let’s read, shall we” (she reads) “It says ‘The malley fowl digs a deep hole and fills it with leaves ... and it warms up like a compost heap’.”

Interactive touch screens were again significant, especially when the various information modes were directly linked to the child’s immediate experience with physical items. When discussing the dinosaur exhibition, one curator explained:
... the dinosaurs have got all the tactile - touch the teeth, watch the bit of video, that kind of - different modes of accessing information. You can go up, above and down on the dinosaurs. There’s the big one upstairs, the viewing dinosaurs, where they come to life, so on and so on (Curator, MV).

SECTION 3 SUMMARY AND CONCLUSION

In this section, we identified the interactive and intellectual features of sustained, shared thinking interactions in museum spaces. By highlighting these features, we have drawn attention to the learning processes that took place, and the ways that conversations between children, parents and their peers established the context for, and then collaboratively extended understandings about the exhibit spaces. This collaborative learning not only revolved around the topic content or the exhibit, but also around the skills that enabled them to learn in the museum space. Skills of negotiating the space, of navigating around and through exhibits, and of operating interactive devices were all topics of conversations. Learning interactions were often as much about ‘learning how to learn’ as well as ‘learning what to learn’ in museums.

Also significant was the finding that, if sustained shared thinking was to occur, at least some of the identified intellectual and material features needed to be present for both the parents and their children. When parents were interested and intellectually engaged, this motivated them to share this with their children, and their children responded with a motivation to engage in learning-rich conversations with their parents. Sustained, shared thinking therefore reflected a dynamic and mutually constructed context as represented below:
Summary and Recommendations

This study investigated the involvement and learning engagement of families with prior to school aged children in museums. Using a range of interview and observational methods, we sought to determine some initial understandings about i) how museums can increase and sustain family involvement and learning and ii) how inter- and intra-generational learning can be fostered in museum spaces.

Our data generated information on parents' perspectives about the kinds of facilities and information sources which would support their visits, and therefore their involvement in the cultural experiences that museums can afford. Our design also permitted an initial examination of the involvement and engagement of different visitor profiles, with a particular emphasis on the contrasting engagement patterns of Novice, Guest and experienced museum visitors. Finally, we sought information on the ways in which collaborative learning was visible in museum spaces, and the exhibit characteristics that appeared to foster interactive, intellectual engagement.

In this final section of the report, we provide a summary of the main findings from this study and, from these findings, derive some recommendations for practice.

MUSEUM SUPPORTS FOR FAMILY INVOLVEMENT AND ENGAGEMENT

Findings from this study highlight the need to focus on engaging families – both in terms of encouraging them to come to the museum and also in terms of engagement once they have arrived at the museum. In terms of facilitating their visit, families stated that they would appreciate additional information about how to get to the museum (parking/transport), accessibility in terms of ramps and lifts, whether they were able to bring their own food, or whether café food would be suitable, cloakroom availability, pram accessibility, and parent rooms/bathrooms.

Attitudes and beliefs about the appropriateness of museum spaces for very young children also impacted upon family involvement. Some families expressed the importance of knowing that museum spaces were designed for young children. When deciding on whether or not to visit, they wanted to know that the museum would be engaging for the children and also that children would be able to touch and explore the spaces without the parents being fearful of breakages.

Once families were at the museum, other information could support their engagement and to help them plan their day. This included details of food locations for both parents and children, as well as indoor and outdoor play areas. Being able to rest, play and refuel were seen as key enablers of involvement, particularly in terms of extending the time that the family spent at the museum. Some families also expressed uncertainty at whether they were able to leave and re-enter the museum.

RECOMMENDATIONS IN TERMS OF FACILITIES AND ACCESSIBILITY

- Provide easily accessible structural facilities to meet the needs of visitors with young children. This includes clean and convenient nappy changing facilities, quiet breastfeeding areas and places where food brought from home can be eaten.
- Provide clear information sources that clearly target families to support parents as they planning their visit and then navigate the facilities and space once they arrived. The inclusion of family-targeted information about parking, ramps, food, play areas, lifts, parent rooms, cloakrooms/stroller storage and so on may help to make families feel more confident and willing to visit museums. Consider including large clearly-labelled links on the main page that
are specifically for families with young children. Include clear information on any food and visitation provisions, such as places to eat own food and re-entry provisions.

- Provide clear and visible information and marketing to reinforce to families that museum spaces are suitable and beneficial for young children. We recommend not only providing this on webpages, but also reflecting this in museum spaces through the minimisation of barriers and ‘don’t touch’ signage.
- When reviewing or redesigning the website and other marketing/ advertising reconsider the visibility of families with young children. Consider how young children and their families are portrayed in these information sources, to ensure that all children (including infants and toddlers) are represented as being actively engaged with exhibit spaces.
- The ability to rest and refuel is particularly important to this audience. The inclusion of places for a ‘time-out’/rest/seating and lower stimulation is crucial and is ideal if it is located close to the exciting stimulating areas.

**ENGAGING CHILDREN AND FAMILIES WITH MUSEUM SPACES AND EXHIBITS**

Data from this study suggests a number of ways that the attention of children and parents could be captured within museum spaces and how they could be drawn into engaging with different displays. Displays and resources that allowed children to see, touch and interact independently were often found to support children to engage with an exhibit. Where displays were too high to see, or resources too high to effectively use, children often did not engage or parents had to lift them up (which also limited engagement at times as they were too heavy to hold for long).

High noise levels were found to be overwhelming for some children (and, at times, parents). Additionally, sounds and noise often served as a distracting and impacted upon sustained attention and engagement. Light levels were also found to enable or hinder engagement. While light ‘pin-points’ such as lighted display boxes captured and focussed children's close attention, some children and parents found dark spaces foreboding and uninviting.

The inclusion of intricate detail within displays was effective in drawing in children’s attention, and facilitating shared focus. These were observed as physical items and also intricate detail in diagrammatic displays. Small spaces such as reading nooks also help to support focus and engagement by reducing the impact of other distractions.

Children’s engagement was also supported where there were opportunities for them to actively explore and investigate. This included hands on experiences and displays that could be touched. Child also responded well to life-sized items, and displays and exhibits that they could go inside, climb over or otherwise physical interact with. Art and craft experiences were also effective in creating sustained engagement and opportunities for discussion. Where resources were in good working order and consumables were tidy and replenished regularly, interactions were more sustained.

**RECOMMENDATIONS FOR ENGAGING CHILDREN AND FAMILIES WITH MUSEUM SPACES AND EXHIBITS**

- The redesign and development of exhibit spaces should include consideration of the mobility and physical characteristics of children under the age of five so that exhibits are fully accessible to young children in terms of height, and that children are able to see, touch and interact independently. Museums could use ‘blank wall’ spaces that are often underneath current exhibits to capture very young children’s attention and curiosity. Small nooks, duck-in spaces and other features especially designed for young children give them a special experience and the pleasure of something “made just for me”.
- The importance of the sense of touch for young children cannot be overstated.
• Give careful consideration to the use of light and sound to ensure that these do not impede or detract from how children and families engage with museum spaces.
• Provide resources that support children’s active engagement with displays, such as real and life sized items that children can engage with, hands on experiences and displays that can be touched. Ensure that consumables (such as art/ craft materials) are tidy and replenished.
• Consider including games that parents can play with their children such as “seek and find” to encourage parents to let children take the lead when exploring and revisiting museum spaces.
• Consider including family trails or labels in core exhibitions—this may take the form of summary text panels that quickly highlight important context and key objects for parents, additional labels with provocation questions or fun facts, or more portable solutions. This could include paper trails, guides, maps, museum apps, large format activity cards in seating or pockets at particular points in exhibitions.

DIFFERENT TYPES OF FAMILIES

A key finding from this study was that different family types experienced and interacted with the museum spaces in different ways. When families were new to the museum experience, the parent and child tended to stay together and explore in a close and intimate fashion. In contrast, Member families were more confident and content to let children explore independently while remaining close by.

An interesting finding was that scaffolding provided by Member families to Guest families did not necessarily result in a higher level of parent-child engagement than Novice families. Instead, the Member-scaffolded children pairs tended to take the lead, which often resulted in less parent-child interaction than that seen with the Novice families. Novice families were more likely to navigate the space systematically, engaging in frequent, yet short interactions. However, when they returned to re-visit displays, more lengthy discussions occurred. In contrast, the experienced children frequently headed directly to a favourite space which they then shared with their Guest peer and family. As such, qualitatively different engagement styles were apparent.

RECOMMENDATIONS TO INCREASE THE INVOLVEMENT OF DIFFERENT VISITOR GROUPS

• Consider ways to encourage Novice and Guest families to visit and return to the museum. This could include approaches such as a “bring a friend day” where Members could bring a friend for free, or other initiatives that encouraged new families to visit the museum for the first time.
• Create spaces that support children of Member families/families who are more familiar with the museum to be able to explore independently. This could involve spaces being arranged in a way that encouraged engagement, but also allowed for parent interpretations to be both proximal and distal. In this way parents could provide close guidance, but also provide children with space to experiment and play independently.
• Undertake further research to develop a clearer understanding of the different visitor profiles and their needs in terms of navigating and interacting with the museum spaces and how to sustain this involvement over time.
• Have a guide of the “Top 10 exhibits for young children (5 years and under)” for the whole museum site.
HOW TO SUPPORT PARENT INTERACTION AND IMPLICATIONS FOR MUSEUM STAFF

Accessibility of information was found to be an important enabler in sustained interaction with museum exhibits. Often written information was too dense for parents to quickly ascertain key points that could be shared with children to sustain interest. Interactions were also facilitated more effectively where children were actively engaged in seeking and sharing knowledge. In a number of instances children lost interest while the parent was scanning the information to find key points to share with the child.

Questioning proved an effective technique for allowing children to demonstrate what they knew, and also in encouraging them to think about the new information and form ideas and hypotheses. Interactions were often sustained when parents made connections between the exhibit content and prior family experiences or knowledge. Families also indicated that it was helpful to them to have museum staff interact with them to share information about the displays and engage their children.

RECOMMENDATIONS FOR SUPPORTING PARENT INTERACTION AND IMPLICATIONS FOR MUSEUM STAFF

- We recommend that written information accompanying displays contain short key points that provide parents with initial information to share with children and create shared interest and engagement. The inclusion of more detailed information (as a supplement to the shorter, key points) would support more in-depth inquiry and exploration during sustained discussion.
- Provocation questions could be included as part of the written material as a means to encourage parents and children to think about and engage with the content. Provocation questions could also prompt parents to make connections with their children’s and/or own prior experiences and knowledge. Question should be tested to ensure they are meaningful and not patronising.
- Provide professional learning opportunities to increase museum staff’s understanding of how to interact with very young children and how to gain their attention and interest in displays.
- Consider investing in placing trained staff in galleries (not just in facilitated activities) to engage with visitors. This is something that is often done in art galleries, but not as common in museums.
- Ensure that communications with families clearly outline that museum content is designed for them and that there is a strong focus on supporting them to become more comfortable in navigating museum spaces as well as guiding and learning with their children.

HOW SPACES FACILITATE COLLABORATIVE LEARNING

Findings from this study highlighted that learning in museum spaces not only involved learning about the exhibit content, but also about learning to become a competent ‘museum learner’. The sustained interactions that occurred between children, their family members and peers involved characteristics of intellectual engagement that reflected a dynamic, socially-constructed process of learning. The establishment of shared attention, the use of rich, detailed vocabulary, effective questioning and explaining, and the practice of making cognitive connections were all features of sustained shared thinking in the museum space.

A number of physical or material exhibit characteristics were associated with rich and sustained intellectual engagement. Children’s curiosity was stimulated when they were able to look at displays from different angles (such as above, below and from different sides) and they were able to make cognitive connections when exhibit content was represented in different forms (such as in model and real form). The inclusion of intricate detail also prompted the use of
detailed vocabulary and often encouraged sustained conversations as children and their families discussed what could be seen. The combination of multiple modes of communication, including objects, written text and audio-visual displays prompted collaborative engagement and prompted much questioning and explaining. Technology was often an effective resource to support initial engagement and then also ongoing, sustained discussions. However, in some instances technology was slow, not working properly or ineffective as a resource for sharing information with children. Technology was most effective when it was utilised in a complementary way with other provisions of information or hands on experiences.

Most significantly, we found that sustained, shared thinking was most effectively established when both children and their parents were interested in, and curious about the exhibit content. Parents would respond to, and then initiate learning conversations about their children’s interests, and children’s attention was also drawn to what their parents were interested in. While children were attracted to exhibit spaces that were specifically designed for child engagement, sustained intellectual engagement most often occurred in ‘regular’ exhibit spaces when exhibit features such as those listed above were evident. These physical and material features were therefore equally important for parents as for the children.

**RECOMMENDATIONS IN RELATION TO HOW SPACES FACILITATE LEARNING**

Recognise that rich learning with prior-to-school aged children has the potential to occur across all museum spaces. With this in mind, in the development and redevelopment of all exhibits:

- Include elements where children can view exhibits from different perspective. Include opportunities to see items from the side, above and underneath, as well as include different versions or representations of the same items (e.g., a model as well as a real item).
- Use elements of multimodality and interactivity to encourage both children and parents to converse about the exhibit content.
- Include displays that contain intricate detail as a way to focus inquiry and attention (physical items and also diagrammatic displays). Continue to consider how small changes can be made to attract children’s and parents’ interest and create a sense of wonder and awe, and to make connections with their previous experiences and knowledge.
- Ensure that digital technology is working and responds quickly/reliably to visitor interaction. Use modes of interaction which children are already familiar with such as touch/swipe gestures that they use in phones and iPads and include young children in the testing phase of interactives.
References


Johanson, K., & Glow, H. (2012). It's not enough for the work of art to be great': Children and young people as museum visitors. *Journal of Audience and Reception Studies, 9*(1), 26-42.


Appendix A - Literature review

“...The reflexivity of museums as they learn about the experience of visitors and then use what they learn to create and intensify the visitor experience, suggests that these cultural institutions have an evolving raison d'être. From preserving artefacts and teaching their meanings, museums have transformed into public spaces for live conversations that are inspired by (but not limited to) their collections” (Johanson & Glow, 2012, p.40)

INTRODUCTION

Historically, museums were elitist institutions, only accessible available only to a chosen few, whose prime responsibility was to their collections (Lehman, 2009; Hudson, 1998). Over time, they have undergone fundamental change, evolving into broader-based institutions which serve and engage the public (Hudson, 1998; Lehman, 2009; Enseki, 2007). To remain relevant and maintain their integrity, contemporary museums must consider not only the impact and currency of their exhibits, but how they relate to the communities in which they are situated (Alba, 2005). Through their ability to strengthen the critical thinking skills of their visitors and address controversial issues, their educational activity may result not just in learning but also social consequences (Hein, 2006). Museums have a role to play in educating visitors about sensitive issues, with adults acknowledging that they can be helpful in filling their own knowledge gaps thus increasing their confidence in discussing them with their children (Kelly, 2011). As important contexts for informal learning, often intrinsically motivated and curiosity-driven (Ahmad, Abbas, Yusof & Taib, 2013), museums have increased their responsiveness to their audiences, and in particular families, a group who frequently visit (Kelly, 2011).

WHO GOES TO MUSEUMS?

The Australian Bureau of Statistics (ABS) reported in 2011 that 26% of population aged 15 and over had visited museums and art galleries in the past 12 months. Although overall females were more likely than males to visit, for the age group of 25-34 years museum attendance rates of males and females were the same (both 26%) which may suggest that in this age group couples and families, both with and without children, may be attending together. Visitors may include knowledge seekers, foreign visitors and those interested in temporary exhibitions (Brida, Disegna & Scudero, 2013).

Families are a key group of museum visitors. In some Australian museums, families constitute over half the total visitors (Kelly, 2011). Families who attend museums are predominantly middle to upper class, generally with a high education level (ABS, 2011; Downey, Krantz & Skidmore, 2010; Garner 2015; Kelly 2011; van Schijndel, Franse & Raijmakers, 2010; Whitaker, 2016). Diverse families and lower socioeconomic families have been less likely to engage in the museum space (ABS, 2011).

Social changes, such as divorce rates and living patterns, have resulted in a reconceptualisation of the term ‘family’. Due to these demographic shifts, museums have begun to use the term ‘intergenerational groups’ to refer to mixed groups of people, including children, who are in some way related (Kelly, 2011). Increasingly research studies are defining ‘family’ as a multigenerational group with at least one adult and one child (e.g., Pattison & Dierking, 2012; Tenenbaum, Prior, Dowling & Frost, 2010).
WHAT MAKES REPEAT VISITORS?

Numerous benefits have been identified when visitors develop an ongoing relationship with a museum, thus understanding the factors which may prompt repeat visits is important (Everett & Barrett, 2009). Benefits for individuals may include improved well-being through greater self-confidence, increased feelings of belonging and connection to place, and reduced impacts of aging (Everett & Barrett, 2011). For museums, motivating visitors to return may be a more cost-effective approach than attracting new visitors (Brida, Disegna & Scudero, 2014).

Designing spaces, exhibitions and programs with the needs of potential audiences in mind, and possibly an element of unpredictability, may position museums for the future and encourage repeat visits (Anderson, Piscitelli, Weier, Everett & Tayler, 2002; Stanton, 2011). Although temporary exhibits can increase the likelihood of a repeat visit (Brida, Meleddu & Pulina, 2012), findings have also suggested that repeat visitation is a “process of enculturation that is not necessarily based on the novelty of the cultural supply” (Brida et al., 2014, p.2836).

Harrison and Shaw (2004) examined the relationship between visitor satisfaction and intention to revisit. Despite mean satisfaction being high, many visitors did not see a need to return unless there was a substantial change to the exhibits. Those who were extremely highly satisfied were more likely to express an intention to return. Through improved understanding of the factors which contribute to higher reported satisfaction, and the characteristics of visitors who express it, museums may develop strategies which could push visitors’ satisfaction levels to extremely high (Harrison & Shaw, 2004). Socio-demographic factors can have an influence - education level has been found to have a positive impact on the intention to revisit, while income showed a negative impact (Brida et al., 2012). Even visitors who do not intend to revisit themselves may express the intention to recommend a museum to friends and relatives (Brida et al., 2012).

Children can play an active role in a family’s decision to visit a museum (Wu, Holmes & Tribe, 2010). Their power to request repeat visits or express a preference for a particular museum suggests that museums should make available activities which are enjoyable to all their young visitors, including those on school trips as well as those attending with their families (Wu et al., 2010). Promotional material depicting images of families having fun together, rather than just of static displays or exhibits, may position museums as able to fulfil families’ desires to be both entertained and educated (Thyne, 2001).

HOW IS ENGAGEMENT / LEARNING SUSTAINED OVER TIME?

A significant challenge for museums is to re-engage families who have visited as this is likely to foster deeper engagement with and learning about the collection content. Museum experiences can leave visitors with memories or a vivid impression that will last beyond the visit and be transformational by providing opportunities to explore new concepts and ideas (Soren, 2009). Long after a museum visit, people may spontaneously remember not only their interactions with exhibits, but what they thought about them and how they felt and will talk to the rest of their group and others about their experiences (Stevenson, 1991). In museums, children may be taught a selection of meaning-making practices which will be applicable across contexts including being curious; paying attention to cues; considering what is the same and different about new situations; recognising alternative perspectives; and engaging in conversations to puzzle over and share meaning (Carr, Clarkin-Phillips, Beer, Thomas & Waitai, 2012).

CREATING A SENSE OF “THIS IS MY MUSEUM AND I WANT TO GO BACK”.

Children who visited museums had positive experiences and considered museums to be somewhere they could see special things and gain ideas (Piscitelli & Anderson, 2001). Museums were seen as exciting and happy, with opportunities to learn. Being able to make ready connections between exhibits and pre-existing knowledge and understandings is correlated with children reporting a positive perspective of museums (Piscitelli & Anderson, 2001). It may be particularly valuable for young children to return to the same museum regularly - with subsequent visits over a period of time, children can develop knowledge about a place by
When children’s programs are designed to suit their needs and are responsive to their experiences, the aims of fostering appropriate visitor behaviour and encouraging them to continue visiting into adulthood may be achieved (Johanson & Glow, 2012).

**SUPPORTING CHILDREN IN BECOMING A MEMBER OF A COMMUNITY OF LEARNERS.**

Experiencing positive family visits to museums from an early age has been shown to significantly impact on museum-going habits in later life. When young children visit museums with their families, the likelihood of them visiting museums when they are older is increased, allowing museums to meet a range of needs across the various stages of life (Everett & Barrett, 2009; Kelly, 2011). The learning supported by museums extends beyond teaching children about new concepts and developing their foundational skills to creating a broader appreciation our world (Munley, 2012). The social network formed amongst family members during visits can foster a lifelong love of learning (Briseno-Garzon, 2013). Connections may be facilitated between people who have common interests and values (Everett & Barrett, 2011). A positive first museum experience can lead the child on a pathway to explore broader educational and cultural opportunities and community connections (Enseki, 2007).

**CHILDREN’S IDENTITY AS A MUSEUM LEARNER: CHILDREN’S COMPETENCE, CONFIDENCE AND AUTONOMY IN THE MUSEUM ENVIRONMENT.**

Children believe museums provide many opportunities to learn and gain ideas, and perceive them as exciting, happy places (Piscitelli & Anderson, 2001). When children feel welcome in a museum space, like they “belong”, and can see that people with similar backgrounds are valued, they may feel more comfortable and their confidence about learning may increase (Enseki, 2007, p.37). An ongoing relationship with a museum may have a role in shaping personal identity (Everett & Barrett, 2011).

Children are increasingly considered to be competent to express their views and opinions and to actively participate in a variety of social and cultural contexts (James & Prout, 1997 as cited in Dockett, Main & Kelly, 2011). Children can be empowered in the museum environment through choice and opportunities for self-expression and control, for example, by allowing them to guide their peers or accompanying adults (Weier, 2004). Through active self-directed inquiry, they can learn about and respond to the objects they encounter and make a valuable contribution by sharing their opinions, ideas, feelings, imagination and communicating their experiences (Anderson, Piscitelli & Everett, 2008; Hackett, 2014; Weier, 2004).

**FAMILIES’ EXPECTATIONS OF MUSEUM VISITS**

Investigations of families’ motivations for visiting museums and their expectations suggest that while there are a range of different reasons which may be influenced by personal factors such as education level and social context e.g., whether visiting as part of a family group, all visitors see some benefit in a museum visit (Falk & Dierking, 2016; Sheng & Chen, 2012; Thyne, 2001). While common themes emerge, differences also exist. Widely reported expectations involve learning and education (Dockett Main & Kelly, 2011; Jansen-Verbeke & van Rekom, 1996; Kelly, 2011; Thyne, 2001) having fun and entertainment (Johnston, Rennie & Cannon-Brookes, 1995; Sheng & Chen, 2012; Thyne, 2001); and social interaction (Thyne, 2001; Kelly, 2011). Some visitors, while predominantly there to learn, also note that socially oriented values such as entertainment, fun and sharing warm relationships are also important, suggesting the “growing popularity of edutainment” (Thyne, 2001, p.127). In contrast to this, Kelly (2011) proposes that while opportunity for social interaction was previously a key reason families visited museums, increasingly it is the learning which is in fact the motivation for family behaviour in museums. Australian families consistently report that enjoyable experiences which stimulate curiosity and encourage hands-on learning within the context of the family are important and consider museums to be value for money and provide a good day out for the family (Kelly, 2011).
However, the research suggests that to ensure expectations are met, services could be expanded to better fill the needs of groups such as families with young children and ethnic groups. Research of casual museum visitors suggests that while they found their visit enjoyable, it could be improved by the provision of additional information to assist with orientation, facilities which are more comfortable and accessible, richer programs and exhibits, more human contact and greater consideration of design (Kotler & Kotler, 2000). The findings from research into the needs and expectations of visitors should inform museum design (Kotler & Kotler, 2000).

WHAT SUPPORTS OR CONSTRAINTS/INHIBITS FAMILY ENGAGEMENT?

Whitaker’s (2016) literature review identified several categories of barriers which hinder families and children participating in museums. These include (i) practical barriers, such as availability of transport, availability of information, time constraints and costs including entry, transport, refreshments; (ii) social and attitudinal barriers which may be impacted by socioeconomic background and negative associations; (iii) pressures on schools and curriculum changes - many children only visit museums through school programs, however challenges can exist in arranging these; and (iv) limited consultation with young people – consulting with young people is considered important however in practice it may be inadequate.

Many Australian museums have created spaces for families, and in particular, hands-on, exploratory learning environments catering to young children (Kelly, 2011). Children’s spaces are typically colourful, attractive and non-threatening (Mayfield, 2005). Presenting learning as a fun, active process which the whole family can participate in together may boost museum attendance (Enseki, 2007). Families may be encouraged to attend a museum which is user-friendly, including services, facilities and exhibits which appeal to both children and adults (Mayfield, 2005).

HOW ARE FAMILIES USING MUSEUMS?

The objects, exhibits and ideas encountered in museums are interpreted by visitors through their own personal filter which consists of their experiences, values, beliefs, biases, customs and personal identity. This filter shapes how they construct meaning by allowing them to make connections between what they experience in the museum and their own previous experiences and knowledge (Anderson et al., 2002; Kelly, 2011; Stylianou-Lambert, 2010). Rather than just observing exhibitions, visitors are active contributors to their experience – understanding how visitors are prepared to participate can enable museums to develop strategies that can help visitors to create meaningful experiences (Hede, Garma Josiassen & Thynne, 2014).

HOW LONG DO THEY SPEND?

A typical Australian family museum visit may start with the family closely looking at the displays in the first exhibit gallery and then spending less time and moving randomly in following exhibits, typically staying for less than two hours (Kelly, 2011). Tracking data has shown that visitors spend a considerable portion of their time attending to exhibits and that children do not rush around for a large part of their time (Wolf & Wood, 2012). When families spend more time at an exhibit, there is a greater likelihood of learning - exhibits which are immersive may increase the length of visits and learning interactions (Wolf & Wood, 2012). When children were in the company of an actively involved adult, they spent more time at exhibits and learned more (Puchner, Rapoport & Gaskins, 2001).

Providing a booklet or a set of activities for children increased time spent at exhibits, supporting engagement and parent-child learning conversations (Tenenbaum et al., 2010). While well-designed, child-friendly activities may increase time spent and the number of related questions asked by parents, using child-friendly signage near the exhibits can make this information more readily available to visitors (Tenenbaum et al., 2010). Although spending time at an exhibit has been found to increase the likelihood that learning will occur, it is possible for children to spend
time at an exhibit without much learning taking place and conversely, in the right conditions, for high quality learning to take place in a relatively short time (Puchner et al., 2001). It is thus important that museums consider their collection presentation as it can play a vital role in families’ learning and engagement.

CHARACTERISTICS OF THE MUSEUM ENVIRONMENT THAT INVITE ENGAGEMENT

Museums are safe, family-friendly environments that allow children to explore, fantasize and learn in different and perhaps more engaging ways than they would in more formal, structured education environments (Downey et al., 2010; Kelly, 2011). Families should be able to identify, ideally via non-literate means of communication such as symbols and illustrations, which exhibitions and activities are likely to engage them, thus enabling them to make discoveries in areas of existing interest and also explore new topics (Hansen, Montagu, Heumann, Gurian, Kamien & Robinson, 1987). Exhibits, displays and objects which were large in size featured strongly when children aged 4 – 6 years recalled their museum experiences (Piscitelli & Anderson, 2001). Their recollections of their visits were frequently of non-interactive experiences and included large-scale exhibits.

When visitors move beyond being just a spectator by immersing themselves in an intense sensory experience which combines sight, sound and motion and unexpected effects and stimuli, their museum visit becomes more unique and memorable (Kotler & Kotler, 2000). However, the same level of intensity and immersion is not necessary for all exhibits, as a range of offerings can provide balance and variety (Kotler & Kotler, 2000).

OBJECTS AS A STIMULUS FOR LEARNING.

Museums provide a unique environment to facilitate young children’s learning through immersive exhibitions, dioramas and artefacts (Munley, 2012). Artefacts which are interesting to children can teach them about specific disciplines, like biology and history (Munley, 2012). Interactive exhibits which allow children to respond using their eyes, hands and bodies support their need to use their senses to learn (Lee, 2011). Frequently, incidental learning occurs which is not related to the exhibit’s original intent (Johnston et al., 1995).

Although interactions may be initiated by adults, children have been observed to interact spontaneously with exhibits in spontaneous way (Harris, 2000). Research in a US children’s museum showed that 60% of the initiations were child-initiated, 32% were parent-initiated, and 8% were mutually initiated (McCarthy Gallagher & Dockser, 1987). Exhibits which were familiar were associated with play and novelty could inspire exploration, suggesting that a balance between familiar and novel is ideal when designing exhibits for young children to avoid overwhelming them. Using familiar objects at the entrance to novel exhibits may be important when designing exhibits for preschool-aged children (McCarthy Gallagher & Dockser, 1987).

TECHNOLOGY.

Information and Communication Technology (ICT), including a broad range of digital tools, may increase the transfer of knowledge to visitors, contribute to an entertaining experience and can potentially be customised to accommodate different types of visitor groups (Kefi & Pallud, 2011). However, the actual ways in which technology and innovation are used and their impacts may differ from what was intended (Brady, 2011; Cohen, 1987).

An investigation of the use of a tabletop interface device observed that some users found it difficult to interact with, were unlikely to persist and moved on (Hornecker 2008). To be effective, visitors needed to understand its purpose and properties, and to experience success quickly thus increasing their sense of competence. When the table was being used by visitors, this was observed by other people who would subsequently take over the interaction, creating a chain of
ongoing use with changing participants, generating educational conversations between parents and children.

An exploration of visitor experiences with a wireless handheld device in a US science museum revealed conflicting accounts – while the devices were able to motivate some users to try new activities and to try new ways of interacting with exhibits, some also described using them as isolating both socially and physically (Hsi, 2003). The devices caused visitors to engage in “heads-down activity rather than heads-up interactions with primary phenomena, live events, or other people in the museum” (p.317). Considering the vital role that peer-to-more-experienced-peer interactions have for learning (Sylva et al., 2014), technology should be designed in ways that stimulate and enrich ‘heads-up’ activities, rather than inhibit them.

Multimedia visitor guides may give visitors the opportunity to tailor their museum experience to their specific areas of interest, discover more about exhibits and personalise a tour that does not follow a linear path (Linge, Bates, Booth, Parsons, Heatley, Webb & Holgate, 2012). The increasing trend for museums to deploy smart phones to provide visitor guides has a number of advantages: cost savings to the museum of buying and maintaining its own guide devices, including staff and space requirements; visitors do not have to learn to use a new device; having the museum app on visitors’ phones may encourage pre- and post-visit interaction; opportunities to personalise guides, for example suggesting exhibits based on what has already been visited and the amount of time spent there (Othman, Petrie & Power, 2013).

The internet and social media platforms can support innovative and effective multi-way communication strategies for museums to disseminate information, encourage visitor engagement and strengthen their authority (Capriotti Gonzales-Herrero, 2013; Fletcher & Lee, 2012; Russo, Watkins, Kelly & Chan, 2006). The quality of the social media content and site are more important than quantity of communication, utilising content that is interesting, witty, thought provoking or funny, and not excessively promotional (Fletcher & Lee, 2012).

Visitors accept the use of ICT as an element of their museum experience, though it may not be highly relevant to all visitors and potential exists for its uses to become more sophisticated (Capriotti & Gonzales-Herrero, 2013; Rey & Casado-Neira, 2013).

**YOUNG CHILDREN’S LEARNING IN THE MUSEUM CONTEXT AND ENGAGEMENT WITH THE SPACE.**

Museums need to demonstrate that their learning experiences provide more than just an enjoyable fun family day trip and can in fact contribute to children's early learning and social, cognitive and emotional development (Munley, 2012). An impediment to understanding learning in the museum context is to consider museum learning as similar to classroom learning, viewing the visitors as students and exhibits as the lesson (Falk & Dierking, 2000). Children’s learning in museums extends beyond facts and content, to encompass cause and effect and procedural learning (Wolf & Wood, 2012). Children’s engagement with exhibits and activities may result in a number of outcomes, including learning, play, creativity and social interaction (Puchner et al., 2001). The diverse experiences provide families with opportunities to learn more about each other through their interaction and to increase understanding of family dynamics (Briseno-Garzon, 2013). The variety of innovative ways through which museums strive to attain their educational goals allow knowledge to be expanded through personal experience and discovery (Johnston et al., 1995; Kotler & Kotler, 2000).

Children’s spaces in museums incorporate many philosophies of key child development theorists (Downey et al., 2010). As early as the 1920’s, the ideas of John Dewey and Maria Montessori were influential – emphasis was placed on children learning through doing by exploring and manipulating materials, and adults were positioned in a facilitative rather than instructional role (Mayfield, 2005). A Piagetian approach, where children learn though active involvement and concrete first-hand experiences, is customarily adopted by museum educators.
(Puchner et al., 2001). Many children's learning spaces are based on constructivist learning principles, where children are encouraged to generate knowledge by making connections between their exhibit experiences and their own ideas - they are learner centred with a focus on interactive play, while at the same time facilitating social interaction by catering to a range of age groups (Kelly, 2011; Wolf & Wood, 2012). Vygotsky theorised that social experiences are essential for learning by working on tasks which are challenging for them with others who are more skilled - children's spaces in museums provide a context for such social interactions to mediate learning (Puchner et al., 2001; Vygotsky, 1978). Experiences in which the sociocultural context is familiar to the child have greater impact than those which are more abstract and decontextualised (Anderson et al., 2002). It is important to understand the sociocultural elements of museum use, so that museum professionals can design programs which may engage a broader spectrum of audiences (Coffee, 2007; Briseno-Garzon, 2013).

Numerous factors can influence learning. These include how familiar the learner is with the setting, prior knowledge, the similarity between the cognitive ability required by the exhibits and the ability of the learner, individual motives and interests, and social elements of the visit (Munley, 2012; Rennie & McClafferty, 1995). People may adopt an idiosyncratic learning style, focusing on what interests them, learning at their own pace using their preferred learning style (Cohen, 1987).

Falk and Dierking (2016) propose a contextual model of learning in museums being an interaction of three overlapping contexts: 1) the personal context includes the visitor's experience, knowledge, developmental level, interests, motivations – these influence what the visitor seeks and what they enjoy; 2) the sociocultural context includes the visitor's cultural background (ethnicity, socioeconomic status, customs) which influence perceptions and experiences of museums, and social interaction factors, such as who the visitor comes to the museum with and their level of knowledge; and 3) the physical context, such as the objects and displays as well as the architecture and feel of the space, can influence what visitors observe and remember as they move through the museum. These factors need to be considered together as a framework to understand the museum experience.

Play which is open-ended, child-directed and process-oriented enables the child to explore ideas and experiment, use motor skills, create and pretend, and in doing so develop abstract thinking, language and literacy, self-control and problem solving and negotiation skills (Downey et al., 2010). Incorporating a range of play behaviours into learning activities can result in exploratory experiences which are more engaging to a broad range of children (Jahreie, Arnseth, Krange, Smørdal & Kluge, 2011; Sutcliffe & Kim, 2014). Most beneficial to children are play experiences which have been initiated by the child and facilitated, but not directed, by adults - adults can play a key role in supporting children's play through encouragement, scaffolding or conflict resolution (Downey et al., 2010).

Scaffolding and learning have been found to be significantly positively correlated and this important factor of children's learning should be provided by a knowledgeable adult, generally a parent or museum staff (Puchner et al., 2001). Scaffolding takes place when the adult provides support, guidance or resources which help the child move towards understanding or learning a concept or task (Wolf & Wood, 2012). A challenge for museum professionals is to develop exhibits with various levels of difficulty in content and activity, starting with entry level ideas which become more abstract and complex for older children and adults (Wolf & Wood, 2012). A relevant consideration is the perceived competence of the parent, who may also have views that certain topics should be left to schools to teach (Puchner et al., 2001). Parents can be provided with strategies and tips to scaffold their children’s experiences in ways which are engaging and diverse, rather than tedious instructions, to help the child stretch to achieve greater understanding (Wolf & Wood, 2012).

Strategies such as these are likely to support sustained interaction with exhibit features and the promotion of shared thinking. Joint attention typically precedes learning talk (Povis & Crowley,
Using flashlights in a darkened diorama, it was demonstrated that families were more likely to engage in learning talk about an object when joint attention to it had been established - it may be relatively simple to manipulate joint attention to effectively support family learning in museums (Povis & Crowley, 2015). When exhibits allow for collaborative participation, families may construct a shared meaning together (Kelly, 2011).

**HOW DO CHILDREN ENGAGE WITH THE MUSEUM ENVIRONMENT?**

Hackett (2014) suggests that young children run about back and forth in a museum as a place-making activity to create meaning in their world - moving through the space may be seen as a way to get to know that space and also as an intentional communicative practice, thus impacting on the child’s growing understanding of the nature of the world and how to communicate in it. Over repeat visits, as children became more familiar with the space, they became more confident to explore. Rather than learning facts about exhibits, through becoming familiar with routes around the museum and remembering how to get to what interested them, the young children were learning ways to interact with new places (Hackett, 2014, 2016).

**THE ROLE OF ADULTS AND SIGNIFICANT OTHERS**

Museums increasingly design their children’s spaces to serve families, not just children (Downey et al., 2010). Family members acknowledge that they may adopt the roles of both learners and educators and utilise the knowledge of individual members to facilitate learning (Briseno-Garzon, 2013). Involving all family members not only creates meaningful connections around exhibits and artefacts, it can promote collaboration and enhance the visit (Wood & Wolf, 2012). Recent years have seen a shift away from child-centred experiences, which overlooked the adult’s critical role in learning, to family-centred experiences, demonstrating an awareness of the value of supporting adults in this role in the museum setting (Wolf & Wood, 2012; Kelly, 2011).

**PARENTS**

Parents who were provided with pre-visit conversation cards with elaborative questions about exhibit objects were found to engage in more elaborative talk and joint nonverbal activities with their children during the visit (Jant, Haden, Uttal & Babcock, 2014). Providing the families with the target objects pre-visit facilitated the most parent-child joint talk. The pre-exhibit activities promoted both learning and transfer (Jant et al., 2014). Children who heard a talk about the concept and function of a museum before their visit showed improved learning outcomes (Abaci & Kamaraj, 2009).

A naturalistic observation study of 4- and 5-year-olds in a children’s museum found that adults were highly involved in 48% of observations (Puchner et al., 2001). The time children spent on an activity was longer when there was high adult involvement and, for most activities, time on task was positively correlated with greater learning. The most frequently observed learning was simple cause and effect. Other types of learning observed, though less frequently, included procedural learning and conceptual cause and effect learning. Key findings included the importance of scaffolding and of adult participation to support learning - learning was significantly higher when adults were highly involved and was more likely to occur when there was scaffolding. The observation that certain exhibits elicited greater adult participation highlighted the need for exhibit designers to give more consideration to adults’ reaction to exhibits, in addition to those of children (Puchner et al., 2001).

Appropriate adult encouragement can enhance children’s learning and exploratory behaviours (Munley, 2012). The mood and behaviour of the child may also impact on their learning experience – adults may have to spend time bolstering a child’s enthusiasm (Kelly, 2011). Adults in museums display teaching behaviours with their children such as showing, answering/asking questions, providing explanations, reading aloud and playing (Briseno-Garzon, 2013). Children’s conversations can be extended with the introduction of new language and concepts by responsive, supportive adults (Weier, 2004). Specific types of conversation may be particularly
important to children’s learning: caregiver wh- questions (why, how, what, where, who) establish what children know and open-ended questions can motivate sustained engagement (Haden, Jant, Hoffman, Marcus, Geddes & Gaskins, 2014). A brief educational program doubled the number of wh- questions asked, facilitating elaborative conversation style, with the differences being consistent across three ethnic groups (Haden et al., 2014).

Mothers and fathers frequently take on different roles — mothers may look after the logistics of the visit, often seeing them as normal routine events, whereas fathers may be focused on the outing as family time, sometimes romanticising them as special and memorable (Garner, 2015; Kelly, 2011). While mothers often managed their children’s activities, fathers were typically observed emphasizing playfulness (Garner, 2015).

Studies have established that parents do not get as involved in their children’s play and explorations as the museums may have intended. Shine and Acosta (2000) observed parent-child social play in a children’s museum. Even though parents acknowledged the pretend play environment of the museum, many did not want to engage in pretend play. Despite realising that their child would resist overt attempts to teach them while they were playing, parents felt a duty or desire to teach their child. Suggestions to increase parent pretend play included 1) enclosed pretend settings may make parents feel more comfortable; 2) sites with well-defined roles would make it easier for parents to role play; 3) adult sized props and costumes should be provided; 4) open ended materials may encourage extension of a play script; and 5) signage could offer suggestions to parents. A brief instructional video to inform parents about how they could coach their children effectively was found to positively affect children’s exploratory behaviour (Van Schijndel et al., 2010).

Although many museums advocate play as an essential part of learning and development and encourage parents in the role of play facilitators, a study exploring parental perceptions of play and of their role identified three main barriers to greater parent involvement a) parents did not understand the learning benefits of play in the museum setting; b) parents did not have knowledge and confidence in how they should play with their children whilst in the museum; and c) the design of many exhibits did not optimise opportunities for parent involvement (Downey et al., 2010). A gap was also identified between the beliefs of parents and museum professional regarding the value of play and the role of adults. Parents were found to value play as enriching, but much less frequently considered it to be skill-building and linked to learning. Observations of adult behaviour with their children at exhibits revealed that most interactions were supervisory or instructional, finding that while one third of adults played with their child only 10 percent engaged in playful behaviour. Exhibits designed specifically for young children may have the unwanted result that adults do not feel it is intended for them and stand back to allow children to play freely. Exhibits could incorporate design features which assist adults clearly and quickly identify their role and provide information which can facilitate scaffolding (Gaskins, 2008; Downey et al., 2010).

Does this lack of engagement by parents’ impact on children’s learning and engagement? Wood and Wolf (2012), reporting on a four-year evaluation of an exhibition, showed that parents consistently stood back while their child was engaged with an exhibit, generally only becoming involved when the child needed assistance. Further analysis revealed an adult agenda: adults saw exhibit space as a safe place and felt that their children could be independent, having the opportunity to learn by figuring things out for themselves. The more families visited the same exhibitions, they less they interacted with each other. Parents generally followed their child’s preferences about moving through the exhibitions. They reported that they enjoyed watching their children make their own discoveries and felt that the exhibits had been designed in a way that parental involvement would not be necessary. Parents’ main reasons for standing back were not wanting to interrupt their child’s experience or take space from another child, with less than one third giving reasons such as needing a break from playing with their child, being uncomfortable playing in public and wanting to socialise with another adult. A challenge identified
is to develop exhibitions which support interaction between parents and children and provide flexibility to allow different levels of parent involvement (Wood & Wolf, 2012).

**PEERS / SIBLINGS**

Young children were more likely to engage in exploratory behaviour if they were with friends in the same age group, creating shared ways of being in the space as they walked and ran together in the museum (Hackett, 2014). In later visits, this knowledge of place influenced how they moved around the museum. Engaging with other children, rather than the actual exhibits, improved children’s understanding of cultural lessons in a museum (Sutcliffe & Kim, 2014).

**MUSEUM STAFF**

Museum staff are valued by visitors and have the potential to enhance visitors’ experiences and can be particularly helpful with difficult technical exhibits (Johnston et al., 1995). Interactive programs facilitated by museum staff can enhance children’s learning by encouraging collaboration and conversation (Haden et al., 2014). By going beyond the interpretation of objects and tailoring talk to the individual, museum staff can optimise interaction and engagement with visitors (Best, 2012).

However, unstructured staff-family interactions may be challenging. Staff initiated attempts to support family learning may not always be welcomed by adults, who tend to maintain an active leadership role in such interactions (Pattison & Dierking, 2012). Posing challenges was observed to be a non-threatening way to guide family groups which could leverage rather than inhibit the role of the adult, as was designing a physical environment in which the educator played a key role in facilitating family learning. Staff could be trained in effective play facilitation, as they have an important role in helping parents understand the relationship between play and learning, and in facilitating play scenarios which provide learning opportunities (Downey et al., 2010).

**CONCLUSION**

In conclusion, it can be seen from the available literature that family engagement in museums is a product of a range of influencing factors, including structural (e.g., museum layout and facilities), social/community forces (e.g., socio-economic status, education level, family structures, parent, peer and museum staff interactions) and exhibit design and features (e.g., interactivity, use of technology, blending of play and inquiry-based experiences). Parents differ in the expectations that they bring to museum spaces, but generally would like the family to have a fun experience where both children and their families can learn together.

The research demonstrates that museum visitation can leave vivid impressions on individuals and groups, and that visitation can be sustained over time. Young children are particularly keen museum visitors, and the effective design of museum spaces to engage young visitors is a means of encouraging the desire to re-visit. Through effective design as well as through supporting and enhancing interactions around, and active engagement with museum exhibits, children can gain a sense of confidence and belonging in museum spaces. In this way, children ‘learn how to learn’ in museums, thus developing an identity as a ‘museum learner’ that they can take into their future lives.