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**Early Childhood Centre Children in an Interactive  
Science Gallery**

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**A thesis presented in partial fulfilment of the requirements  
for the degree of Master of Education  
at Massey University.**

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1998**



## ABSTRACT

The Science Centre & Manawatu Museum (TSC&MM) was established with monetary support from the Palmerston North City Council and Lotteries Board. The science gallery, Kids Own (KO), is designed especially for children 0 to 8 years of age and usually contains fourteen exhibits which young children and their accompanying adults are invited to explore. This research investigates use of the Kids Own gallery by people in the Early Childhood Education (ECE) sector. The data were gathered by a questionnaire administered to all Early Childhood Centre (ECC) staff in the catchment area of The Science Centre & Manawatu Museum, and by audio-recording, observing, and later interviewing children from 3 Early Childhood Centres who visited the Kids Own gallery. The findings of phase one of this study suggest that Early Childhood Centre staff are composing groups of children and adults from their centres to visit the Kids Own gallery. Interaction among peers is relied upon for children to learn about phenomena in the world and develop their concepts of how the world works. Phase two of this study was conducted to record the interactions of early childhood staff, adults, and peers with the exhibits, and with each other while visiting an interactive science centre gallery. Major findings include: That The Science Centre & Manawatu Museum is perceived by most early childhood educators to be meeting the needs of young children and staff from Early Childhood Centres; That Early Childhood Centre staff have taken groups of young children to the Kids Own gallery because they perceive it enables them to meet all the principles of the current early childhood curriculum; That the peers and ECC staff in the gallery scaffolded children's interactions with exhibits; That girls showed a preference for sensory exhibits and activities with child peers, while boys engaged in interactions with adults, primarily at physical science exhibits; That there are issues regarding the creation, placement, publicity, and appropriateness of exhibits designed for young children.

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## GLOSSARY OF ABBREVIATIONS

CDPA	Central Districts Playcentre Association
CIMA	Curiosity Index of Motor Activity
Dip Tchg EC	Diploma of Teaching in Early Childhood
ECC	Early Childhood Centre
ECE	Early Childhood Education
ECS	Early Childhood Services
ESOL	English for Speakers of Other Languages
KO	Kids Own Gallery
LEOTC	Learning Experiences Outside The Classroom
NZQA	New Zealand Qualifications Authority
NZCACDB	New Zealand Childcare Association Central Districts Branch
NZFKU	New Zealand Free Kindergarten Union
PNCC	Palmerston North City Council
PNTC	Palmerston North Teachers College
PNCE	Palmerston North College of Education
RKA	Ruahine Kindergarten Association
SECOH	Structured Environment for Creative and Original Happenings
STN	Special Teaching Needs
TSC&MM	The Science Centre & Manawatu Museum (referred to as the Institution)

## INTRODUCTION

### CHAPTER 1

This chapter identifies the nature of the inquiry in this study, which was conducted with young children in an interactive science centre. It includes a description of how interactive science centres have evolved internationally and in New Zealand. The educational and experiential background of early childhood educators in New Zealand is also discussed since they decide if their group will visit an interactive science centre, and if so who will visit from their ECC.

#### 1.1 Interactive Science Centres World Wide

In 1968 Oppenheimer (cited in Hein, 1990) published "A Rationale for a Science Museum" in a national museum journal. He wrote: "Oppenheimer began with the observation that although the phenomena of basic science and the fruits of technology are increasingly important in shaping society and our daily lives, remarkably few persons understand or feel comfortable with them." (Hein 1990, p.24). Oppenheimer proposed that a new institution, which he called "an exploratorium", be established to bridge the gap between traditional art museums, science centres, and museums of science and technology. The South Kensington and Deutsches museums inspired Frank Oppenheimer. But the Exploratorium he founded in San Francisco in 1969 was the first of a completely new kind of institution with a truly hands-on approach. His achievement in setting up the enormous cavern-like Exploratorium with its 600 interactive exhibits was the culmination of his career as physicist, schoolteacher and wondersmith.

*"This new institution would supplement and be a resource for schools and adult education centres and would have the advantage over books, television, and other traditional learning resources in that it would contain physical props that people can see and handle and which display phenomena which people can turn on and off and vary at will. Its emphasis, in other words, was to be interactive- directed to people as thinkers, creators, and users rather than as passive consumers" (Hein, 1990, p. 24).*

Quin (1990) describes interactive science centres as exciting places where visitors can touch, play and experiment with exhibits. He lists several characteristics which science and technology centres have in common. The centres are largely devoted to science and technology and are contemporary rather than historic. The exhibits are interactive (hands-on) and constructed to encourage visitors to investigate natural phenomena and experiment with technology. The interactive centres are informal places where 'explainers' or 'volunteers' are always on hand to welcome, discuss the exhibits and help if required. Finally these centres are publicly and educationally oriented with the aim being to make a visit enlightening as well as entertaining.

## **1.2 Interactive Science Centres in New Zealand**

The development of interactive science centres in New Zealand was prompted by the low numbers of young people choosing careers in science and technology during the late 1980s, and the perceived need for a population to be informed about science and technology in a world where this was of increasing importance (Department of Statistics, 1997). For those people in the scientific and education communities who were advocating the development of provincial interactive science centres a strong incentive was to make science more accessible and meaningful to the public. Financial support came from the central government, who set aside Lottery Grants Board money for the purpose of building science centres (Department of Statistics, 1997). This was due in part to the representations made by the Royal Society of New Zealand. The initiative in planning the centre, preparing business plans and submissions, and gathering local support and finance to supplement the Lottery Board capital grant fell to staff in universities and museums, community leaders, and in Palmerston North scientists from the local Crown Research Institutes. Local and regional input of funds were critical for the establishment of centres and continue to be an essential source of funds for their ongoing operation. Funds from this source supplement the income from admission charges, commercial sponsorship and contracting for educational activities. On February 26th 1994 a new complex, The Science Centre & Manawatu Museum (hereafter called the Institution), was opened in Palmerston North. The Institution

has a Kids Own gallery (hereafter referred to as KO) designed for and limited to the use of children under the age of 8 years when they are accompanied by an adult. A description of the gallery and the fourteen interactive exhibits available in it during the course of the research are included in Appendix A.

The exhibits displayed in science centres overseas, notably the Exploratorium, were largely concerned with physics and physical technology. They were prototypes for exhibits in New Zealand science centres and these aspects were strongly represented in the initial exhibitions of most New Zealand science centres. Successive exhibitions have diversified considerably and the themes of exhibitions in 1996 included: natural disasters – ‘Nature Strikes Back’; road safety and engineering – ‘Street Science’; technology behind sports and fitness – ‘Sports Lab’; processes that form and modify our planet – ‘Earthworks’; vibrations and sounds – ‘Sounds Amazing’; and mathematical games and puzzles – ‘Magic Mathsworks’. Such diversity offers extensive possibilities for educational linkage between schools and science centres. Partly for financial reasons exhibits, whether in the permanent collection of a centre or part of a travelling exhibition, have to appeal to the general public as well as to students and their teachers. The small population surrounding each science centre in New Zealand requires a programme of changing exhibitions to encourage return visitors. A typical visiting pattern in New Zealand centres is for a child to visit during the week with her/his school group and return at the weekend with the rest of their family (Department of Statistics, 1997). The Institution estimates one third of the 100,000 visitors in 1994 and 100,000 in 1995 visited the centre in a school group (Paul Smith, personal communication, May 1996).

### 1.3 Early Childhood Centre Educators

The educational and experiential background of early childhood educators in New Zealand is also considered since it is they who decide if their Early Childhood Centre (hereafter called ECC) will visit an interactive science centre, who will visit from their group and why they choose to visit an interactive science centre.

Young children observe, interact with and learn from the staff (usually women) in their ECC. Girls often reject the study of physics in secondary school. The Education Statistics of New Zealand show that in the thirty years prior to this study, when the staff who are now teaching young children in ECCs were at school in 1963, only 11 % of the physics students at secondary school were women. The figure had risen to 28.5% women students by 1993, showing that still only 1 in 3 physics students were women (Department of Education, 1963 - 1988; Ministry of Education, 1989 - 1994).

As a result of these past experiences and choices, few teachers of young children are enthusiastic for, or know how to, provide physical science activities for their students. Meade & Staden (1985) suggest that this antipathy may go back to early childhood experiences. They surmise that parents and kindergarten teachers “turn girls off, or more likely, fail to turn girls onto physics” (Meade & Staden, 1985, p5). Because teachers lack the knowledge, confidence or enthusiasm to discuss physical science concepts in centres children are seldom challenged or have the opportunity to discuss their ideas with child peers or adults, and therefore explore physical science concepts. Therefore, some teachers are now choosing to provide their students with the opportunity for exploring physical science concepts by allowing them to participate in hands-on science activities in the Kids Own gallery of the Institution.

This study was conducted to observe the interactions between young children their child peers, adults, teachers, volunteers and the exhibits in an interactive science centre gallery designed specifically for them. Data were gathered in the latter half of 1995. The methods included a questionnaire to all early childhood staff in the

catchment area of the Institution, followed by an in-depth study of 3 groups of young children visiting the Institution. The children's verbal interactions were audiotape recorded and their physical interactions were observed in the KO gallery. A post-visit interview was also conducted with the children to ascertain their recollections of the visit.



## **CHAPTER 2**

### **A REVIEW OF THE LITERATURE**

This chapter reviews previous research conducted in New Zealand and overseas on informal science education via school groups and casual family groups visiting interactive science centres. Research into how early childhood educators interact with young children and how child peers scaffold one another's learning has been reviewed. Theories and research about young children's learning is also reviewed.

#### **2.1 Interactive Science Centres**

Although there has been little research conducted on groups of young children visiting interactive science centres there is a body of research which studies groups of 5-15-year-old school children visiting interactive science centres. The research literature is reviewed paying particular attention to why teachers take children on field trips, how visits are structured, the significance of the size of the group, teacher planning for the visit, how visitors behave, and how visitors interact with exhibits. The findings from research about the influence of gender, the social context of visits, and the learning outcomes for children are also reviewed.

Sorrentino & Bell (1970) defined field trips broadly as "any journey taken under the auspices of the school for educational purposes" (p233). Based on their experience in both science and museum education Falk & Dierking (1992) suggest that what happens in terms of outcomes from visits depends on the visitors' background knowledge, experience, and skills, their social interactions during the visit and the physical environment created by the exhibits and their surroundings. According to science educators what school children 6-12 years learn from a visit to an interactive science centre is inextricably bound with what happens before, during and after the visit (Rennie & McClafferty, 1993). The researcher was unable to trace any documented studies of field trips with young children from early childhood centres in New Zealand or elsewhere in the world.

Research by Gottfried (1980), Rennie & Elliot (1991), Falk & Dierking (1992) and McManus (1993) has reported the reason teachers give for taking their class to visit a science centre. Gottfried (1980) reported that teachers arranged visits to the Biolab at the Lawrence Hall of Science because they wanted to offer their students a change of pace, science enrichment, a social experience, and to increase their exposure to science. Rennie & Elliott (1991) found that teachers in Western Australia cited similar reasons for organising groups of 8-10-year-old students to visit a science centre. From these findings we can conclude that if the purpose of the visit is essentially related to entertainment, such as an end of term reward or a change of pace, the resulting learning will be quite different from those of visits which are planned to link with the school curriculum. Research by McManus (1993) and Falk & Dierking (1992) revealed that students found visits to science centres to be memorable events. Falk & Dierking (1992) interviewed middle school children and college students and found that 80% of them were able to recall 3 or more specific things linked to a field trip during their first, second or third years at school. These findings suggest an effective teacher can call upon the visit experience later, in appropriate learning situations.

The structure of a visit can vary, from students being allowed free exploration of exhibits to the group being demonstrated to and then led on a tour of the exhibition. Research suggests neither extreme is effective. Students need some structure, but also some exploration time. Both cognitive and affective learning can be increased when teachers use structured activities before and/or after the visit to create a context for the experience and link it with classroom work. The study by Stronck (1983) concluded that students demonstrated greater cognitive learning when they participated in a more structured tour. Finson & Enochs (1987) contend that unstructured visits may cause anxiety in children, thus reducing their enjoyment. An important aspect of structure is the means by which students are cued to the salient features of the exhibits. The most universal cue is the labelling of the exhibit and there is a considerable body of research about the optimal style and positioning of labels. Many visitors read labels and often read them to each other (McManus, 1989a; Tuckey, 1992a). Carlisle (1985) found 10-year-old

children were less likely to attend to labels and that most work with interactive exhibits in a trial and error fashion. McManus (1985) suggests that for 10-year-old students one worksheet per group of students can be effective, because this promotes opportunities for meaningful, cooperative group learning rather than trading answers which often happens when each student has a worksheet. Most young children cannot read cues such as labels or worksheets and research into alternative cues for children not yet able to read could not be found in the field trip studies recorded in the literature.

Gottfried (1980) concluded that the presence of 'explainers' is important. Because students have different combinations of background experiences, interests and skills they will interact differently with exhibits and therefore need different kinds of help. Effective explainers try to challenge and extend students' thinking rather than telling them the 'right' answer.

Russell (1990) gives the following advice to adults accompanying children to an interactive science centre.

*"It is fundamental to the whole thing that children feel in control. Every experience is so much more real to them when they discovered it and they chose to mess about with it. One of the most supportive things an adult can do is to listen, show real convincing evidence of interest in what the child is doing and saying, and hardest of all, to stand back and SHUT UP!" (p. 261)*

Russell (1990) suggests adults should "ask questions, not give explanations". In situations like this explanations are the quickest way to stop people thinking for themselves. Explanations are for the classroom; explorations are for the science centre. No research could be traced which examined the kinds of questions being asked by adults, teachers, volunteers (explainers) or child peers during their interactions with exhibits in a science centre.

Previous research findings suggest the optimum group size is small, which enables students to ask questions, receive answers and have their hands on the exhibits. Gottfried (1980) and Tuckey (1992a) report that pairs of students get most deeply involved in interactions with exhibits. In larger groups some students may only be able to watch the interactions of other students, which reduces their opportunity to learn through personal hands-on exploration. Birney (1988) found children preferred to be with peer companions rather than adults and Stronck (1983) found many children showed a preference to teach themselves, even when exhibits were not interactive. Carlisle (1985) observed children behaving in a more social way with each other than adults do, demonstrating more cooperative and sharing behaviours. Field trips are made by Early Childhood Centre groups of various sizes. Previous studies do not provide evidence for what would be the ideal size and composition for a group visiting a gallery for young children in an interactive science centre.

Rennie & Elliott (1991) observed teachers totally involved in the visit their classes made to an interactive science centre whereas Price & Hein (1991) observed elementary school teachers who stayed in the cafeteria for the duration of their students' visit. Although teachers recognise the importance of preparing themselves and students for a visit such preparation seldom happens. Gottfried (1980) reported that none of the teachers in his study had planned preparatory activities for their 8-14-year-old students and only one third planned follow-up activities. None of the teachers in Tuckey's (1992a) study had prepared their 8-11-year-old children or linked the visit to any topic they were studying; they considered enrichment of the curriculum the primary reason for the visit. A suggestion in the Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996) is that children and their families find out about places of importance in their community through trips. Many ECC staff take young children on field trips away from their centres but no studies could be found reporting why staff include field trips in their programme. How field trips are organised, what pre-trip planning is made and post-trip follow-up is conducted has not been reported.

Common features of how all visitors behave when visiting an interactive science centre are well documented and remarkably consistent. Numerous studies show that whether visitors arrive in a school group, family group or on a casual visit they orientate themselves for the first few minutes, engage with chosen exhibits for 30-60 minutes and then cruise for a further 15-30 minutes. Similar behaviour has been observed in children on unstructured visits to an interactive science centre with a period of “roaring around” followed by “settling down” (Carlisle, 1985, p. 31). Carlisle found that most 10-year-old children orient themselves at the beginning of their visit. They look around, choose an exhibit, and begin work. If children are visiting for the first time exploration is a high priority for them and in a new, unfamiliar environment this behaviour takes precedence over the teacher’s plans for the visit. Balling & Falk (1980) found 6-10-year-old children who are familiar with a setting tend to learn more than those who are not. If students are very familiar with a setting they can find repeated visits to the same exhibits boring and not engage in prolonged interaction with them.

Kubota & Olstad (1991) and Gennaro (1981) used novelty-reducing interventions before a visit of 13-year-old students they found the amount of purposeful exploratory behaviour was increased. Kubota & Olstad (1991) conducted research using slide shows of the venue before the visit of 11-year-old children. Exploratory behaviour was shown to be positively correlated with cognitive learning. The results of the Kubota & Olstad study indicated that novelty-reducing preparation with 11-year-old students’ resulted in increased on-task exploratory behaviour and greater cognitive learning in boys, but that the novelty-reducing treatment was not effective on girls. In Gennaro’s (1981) study during the week preceding the visit the experimental teacher used demonstrations, study sheets and hands-on experiences in the classroom designed to focus on the concepts and ideas the 13-year-old students would see and hear about on the visit. Gennaro found that it appeared that using the pre-visit instructional materials is valuable for students of all ability levels. The findings of previous research generally agree that there are predictable visitor behaviour patterns, which occur amongst school groups and casual visitors to an interactive science centre.

Research findings have shown that once students begin interacting with the exhibits, they tend to do it in a 'stop-start' manner, often revisiting exhibits that interest them several times (Carlisle, 1985; Tuckey, 1992a). Beiers & McRobbie (1992) and Gottfried (1980) found that students' prior knowledge is important in determining how they interact and what they learn from exhibits. Research findings suggest that both the time spent at an exhibit and the nature of the interaction affects the amount of learning which occurs. Carlisle (1985) found that the science centre visits of 10-year-old children in school groups are both a solitary and a social experience. Many of the children observed the exhibits as individuals and then shared their experience.

Interaction with exhibits is most effective when children's cognitive development enables them to understand the exhibit (Feher & Rice, 1985; and Tuckey, 1992b). Israelsson (1993) considers that the interactive exhibits in science galleries are usually created by adult males and frequently are developed by adults without reference to or advice from their target audience. Tuckey (1992b) interviewed 8-11-year-old pupils a week after their visit, for feedback about the exhibits they had visited. They were asked to name their favourite exhibit, list exhibits they remembered and to think of one thing they had found out from their visit. This recall exercise was intended to reveal those exhibits that had made the most impact on children. Pupils' recall showed that they tend to remember the exhibits that have made the greatest demands on their attention and require most active participation. Tuckey (1992a) suggests the impact an exhibit makes is dependent on its interactive potential rather than its visual attractiveness, however if a young child is not attracted to an exhibit by how it looks they may not be curious enough to interact with it. Only studies by Tuckey (1992) and Birney (1988) asked 11-year-old students for feedback about exhibits. No studies reported what children between 4 and 5 years of age recalled of their experiences with interactive science exhibits that had been designed especially for them.



In order to assess the level of interaction of children visiting, a number of studies have used motor activity as an index of curiosity in children, as devised by Peterson and Lowery (1972) and used by Gottfried (1980), Carlisle (1985) and Tuckey (1992a). Peterson and Lowery developed a measure of the curiosity index of motor activity (CIMA). All responses such as looking, smelling, tasting, listening and touching, which were coordinated with movement of the body, were assigned to one of three levels: Level 1: Subject approached the object without touching it; Level 2: Subject approached the object and touched the object; Level 3: Subject approached, manipulated and reorganised the object. Peterson and Lowery (1972) found that the amount of curiosity did not vary between age groups or sexes and that children who exhibited greater amounts of curiosity through motor activity usually asked fewer unsolicited questions. The CIMA measure has been used repeatedly over the past two decades and helps to clarify the degree of interaction people engage in with interactive exhibits.

The findings of Carlisle (1985) and Koran Jr., Morrison, Lehman, Koran, and Gandara (1984) Kubota & Olstad (1991) suggest a person's gender may affect their choice of exhibits and how they interact with them. The data from Carlisle's (1985) study with 10-year-old children do not show any significant differences between the sexes in level of interaction, number of exhibits seen or length of time spent at an exhibit. However Koran Jr., Morrison, Lehman, Koran, and Gandara (1984) found that when adults and children could freely choose children preferred to engage in hands-on experiences significantly more than adults. Female children and female adults preferred to engage in hands-on experiences rather than the alternative encased exhibits, and significantly more male children than male adults interacted with the manipulatory exhibits. These results suggest that given the opportunity to interact with exhibits female teachers and children are more likely to manipulate physical science exhibits. Kerrison & Jones' (1994) study explored the impact of interactive exhibits set up in a normal classroom. The 10-11-year-old children's interactions were recorded on videotape and analysed. Kerrison & Jones (1994) concluded that prior conceptions about related phenomena appeared to influence children's responses and conclusions. The researchers made no claims for

gender differences in the responses to the exhibit although it was apparent that the all-girl's group were more intellectually active and systematic, they made more quantitative measurements (with greater care) and cooperated better socially in potentially fruitful ways. Greenfield (1995) studied the attraction of hands-on interactive science museum exhibits for females and males. She found that 12-13-year-old girls and boys used all types of exhibits, but that the girls were more likely than boys to use puzzles and exhibits focusing on the human body; boys were more likely than girls to use computers and exhibits illustrating physical science principles. Israelsson (1993) claims that exhibits are big boys' toys created by adult males to appeal to adult males. She claims the science presented is the science of men, and the way in which science is communicated is in most cases very masculine, splitting reality into events and principles and thus failing to form a true representation of what we see around us. Israelsson (1993) declares that as a result female visitors to science centres will remain passive companions of sons, husbands or male students rather than active participants. There is no evidence in the literature to support Israelsson's declaration that boys interact more than girls do with the interactive exhibits in science centres. To the contrary Koran Jr., Morrison, Lehman, Koran, and Gandara's (1984) Greenfield's (1995) and Kerrison & Jones' (1994) studies all found girls and women engaged more in interaction with exhibits. ECC studies have observed boys dominating sandpit play and girls demanding the family corner as their territory, however no studies have been conducted to consider the appeal interactive exhibits hold for young girls and boys.

Rennie & McClafferty (1993) claim the social context of the visit has a powerful influence on behaviour and learning. Blud (1990) focussed on the nature of the exhibit and how effective different types of exhibit are in stimulating learning. Preliminary observational studies of family groups indicated that different types of museum exhibits stimulated very different types of social interaction between family members. McManus (1987) suggests that an important component of social interaction is the identity of the person with whom one interacts, and that we tailor our behaviour to suit our companions. McManus found there appeared to be 4 distinct communicatively related behaviours: reading; playing; talking; and



allocation of time on the part of the visitor groups. Groups containing children were characterised by play at interactive exhibits and long conversational periods within the group, with a strong tendency towards longer visits. Males visiting alone preferred brief visits to exhibits and comprehensive reading behaviour. Adult couples did not talk to each other a great deal but they tended to stay at exhibits for long periods. They were comprehensive readers and likely to be among those visitors who did not play at interactive exhibits. In summary, everyone who visits an interactive science centre is more likely to be engaged in playing with and talking about an exhibit if they are part of a group that includes children and female adults. Carlisle (1985), Gottfried (1980), Rennie & Elliott (1991) and Tuckey (1992a) found peer teaching to be a frequent occurrence, with children taking on the role of explainers as they question their companions, read labels aloud, and demonstrate the way the exhibit works. Many of the children observed the exhibits as individuals and then shared their experience. Some children took on the role of explainers, introducing other children to an exhibit. Overall sharing and other cooperative behaviours predominated. Carlisle (1985) concluded

*"when judged as a learning environment the science centre provided a context that motivated, encouraged meaningful behaviour and social interaction, was pleasurable, and held the potential for learning scientific facts and principles"*  
(p. 32)

Birney (1988) found that almost half the 11-year-old children participating in her study found adult verbal behaviour on a school visit to be managerial, directive, and controlling. Birney found this category of verbal interaction was non-existent amongst peers on the field trip. While adults may be familiar and therefore reassuring, no children in Birney's study associated them with humour. Children felt that social interaction with peers is characterised by an equal exchange of information, greater freedom to explore, humour and shared values. Children imply that they acquire more information when with peers, because they participate equally in exchange of information. Frequencies related to talking, directing attention of a peer to the exhibit, and verbal expression are twice as high in informal learning conditions than in formal learning conditions. Children reported a

preference for a non-restrictive social environment. The frequency with which children move to a different exhibit and return to an exhibit is twice as high in the informal learning situation. They also engage in more play and manipulation of their physical environment.

Many studies of children in interactive science centres have reported a range of gains in cognitive learning. Some findings have emphasised that students develop more positive science-related attitudes following a visit to an interactive science centre. The findings for cognitive change are not always consistent. Stronck (1983) concluded that students demonstrated greater cognitive learning when they participated in a more structured tour. However Stronck recommended that if teachers wished to improve attitudes they should allow students to participate in a less structured visit with more opportunities for the students to enjoy their own explorations without guidance.

Feher (1990) studied field trips by 8-14-year-old students and found "using the interaction of the visitors with the exhibits to study general questions about learning serves, in turn, to enhance the quality of the learning experience" (p49). Flexer and Borun (1984) examined the cognitive and affective outcomes of a class visit of 10-12-year-old children to an interactive science centre. Flexer & Borun (1984) found a well-structured class lesson was more effective in promoting learning than a visit to an interactive exhibition, but students found the visit much more enjoyable, interesting and motivational than a classroom lesson. Children who were interviewed by Birney (1988) did not distinguish between learning and enjoyment when discussing their interactions while on a field trip. Gottfried (1980) drew attention to the unique type of self-motivated learning that occurs during a school field trip. Gottfried (1980) found an outcome of the field trip for many children was their association of science with fun and playful activity rather than drudgery or a catalogue of facts. The data gathered show that taking a group of children to an exhibit gallery designed with them in mind is educational. The findings of Gottfried's study document a unique type of self-motivated learning

that occurs in the context of an exciting social ritual, the school field trip: "What appears to the casual observer as just fun and games and a day off from school *is* fun and games, accompanied by important educational, motivational, and social benefits for children" (p174).

Stevenson (1991) reported that even 6 months after their visit to interactive science museum families still talked to each other about their experiences there. Tuckey (1992b) found that it was very evident that pupils used their existing concepts to provide explanations for the exhibits they explored. They frequently drew analogies with events in everyday life. Tuckey (1992b) concludes that "in order to be able to learn from exhibits pupils must already have a store of 'suitable' concepts and that a visit to an interactive science centre may enhance understanding, but it cannot teach unfamiliar concepts" (p. 278).

Russell (1990) claims that it is simply not practical to expect children to absorb a great deal of factual information during an hour-long visit to a science centre. But what science centres have a staggering degree of effectiveness in is changing attitudes. This kind of attitude change is affective, not cognitive (knowledge and understanding). Children learn more from their teachers than facts and concepts, and in a science centre they may develop curiosity, interest, eagerness to learn, intellectual self-confidence and a liking for science, or wanting to become a scientist. Russell (1990) claims "this kind of attitude change is a fundamental and major component of what science centres have to offer" (p. 260).

Wellington (1990) suggests that hands-on science centres contribute to the cognitive domain in two ways. Directly, by providing new knowledge that certain things happen in certain circumstances and indirectly, by sowing seeds and leaving memories, which may ultimately lead to understanding. Wellington (1990) claims hands-on science centres generate such activity, enthusiasm, adrenalin, interest and excitement that their failure to contribute immediately and directly to deeper

understanding of science is insignificant. By developing motivation and interest for science and technology they will ultimately contribute to understanding, for example a knowledge of how and a knowledge of why.

Rennie & McClafferty (1993) claim it is not surprising that a list of benefits from visits to science centres, aside from the cognitive learning, include the excitement and pleasure children gain from visits, the ready involvement of non-academic and non-English speaking students; and the cooperative ways of working developed by students.

Many of the reviewed studies employed traditional testing instruments which categorise learning and understanding but do not use a continuum of different levels of understanding (White & Gunstone, 1992). A phenomenographic approach was used by Beiers & McRobbie (1992) to determine changes in levels of understanding of aspects of the concept 'sound' of 12-year-old children as a result of a visit to an interactive science centre. The results showed that most students did change their level of understanding of aspects of the concept 'sound' following their visit to an interactive science centre.

## **2.2 Early Childhood Centre Staff and Parents' Interactions with Young Children**

Research in teacher-child interactions in Early Childhood Centres in New Zealand show distinctive patterns in adult preferences for activities such as tidying up, getting equipment, supervising activities, story reading, preparation of snacks, collage and art (Meade, 1985). Jordan (1993) concluded that the activities least favoured by adults were those most likely to provide problem-solving experiences. Research into verbal interactions between adults and children in the ECC has revealed a very high number of contacts: an average of 4 per minute or 120 per 30 minutes. This constant shifting of the adult's attention from child to child meant that each verbal interaction was short, usually only 30 seconds in duration, and

in duration, and mostly related to management and organisation (Meade, 1985). Meaningful discussion and interactive learning can only occur when several exchanges take place between an adult and child in a continuous episode.

Neuman and Roskos (1991) in the USA found that teachers who provided a traditional half-day pre-school programme including circle time, themes on a specific topic and 40-50 minutes of "free play" rarely interacted directly with the children during free play, except to settle disputes or restore order. Tizard & Hughes (1984) conducted a study in England to describe the ways in which young children learn from their mothers at home. Tizard and Hughes (1984) audiotape recorded conversations between 4-year-old girls at their nursery school with their teachers and at home with their mothers. Children's conversations with nursery staff were infrequent and often restricted to brief exchanges. Tizard and Hughes (1984) found when children were talking with nursery school staff they seemed subdued and conversations were mainly restricted to answering questions rather than asking them, or taking part in minimal exchanges about the whereabouts of children or materials. By comparison the conversations between girls and their mothers ranged freely over a variety of topics. At home children discussed topics like work, the family, growing up, and death, and they talked with their mothers about things they had done or were planning to do. Tizard and Hughes (1984) found that in many conversations at home the children were actively struggling to understand a new idea or some information which didn't fit in with what they already knew, or the meaning of an unfamiliar word. Tizard and Hughes (1984) suggest that the exchange of views and questions equally balanced between adult and child that typified conversation between mothers and children is better attuned to young children's needs than the question-and-answer technique of nursery school teachers.

A focus on 'scaffolding' has developed from the social constructivist theories of Vygotsky (1978, as cited in Wertsch, 1985), Bruner (1983), Rogoff (1990) and others. Vygotsky (cited in Wertsch, 1985) argues that children are entrenched in social experiences, many of which they participate in or make use of but which

they do not understand. Wertsch (1985) contends that these experiences cannot be cognitively understood without being socially mediated. This view of learning emphasises the importance of the teacher in the education process. It makes explicit the role the teacher takes, as leading conceptual thinking rather than following the children's lead. Vygotsky argues that the adult allows the child to work well beyond her/his level (as defined by the child's independent efforts). This process of adult and child working together moves the child through to its 'zone of proximal development' - "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with a more capable peer" (Wertsch, 1985, p. 67-68). Bruner and Haste (1987) labelled the teacher-child interaction that successfully facilitates conceptual change as 'scaffolding'. Bruner (1983) identified these behaviours from research with child/adult couples working at joint problem solving. Although these behaviours do occur in natural teaching interactions they were derived from a context-specific setting with teacher child dyads. Hatano (1993) suggests this very narrow interpretation of Vygotskian theory has been used to justify conventional teaching with the transmission of knowledge its primary focus. A broader interpretation of Vygotskian theory is proposed by Moll and Whitmore (1993) who stress that it is the quality of cooperation between the child and adult which requires mutual trust and active involvement that is central to the scaffolding process. Stone (1993) argues that scaffolding does not occur in single social interactions but is based on the ongoing relationship between teacher and student, which allows repeated interactions. Stone (1993) suggests teachers are very aware of how they relate to individual students and adjust their interactions according to their knowledge of the child. Classroom-based studies by Cullen and St. George (1996), Flear (1995), Jordan (1993), and Orr (1997) have considered the impact or influence of the group setting on the stimulation of the 'zone of proximal development' of the individual child within the group. Moll and Whitmore (1993) stated:



*“The above [Vygotskian] theory suggests that it is incorrect to think of the zone as solely characteristic of the child or of the teaching, but of the child engaged in collaborative activity within specific social environments. From our perspective, the key is to understand the social transactions that make up classroom life.” (p. 20)*

Cullen and St. George (1996) found that despite the salience of peers in the classroom life of new entrant children, their interviews indicated little awareness of peers in the learning process. Interviews a year later indicated children had a greater awareness of peers. The fact that the learning environments for the junior classrooms featured planned opportunities for collaborative learning does suggest there is a need for teachers to structure peer learning and acknowledge the value of peer assistance for children's learning. Cullen & St. George (1996) found that the teacher's focus on procedural aspects was reflected in children's attempts to scaffold their peers, knowing what to do was important for these school beginners. The results suggest that teaching practices need to support the construction of scripts for learning and not simply scripts for routines and procedures.

A study by Fler (1995) was designed to investigate children's scientific understandings and the conceptual change that occurs during the teaching of science. Fler analysed transcripts of discourse between 5-6-year-old children and their teacher as they engaged in scientific investigations. It was evident from the teacher's interaction with the children in the class that most of her language was procedural in nature. Limited extension or facilitation of children's thinking occurred during teacher-child interactions. This teacher predominantly assisted children with physical difficulties associated with the task at hand, and prompted children by asking questions about what they were doing or trying to find out. The teacher did not follow through her questions or inquire about their findings. There is little evidence to suggest that the teacher has given herself the opportunity to develop a shared understanding of the children's ideas, experiences or investigations. Consequently the teacher was not in a position to know what degree of learning had occurred, what ideas the children had, or indeed if any of their ideas were inconsistent with a scientific view. Fler (1990) found the data

from the student interviews indicated that the learning outcomes for the children were minimal. Fleer concluded that when the role of the teacher/adult is not clearly stated or understood the types of adult/child interactions will vary enormously and the resultant learning for children will be significantly different.

Bredekamp and Rosegrant (1993) offered a continuum of teaching behaviours to help visualise the multiple options early childhood teachers have for the many teaching decisions they make daily. Decisions concern which specific teaching behaviour or form of adult assistance is appropriate for this child in this situation at this time. Bredekamp and Rosegrant listed 8 behaviours they claim occur in adult-child interactions: acknowledge; model; facilitate; support; scaffold; co-construct; demonstrate; or direct. Gardner (1996) studied the teaching strategies employed by early childhood educators to scaffold children's learning in the classroom. Gardner (1996) made two modifications to the teaching continuum of Bredekamp and Rosegrant. Gardner did not use the category of 'support'. The other modification involved the addition of 'structure' to the categories. Gardner (1996) found the teachers employed indirect teaching styles, with frequent use of questioning to engage children in ongoing learning situations, and that the content of the teacher's talk was mainly focused on the task or activity in hand. Gardner found that there was evidence of congruence between the intentions or stated aims of the teachers and their actions or the teaching behaviours they employed as interactive strategies.

Socio-cultural theory emphasises that when goals give direction to the social interactions between a 'novice' and an 'expert' this creates the potential for learning to be an outcome. (Vygotsky, 1978 cited in Wertsch, 1985; Wertsch, Minick & Arns, 1984; Rogoff, 1990). If all participants share the goal the effectiveness of the social interaction to generate learning is enhanced. Conversely, if the 'novice' is unaware of the purpose or goal of the interaction, or holds a different expectation from the 'expert', the desired outcomes may not be realised. Wertsch, Minick & Arns (1984) describe the goals or motives as an interrelated three-tiered framework. There is a broad goal that is embedded at the institutional



level of the culture and gives definition to a context. It guides whether the interactions should be interpreted as work, instruction or play, and structures the appropriate social interactions that occur. At the next level the goals are formed in anticipation of the specific tasks or purposes of shared activities; that is 'what must be done'. The third goal is at the operational level, 'how can it be done?' and gives form to the actual strategies employed while performing the task.

### **2.3 Young Children Learning**

This study is concerned with how young children learn during their interactions with peers in an environment designed especially for them. Theoretical cognitive perspectives, and theories regarding peer scaffolding and co-construction are reviewed in this section. Metacognitive studies are reviewed to consider how previous research has evaluated young children's learning and the methods used in these studies.

#### **2.3.1 Cognitive perspectives**

Contemporary cognitive perspectives emphasise how strongly children's learning is influenced by their social and physical surroundings. Previous studies by Cullen (1991a), Moll & Whitmore (1993), Tizard and Hughes (1984), and St. George & Cullen (1995) have indicated that it is important to observe children's unprompted interactions in a natural environment and talk to them about their experiences in a familiar location.

#### **2.3.2 Child peer scaffolding**

Theoretically the idea that child peers guide and instruct each other is exciting but how young children 'scaffold' one another's learning has not been clearly identified. Neuman and Roskos (1991) claim that little attention has been paid to the potential contribution of social interactions among children themselves. Very little is known about how children teach each other, or whether they intentionally set out to impart information or 'scaffold' a peer's performance on a task. Atkinson and

Green (1990) found that comparisons of children's performance in competitive and individualistic learning settings and cooperative learning settings yield evidence that children in the cooperative settings gain a better understanding of the subject matter. Their findings suggest that if teachers organise tasks and lessons so that children actively share their learning as 'knowers', then these same children develop their understanding of a subject as 'learners'. When teachers encourage children to observe, imitate, initiate and discuss ideas with one another, children's thinking is stimulated. When teachers foster children's playing, working and talking together, they enable children to become self-motivated learners. Assuming roles of models and mediators rather than directors, teachers engender cooperative peer interaction and increase the likelihood that all children will value their own efforts and respect others efforts. Atkinson and Green (1990) conclude that shared learning may lead to interactions within and beyond the classroom that sustain every child as a lifelong learner. Cullen and St. George (1996) claim "peer interactions provide valuable opportunities for establishing relationships with other children which support emergent forms of scaffolding, including metacognitive assistance to others" (p17). Morrison & Kuhn (1983) studied the importance of imitation as a mechanism of learning for young children in a naturalistic setting compared to previous research in laboratory settings. Their findings support the view that imitation is an important behaviour by which children enhance their performance in a cognitively demanding activity in a natural setting.

Young children learn about the physical world through hands-on experiences they may have an adult or more able peer scaffolding their learning. If peers of differing ability work together in a problem-solving or exploration-type activity Kuhn (1990) suggests the less able child will change his/her perspective toward the more advanced one. Slavin (1983) claims that peers of equal skill working together may still yield progress. Rogoff (1990) argues that children's discussion with peers helps each child to diversify their understanding. Neuman & Roskos (1991) argue from an interactionist perspective children's learning is influenced by the social context, through their collaboration with adults and more capable peers as well as their interaction with culturally developed 'tools'. Their study reports on pre-schoolers'

literacy-based verbal exchanges in a print enriched play environment. Three types of discourse about literacy were identified in the play context: children's conversations focused on designating the names of literacy-related objects; on negotiating meaning related to a literacy topic; and on coaching another child in some literacy task in order to achieve a goal in play. Results suggest that children's collaborative engagement in literacy through play may have an important influence on their developing understanding of written language.

Research on peer tutoring which has been conducted in a formal classroom environment suggests that child teachers help to inform and correct their younger peers' work, in a style similar to their teacher (Johnson & Johnson, 1975; Topping, 1987). In less formal collaborative-style classrooms the findings of Cullen & St. George (1996) suggest children's behaviour may not resemble these more formal role models. The findings of Jordan, D'Amato, and Joesting (1981) (cited in Neuman & Roskos 1991) suggest that peer relations may have considerable influence in teaching/learning contexts, particularly due to the limited number of adult-child interactions in typical classroom settings. With the literacy-enriched environment Neuman & Roskos (1991) attempted to provide children with the 'culturally developed tools' (Vygotsky, 1978, cited in Wertsch, 1985) necessary to extend their current skills and knowledge of literacy through social interaction. This work was designed to analyse how young children may attempt to guide and assist each other in becoming literate through their collaborative play activities. Neuman and Roskos (1991) found children's 'literacy talk' was situated, deriving its meaning from the context of the ongoing play event. The literacy talk was always accompanied by active engagement in the event itself. Children did not just describe how to do an activity, they showed children what to do and talked about what they were doing. This research also found children often reversed the role of a more capable child peer according to the purpose of the play. Sometimes a child teacher might assume the role of guiding and correcting, while the other child performed the task; at other times these roles would reverse, with the teacher initiating a bid for assistance.

St. George and Cullen (1995) found when observing new entrants evidence that children received peer guidance and support in their first weeks at school. The data revealed that children moved sequentially from awareness of peers as a source of information, to accepting the role of receiver of peer scaffolding and finally to giver of scaffolding as less experienced peers joined the classroom. They concluded that children's scaffolding attempts were not always successful and children who provided scaffolding for peers were assisted themselves on other occasions. The findings of St. George & Cullen (1995) are consistent with those of Neuman and Roskos (1991) and confirm Stone's (1993) explanation that emergent peer scaffolding appears to be a complex, fluid, interpersonal process.

### **2.3.3 Co-construction**

Winegar (1988) suggested that the concept of co-construction more accurately described how the environment and peers contribute to a child's understanding of social events. The concept of co-construction is supported by the findings of the study of Cullen & St. George (1996). The learning environments in their study featured planned opportunities for collaborative learning and when children were interviewed about their learning they had a greater awareness of peers in that classroom. McNaughton (1995) in his book about patterns of emergent literacy elaborates on what Valsiner (1988) called co-constructionist theory. McNaughton argues that co-construction of development should be seen as occurring through complex and dynamic interactions between children, which are part of an activity and help to structure ways of doing and ways of thinking. In this view socialisation is active, and learning and development are co-constructed. Both the more expert others with whom a child directly and indirectly interacts, and the child, bring personal meanings to their interactions and develop their theories as a result of their interactions. These interactions are dependent on each other but also part of each other, hence the term co-construction.

The study by Cullen and St. George (1996) focuses on children's acquisition of scripts for school learning with 5-year-old children. Children were observed in regular classroom activities and informal and semi-structured interviews were conducted on children's entry to school and one year later. The interviews were conducted to elicit children's perceptions of learning tasks.

The work of Solomon (1994a) Fler (1991) and Neuman & Roskos (1991), although not based on the theory of co-construction, discuss the value of social interaction in children's science learning. Solomon (1994a) contends that the social scene makes an essential difference to the learning task, to how the task is perceived, and even to the tools for thought that will be used. Fler (1991) agrees that "science learning in early childhood is better placed within a paradigm in which learning is socially constructed" (p17). Neuman and Roskos (1991) found children's conversations included not only linguistic phenomena but also a full range of bodily movement embedded in the social-physical play setting, thus requiring an examination of the child's whole behaviour at that moment during conversational episodes.

The assumption inherent in an experience-oriented approach to learning is that children's experiences influence the way they understand and conceptualise, and is more basic than skills and knowledge. If we learn something it means our previously held assumptions collapse and immediately become integrated into a new accepted way of looking at any specific phenomenon (Marton & Helmstad, 1991). Pramling (1992) suggests early childhood educators should work on developing children's awareness of different phenomena in the world around them. Bredekamp (1992) suggests appropriate practice for 4 and 5-year-old children is that which helps them "develop understanding of concepts about themselves, others and the world around them through observation interacting with people and real objects and seeking solutions to concrete problems" (p. 56). Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996) emphasises that ECE children and their families will experience an environment where connecting links

with the family and the wider world are affirmed and extended and the children are encouraged to learn with and alongside others.

### **2.3.4 Metacognitive studies**

Current thinking amongst researchers is that we should ask the children themselves about their recollections of a learning experience to add to the information we have about their perceptions and recollections of their experiences (Smith, 1995; Hetherington & Camara, 1984; Pramling, 1992). Smith (1995) asserts that New Zealand educational research and practice has made few systematic attempts to take a child-oriented view of children's experiences. Smith (1995) believes it is necessary to give more priority to the meanings which children construct about their experiences in the different contexts of their lives. Landsdown (1994) makes the point that "Children have the right to be seen as the consumer and not just the product of education" (p. 37). Mayall (1994) explains that studying what children experience and the discourses of their daily lives is an important research endeavour in its own right, which should allow us to reconstruct notions of childhood in the light of the children's own evidence. Early studies on the metacognitive development of young children used interview methods to ask children about their thinking and found that young children have not yet developed the ability to think and talk about the process of learning. Learning is defined by Pramling (1992) as "a qualitative change in the child's way of thinking" (p. 2). Research by Pramling (1983) argues that children from 4 years of age can understand the concept of 'learning to do'. Few children at this age connect learning as 'learning to know' and Pramling found 'learning to understand' was not achieved by children until they reached middle childhood.

The study of Cullen and St. George (1996) focused on children's acquisition of scripts for school learning with 5-year-old children. Children were observed in regular classroom activities and informal and semi-structured interviews, conducted on each child's entry to school and one year later. The interviews were conducted to elicit children's perceptions of learning tasks. Cullen & St. George



(1996) found that despite the salience of peers in the classroom life of new entrant children, their interviews indicated little awareness of peers in the learning process. These findings suggest it is important not to rely solely on post-experience interviews to recall interactions but also to observe interactions when and where they occur.

Cullen (1994) and Prince (1995) incorporated metacognitive teaching strategies into early childhood programmes and the children revealed an increased awareness of their own learning. Prince (1995) conducted a teaching intervention with 10 four-year-old children. Three interviews were conducted with the children using photo prompts. The teaching intervention consisted of environmental studies which were taught metacognitively and followed the scaffolded model of early childhood science education advocated by Fler (1991). Prince found the children who had their learning scaffolded by the researcher, developed a greater awareness of their own learning. This finding is consistent with the research of Fler (1992) who emphasised the use of questions and discussion in scaffolding children's learning in science.

## **2.4 Summary**

The research reviewed has studied what happens before, during and after school groups visit interactive science centres. Primary school teachers have been asked why they plan field trips and how they structure a visit to an interactive science centre. Many ECC staff plan field trips away from their centres but no record can be found of the reasons why they organise excursions or any planning and preparation carried out before excursions occur. No data can be traced about what ECC staff see as the goals or expected learning outcomes for children when organising a field trip to an interactive science centre. There is a gap in the literature regarding how the early childhood educator (expert) who is organising a field trip communicates with the children and accompanying adults (novices) about the educational goals for the trip. It would be valuable to find out the reasons the 'expert' has for the visit to take place, how she prepares herself for the visit, and if

the experience is planned to link with other curriculum activities in the ECC. This will enable management and staff of the institution to ensure the KO gallery has exhibits that are appropriate, accessible and relevant for young children. Data which illuminates how adults interact with young children during a visit to an interactive science centre will contribute to our understanding of the expectations of teachers regarding the outcomes of the visit. It will also be relevant to know whether or not the organiser conducts pre-visit preparation and post-visit follow-up for children and other adults to inform and reinforce the goals and motives for the visit to KO.

The literature generally agrees that there are predictable visitor behaviour patterns that occur amongst school groups and casual visitors at an interactive science centre. It would be illuminating to see if young children unable to read a clock would follow these same patterns of behaviour when visiting an interactive science gallery as older visitors who know they will be in the gallery for 60 minutes.

Research conducted with 10-year-old children in an interactive science centre has shown that they do take on the role of explainers, introducing other children to an exhibit, taking turns working on an exhibit and cooperating with their peers' interacting with an exhibit. Research with young children has not identified these behaviours while they are in an unfamiliar environment. We do not know how young children interact with their child peers, adults and exhibits in an interactive science centre. No research could be found which studied the verbal interactions of parents with young children on field trips. It would therefore contribute to our meagre knowledge of verbal interactions between mothers and children if verbal interactions were recorded between mothers accompanying their children on field trips with an early childhood centre group. Studies have been conducted on how ECC staff interacts with young children in an early childhood centre, but we do not know how they interact with young children in an interactive science centre gallery.



No previous studies have been conducted to consider the attraction interactive exhibits hold for young girls and boys. Very few studies could be found which asked children's opinion about exhibits and no studies talked with children between 4 and 5 years of age to recall their experiences with interactive science exhibits that had been designed for them.

## **2.5 Research Questions**

1. Which Science Centre & Manawatu Museum policy, planning and management goals are pertinent to Early Childhood Education?
2. Which Early Childhood Centres visit the Kids Own gallery?
3. Why do Early Childhood Centres visit the Kids Own gallery?
4. How do early childhood educators organise their visits to the Kids Own gallery?
5. How do children, child peers and adults interact in the Kids Own gallery?
6. What do children's recollections of their experiences include about their interactions with exhibits, adults and child peers?

## CHAPTER 3

### METHOD

This chapter describes the methods used to gather data in this research. Why programme evaluation was chosen as the overall approach is discussed. The methods used in phase 1 of the study include an explanation about how access to the site was requested, how the samples for discussion with staff and document analysis were selected, organised and analysed. Sections on the population surveyed, questionnaire construction, administration and analysis are also included. Discussion regarding methods used in phase 2 of the study include sample selection of the young children participating in the study, and why and how data were gathered in the KO gallery of the Institution. Sections describe the interview schedule construction, administration and analysis. The final sections in this chapter discuss ethics and limitations of this study.

#### 3.1 Overall Approach

Early studies of educational programmes used a classical or agricultural-botany method, which utilised a hypothetico-deductive methodology. Students were given pre-tests, then exposed to different treatments and their subsequent attainment was measured to indicate the efficiency of the programme. Studies of this type yield 'objective' numerical data, which permits statistical analysis. Variables like I.Q., social class, test scores, and attitude ratings are tabulated. As Parlett and Hamilton (1972) state there are a number of reasons why this paradigm is neither appropriate nor effective for evaluation of educational programmes.

In The Science Centre & Manawatu Museum, for example, to attempt to simulate laboratory conditions by manipulating educational personnel would be ethically dubious and lead to gross administrative and personal inconvenience. An alternative approach to programme evaluation was chosen for this research. Parlett and Hamilton (1972) describe such an alternative as illuminative evaluation. They suggest the primary concern of illuminative programme evaluation be with description and interpretation rather than measurement and prediction. The aims

are to study how a programme operates, how it is influenced by the situation, what those directly concerned regard as advantages and disadvantages and how students are affected by the experience. It is also to discover and document the participants' perspective and to discern and discuss the program's most significant features.

Parlett and Hamilton (1972) provide us with numerous reasons to adopt the approach of illuminative evaluation. They discuss the learning milieu which represents a network of cultural, social, Institutional and psychological variables, which interact in complicated ways to produce a unique pattern of circumstances, pressures, customs, opinions and work styles. Acknowledging the diversity and complexity of the learning milieu is an essential prerequisite for the serious study of educational programmes. Illuminative evaluation is not a standard methodological package; it is a general research strategy. The problem and research questions define the methods used, and no method is used exclusively or in isolation. Different techniques are used to throw light on a common problem.

In this study a triangulation approach is used whereby the problem is considered from a number of viewpoints. Methodological triangulation refers to the use of multiple methods in the examination of a social phenomenon. Denzin (cited in Mathison, 1988) suggests that "the rationale for this strategy [the between-methods triangulation] is that the flaws of one method are often the strengths of another, and by combining methods, observers can achieve the best of each while overcoming their unique deficiencies" (Denzin, 1978, cited in Mathison, p. 56). Such research bears all the hallmarks of qualitative research where the emphasis is on understanding (Anderson, 1990). Mathison (1988) suggests that triangulation as a strategy provides evidence for the researcher to make sense of some social phenomenon. Matheson proposes the three outcomes that might result from a triangulation strategy are data which converge, or are inconsistent and contradictory and from which a researcher can construct explanations of the social phenomena from which they arise.

### **3.2 Evaluation of the Programme**

In order to answer the research questions methods and techniques of illuminative programme evaluation were used, including document analysis, informal discussion with Institution staff, questionnaire to ECC staff, field notes, observation, audio-recording, and interviewing of young children in the interactive gallery and at their ECC. In keeping with the illuminative evaluation approach the researcher did not manipulate, control or eliminate variables ie. exhibits that were located in the KO gallery or who and when ECC groups would visit the gallery.

In this research a programme is understood to be a well-defined activity or series of activities with one specific purpose (Anderson, 1990). The Kids Own gallery in the Institution is the environment in which the programme is provided. This gallery was designated an area for young children in the original plans of the Institution. The space that was developed into the Kids Own gallery is located on the ground floor, where it has ready access to the main entrance, and also toilets and parents' room facilities. The modular furniture is lightweight and movable with rounded edges and soft furnishing seat tops. Safety issues of adequate light, escape or access hatches and hygienic cleanable surfaces are included. Ample floor-space is allowed between exhibits to accommodate large groups of visitors. Fire Exit, No Smoking and First Aid notices are prominently displayed.

In the Kids Own gallery are 14 interactive exhibits all expected to be physically and cognitively challenging to young children. It is intended they will promote interactions between peers and adults and be fun activities for everyone. The Institution ensures volunteers are available to interact with visitors. The children's interactions are influenced by significant others including child peers, adults and volunteers in the gallery. The gallery environment, the interactive exhibits and the interactions between children and other people are all components of the programme, which is being evaluated.

The researcher gained access to the research site by written request to conduct the research in the Institution. Approval was given by The Science Centre &

Manawatu Museum Trust Board on 25th August 1994 and confirmed by letter in Appendix B.

This programme evaluation was conducted in two phases. Phase 1 included informal discussion with management staff and volunteers of the Institution, analysis of documents generated by the Institution and a survey by questionnaire of all ECC staff in the catchment area of the Institution. Phase 2 was an in-depth study of visits made to the Kids Own gallery by three ECC groups. Contemporary cognitive perspectives that emphasise the social and situated nature of learning influenced the researcher to employ a qualitative and quantitative investigation. Multiple methods of data collection were employed including running records, audiotape recording verbal interactions and conducting informal interviews to illuminate the children's interactions with child peers, adults, and exhibits from their perspective.

### **3.3 Provision and Uptake of the Programme**

Techniques for conducting informal discussion with management, staff and volunteers of the Institution, analysis of documents, and a survey by questionnaire of all ECC staff in the catchment area of the Institution are described.

#### **3.3.1 Informal discussion with staff**

First the researcher familiarised herself with all facets of operations in the facility. The emphasis of this inquiry was to observe the environment and talk informally with the Institution's management, staff, and volunteers in order to set up the research. The researcher also talked with the cleaners, and people who sublease the eatery and souvenir shops housed within the complex.

##### **(i) sample selection**

People involved in every facet of the running of the Institution discussed their role and in what way they influence the functioning of the complex. People who are

employed in the complex as managers, education staff, administrators, exhibit creators, makers and maintainers, staff, volunteers, cleaners, and the leasees of the shop premises within the complex were all talked with informally about their perceptions of their place of work. Appendix C reports the names and titles of those who participated in the informal discussion with the researcher.

#### **(ii) discussion guidelines**

People in the Institution were asked how decisions regarding the Kids Own gallery environment and exhibits were made. Information was gathered about how the particular exhibits for KO are conceived, who selects them, what criteria influences where exhibits are allocated, how they are funded, also who constructs and maintains them and who evaluates the exhibits in each exhibition. Data were gathered about who visits the KO gallery and how their comments about the visit are recorded. Staff and management were also asked what information would be useful to them in their expressed goal of making science accessible, appropriate and relevant to young children visiting the Institution.

#### **(iii) data analysis**

From the observations of the environment a description of the Kids Own gallery and the exhibits contained in it was written refer to Appendix A. The information gathered from informants employed in the Institution was used to develop an outline of questions to be asked in the ECC survey.

#### **3.3.2. The Science Centre & Manawatu Museum document analysis**

A number of documents published and/or compiled by The Science Centre & Manawatu Museum were referred to for analysis. Sample selections of these documents are contained in Appendix D.

### **(i) sample selection**

The documents in the sample included the Mission Statement of The Science Centre and Manawatu Museum, Education Policy of The Science Centre Inc., Guidelines for Volunteers, publicity leaflets, Cinema and Newspaper advertising, Te Huia (a newsletter produced by the Institution), Flyers, Handouts, Exhibit descriptions and exhibit labels. The bookings to the KO gallery by early childhood groups was consulted, as were records of the names of early childhood services in the catchment area, and copies of all the mailed-out flyers, information, and publicity which had been posted directly to educational institutions in the area. Details of school membership, staff attendance at teacher previews, and open days were also referred to. Comments in the visitor's book that refer to the KO gallery were also noted. The Education Officer allowed the researcher access to all the records of material mailed out to educational institutions. The Education officer provided evaluations written by ECC staff who had visited the Kids Own gallery in the first 6 months of operation in 1994. The Assistant Educator/Science allowed access to the Education Resource room in the Institution. This library contains numerous publications, which are used by the staff to create new exhibits and exhibitions. The researcher was provided with copies of school membership lists and information about exhibition openings. The Development Officer provided the researcher with a photographic record of the development of the Institution and copy of numerous scripts of advertising material published in the local newspaper and on the local Cinema screen.

### **(ii) schedule for analysis**

The documents collected were organised into groups according to the purpose for which they were printed. For example collections were made of policy documents, publicity documents, information for specific groups, material printed regarding exhibits, booking information, and visitors' written evaluative comments, and the publications housed in the Education Resource room library of the Institution.



### **(iii) data analysis**

The documents gathered were analysed and essential features noted to identify the goals of the Institution and the strategies employed to reach them. The statements of intent and education policy were referred to, to ascertain how these guidelines impinged on the creation and maintenance of the KO gallery and exhibits within it.

### **3.3.3 Early Childhood Centre survey**

This section describes the Early Childhood Centre population that was surveyed by the questionnaire. The process employed for the construction, pilot study and administration of the questionnaire is reported. The quantitative and qualitative methods used for analysis of the questionnaire data are also explained.

#### **(i) population**

A Palmerston North City Council publication of all Early Childhood Centres in Palmerston North was referred to for confirmation of the names and addresses of all the early childhood institutions to be included in the questionnaire survey. The questionnaire was sent to the population of early childhood services in the Manawatu region, who are all geographically within a 60 minute travelling time of the Institution. Institution records show that this is a governing factor for ECC groups leaving their Centre for an excursion. This is because most ECCs plan excursions away from their centre where no more than 60 minutes travelling time is required, which enables children who attend a half day session to complete an excursion away from the ECC with a maximum of 120 minutes travelling time and 60 minutes to explore the venue being visited.

Table 3.1

## Composition of Population Compared with Composition of Sample Obtained

	population		sample obtained	
	(N)	%	(N)	%
Kindergarten	23	27	22	34
Playcentre	28	33	15	23
Kohanga Reo	11	13	10	15
Childcare Centre	23	27	18	28
Total Centres	85	100	65	100

Over 75% of questionnaires sent to kindergartens, childcare centres and kohanga reos were returned while just over 50% of the playcentres returned completed questionnaires. While all major types of Early Childhood Centre are represented in the sample there was a lower response rate from playcentre staff.

## (ii) questionnaire construction

To construct the questionnaire texts by Tuckman (1972) Delamont (1992) Anderson (1993) were referred to. Decisions regarding layout and design were made with respect to the research questions to be answered and how data collection could be gathered to streamline statistical analysis of this data. Decisions regarding the type of questions to include were influenced by referring to the Education Policy of The Science Centre Inc. (see Appendix D) since answers to these questions would confirm or deny whether exhibits in the Kids Own gallery were fulfilling the aim to make science accessible, enjoyable and relevant to people of all ages, cultures, interests and abilities. The questions to be included in the questionnaire were also discussed with the education staff of the Institution. Staff

from kindergartens and playcentres were also consulted informally about their use of the KO gallery to help clarify which questions would elicit answers that would illuminate their perceptions about the gallery and problems with organising and conducting a visit there. Questions were included which explored the factors that influence the choice teachers make about where they take their students on excursions. It asked teachers why, who, how, when, where, and what they have used the KO gallery as an excursion destination for. The researcher also referred to her own experiences as a kindergarten teacher who has taken groups of young children to KO.

The questionnaire was structured into 4 sections. The first section asked for a centre and staff profile. The second section asked about the knowledge ECC staff had about the Kids Own gallery. Material published to advertise the Institution was referred to, in order to frame the questions asked in section 2 of the questionnaire. The third section asked about how staff organise excursions to KO. The final section asked staff about their experiences and perceptions of the visits they have made with young children to KO. Comments in the visitor's book, which refer to KO, were also noted. This information was used to guide the questions included in Section 4 of the questionnaire that asked staff about their experiences and perceptions of the visits they have made with young children to KO.

Although careful consideration was made of each of the closed questions asked in the questionnaire, it is impossible to cover every eventuality with closed questions. There were in every section of the questionnaire open questions inviting respondents to give a full explanation of their thoughts on aspects of the provision, function, purpose and effectiveness of KO and the exhibits in that gallery.

A pilot study was conducted of the draft questionnaire with 10 Early Childhood Centre staff who had been employed in Palmerston North Early Childhood Centres during 1994, and had visited KO with groups of young children. These staff

members included 2 ex-kaiako from kohanga reos, 2 ex-supervisors from playcentres, 3 workers from childcare centres, and 3 staff from kindergartens. These people were not employed in permanent positions in Early Childhood Centres during July 1995 when the pilot study was conducted; consequently they did not contribute to ECC responses in the research.

The ECC staff who participated in the pilot study was asked to consider the clarity of the questions, what they would change and why and how long it took them to complete the questionnaire. Their verbal and written responses indicated they perceived it as generally appropriate and user-friendly and suggested it could be improved with a few minor revisions. Following the pilot study 7 modifications were made to the questionnaire.

The pilot respondents did not all feel that the invitation to respond to the questionnaire was intended for each of them, because adults in each type of Early Childhood Centre have different titles. For example 'workers' are employed in childcare centres, 'kaiako' in kohanga reos, 'teachers' in kindergartens, 'directresses' in Montessori pre-schools, and 'parents' in playcentres. Not every adult could be invited to respond by their title so an introductory comment was included at the beginning of the questionnaire which explained that all staff involved in the programme planning of the centre were invited to contribute to the response from their ECC.

Three respondents requested a definition of the terminology when referring to the level of training. (section 1 question 2). The question was rephrased to ask "how many staff in the centre have early childhood teacher training?" Five respondents requested clarification on how 100+ licensing points are achieved by staff in ECC in section 1 question 3. Examples were included eg. NZQA Certificate + hours; Playcentre Federation Certificate; NZFKU Diploma; Whakapakari; Dip. Tchg. EC. Pilot respondents wanting to know what relevance their science background had to

their organising visits to the Institution asked about in section 1 question 4 of the questionnaire. To explain why this question was included a stem was added to the question which read "As past experiences in formal school science may influence staff interest in visiting The Science Centre & Manawatu Museum, please indicate to what level each of the staff have studied science".

Playcentre and kohanga reo staff suggested section 1 question 5 be rephrased from "in pre-service training" to "during early childhood qualification training course" because these staff members are not required to complete formal early childhood teacher training before they become staff members in a playcentre or kohanga reo. Childcare centre, playcentre and kohanga reo staff all explained that they attend workshops, not inservice courses, for professional development, so the term 'inservice course' was replaced with 'workshops' in section 1 question 6. Playcentre respondents were adamant they would not 'select' children to attend an excursion, as the playcentre philosophy expects that all children will attend organised excursions with their parents. Section 3 question 3 was therefore rephrased to read "What factors influenced which children were taken on this visit to Kids Own?"

The final format of the questionnaire is included as Appendix E. A questionnaire was sent to each ECC in the catchment area of the Institution with the intention that all the staff would discuss the questions during a planning meeting (usually held weekly in ECC) and therefore contribute to the response from their ECC.

### **(iii) instrument administration**

The staff of all licensed Early Childhood Centres in the catchment area of the Institution were posted a questionnaire with a request that they be completed by the combined staff, kaiako, parents or caregivers responsible for the programme planning of their Early Childhood Centre. Questionnaires were posted in mid August 1995 to 85 licensed Early Childhood Centres, including 28 playcentres 23

kindergartens 11 kohanga reos and 23 childcare centres. Within one month 33% of the population had returned completed questionnaires. Follow-up phone calls and duplicate copies of the questionnaire were sent to Centres that requested them to raise the response rate. By early December 76%, that is 65 of the 85 licensed Early Childhood Centres, had returned a completed questionnaire. Appendix E contains a copy of the questionnaire.

#### **(iv) data analysis**

Questionnaires were coded according to the type of ECC responding, as described in Appendix F. Data were qualitatively and quantitatively analysed. Quantitative analysis was completed using the SPSS/PC computer programme (Norusis/SPSS Inc., 1988). This enabled the researcher to identify the choices the majority of Centre staff made regarding when, how and with whom they would visit KO.

The responses to open questions were grouped into categories decided by the researcher on the basis of key words or themes contained in the responses (Delamont, 1992). Each group of responses was given a title that the researcher considered best described the theme or main ideas contained in the responses. Quotations extracted from Centre responses were given a Centre Participant Code described in Appendix F.

### **3.4 Children's Interactions in the Programme**

Phase 2 of this research involved an in-depth study of a sample of children from 3 Early Childhood Centre groups, before, during and after they visited KO. Emphasis was on observation of physical interactions and audio-recording of verbal interactions between children, their child peers, ECC staff, Institution volunteers and adults while they were in KO. In the week following their visit to KO children were interviewed in their ECC and asked to recall their interactions with the exhibits, adults and child peers in KO.

### 3.4.1 Sample selection

Potential participants included the children in all early childhood groups who booked a time to visit the Kids Own gallery in July/August 1995 since this was when the researcher was available to conduct the data collection and before the gallery was to have a different exhibition installed in September. The criteria included that the ECC group children should all be 4 years of age. Each group should represent a different ECC service delivery, use different forms of transport to and from the venue, visit at different times of the day, and visit KO with and without volunteers present in the gallery. Three of the ECCs who booked to visit KO (a Montessori pre-school, a kindergarten and a childcare centre) were contacted to seek permission from staff, parents and children for them to be participants in the study. Each Centre was asked to provide the researcher with the names of the children who were to be included in the group visiting KO.

Staff were asked about the willingness of the children to wear a radio-microphone and the ability of the children to talk about their experiences. Written consent for the child to be included in the study was requested from each child's parents/whanau. This was requested when the staff asked for permission for the child to go on the excursion, which is standard procedure in all early childhood institutions. Permission to conduct the research was requested and approved by the Massey University Human Ethics Committee (Appendix K).

Each Early Childhood Centre was visited one or two days before the planned excursion was to take place. The tape recorder and radio microphone were demonstrated to all the children who were to go on the excursion and they were invited to 'try it out'. They were offered the opportunity to try out and practise using the radio microphone and tape recorder in the ECC during a normal session time. When the children heard their own voices recorded they exclaimed and showed looks of wonder, recognition, and amusement that demonstrated how much they enjoyed the experience. During the visit to each ECC the researcher consulted with the staff member organising the visit and asked her to identify four



4-year-old children (2 girls and 2 boys) with sufficient personal confidence and self-assurance to enjoy being a participant. These children also needed to have the ability to communicate verbally and the cognitive maturity to discuss the thoughts they had about what they saw and did while in KO. The researcher asked that 4 children be nominated because during the winter season children are often absent due to illness. Consequently 2 boys and 2 girls were selected to increase the likelihood that 2 children at least would be available and prepared to wear a radio microphone during their visit to KO. There were only 2 audio-recorders and microphones available. When the children arrived at the Institution on the day of their visit 2 children from each group were asked by the researcher if they would wear a walkman in a bum-bag at their waist and a radio microphone pinned to their clothing while they were in KO.

### **3.4.2 Audiotape recording of child interaction in Kids Own**

This section will explain why and how data were gathered about the interactions of the children, their child peers and accompanying adults during the visit of their ECC group to KO. The target children's verbal interactions were audiotape recorded while they were in KO.

#### **(i) administration of audiotape recordings**

The intention was to audio-record the verbal interactions that were uttered in KO by the 2 target children and the child peers, teachers, parents, volunteers and other adults interacting with the children while in KO. Tizard and Hughes (1984) had adopted an audio-recording method for their study because it allowed children freedom of movement and was the least intrusive way to record their verbal interactions in a natural setting. Trials were conducted with young children in their ECC wearing radio-microphones and a walkman. The researcher practised how to introduce the walkman and radio-microphone to young children. It was decided that the least obtrusive and/or threatening way for children to wear the equipment was to store it in a bum-bag worn around their waist with the small radio microphone pinned to their clothing near the neckline. For each group between the



day of the researcher's visit and the day of the excursion numerous changes were made to the plan of 2 children from each group wearing a recorder for the duration of their visit to KO. The researcher was unaware that the time of one visit to KO was bought forward by 30 minutes, a girl was away sick and the only other available girl in this small visiting group was unwilling to wear a microphone and audio-recorder. A boy had difficulty with the attachment of the microphone to his clothing and lost the clip that held it in place while crawling in the Kids Cave exhibit. Another boy found the microphone and bum-bag a hindrance and politely returned it to the researcher after 15 minutes of the 60-minute visit. The useable recordings are from 5 children for between 15 and 45 minutes of their visit.

## **(ii) data analysis of audiotape recordings**

The audiotapes were all transcribed onto computer file. In total there were 160 minutes of tape recorded in the Kids Own gallery, girls: 78 minutes and boys: 82 minutes. All the data gathered by interview was colour-coded according to the exhibit where the interaction was taking place. This data was analysed to find out the nature of the verbal interactions that young children engaged in while they were in KO. Neuman & Roskos (1991) identified 3 types of informal exchanges between children in the classroom that they suggest may function as scaffolding situations between child peers. In this study the researcher found children scaffolding child peers in the ways which Neuman & Roskos had identified. They are: 1. designating or labelling an object; 2. negotiating to establish a shared meaning; and 3. coaching to guide or teach a peer. An additional type of interaction was identified when young children uttered affective exclamations to their child peers to talk themselves through a difficult or scary experience, or express enthusiasm and enjoyment for an activity.

Since verbal communication is a vital component of scaffolding in children's learning transcripts of the audiotape recorded conversations at each exhibit were analysed to reveal the tone, content, quality, and quantity of discussion which ensued at each exhibit among children, teachers and other adults in the gallery. The

Teaching Continuum of Bredekamp & Rosegrant (1993) was considered to categorise verbal teacher/adult interactions with children.

Teaching Continuum		
Non-Directive	Mediating	Directive
Acknowledge/Model/Facilitate/Support/Scaffold/Co-construct/Demonstrate/Direct		

Themes were looked for in the verbal interactions of the target children with child peers and adults at each exhibit. Examples of what children said in their verbal interactions were written onto an A3 size card drawn up with a column for each exhibit in KO. In the verbal interactions recorded 10 categories were identified:

- Adults asked children questions about the exhibit they were interacting with.
- Adults gave verbal directions/instructions for interactions with the exhibit.
- Adults demonstrated/explained to children how to interact with the exhibit.
- Adults encouraged/acknowledged children's interactions with the exhibit.
- Adults read labels aloud to the children about the exhibit.
- Children asked for help while interacting with the exhibit.
- Children talked with child peers while interacting with an exhibit.- cooperated?
- Children exclaimed, named or commented on the exhibit they were interacting with
- Children invited child peers to interact with them and the exhibit.
- Children asked questions.

### 3.4.3 Observing children's interactions in Kids Own

This section describes why and how the physical interactions of 4 children from each ECC group were observed during their visit to KO. Although only 2 audio-recorders and microphones were available, as most visits were of 60 minutes duration it was possible to observe 4 children during their visit.

#### (i) recording field notes

An observation schedule for time sampling of with whom, with what, and how each visitor interacts while in the gallery was prepared and trailed. Trial observations were conducted of young children visiting KO with their family or primary, kindergarten, playcentre and kohanga reo groups throughout July 1995.

Code names for exhibits were developed to be used when writing running records and are listed in Appendix H.

During trial observations it was intended to write down the target child's comments and language used, indeed all verbal interactions. However the researcher found it was not possible to write down every word uttered by children and adults. It was extremely difficult to be close enough to a child in the public gallery without causing discomfort in the child and arousing suspicion amongst the adults accompanying the group. In normal speech patterns everyone speaks very quickly and not necessarily in complete sentences. The spoken language is very idiosyncratic. Rather than try to overcome these difficulties it was decided to rely on the audiotape recordings to gather the verbal utterances of children and those near them when they are wearing the radio microphones in KO.

Following these trials it was decided to write running record observations of 2 girls and 2 boys from each group visiting KO. From each group one child was observed at the beginning of the visit, two during the visit and one in the last 11 minutes of the visit. Field notes by the observer recorded: which exhibits the target child visited; how long the target child spent at each exhibit; interaction between the child and the exhibit; and child peers and adults at each exhibit they visited. Any other people present at the exhibit with the target child were also noted. When the observer was close enough to hear verbal interactions between the target child and child peers or adults, they also were recorded.

## **(ii) analysis of field notes**

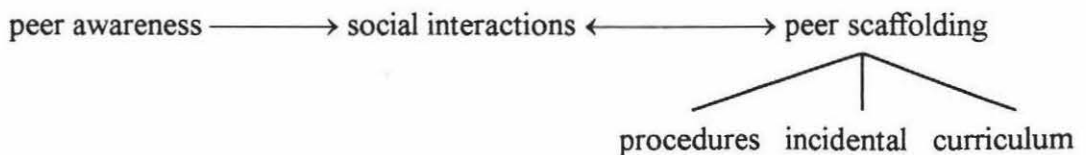
The 121 minutes of observations (girls: 55 minutes boys: 66 minutes) in KO were transcribed onto computer file. All data for each exhibit was colour-coded to simplify analysis of the data about each exhibit from every source. The qualitative analysis entailed drawing up a table on an A3 sized card with a column for each exhibit. For the purposes of this analysis an interaction was defined as all the

observed activity by a target child at an exhibit. Every interaction for each observed target child was written onto the table in the column of the exhibit. This analysis of the field notes revealed how the children reacted to the exhibits and described how they interacted with the exhibits and other people while in KO. The analysis of all the interactions at each exhibit involved looking for similar behaviours of children at each exhibit which were then put into categories.

The quantitative analysis revealed the number of exhibits children visited, the amount of time children spent interacting with each exhibit, the number and gender of child peers and adults who were interacting with target children at exhibits during the 11 minute observation period. This information was extracted from each child's field notes as interactions during each minute had been recorded and transferred onto a schedule as in Appendix I. Each target child's level of interaction with the exhibits was determined using Peterson & Lowery's (1972) Curiosity Index of Motor Activity (CIMA). When a child revisited or interacted at different CIMA levels at the same exhibit during the 11 minute observation the most advanced CIMA interactive level engaged in by the child was recorded. This interpretation indicates the total number of observed children interacting with the total number of exhibits but does not indicate all CIMA levels of interaction by one child with one exhibit.

The qualitative analysis involved looking for categories of child peer interaction in the observed behaviour of young children in the gallery. Each child's field notes were analysed and examples of interactions between children at the same exhibit were recorded using the model of peer interactions developed by St. George & Cullen (1995).

#### Model of Peer Interactions



### **3.4.4 Child interviews in Early Childhood Centres**

The 12 children, 4 from each of the three Early Childhood Centres who had been observed in KO were interviewed in their Early Childhood Centre during a normal session within 7 days of their visit. The construction and administration of the interview schedule and the analysis of the data are described.

#### **(i) interview schedule construction**

Within a week after their visit an informal semi-structured interview was conducted with each of the 12 children who had been observed in KO. The semi-structured interviews were intended to be conversations designed to probe children's conceptualisations and recall of the exhibits they experienced. An interview is considered the most direct method of assessing a person's understanding. Its purpose was to elicit as much as possible of what the child could recall and tell the interviewer about their visit to KO between 2 and 6 days previously and ascertain what the children found most interesting and were able to recall most readily. The studies by Hatch (1990), Edwards, Logue and Russell (1983), Gabarino and Stott (1989), Tammivaara & Enright (1986) and Hoffman & Wundram (1984) all provided guidance and information regarding techniques useful in interviewing young children. Children were first asked scene-setting questions like 'how did you get to the science centre?' and 'whom did you travel with?'. Then children were asked to recall what they liked best in the gallery. The semi-structured interview schedule may be found in Appendix J. In each ECC environment the presence or absence of follow-up support or alternative resource materials to capitalise on the excursion experience was looked for.

#### **(ii) administration of interviews**

There were a number of problems encountered with the interview process involving when, where and how children were interviewed in their ECC. To gain access to the children who had been observed in the gallery the researcher had to accommodate the routines of the Centre, and the days and hours of attendance of the children to be interviewed in the ECC. Not all children attended their ECC

every day or every session. In each Centre the routines of the session restricted the time when children could be interviewed. The problem of where children could be interviewed was resolved after negotiation with the teacher, supervisor or directress of the ECC. The researcher had to be within view of the staff and other children in the Centre for her own and the child's protection, in a space that was public enough for safety and private enough for confidentiality. Consideration of each child's physical and mental health and well being at the time of the interview also had to be taken into account. To build trust and rapport with each child it was important that the interview site was familiar and comfortable for the children but in a public place. Because the site for the interview was a public place this created the problem of visual distractions for both the interviewer and interviewee. There was a considerable amount of background noise, which necessitated the interviewer almost shouting some questions, which made them sound extremely artificial. The tone and volume of these questions did not elicit confiding or relaxed responses from the children. Maintaining eye contact and the child's attention during the interview was made more difficult depending on where the researcher was invited to interview the children.

The language used during the interview, particularly descriptive terms, had to be considered very carefully. If the interviewer did not use familiar terminology the children tended to focus on trying to understand the names and terms used rather than the ideas they were being asked about. Prior to commencing the interviews with the children photographs were taken of all the exhibits in the KO gallery. Photographs of the exhibits in KO were used to assist the children to recall their experiences. When the preliminaries had been completed and the scene had been set the children were shown a book of photographs of the exhibits in the Kids Own gallery at the time of the visit. The ECC staff and children who participated in the study reported that they often take photographs while on excursions out of the Centre. The photographs were used to prompt children's recall of the exhibits they had interacted with in the gallery during their visit. The photographs had been taken for publicity purposes and the Institutions Development Officer made prints available to the researcher.



### **(iii) data analysis of interviews**

The 194 minutes of taped children's interviews (girls: 78 minutes boys: 116 minutes) in their ECC were transcribed onto computer file and then colour-coded according to which exhibit the child was talking about to organise the data for analysis. A table was used to guide the analysis of children's interview data. A phenomenographic approach was used to analyse the data gathered during the interviews. This is a technique for identifying and characterising the qualitatively different ways in which people conceptualise phenomena in the world. The researcher made decisions about what constitutes the similarities and differences of expressions of the children's conceptualisations (Burns, 1994). The comments made by each child about each exhibit were analysed and grouped in categories under titles that described the theme they best suited. For example: Children Theorise Why; Children Theorise How; Children Explore Exhibits; Children Experimented with Exhibits; Children Described Actions; Children's Favourite Exhibit; Recalled Peers; Did Not See Exhibit.

### **3.5 Ethics**

Phase 1 Approval was requested of the relevant management bodies to include the staff and families of the Ruahine Kindergarten Association (RKA), the coordinators and families of the Central Districts Playcentre Association (CDPA), Early Childhood Centre staff (ECC) and families who are members of the New Zealand Childcare Association Central Districts Branch, (NZCACDB) and Te Kohanga Reo kaiako and whanau of the Rangitane district. All organisations consented to be included in the study. The ethics of the proposed project were approved by The Human Ethics Committee of Massey University, 6 July 1995 (Appendix K). The researcher was a member of the Early Childhood Exhibits Advisory Committee 1992-1994 and continues to be an Education Advisory Committee Member and Council member of The Science Centre Inc. Because of this close and continued involvement in the operations of the Institution the researcher is mindful of not harming the reputation or goodwill of anyone connected to the Institution.

The close involvement the researcher has maintained in the Institution and the friendships and collegial relationships developed with management, staff and volunteers has resulted in a level of trust and free speaking which necessitated the researcher maintaining confidentiality and sifting the personal confidences from the professional opinions all expressed during conversations between friends.

In the covering letter attached to the questionnaire all staff in each Early Childhood Centre were invited to contribute to their Centre's response to the questionnaire (refer Appendix E). Staff were assured of anonymity, and that the information they provided would be strictly confidential and used for research purposes only. During follow-up requests for the return of completed questionnaires the researcher was freely given access and entry to many ECCs in the region including the Rudolf Steiner kindergarten, Montessori pre-school, playcentres, kohanga reos and childcare centres. This was because the researcher is a parent who holds a Diploma of Teaching in Early Childhood Education, and is an experienced early childhood educator. These credentials gave everyone approached to contribute to the study confidence that the researcher could and would empathically represent their true point of view.

"It is widely agreed that the consent of the subject is required for research to be legitimate" (Snook, 1981, p. 88). To comply with the ethical requirements for Phase 2 in this study the researcher requested the written and verbal informed consent of all participants. The information sheets and permission forms were duplicated for each of the three groups involved in the in-depth study (see Appendix G). Written consent for the child to be included in the study was requested from each child's parents/whanau when the staff asked for permission for the child to go on the excursion. Permission for children to leave their ECC is a requirement of the Early Childhood By-Laws. As Snook (1981) suggests, gaining participant consent is particularly problematic where children are concerned because it is difficult to know if a child has sufficient understanding to give or refuse consent. Since most 4-year-old children are unable to give their written



consent to be participants in a research, the children were asked if they would like to wear the tape recorder and radio-microphone. The children were shown how to switch the recorder off and on and were assisted to take off the recording equipment if they requested it. To ensure the anonymity of participants children, staff, accompanying adults and volunteers were all given pseudonyms. These are reported in Appendix F.

### **3.6 Limitations of the Research**

For the ECC survey a limitation of the research is that not everyone who may be involved in the decision-making regarding the curriculum planning and programme in the Centre will have contributed to the completion of the questionnaire. Not all the Early Childhood Centre staff attended the planning meeting in their Centre when the responses were discussed for the questionnaire. Staff meetings may include in childcare centres between 3 and 12 staff members, in kindergartens usually 3 staff members, and in playcentres there may be 25 parents involved in a programme-planning meeting. A common feature of staff meetings is brainstorming, where every staff member present is expected to contribute their ideas and the scribe is obliged to record all contributions. As a consequence the open questions of the questionnaire may have multiple responses from either one or many staff members to a single question. Also staff in ECCs change and the staff who completed the questionnaire may not have been employed or involved in their ECC's visit to KO since it has been available for visitors since February 26 1994.

The response from 65 returned questionnaires of the 85 mailed out is a 76% response rate. Although this is high for a mailed questionnaire we should be cautious when considering the data because there is a much higher response rate from kindergarten staff than from staff of any other Early Childhood Centre staff group represented in the sample. As 22 of the 23 kindergartens (96%) responded, and 15 of the 28 playcentres (54%) responded, playcentre groups are under-represented in the sample.

This research studied groups of young children visiting one gallery of a regional science and museum institution funded and managed by the City Council. The sample included three groups of 4-year-old children and adults from three different Early Childhood Centres of the 85 Centres in the region who have access to the Institution. Because there was a small number of participants in the study the findings cannot be generalised to all Early Childhood Centre groups who visit an interactive science gallery. However this Institution, like many others worldwide, does provide galleries and interactive exhibits specifically for young children to explore, and these findings contribute to theory construction.

Clearly the lone researcher does not conduct an objective study. A limitation of a single researcher writing running records of the children's interactions is that a child may look, touch, and/or engage with one to five exhibits within a 60 second time span. There were a number of physical constraints to observations in KO. It was difficult to be within earshot and sight of the target child at all times to see what children were physically doing or what their body language was expressing. Conclusions drawn from these experiences were that there were physical, visual, and social constraints which limit how much can be observed. The researcher attempted to be as unobtrusive as possible in her choice of clothing, the amount of writing material she carried and the casual way in which she moved about the gallery while writing running records on target children. It must still be considered that the presence of the investigator as a participant observer in the gallery during children's visits may have influenced the behaviour being observed. The target children being singled out for special attention may also have influenced their behaviour.

Data collection and analysis will be subjective and presentation of the findings will have the researcher's interpretation of the data. No research is immune to prejudice, experimenter bias or human error.

## **CHAPTER 4**

### **PROVISION AND UPTAKE OF THE PROGRAMME**

This chapter reports the results from the informal discussions with people employed at The Science Centre & Manawatu Museum, the analysis of documents from the Institution and the results of the survey by questionnaire of Early Childhood Centre staff regarding their uptake of the provision of the Kids Own gallery for young children.

#### **4.1 Roles and Perspectives of The Science Centre & Manawatu Museum Staff**

The researcher conducted informal discussions with many members of the staff employed by PNCC or in the te Aweawe complex to familiarise herself with all facets of operations in the Institution.

After consultation with the project team, the Head of Education and Science Services makes the final decision regarding which exhibits are included in each exhibition and where they will be placed in the gallery. The Head of Education and Science Services is totally involved in all facets of the creation, placement, labelling and maintenance of all exhibits in exhibitions in the Institution. It was therefore essential to continue to liaise with him regarding the research conducted in KO. The Head of Education and Science Services leads and directs the team of education staff. For funding from the Ministry of Education he writes draft applications, consults with staff and advisers, then rewrites and edits applications for LEOTC (Learning Experiences Outside the Classroom) contracts. He also applies for and allocates funds donated to the Institution to pay for teacher packs of study support material and to allow school groups free or subsidised entry to exhibitions.

The Education Officer took responsibility for writing the Education Policy of The Science Centre in 1993. The role of the Education Officer includes the delivery of education programmes to visiting groups, and the organisation and delivery of

teacher previews for new exhibitions. The Education Officer compiles and develops teacher resource packs to compliment and accompany exhibitions in the Institution and is involved in creating and producing written material advertising new exhibitions and mailing information to educational institutions. The Education Officer explained the way she envisaged new exhibits called 'B-Boxes' should be developed for the KO gallery. She believed that interaction with these small activity kits will provide an achievable and appropriate way for young children to develop their science concepts. The Education Officer conducts evaluations of exhibitions and shared with the researcher the verbal and written feedback she had received from ECC staff regarding KO. Kindergarten staff had indicated that all the children in the kindergarten had visited in separate small group visits to 3 exhibitions during 1994, including KO. The feedback told her that the focus for these kindergarten groups was science, maths and language, and that the visits complemented the regular planned ECC programme. ECC staff had heard about KO via mailed out material from the Institution and word of mouth. ECC staff felt that the policy of providing free admission for parents/adults with an ECC group is an incentive for them to visit. ECC staff indicated they recommended colleagues from other ECCs visit KO and that their visit met the needs of their group. The Institution had received feedback from kindergarten teachers who felt uncomfortable charging \$2 per child for a small group visit (with the Burger Buggy) which is teacher led and lasts less than an hour.

The volunteers are a large group of 150 people between 15 and 75 years of age who are rostered on an unpaid basis to provide their time to act as 'explainers' or 'facilitators' in the galleries of the Institution. Volunteers are on hand to guide a group to the chosen exhibition, ensure everything is working correctly and help explain operations, as required, to visitors in science and museum galleries in the Institution. Duties of the Volunteer Coordinator, who is a staff member of the Institution, include: recruiting and interviewing prospective volunteers; keeping a register of volunteers; and organising volunteers to serve in various areas of the Institution according to their interests and expertise and as required by staff. The Coordinator is expected to keep the volunteers informed by producing a quarterly

newsletter; providing the opportunity for them to participate in events such as field trips, films, workshops and social events, and organising training programmes for the volunteers. Training days with workshops are held for volunteers for every exhibition in the Institution. The Coordinator invited the researcher in her role as an early childhood educator to run workshops for the volunteers. The first workshop before the Institution opened in 1994 was structured to inform volunteers about how they could best meet the needs of young children visiting KO. The researcher conducted a second workshop in July 1994 and the volunteers provided a list of questions they wanted answered during the workshop. These workshop sessions with the volunteers allowed the researcher to talk informally with volunteers about the liberties and constraints of their role in the Institution. Some of the questions volunteers asked regarding how to interact with young children are as follows: 'How may I physically handle children?'; 'If I have to physically restrain a person what parts of the body are safe zones?'; 'How might I phrase questions to extend children's interactions?'; 'What interactions are culturally inappropriate?'; 'How may I deal with children's unacceptable behaviour?'; 'How can I help a distressed child?'; 'What must I do in an emergency?'; and 'What should I do when 40+ children and adults arrive in KO?'

The Administrative Assistant's responsibilities at the Institution include the maintenance of records for school membership of The Science Centre & Manawatu Museum, individual or family membership of The Science Centre Inc. and gathering data on the numbers of visitors who attend each exhibition.

When ECC staff make contact to book a visit by telephone or in person, the Booking Officer requests a contact name and address, and then which exhibition or gallery they wish to visit. She will ask how many children and adults will be visiting, if they require an Education Officer or will self-lead their group, and how long they intend to spend in the Institution. The Booking Officer posts them written confirmation of their booking and, if they intend visiting the KO gallery, a flyer about the exhibits in this gallery. A copy of the letter confirming a booking

and the KO flyer is included in Appendix D. The Booking Officer must adhere to health and fire safety rules regarding the number of visitors in a gallery at any one time. This is a constant challenge to juggle multiple bookings for the same gallery at the same time for different sized groups with visitors of different ages. She must also consider accommodating an ECC's hours of opening, Centre routines and when children attend. The type of transport used to travel to and from the complex is also a factor since there is parking set aside for buses but very few private car parks available close to the complex.

Exhibit Creators reported ideas for exhibits come from many different sources and, although many hundreds of ideas are considered, few reach maturity and become interactive exhibits in the science galleries. The rationale behind each exhibit is different and the decision on which exhibits will be included is governed by many factors considered by the project team. The final decision rests with the Head of Education and Science Services. Factors considered include the visual appeal of an exhibit and the opportunity it presents for interaction. The appropriateness of an exhibit for the target audience and with others in the same exhibition, because exhibitions usually explore a particular theme. For example exhibits in the 'Electricity in Action' exhibition offered visitors the opportunity to make your own electricity, wire up a simple circuit, and check out how common electrical appliances work. Other considerations include the cost to make, run and maintain an exhibit, the availability of original materials and replacement parts, the durability of components, the finished size, and whether or not there is sufficient space in an exhibition for a particular exhibit. Also considered is the ability to adequately display the exhibit and store it when the exhibition is finished. The possibility of including it in a travelling exhibition for loan to other institutions or as part of the Learning Experiences Outside the Classroom programme, which is provided by the Institution with funding from the Ministry of Education. If an exhibit is on loan from another institution transport costs and repair of damage must be included in the budget for that exhibition. The Exhibit Technician constructs and maintains interactive exhibits on the floor of the science galleries in the Institution.



The objective of the informal discussions with staff of the Institution was to ensure the questions in the survey to Early Childhood Centres were relevant and appropriate and would inform future Institution and Early Childhood Centre staff practice. Discussions revealed the roles and responsibilities of the staff of the Institution. Informal discussions revealed factors which influence decisions made regarding which exhibitions and exhibits will be installed in the Institution by the Head of Education and Science Services and project teams. The considerations and constraints in this process were discussed. The Education Officers explained how they plan, publicise and deliver teacher previews, education programmes, and teacher resource packs. Talking with volunteers established who they are, why they have volunteered, what they perceive their role and responsibilities to be while they are in the Institution. These discussions also revealed the questions volunteers had about how to interact with young children in Kids Own. Discussions with the administration staff helped to establish what their responsibilities included, what records are kept, what they do when confirming a booking for an ECC group and how they communicate with Early Childhood Centre staff. Talking with the Exhibit Creators reported on where ideas for exhibits come from and the factors that influence the selection of exhibits for the Kids Own gallery.

#### **4.2. The Science Centre & Manawatu Museum Documents**

Documents published and/or compiled by staff of the Institution were sorted and catalogued according to their purpose for analysis. Documents referred to are in Appendix D.

Relevant points from the Statement of Intent policy document are that stimulating public interest in science and technology will be achieved by the Institution providing the best hands-on interactive science centre that resources will permit. It is also the intention to provide innovative and accessible opportunities for informal public learning and an education programme to compliment school curriculum goals. Another intention is to provide interactive learning opportunities, which will enhance scientific literacy.



The 1993 Education Policy of The Science Centre was developed by the Education Advisory Committee, which comprised of Science Centre education staff, local teachers, and Massey University and Palmerston North College of Education lecturers. The Education Policy was designed to provide a sound base for the science education activities of the Institution. The intention was that the aims and objectives of the document would be reflected in the planning, execution, evaluation and refinement of both the science exhibition and education programmes. The document defines general educational aims followed by more specific objectives divided into school education and general public education. The Education Policy (see Appendix D) states

*"The Science Centre in Palmerston North aims to make science accessible, enjoyable, and relevant to people of all ages, cultures, interests and abilities."*

School education aims, objectives and strategies in the Education Policy include: that the interactive exhibits will provide experiences to support classroom programmes; that the Institution will promote activities, exhibitions and interactive exhibits that meet the needs of specific groups of school visitors; that the Institution will communicate with educational institutions on a regular basis using various media as appropriate, and assemble and publish an annual guide to science and technology activities in the Institution to assist teacher planning. The Institution will offer choices in levels of staff support and resources for school visits and offer financial incentives to promote support and participation of teachers and parents during school visits. The general public education objectives in The Education Policy include: to find and then meet the needs of the community; to encourage family interaction in science settings; and to encourage the public to use The Science Centre as a learning resource.

There are 150 volunteers for the Institution. In the Volunteer Handbook of the Science Centre and Manawatu Museum (The Science Centre and Manawatu Museum, n.d.) the philosophy of the Volunteer policy for the Institution states

*"The volunteer programme will encourage interested members of the community to further the work of The Science Centre & Manawatu Museum." (p. 5)*

The philosophy statement is followed by a list of 10 ways in which it will be achieved. The handbook also contains procedures for volunteers when arriving, on duty, leaving and the emergency procedures at the Institution. As many employed staff are not in the Institution on the weekends there are 'Weekend Gallery Volunteer Guidelines' included in this handbook. The handbook contains a plan of the layout of the galleries' facilities and current exhibitions in the te Aweawe Complex.

The philosophy implied by the production and contents of the information handbook is that the volunteers are valued members of the team whose duties compliment but do not replace the paid staff in the presentation of programmes in the Institution. The volunteers are empowered through training to gain increased knowledge and understanding of exhibits and exhibitions which prepares them to be informed, effective and sensitive communicators who are often the front persons for the Institution.

Documents generated and held by the Institution include: a data base of local educational institutions; Lists of membership of The Science Centre Inc.; records of attendance at teacher previews and open days at the Institution; records of bookings made by educational groups for specific exhibitions and/or galleries.

Scrutiny of the mail-out list of 750 educational institutions in the catchment area of the Institution confirmed that 64 Early Childhood Centres have advertising material mailed to them. The records of those who hold school, family, and individual membership of the Science Centre Inc. confirmed that of the 34 institutions holding school membership in 1994 only 2 were ECCs. Records revealed that 18 ECCs had staff members attending teacher previews. Perusal of these records indicated the

ECC staff who had attended teacher previews for the Kids Own gallery and other exhibitions in Institution galleries. Records revealed 8,300 people attended open days with attendance free at the Institution on February 26th & 27th 1994 and 3,300 on February 26th 1995. Records confirmed that 38 different ECC groups had booked more than a single visit to the KO gallery since the official opening of The Science Centre & Manawatu Museum in February 1994. The Early Childhood Centre groups varied in size between as small as 5 children and 2 adults to 50 children and 25 adults. It should be noted that ECC groups do also visit spontaneously and therefore are not noted in the booking records. Comments in the visitors' book that refer to the exhibits in the Kids Own gallery were also noted. They were frequently congratulatory and occasionally expressed concern that no volunteer was in attendance or about an exhibit that 'was not working'.

Analysis of the information published by other science centres and the Institution about exhibits including descriptions of the interactive exhibits in all the galleries of the Institution and their labels were referred to. Decisions regarding labelling were influenced by providing sufficient information to stimulate visitors' curiosity but not so much information that visitors would not interact with the exhibit itself to explore their own ideas. Some exhibits had only a name label; others had comments under the headings 'Try this!' and 'So what?' No written rationale for any exhibit in KO could be found.

Material published to advertise the Institution, included cinema and newspaper advertising, flyers, and front desk handouts. These publications advertise accessible opportunities for the public to explore interactive science and technology exhibits. The advertisements give details about where the Institution is situated, when it is open, what it costs to visit, and what exhibitions are currently available. At the front desk were application forms for individual or family membership of The Science Centre Inc. and flyers about current exhibitions. Displayed on the front desk was a notice regarding unaccompanied children. It 'strongly encourages parents to accompany their children'. This notice continues by explaining the

problems with older children being left responsible for younger siblings and explains the role of volunteers as not being 'baby-sitters'. The concluding comment is about entry fees and family discounts via the City Council's Passport for Recreation Leisure and Education.

The "Te Huia" (the Institution's newsletter to members) is posted to members quarterly. This publication contains staff news appointments and resignations. It informs members about current exhibitions and the age group or level for whom they are most suitable. It contains reports from the Director's desk, the President of The Science Centre inc. and a 'Museletter' from the President of the Manawatu Museum Society. Advertisements for the 'Minds Eye' Gift gallery and 'Lufis' cafe in the complex are included.

Information posted to educational institutions is a way in which the Institution applies a strategy included in the Education Policy (See Appendix D). A way that "educational institutions are communicated with on a regular basis" is with information posted to educational institutions included on the data base. An example is a letter with the heading "A message to the principal" with details regarding school membership as a service for all educational institutions including ECCs. Another example is a form entitled "What Can the Science Centre Do For You? as a member school? all schools?; as teachers?; for your students?". The Institution "offers choices in levels of staff support" by explaining how a school group may be self-lead. A form entitled "Self Lead Programmes" has headings of "what are they?" "Why have them?" "What's the benefit?" and "How do I do it?". The Institution Education Policy states that it will: "assemble and publish an annual guide to science and technology activities". A sheet entitled "1995 Exhibitions at a glance" lists a month-by-month account of the exhibitions to be staged during the year, whom it is recommended the exhibition is most suitable for, and how it links to curriculum areas. The reverse side contains notes on exhibitions and programmes. Dates and times for upcoming teacher previews, special events, lectures and workshops are also publicised. A strategy to encourage specific

groups to visit states: “meet the needs of specific groups of school visitor and offer financial incentives to promote support and participation of teachers and parents during school visits”. The Institution applied this policy when ECCs received an additional flyer entitled “Kids Own 1995” explaining that children visiting this area in pre-booked groups pay only \$1 each and accompanying adults come free. These groups are self-lead with the help of a volunteer trained to assist in Kids Own. This flyer also describes some of the exhibits currently in the KO gallery for young children.

The Education Policy states that the aim of the Institution is to make science accessible to people of all ages, cultures, interests, and abilities. The strategies with regard to school education include: to promote exhibitions and exhibits that meet the needs of specific school groups; communicate with educational institutions; use various media (for example telephone, fax, e-mail, and/or a postal system), and to publish information to assist teacher planning. When a group has booked to visit the Institution they are sent a letter confirming their booking. It confirms the name of the group; age of those in the group; date, time and programme they are to visit; estimated numbers in the group; if it is to be self-lead; and cost per person. This booking confirmation recommends a ratio of 1 adult to 4 children for early childhood and junior primary age, and 1:10 for other age groups. A map of the complex is included and contact phone number for any further information. Those booked for the Kids Own gallery are also sent a copy of a flyer entitled “Self lead in Kids Own Handy Hints for Having a Great Time” (see Appendix D). This flyer contains a brief explanation of the term ‘self lead’, and some suggestions to help visitors get the most from their visit. The flyer describes what an adult might do with and tell children about the exhibits. Suggestions are included for the type of question adults could ask children and how they might encourage the children’s interactions with each exhibit.

The Statement of Intent informs us of policy and practice in the Institution. The Education Policy serves as a guide to the staff of the Institution on why exhibits

and exhibitions will be available in the Institution. It confirms that programmes will be delivered and by whom. The publication of a Volunteer Handbook (The Science Centre and Manawatu Museum, n.d.) confirms the roles and responsibilities of staff and volunteers and gives an indication of how important and valuable the work of the volunteers is in the day-to-day running of the Institution. Many of the documents generated by the Institution are intended to publicise the existence of, and activities in, the Institution and are interpretations of the policies that require communication with the general public and educational institutions. Information gathered from discussion with the staff, documents, analysis and observation of the Institution were referred to, to develop an outline of questions to be asked in the ECC survey.

### **4.3 Early Childhood Centre Survey Results**

The results of the survey by questionnaire are reported here. 65 ECCs returned a completed questionnaire. Section 1 of the questionnaire results provides a detailed description of the characteristics of the study participants and confirmed which early childhood services have visited the Kids Own gallery. Section 2 explains which Science Centre & Manawatu Museum policy, planning, and management goals and strategies have been effective in communicating with ECC staff. Section 3 responses revealed how ECC staff organise visits to KO. Section 4 reports staff experiences and perceptions of the visits they have made with children to KO. Staff explained why they take children to Kids Own.

#### **4.3.1 Characteristics of study participants**

Types of Early Childhood Centres, the numbers and ages of children enrolled in the Centres, and the training and science background of staff in the Early Childhood Centres that returned a completed questionnaire are described in this section. The ages of children for whom these Centres were licensed at any one time are represented in Table 4.1. The vast majority of children for whom the Centres were licensed were over two years old. Only 15% of these children were under two years old and no under two year olds attend kindergartens.

Table 4.1

## Number and Age of Children for Whom Centres are Licensed

Early Childhood Centre Type	Age of children		Number of Centres (N)
	under 2 years (N)	over 2 years (N)	
Kindergarten	0	935	22
Playcentre	118	306	15
Kohanga Reo	67	217	10
Childcare Centres	89	517	18
Total	274	1975	65

**4.3.2 Profile of staff in participating Early Childhood Centres**

Gender, training, qualifications and science background are reported for staff of participating Centres.

**(i) gender and training of Centre staff**

The training of female staff is reported in Table 4.2. Almost all staff in kindergartens were fully trained whereas in other types of Centres a number of staff were in training and untrained. There were no trained male staff in any centres but 70 playcentre fathers were reported as untrained male staff at their children's playcentre.



Table 4.2

Training of Female and Male Staff Employed in Centres

	Kindergarten		Playcentre		Childcare		Kohanga Reo		Total	
	f	m	f	m	f	m	f	m	f	m
	(N)	(N)	(N)	(N)	(N)	(N)	(N)	(N)	(N)	(N)
Trained	62	0	20	0	67	0	16	0	165	0
In-training	0	0	53	0	36	0	7	1	97	1
Untrained	3	0	79	70	12	0	14	7	108	77
Total staff	65	0	152	70	115	0	37	8	369	78

(ii) science background of Centre staff

Because of its possible relevance to staff interest in The Science Centre & Manawatu Museum, the previous secondary and tertiary science education of staff, other than those in Playcentres, is reported. Playcentre respondents considered it inappropriate and difficult to obtain this information from parents who are all considered staff at their playcentre.

*Question 4 on school qualifications was just TOO hard - 35 families - I know we have nurses, a seed technician, refrigeration engineer, air traffic controller amongst our parents, but other parents are not literate in the English language. It would be very unfair to ask them to divulge their educational background (226).*

Table 4.3 gives an overview of the level of secondary and tertiary science studied by the Early Childhood Centre staff, excluding the playcentre ‘parents’.

Table 4.3

## Secondary and Tertiary Science Background of Centre Staff

Centre Type	Form 4 (N)	Form 5 (N)	Form 6 (N)	Form 7 (N)	Tertiary (N)
Kindergarten	123	114	71	133	126
Kohanga Reo	53	42	55	59	73
Childcare	91	66	88	127	118
Total	267	222	214	319	317

The science subjects studied at Form 6 were physics, chemistry, mathematics, geography and biology. Only 11 staff indicated they had studied physics in the 6th form. At Form 7 physics, chemistry, biology, mathematics and geography were studied. Only 5 staff indicated they had studied physics in the 7th form. The science subjects studied at tertiary level were physics; biology, chemistry, maths, geography, zoology, botany, food and nutrition, food science and food biochemistry, Science Part A (PNTC), science in the environment, 1 to intermediate level (unspecified), psychology and sociology, medical training, nursing, microbiology and biochemistry. Of the 225 non-playcentre ECC staff who responded only 1 person indicated she had studied physics at a tertiary level.

Table 4.4 shows that 145 of the 263 trained staff and staff in training (55%) had a compulsory science component in their training for an early childhood qualification.

Table 4.4

## Science Studied by Staff for an Early Childhood Qualification

	trained staff	staff in training	all staff
no science	39	17	56
compulsory science courses	114	31	145
no response	12	50	62
Total	165	98	263

Staff reported topics that were addressed during this training for an ECE qualification as including: general science in ECE; environmental, biological, natural, and physical science. Several others indicated the science component in their training had been a 50 hour course entitled 'Exploring Experimenting and Thinking'. These studies included as a set text a book called Challenges For Children Discovering Science Together (Crabtree, 1982) published by the New Zealand Playcentre Association. Staff had also attended workshops entitled 'Science Investigation or Exploration and Sensory Experiences for Young Children.'

One third of the staff in this sample indicated they had attended science workshops or in-service courses for their continued professional development. The topics which staff studied at science workshops or in-service courses included: physical and natural science; environmental science; exploring how things work; science experiments for young children in Early Childhood Centres; making science fun; and living in the physical world. Some staff named specific workshops about insects, electricity and magnets for pre-schoolers, pets in kindergarten, rocks and

crystals, and Challenges For Children (Crabtree, 1982). Some staff suggested they had visited the Institution as a science workshop or in-service course.

#### **4.3.3 Previous contact by Early Childhood Centre staff with the Institution**

Having established the background knowledge, strengths and interests of ECC staff in science and technology, section 2 of the questionnaire asked staff how they had first heard about the Kids Own gallery in The Science Centre & Manawatu Museum. The percentage of ECC staff who have heard of, and how they have heard about, the Institution is reported, as is membership of The Science Centre Inc. The occasions when ECC staff have visited the Institution with or without children are reported. The other galleries in the Institution that have been visited by Early Childhood Centres are also recorded.

Of the Early Childhood Centre staff participating in the study 88% had become aware of the existence of the Kids Own gallery in a variety of ways: 86% had heard by word of mouth, while 77% had seen a flyer from the Institution. This suggests that the strategy of mailing flyers directly to educational institutions is effective in communicating information about the Institution to many staff in Early Childhood Centres.

Of the 447 staff who responded to this survey only 13 ECC staff held individual or family membership of The Science Centre Inc. Responses from 8 centres indicated that they are member schools of The Science Centre Inc. Institution records show only 3 ECC hold school membership, so it is therefore reasonable to suggest that these staff respondents misinterpreted the question.

Amongst staff who had visited KO 75% had visited with an Early Childhood Centre group, and 69% had also visited as a member of the public. These figures

suggest respondents considered the Institution a worthwhile place for them to visit independently from their role as an ECC staff member, as well as in that capacity.

When asked to name the exhibitions and galleries their Centre had visited in the Institution, 10% of centres had only visited the KO gallery. A quarter of the respondents had visited the Kids Own gallery, free museum galleries and paid to visit other science galleries and as well. Figure 4.5 reports participants' uptake of visits to the Institution.

Table 4.5

Participants' Uptake of The Science Centre & Manawatu Museum

Galleries Visited	Participants	
	(N)	%
Kids Own gallery only	7	10
Kids Own, Science and Museum galleries	16	25
Kids Own and Science galleries	13	20
Kids Own and Museum galleries	11	17
Science and Museum galleries	3	5
No Institution galleries	15	23
Total	65	100

#### 4.3.4 The Early Childhood Centres that visited Kids Own

Table 4.6 provides a breakdown of how many Centres, by type of service delivery, have visited the Kids Own gallery. The results show that 72% of the participating Centres have taken a group of young children to KO. More kindergarten groups made visits to KO than any other ECC group in the sample.

Table 4.6

Proportion of Centres That Visited Kids Own

Early Childhood Centre	All	Visited Kids Own	
	(N)	(N)	%
Kindergarten	22	19	86
Playcentre	15	10	67
Kohanga Reo	10	7	70
Childcare Centre	18	11	61
Total	65	47	72

**4.3.5 Reasons why Early Childhood Centres visit Kids Own**

When asked to explain as fully as possible why they had decided to go or not to go to the KO gallery 65 participants wrote a total of 125 responses. Almost half of all responses discussed how a visit to KO provided an educational opportunity for the children and adults in their Early Childhood Centre. The responses are grouped into seven categories in table 4.7, and these are discussed below.

Table 4.7

## Reasons Why Centres Have or Have Not Visited Kids Own

Reasons to Visit Or not to visit	Responses (N)
Visit Provided Educational Opportunity	56
Money Matters	15
Reasons dependent on what ECC staff know about KO	13
Reasons why ECC did not visit KO	11
Because KO is Appropriate for ECC groups	11
Because KO is Accessible and Available to ECC Groups	10
General Comments	9
Total	125

Fifty-six responses indicated early childhood educators considered that a visit to the exhibits in KO provided an educational opportunity for young children. Some Centres indicated that they considered that KO provides an educational environment suitable for young children with a variety or range of hands-on science experiences not available in their Centres. Centres used exhibits in KO to extend the range of science experiences their Centre could provide for the children, which were linked with the programme in their Centre. Some kohanga reos made their visit to KO an opportunity to use language resources in a different environment. An Early Childhood Centre staff member considered a visit to KO “stimulates good parent/teacher relationships within the kindergarten and on trips” (180), and another had visited KO because they wanted to “increase awareness of parents and children to this facility” (218). A childcare centre staff member wanted to “inform staff members about what learning experiences were available there” (464). Respondents wrote that they wanted to “show we value the city’s



resources" (168) and to "access community resources for our learning" (213). Other reasons why Centres had visited Kids Own were because previous trips had been enjoyed and were successful. Staff had heard reports about successful trips to KO from other staff or seen advertising about an exhibition, the 'Te Huia' newsletter or flyer and said Kids Own sounded fun, exciting, or interesting.

Fifteen responses indicated ECC staff considered money factors influenced whether or not their Centre visited KO. Many Centres consider the entry fee reasonable to visit Kids Own and that the group discount "allowed children who would not normally get to go, to go" (174). Some Centres felt that the families in their community were unable to afford the cost of travel plus the entrance fee to KO: "because of the cost of travel plus the added cost of the visit we are in a very low socio-economic area and money is very tight" (175).

The participants' response to a reduced entry charge for pre-booked groups visiting KO show that 51% of staff considered the reduced fee an incentive. A significant 34% indicated they did not know about this reduced entry charge to KO. This would suggest that more publicity to ECC staff about this reduced charge for pre-booked ECC groups is necessary.

Thirteen responses suggested that the Institution could increase awareness amongst Centre staff and parents about what the facility offers for Early Childhood Centre groups as some staff indicated they were unaware of the suitability of exhibits in KO for young children and more specifically a kohanga reo staff member wrote "as it is not Maori oriented we didn't think it would benefit Kohanga children" (394). A playcentre said they had visited KO because a parent suggested and/or organised the visit, and they wrote "parents learn with children in a safe, supported and stimulating environment" (230). This response could be used to promote the KO gallery to all parents of young children.

Reasons why ECC had not visited KO included that there was no parent help available to accompany the group or “insufficient staff to maintain adult/child ratio in and out of Centre” (447). Some out-of-town Centres felt it was “too great a distance to travel from Centre during a session” (217) and Centres dependent on private transport had insufficient car restraints for children to enable every child to attend. One childcare respondent explained a visit to KO was “not possible since crèche is only attended by casual visitors occasionally and all children on the roll are under 3 years old” (445). These reasons are beyond the control or jurisdiction of the Institution.

Eleven responses indicated early childhood educators considered a visit to the exhibits in the KO gallery was appropriate for young children from Early Childhood Centres. Respondents considered KO an appropriate excursion destination for a group of children of mixed ages and that the gallery could cater to small or large sized groups, including caregivers, and is easy for supervision purposes. Some respondents wrote it is a gallery that provides “fun in an educational and safe environment” (181). Staff appreciated that children are allowed to touch the exhibits in KO and that the exhibits are interesting for the children. The researcher had anticipated that the appropriateness of the exhibits would be an issue for ECC staff and in section 4 of the questionnaire they were asked to assess how appropriate they considered the exhibits in Kids Own to be for children under 2 years old, over 2 years old, girls, boys, children with STN, Maori and European children. Results show that 36% of exhibits were considered by staff to be appropriate for children under 2 years of age. This question was not applicable for a large number of staff employed in ECCs that are not licensed to cater for under 2-year-old children in their Centre. Over 76% of staff considered all/most or many exhibits were appropriate for children over 2 years of age.

Staff did not consider that the exhibits were more appropriate for girls than boys, as many staff made an identical response to the questions regarding appropriateness of exhibits for girls and boys. One Centre added the comment that

they considered “the exhibits have no bearing on what gender the children are, as there are no roles implied” (168). Over 30% of staff suggested that some of the exhibits were appropriate for children with special teaching needs. Over 30% offered no response when asked to assess exhibit appropriateness for STN children because they had no such children on their roll. Over 47% of staff considered most of the exhibits were appropriate for Maori children. Over 20% of staff offered no response to this question as they considered they were not qualified to comment. One Centre considered that the exhibits are “not culturally offensive but neither are they specifically appropriate” (389). Over 60% of staff considered most of the exhibits were appropriate for European children. Some centres commented that they considered the exhibits were appropriate for all children.

Ten responses indicated Early Childhood Centre staff considered a visit to the KO gallery because “It was accessible and available at a time which fitted with our needs” (446) and “In winter it is a warm dry place to visit” (226).

#### **4.3.6 Organisation of visits to Kids Own**

In this section the results are reported from the staff of the 47 Early Childhood Centres that indicated they had visited KO. The responses from section 3 of the questionnaire answered the research question that asked how ECC staff organise visits to KO.

##### **(i) staff planning of the excursion**

Staff were asked about the planning that occurred before their excursion to KO. Centres could provide more than one response and 43 Centres offered 90 responses regarding pre-visit planning. These responses have been sorted into 3 groups as reported in Table 4.8. Examples of responses in each group are discussed.

Table 4.8

Nature of Staff Planning of a Visit to Kids Own

Category of Staff Planning	frequency (N)
Programme planning	46
Administration	30
Housekeeping	14
Total	90

The largest number of responses, 46, to this question referred to planning that concerned the curriculum or programme in the Early Childhood Centre. Responses from all types of early childhood service indicated the excursion to Kids Own was planned by all the staff during a weekly staff meeting, or planned with parents at a programme planning meeting, or planned and discussed with the children during a session. During the planning session, staff considered the individual needs of children, and used the excursion as an opportunity for child peers to share in the occasion. Staff discussed who (of the children on the roll) would most benefit from a visit to KO. Kohanga reo and kindergarten staff also decided who would attend the visit including children, staff and other adults.

During planning some kohanga reo kaiako made a pre-visit check of the KO gallery, and they also discussed who would translate labels and instructions about the gallery from English to Maori, and decided who would talk in Maori to the children when they were in KO. Playcentre responses indicated that their parents planned to talk to children to prepare them for the visit, they gathered books and resources, and borrowed equipment from the Institution to support and link their

programme with the experiences available in KO. During the planning session staff discussed what the children might learn and see at KO. Staff from one group “waited for teachable moments and spontaneous happenings to occur during the excursion” (174). Some Centres suggested they planned the visit to link with and offer an extension to the science and technology in their Centre’s programme. One Centre mentioned that by going to the Kids Own gallery the staff could achieve the goal they wanted, which was “to get out into the community” (181), as a response to the Te Whaariki Early Childhood Curriculum Strand 2 (of Belonging), Goal 1: Connecting links with the family and the wider world are affirmed and extended (Ministry of Education, 1996; see also Appendix L). Responses indicated that staff were not only involved in planning before the visit, but also planned post-visit follow-up on children's interests and follow up evaluation and planning for sessions in the ECC following the excursion.

Responses in this category suggest that ECC staff consider a visit to the Kids Own gallery will allow them to provide an experience which extends the science and technology programme existing in the ECC, meet individual children’s needs, and use the opportunity the gallery provides for peers to scaffold one another's learning, therefore meeting Te Whaariki Early Childhood Curriculum strands in contribution and exploration (Ministry of Education, 1996).

An essential part of planning any excursion away from the Early Childhood Centre is attending to the administrative details. Thirty responses regarding staff planning of a visit to Kids Own were concerned with administrative details like deciding what day and what time they would go, pre-booking the visit to KO, informing parents via a newsletter home or on a Centre noticeboard. Kohanga reo planning focused on administration details for the visit. Kindergartens belonging to the Ruahine Kindergarten Association (RKA) are required to inform the administrative executive when they are leaving the Centre on an excursion. For many Early Childhood Centres other administrative details include requesting parental consent, collecting the entry fee from families, and organising transport by booking a bus or

requesting private cars to transport the group. Since the legal requirement is for one adult for every four children during an excursion the staff planning in many Centres involves requesting parent help and organising who goes with whom, and how many children each adult can safely transport and be responsible for.

Fourteen respondents included in their planning general housekeeping plans like ensuring the children in the group had name-tags, or they took morning tea, toilet paper, spare clothes, and a first aid kit. The groups which included these factors in their planning list were all visiting KO from outside Palmerston North and visiting in large groups that included all the children on the roll and used a big bus as transport. These groups from Early Childhood Centres were on their annual major excursion. Only 2 ECCs indicated they did no planning for a trip to KO.

Most Early Childhood Centres spend a considerable amount of time planning an excursion out of the Centre and many will document the aims and goals for a visit and evaluate the outcomes. Staff planned to link the experiences children have outside the Centre with the strengths and interests of children and or the core curriculum of the ECC.

#### **(ii) additional adults attending the excursion**

To maintain a legal and/or desired adult-child ratio for an excursion many Centres requested additional adults who were not employed in the Centre to accompany the group on their excursion. Staff could nominate more than one way in which additional adults were included in an excursion. Responses show that parents and caregivers were very willing to accompany their child's Early Childhood Centre group on a visit to KO. More than half of the responses indicated that additional adults volunteered to attend an excursion to KO. A quarter of the Centres included additional adults in the excursion by invitation. Under 10% of Centres used a roster system to ensure they had sufficient adults to run the excursion. Two playcentre

responses noted that it was a standard requirement in the playcentre movement that parents be responsible for their own children on excursions.

Because many Centres do include additional adults when going on an excursion outside the Centre, and because the quality of the interactions between adults and children will affect everyone’s experiences in KO, respondents were asked what information they shared with the additional adults before they left their ECC. Table 4.9 shows that 36 Centres offered 73 statements about what information they shared with adults before going to Kids Own. Not all of the playcentres wrote responses to this question as some did not consider they were taking additional adults, and they did not formally discuss how they would interact with the children while in KO. The 3 categories of responses are discussed.

Table 4.9

Pre-Visit Discussion with Adults About Their Role in Kids Own

Ways of preparing adults	frequency (N)
Intended educational purpose revealed	33
Housekeeping instructions	28
Few instructions	12
Total	73

33 statements indicated that staff told additional adults about their role while in the Kids Own gallery. The information they shared informed these adults about what the Centre staff intended the children to gain from the visit. Adults were given guidelines on how to interact with the children they were with during the



excursion. Some staff used the flyer posted to them with confirmation of their booking for KO (Refer Appendix D), to inform adults what to do and how to make the most of the visit for the children. Many responses provided examples of verbal suggestions made to the adults by staff about how adults should talk to children during the visit. For example: adults to talk to children about what they were doing; adults to encourage children to ask questions to extend learning; adults should optimise the experience for children by using open questions and lots of language to increase children's vocabulary; adults should listen to children's questions and observe the actions children have initiated, then stimulate their thinking through discussion about what they are doing.

The kohanga reo kaiako wanted to ensure adults used the Maori vocabulary lists provided and didn't speak English to the children while on the excursion. One kohanga reo response stated: "explained the aim of the Kaupapa to the additional adults attending the visit" (396). Suggestions were made regarding how adults should interact with the children on the visit, for example: to be interactive with the children; encourage children's participation to try activities and explore the gallery; don't show children how to explore the exhibits. Adults with kindergarten and kohanga reo children were instructed to work alongside and help children with hands-on activities where necessary; to help, support, and encourage children to try as many experiments as possible; to walk their way through problem solving; to participate, have fun and get involved.

Staff from all types of ECC gave very specific housekeeping-type instructions to their adult helpers. For example: adult responsibility explained; adults to supervise children; who they (the adults) were in charge of; each adult given 2-3 children to care for; safety of children; adults were responsible for their own children; parents would be required to assist where necessary; be respectful of property/the environment. Some Centres gave each additional adult a handout that informed them about the number and names of children and items on view. Adults with kindergarten and kohanga reo groups were instructed to answer children's

questions and make sure they take turns. One Centre wrote that they “highlighted safety and management when preparing adults for the visit” (187).

Six respondents indicated they gave few instructions to additional adults about their role while in Kids Own. For example, responses included: enjoy yourselves; have fun; adults to join in. Although these comments do not inform adults about their role, they do suggest that adults should enjoy the excursion which may allow them to provide a positive role model, one who shares with the children an interest in and enthusiasm for the science exhibits in KO. Two kindergarten responses made comments that suggest they had evaluated what was shared with adults before a previous trip and felt they would do things differently next time, ie. did not prepare adults well enough for supervising children. One Centre implied that it was unnecessary for them to instruct adults in their role as “they are experienced in using Kids Own” (168). Five Centres wrote that they did not talk with the adults about their role while they were in Kids Own with the children. ECC staff advised adults accompanying the group to KO about how they could talk to children concerning what they are doing, the questions they could ask, and how they could respond to children’s questions. Adults were advised about their role in KO and how they could interact with children and the exhibits while in the gallery. Some organisers gave the adults printed information about the exhibits in KO and many organisers advised the adults to have fun and get involved.

### **(iii) preparing children for the excursion**

Of the 47 Centres that have visited Kids Own 41 Centres offered 80 statements about what they told children before they visited Kids Own. Responses have been sorted into 3 categories that are reported in Table 4.10 and discussed.

Table 4.10

## Pre-Visit Discussion with Children About Kids Own

Ways of preparing children	frequency (N)
Advance organisers	52
No instructions	14
Limiting instructions	14
Total	80

To help a child cue in to the potential learning in a visit to the exhibits in KO some teachers will tell the children what they will see, be able to do, and that they will be expected to talk about their experiences when they return to the ECC. As one Centre response explained, with young children the staff have to decide how the children can best be prepared for an excursion. One Centre wrote,

*“on our last trip we told the children very little. We told them on the day that it would occur (some had heard from parents) and that we would all go together, with some of the parents, all stay together, and that there would be things to see and something for everyone to do. We have one or two children with behaviour difficulties. Anything out of the ordinary, particularly anything anticipated, could cause them to be very silly and disruptive and to spoil others' enjoyment. We either prepare for the out-of-the-way by building up to it over weeks, or we try to do things with no prior notice. The outing went very well; everyone was fine, and loved the surprise” (462)*

Fifty-two responses to this questionnaire suggest that early childhood educators from all service deliveries are using advance organisers to prepare their children before they go on an excursion to the Kids Own gallery. Examples of how educators prepare young children included: telling the children how they were travelling/who they were travelling with; who was going; where they were going;

what they might see and do; what they would experience; that they would have lots of investigating; staff shared information about activities available. Children were told to listen and to respect equipment. Previous visits were discussed eg. “general discussion but mainly waited for hands-on experience” (398). An ECC staff member, knowing the anxiety of some children in her group “described briefly the cave because of expressed fears of the dark” (187). Other ECC staff told children “the adult you are with is there to help you in any way” (179), and “you are allowed to touch and try all the different activities” (238). In one ECC children are “Expected to recall their experiences for their peers back in the Early Childhood Centre” (180).

Fourteen responses indicated they did not tell the children about the excursion. Examples of these responses are: nothing; we left it as a surprise; left it to the parents; left the children to discover for themselves; only mentioned Science Centre. The term ‘Science Centre’ was the way most staff referred to the Institution which may be as a result of many ECC having visited the Science Centre science galleries on the same site before the te Aweawe complex was constructed to house The Science Centre & Manawatu Museum. The intention implied in some responses from playcentres and kohanga reos was that the visit to KO was a treat, a surprise, or a discovery experience rather than planned as an opportunity for science education.

Ten respondents reported giving the children instructions that might limit their exploration of the gallery or focus their attention on how to behave in public as part of their group. Children were told to wait for an adult caregiver; behave/do not touch; ground rules were explained; information given concentrated on the bus trip and general preparation focusing on administrative & practical details; to go to the toilet (before leaving ECC).

**(iv) educational factors considered by staff organising the excursion**

Many Centres obtain further information from The Science Centre & Manawatu Museum before taking a group of children on a visit to Kids Own. 40 of the 47 Centres who had visited KO reported that Centre staff had obtained further information from the Institution by telephone when they booked their visit. 38 of the 47 ECC pre-booked their visit to KO. Three quarters of the respondents said that knowledge about the exhibits does influence their decision to take young children to KO.

Administrative factors including arranging the time and duration of the visit and organising transport to and from KO all need to be attended to before a visit takes place. Most (83%) groups visited KO between 9.00 a.m. and 12 noon. Although the Institution is advertised as being open at 10.00 a.m., some groups arrange to visit at 9.00 a.m. Most groups spend approximately one hour in KO. When organising the visit staff usually allow 45 minutes either side of the visit to match parents and children and arrange transport to the venue. A 60 minute excursion fits very neatly into this schedule. For those using the free transport service for 8 children and 2 adults provided in the McDonalds Burger Buggy, one hour is the usual length of time between pick-up and return to the ECC. Over a third of Early Childhood Centre groups use private vehicles to travel to and from their Centre to KO.

**(v) non-educational factors considered by staff organising the excursion**

Centre staff were asked to indicate any factors (apart from the educational purpose) which influenced their decision to visit KO, for example transport and available adults. There were numerous factors mentioned as 41 Centres offered 100 statements regarding factors that influence their decision to visit KO. Refer to Table 4.11. for information on these factors, which are also discussed below.

Table 4.11

Non-Educational Factors Which Influenced Staff Decision to Visit Kids Own

Non-educational factors	Number of Statements (N)
Factors affected by provision of KO	38
Factors particular to ECCs	52
Factors not relevant to KO	10
Total	100

Staff responded with 38 statements about factors that did and can influence who goes to KO. Centres indicated factors supposedly separate from the educational purpose. However comments referred to the provision of hands-on exhibits which are appropriate for a young age group that KO caters for the specific interests of children, and provides a safe space where children are allowed to touch, enjoy and otherwise interact with the exhibits. One Centre used the visit to KO to meet the “particular needs of a disabled child”(187) another for an “opportunity to provide parent education” (182). Although the staff suggested that these points did not contribute to the educational purpose it could be argued that these factors have a strong influence on education. If children are encouraged to have fun while they explore a safe and challenging environment with developmentally appropriate interactive exhibits there is potential science learning to be gained from their experiences in this informal science environment. How effectively the opportunity is utilised is dependant upon the awareness of accompanying adults of the potential learning for young children.

Staff comment on KO as being “a building suitable for flexible numbers of visitors” (181) and meeting the “needs of children for a large but confined space” (180), with “room for whole group or children could go off in small groups with their adult” (446). Some Centres appreciated the “ability of venue to cater for large (bus load ) of visitors” (173). Kindergarten staff and kohanga reo kaiako wrote that it (KO) is an indoor facility not dependent on weather therefore good for rainy winter days. A number of kindergartens considered the reasonable entry cost and the group discount being factors that influenced their decision to visit the KO gallery. Factors regarding opening hours and the provision of “parking close-by” (454) to the venue were also mentioned. Some Centres referred to the memory of previous successful visits or that they had heard about the gallery which sounded exciting and challenging, others valued “having a volunteer available on site” (171) and having “a relaxed supervision atmosphere” (446).

Fifty-two statements were made about factors that are particular to the Early Childhood Centre, for example, how an excursion fitted into the Centre long term programme plan, or met with the particular interests of staff members “3 staff members have a strong interest in science for children” (168). The location, clientele, and socio-economic class represented in the community of the ECC also influence parents’ response. Playcentre staff members consider the interest and support of parents essential because a visit requires a high adult/child ratio to be successful. A number of Centres were concerned about the ability to maintain staff/child ratio in ECC and also on the trip. One third of the kindergarten responses stated that the decision to visit KO was dependent on if there were parents/caregivers to accompany the group. A number of Centres suggested the distance to travel plus the availability and cost of transport were factors that influenced their decision to visit KO. Eight Centres explained that they utilised the free transport available in the McDonalds Burger Buggy, while some childcare and kohanga reo staff members used their own Centre minibus. A further factor which Centre staff mentioned was the ability of the Centre to subsidise entry cost to Kids Own.



**(vi) composition of Centre groups who visit Kids Own**

The composition of Early Childhood Centre groups visiting KO most often involves children over 2 years of age. This statistic may be explained by the high number of kindergartens that only have over 2-year-old children enrolled and because no childcare centres took children under 2 years of age to KO. In one third of the visiting groups there were equal numbers of girls and boys visiting KO; this reflects the equal proportions of girls and boys enrolled in the Centres. It also confirms that ECC staff are not selecting more girls or boys to visit KO. Generally far fewer men than women accompanied groups on their visit. 25 Centres had no men accompany them on their visit to KO. As no Early Childhood Centre has trained male staff and one kohanga reo has one male in training to be a kaiako there appear to be few males available to accompany Centre groups.

**4.3.7 Staff perceptions of visits to Kids Own**

Staff perceptions from the visits they have made with young children to the KO gallery are reported in this section. Staff perceptions regarding the most popular KO exhibits, and their evaluation of physical accessibility, visual appeal, intellectual challenge and need for adult interpretation of KO exhibits are discussed. ECC staff commented on the helpfulness of volunteers and how they believe children benefit from a visit to KO.

**(i) the five most popular Kids Own exhibits**

ECC staff were asked to nominate the 5 exhibits which the children spent the most time with during their last visit to KO. Since only some of the 14 exhibits listed on the questionnaire have been available throughout the 18 months since the Institution was opened this response can only be considered indicative of the exhibits which are most memorable for Centre staff from their visit to the gallery. Table 4.12 shows that the Kids Cave, Shadow Catcher, UV Room, the Grain Pit, Needle Pictures and Trust your Touch exhibits received the highest number of nominations for most popular exhibits. Appendix A contains a description of the KO gallery exhibits. All of these exhibits except the Grain Pit have been available in

the KO gallery since it opened in February 1994. The Grain Pit was nominated the 4th most popular exhibit and had only been available in the gallery from February to August 1995.

Table 4.12

## The Five Most Popular Exhibits in Kids Own

Exhibit	frequency	
	(N)	(%)
Kids Cave	41	<b>19.9=1st</b>
Shadow Catcher Room	34	<b>16.5=2nd</b>
Glow in the Dark Room	32	<b>15.5=3rd</b>
Grain Pit	22	<b>10.6=4th</b>
Needle Pictures	15	<b>7.3=5th</b>
Trust your Touch	15	<b>7.3=5th</b>
Klingons	12	5.8
Paddle Sound Tubes	11	5.3
Roll-a-Ball	6	2.9
Tabletop activities	3	1.5
Building modules	3	1.5
Stick-EEs	3	1.5
Humdingers	3	1.5
Holograms	3	1.5
Fish tank	2	0.9
more than 5 exhibits ticked	1	0.5
Total responses	206	100.0

**(ii) staff evaluation of Kids Own exhibits**

Respondents were invited to evaluate the effectiveness of the Kids Own gallery exhibits to meet the stated goal of the education policy for the Institution which reads “to make science accessible, enjoyable, and relevant to people of all ages, cultures, interests, and abilities” (see Appendix D). Exhibits in KO are designed by the exhibit creators to be appropriate for young children. Over 89% of the ECC staff felt that most of the exhibits were physically accessible for young children and 87% considered most of the exhibits in KO visually appealing for young children. Over 82% of respondents indicated that most of the exhibits were intellectually challenging for young children. However almost half of the responses considered that some of the exhibits needed adult interpretation to be explored by young children.

**(iii) staff evaluation of volunteers**

The Early Childhood Centre groups who had a volunteer available when they visited KO were asked ‘how did the volunteer help your group?’. Of the 47 Centres who had visited Kids Own 14 did not have a volunteer accompany their group. 33 Centres offered 53 responses about how volunteers interacted with their ECC group as reported in Table 4.13

Table 4.13

Ways That Volunteers Helped Visiting ECC Groups

Volunteer Help	frequency (N)
When Volunteers Were Helpful	34
When Volunteers Were Not Helpful	19
Total	53

There were 34 responses that provided examples of how volunteers were helpful to early childhood groups visiting KO. Staff found the volunteers to be friendly, talkative, cheerful and informative and appreciated that they gave a brief outline of the available activities. Staff found volunteers “offered help and advice when needed” (165), and “were available to answer questions” (178). The kohanga reo groups found volunteers who provided “an explanation in Maori very helpful” (399). One response suggested that the “expertise of volunteers was welcome and respected” (232). Staff found some volunteers to be “extremely helpful but not intrusive” (229) and appreciated the way volunteers were helpful “by easing themselves into the group so children and adults felt comfortable with them and would ask them questions” (232). Volunteers were helpful when they got down to children’s height, explained at children’s level and encouraged children to use the equipment. Further examples supplied included volunteers talking to children about what was happening on the Grain Pit and explaining how to use some of the features. Volunteers supervised and encouraged children to go into Kids Cave and made it accessible for some children by turning on the light and talking them through the very dark tunnel.

Volunteers were also helpful to staff when they pointed out things they were unaware of, and when they talked to everyone about safety and general housekeeping. Practical help was offered when volunteers showed visitors where the emergency exit was for the Kids Cave and requested everyone who went into the cave to remove their shoes so-as not to kick anyone crawling along behind them. Volunteers also helped staff by lifting children up so they could reach high activities. One group member appreciated that the volunteer “discouraged people [older children] not connected with our group from interrupting the children’s activities” (230).

#### **(iv) staff perceptions of benefits to young children visiting Kids Own**

Forty-three Centres provided 98 statements about ways in which they believe children, parents and staff from Early Childhood Centres benefit from a visit to

Kids Own. Almost half of these statements suggest staff perceive children benefit from the opportunity children have to experience new ideas outside the Early Childhood Centre. Statements made are grouped under 5 headings and reported in Table 4.14

Table 4.14  
How Children Benefit From a Visit to Kids Own

Statement	Frequency (N)
Opportunity for new ideas and experiences	46
Positive Learning Environment	18
Hands On Exhibits Suitable for Young Children	16
Opportunity for social interaction	12
Other Comments	6
Total statements	98

Almost half of all responses to this question suggest that staff felt children benefit from a visit to Kids Own because it contains many opportunities to stimulate new ideas and provide different experiences for young children. A respondent wrote “They gain new knowledge and understanding of how things work in this world and are given opportunities to explore things related to the various schemas they are currently working on” (230). A number of respondents believe children benefit from the many problem-solving opportunities in KO, where children are challenged intellectually and physically (218). Some respondents emphasised that in KO children are given the opportunity to use and experience things they have not had the opportunity to use before in activities, which could not easily be duplicated at home or in the Early Childhood Centre. Others felt children benefit because the visit allows staff to tap a “hands-on extension to our programme” (232). This

comment was reinforced by another that stated “children took idea of shadows back to kindergarten and did follow-up shadow experiments there” (184). Comments mentioned the fact that the visit to Kids Own provided a first time experience for many children with “a new challenge for children with obstacles they had not seen” (397), “The ‘cave’ was a first for many children” (180), “stimulated their imagination, with new experiences and new vocabulary” (179), and “allowed children to explore and experiment with the equipment in a variety of ‘hands-on activities which get them thinking and help them to consolidate their ideas” (187).

Eighteen statements suggested children benefit from a visit to Kids Own because it is a positive learning environment for young children. A number of the responses suggested that educators believe the visit was an enjoyable and positive experience for young children. “Children enjoyed the visit and wanted to return or remain” (238). Children had fun; they could gain confidence and control of their body in Kids Cave while in a safe environment. One ECC identified that the children of their Centre would benefit through the adults in their group becoming aware “of a wide range of science ideas to share with children” (187), by making parents aware of this facility where adults learn alongside children.

Sixteen responses suggested children benefit from a visit to KO where the exhibits are suitable for young children. Staff comments in this category suggest visiting children have the opportunity to learn through appropriate hands-on exhibits that enhance development and provide excellent sensory experiences with plenty of objects and activities to examine. One Centre’s response wrote “Discovery learning, science is learnt in a fun way” (174).

In the Kids Own gallery children are allowed to touch and experience, solve problems, take risks, build on their interests, and enhance general knowledge. They experience “a wide range of activities that stimulate them physically, visually and

intellectually” (218), activities that are “achievable and hard to fail with” (166). One kohanga reo response commented “our tamariki found Kids Own an adventure playground” (391). Twelve staff felt young children benefit from a visit to Kids Own because it provided them with opportunities for social interaction with and alongside peers and adults. An ECC described KO as a new play area that encourages interactive learning, promoting conversations as “our children are eager to ‘report back’ [to peers] on what they saw” (168). Other Centres commented on how “some [children] still talk about and compare visits with each other” (232). Some Centres found their visit to be an “enjoyable social outing” (178) where children benefit by learning social skills, including taking turns. Other comments suggested “The visit was good for communication skills because it gets children talking and extends language and vocabulary” (454) and “questioning skills were shown by the children, which provoked lots of discussion on how things work” (464).

Three Centres wrote an unqualified ‘Yes’ as their response to the question of how children benefit from a visit to the Kids Own gallery. This question was not applicable to five Centres where ECC staff members had not attended the excursion.

#### **(v) how staff describe the exhibits in Kids Own**

Staff were asked how they described the exhibits in Kids Own to other adults in early childhood education. Forty Centres offered 85 statements about what they tell other early childhood educators about exhibits in Kids Own. About one third of these descriptions explained that staff believes the Kids Own exhibits are suitable for young children. Statements are reported in 5 categories, reported in Table 4.15 and discussed below.



Table 4.15

How ECC Staff Describe Kids Own Exhibits

Categories of Description	frequency (N)
Who Kids Own is suitable for	27
Exhibits in KO are described	18
Positive description of gallery & exhibits	14
Recommendation with conditions	14
Comments of approval	12
Total	85

In twenty-seven responses staff describe whom they consider the Kids Own gallery is suitable for. Comments include “Kids Own gallery is a great place to explore with your children” (168). It is a “fun and challenging *place* where children learn through active exploration” (167) and is a gallery “which is solely designed with children in mind” (181). Kids Own is “catering for all children irrespective of age, ethnicity or gender” (185). “Children can have a range of experiences with hands on equipment, lots of fun for adults and children” (442). Some staff suggested the gallery is “Really interesting for 2-5-year-olds” (451). “Stimulating and age-appropriate for over 2-year-olds” (218). Others suggested “Great! you will enjoy it as much as the children” (212) and it is a “Cool outlet for a family experience” (182). “Kids Own is relatively self-contained with toilets close by, children are safely confined” (180).

Eighteen responses described exhibits. One described the exhibits as big 'toys' that really work (172). Kids Own has a wide range of exhibits that are hands-on and

non-threatening. A number of responses emphasised that in Kids Own “science is learnt in a fun way” (174) with “activities set up that could not easily be duplicated at home/Centre” (166), “things children cannot find in the playgroup education” (397).

Fourteen responses included a number of positive comments to describe KO: that it is good value; a reasonable cost; accessible; well presented: “the Centre is set up to be a discovery place for the children” (171), and “children can have help available from an interested adult to problem solve” (180). KO is a place “where children are safely confined and there are very few supervision concerns” (180).

Fourteen responses made conditional recommendations about how early childhood staff should visit Kids Own with young children. Some suggested colleagues visit beforehand and check out the Kids Own gallery. Others recommended maximum benefit would be gained from a visit when there was a 1 to 1 or 1 to 2 adult to child ratio and a visit to the gallery lasted approximately 60 minutes.

Twelve responses included comments that clearly indicated they approved of this gallery for young children and would enthusiastically encourage fellow early childhood staff to visit the Kids Own gallery

#### **4.3.8 Summary of questionnaire responses**

This section will summarise and discuss staff written responses to the questionnaire. Major themes include a summary of the people from Early Childhood Centres who have visited the Kids Own gallery in The Science Centre & Manawatu Museum, why they have visited Kids Own, what they do in preparation for a visit. Frequent reference is made to Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996).

### **(i) ECC groups who have visited Kids Own**

Children from forty-seven Early Childhood Centres have been escorted in groups to visit the Kids Own gallery. Trips out of the ECC are a fairly regular occurrence for children 2-5 years of age and a popular destination is KO. Over four-fifths of kindergarten children in the area had visited the Kids Own gallery. Most ECC groups visiting Kids Own include equal numbers of girls and boys. Staff in Centres wrote that a visit to Kids Own provides them with an opportunity to meet the goals of Te Whaariki Early Childhood Curriculum Strand 3 Contribution (Ministry of Education, 1996). Goal 1- because they consider at the Kids Own gallery there are "equitable opportunities for learning, irrespective of gender, disability, age, ethnicity, or background". The ECC who have taken groups of young children to KO most often are those who employ trained staff, namely kindergarten and childcare centres. Although many ECC staff have visited the Institution and are aware of what the facility can offer young children, almost a third of the 447 who responded to the questionnaire have not visited the Institution. Amongst the parents/whanau who accompany ECC groups there are generally far fewer men than women attending excursions to KO. ECC guidelines require, and management of The Science Centre & Manawatu Museum suggest, a 1 to 4 adult-child ratio when ECC groups visit the Kids Own gallery. Many ECC groups aim to have and achieve a 1 to 1 or 1 to 2 adult-child ratio. There are 2 types of ECC groups that visit Kids Own. The size and composition of the first type includes up to 8 children and 2 or more adults who use the Burger Buggy or an ECC van to transport them. The second type of group includes every child on the roll, which may include up to 45 children and 25 adults in a group, making a single visit to the gallery and using a 65-seat bus or private cars to transport them to and from the Institution. Many ECC staff are taking girls, boys, parents and staff on excursions to the Kids Own gallery in the Institution.

### **(ii) reasons why ECC groups visited Kids Own**

Questionnaire responses revealed that some ECC staff plan to access what they consider to be a valuable science learning resource in the community. These staff consider visiting KO one way they may build on and expand the science and

technology programme provided in their ECC. Staff report they choose this venue because it provides fun, appropriate, interactive learning experiences for young children. Staff use the field trip as an opportunity to facilitate social interaction amongst child peers, family/whanau and staff. Through their responses staff indicated that the reasons they choose to visit the Kids Own gallery enable them to meet the goals of all the strands of Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996).

Staff wrote that they considered that the Kids Own gallery provides an educational environment with a range of hands-on experiences and resources suitable for children under 5 years of age not available in their Centres. Some staff suggested that a visit to the gallery provides a science learning opportunity that links with and extends the programme in the ECC. Other staff suggested that in Kids Own children can learn in an environment where they are allowed to discover for themselves and where child peers and adults can support children in their problem-solving. Staff wrote that when taking children to the Kids Own gallery, where they can actively explore this new environment, staff use this visit as one way in which they can fulfil the Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996) Strand 5 Exploration - The child learns through active exploration of the environment Goals 1,2,3,4 (See Appendix L). Staff suggested a visit to Kids Own provides them with the opportunity to extend children's view of the world and to promote discussion amongst children on their return to the ECC. This implies that a visit to Kids Own allows staff to meet the Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996) Strand 4 Communication Goal 2. (See Appendix L). These comments imply that staff state that by taking children to KO they are giving children the opportunity to observe and interact with people and exhibits in a new environment. A visit to the Kids Own gallery as described by ECC staff allows children to observe, interact with people and objects and it also provides problem solving opportunities.

Staff also use a visit to the Kids Own gallery to stimulate good parent/teacher relationships because during a visit to Kids Own there is time for staff and parents to relate to one another on a 1 to 1 basis. Staff wrote that they use an excursion to The Science Centre & Manawatu Museum to increase the awareness of parents and children to this facility and to inform staff members about the learning experiences that are available there. Staff also indicated that they visited the Institution to access community resources for their own learning and to show that they value the city's resources. This is consistent with Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996) Strand 2 Belonging-Goal 1.

The Kids Own gallery is a popular destination with ECC staff because it is accessible and available at a time which meets the needs of children and staff from Early Childhood Centres. Staff recommend it provides a safe, fun and educational environment where children are allowed to continue to explore their world through their senses, in particular by touching everything they see. Staff consider Kids Own an appropriate excursion destination for a group of children of mixed ages and appreciate that it is an indoor facility not dependent on weather. Because it is a large but confined space which can accommodate big or small groups of children and adults the Kids Own gallery allows the adults accompanying the group to supervise children without controlling their activities. Staff perceived the Kids Own gallery to be good value, a reasonable cost, accessible and well presented.

Staff indicated they considered the exhibits provided in the Kids Own gallery as meeting the needs of children because they are physically and mentally challenging and developmentally appropriate for young children. Staff choose to take children to Kids Own because the activities provided are fun for children and because they consider the exhibits link in with what children are interested in. "Children can have a range of experiences with hands on equipment, lots of fun for adults and children" (442). A number of responses emphasised that in Kids Own "science is learnt in a fun way" (174) with "activities set up that could not easily be duplicated at home/Centre" (166).

There are numerous factors, apart from the educational purpose, which influence ECC staff when they are deciding if they will take an ECC group on an excursion to KO. Some of the factors that influence staff decisions include the information available about the Institution, regarding facilities and cost. Other staff consider the cost of transport and entry, and availability of adults both in the Centre and on the visit.

### **(iii) how ECC staff organise a visit to Kids Own**

The findings of this research are that a very high 91% of Early Childhood Centre staff are involved in planning a visit to the Kids Own gallery. Much of this planning concerned how the visit to Kids Own linked with, complemented and extended the programme in the Early Childhood Centre. Responses indicated that some staff, during planning, talked to children about where they might visit. Staff planned for children to visit KO with child peers, children and adults who might scaffold one another's learning.

In this study many staff indicated they had visited the Kids Own gallery or attended a Teacher Preview to prepare themselves for a group visit to Kids Own. Staff during the planning stage, before visiting Kids Own, gathered books and resources and borrowed equipment from the Institution to support, link, and extend the science and technology in their Centre programme with the experiences available in Kids Own gallery as suggested in Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996) Links with Essential Learning Areas. Responses indicated that staff were not only involved in planning before the visit, but also planned post-visit follow-up on children's individual needs and interests and follow-up evaluation and planning for sessions in the Early Childhood Centre following the excursion.

In this study staff reported they do prepare additional adult helpers for a visit to KO. Some staff used the flyer posted to them from the Institution (refer Appendix



D) to inform adults about what to do and how to make the most of the visit for the children. Adults were asked to help, support, and encourage children to try as many exhibits as possible. Staff suggested adults should have fun, get involved and work alongside children, while some instructions emphasised safety and management of children rather than talking with children and enjoying the experience.

An ECC staff member explained that with young children the staff have to decide how the children they are taking can best be prepared for an excursion. ECC staff members prepare children who are going on a trip to Kids Own by talking about how they are travelling and who they are travelling with, who is going, where they are going, what they might see and do, and that there are lots of things to see and touch. One Centre staff member, knowing the anxiety of some children in her group “described briefly the cave because of expressed fears of the dark” (187). Other staff explained to children that they could “Have a go on whatever activity you want to, the adult you are with is there to help you in any way” (179). In this study some staff did not prepare children for the excursion by talking about it beforehand. The intention of these ECC staff appeared to be that the visit to Kids Own was a treat, a surprise, or a discovery experience rather than planned to be an opportunity for science education.

Rennie and McClafferty (1995) suggest that young children should be given an opportunity, after a visit, to share their experiences with their peers through class presentations, group reports or posters. In this study one ECC noted that children are “expected to recall their experiences for their peers back in the Early Childhood Centre” (180). Rennie and McClafferty also suggested children should be able to conduct “further experiments based on what they have found out, and every opportunity should be taken to refer back to exhibits and activities experienced during the visit, thus reinforcing and extending the learning which has occurred” (p. 4). In this study some staff included examples of how they and their students



had continued to explore science concepts with shadows and levers back in their ECC following a visit to Kids Own.

Most ECC staff plan a visit to KO. Many discuss the visit with staff, children and adults before they leave, during the visit, and on their return to their ECC. When deciding where to visit most ECC staff are influenced by their knowledge of the exhibits in KO. Staff are most likely to have requested further information about the KO gallery by telephone before visiting. Over 80% of Centre groups pre-book a visit and plan a 60 minute visit to the gallery between 9.00 am and 12 noon during a Monday to Friday weekday.

#### **4.4 Summary of Phase 1 of the Study**

The discussions with staff and document analysis revealed how the roles and responsibilities of the staff of the Institution are interpreted into practice. The education officers explained why and how they plan, publicise and deliver teacher previews which the survey results showed are well received and supported by ECC staff. The volunteers discussed how they interpret the volunteer guidelines and the problems they face when assisting in the KO gallery. ECC staff wrote how they considered volunteers helpful or unhelpful in the KO gallery. The Exhibit staff discussed how they interpreted the policies regarding the provision of interactive, relevant, and appropriate science and technology exhibits. Exhibits staff explained that they are guided by the New Zealand Curriculum Framework and influenced by evaluative feedback from ECC staff when making decisions regarding exhibitions and exhibits for KO. When evaluating the effectiveness of the KO exhibits more than 85% of ECC staff considered they were physically accessible, visually appealing, intellectually challenging and appropriate for children 2-5 years of age. The strategies used by the Institution to promote visits by schools in particular methods of communication, the provision of financial incentives, and choices in levels of staff support and resources were all recognised and valued by ECC staff in their survey responses.

**CHAPTER 5**

**CHILDREN’S INTERACTIONS IN THE PROGRAMME**

Characteristics of the selected Early Childhood Centre groups participating in the study are reported. Data collected by audiotape recording of verbal interactions and observation of physical interactions between children, their child peers, accompanying adults, ECC staff, and volunteers while they were in the Kids Own gallery are reported. Interviews with children in their Early Childhood Centres who had been observed in the gallery are also reported.

**5.1 Characteristics of Selected ECC and Child Participants**

The three early childhood groups who participated in this study were given codes to protect their anonymity. The adults and the target children in the visiting ECC groups were given pseudonyms. These are described in Appendix F. Each group visited KO at different times during the working week. Group 1 (ECC 442) visited from 10.30 a.m. to 11.30 a.m., Group 2 (ECC 187) visited from 10.30 a.m. to 11.00 a.m. and Group 3 (ECC 454) visited KO from 1.00 p.m. to 2.00 p.m. The composition of each ECC group visiting KO is reported in Table 5.1 and Figure 5.1. The codes used, the pseudonyms of the target children and the duration of the data collected about them are reported in Table 5.2

Table 5.1  
Characteristics of ECC Groups in Sample

Participants	ECC/1	ECC/2	ECC/3	Total
Age & Gender(442)	(187)	(187)	(454)	
	(N)	(N)	(N)	(N)
Girls	13	2	4	19
Boys	10	4	4	18
Women	9	2	2	13
Men	2	0	0	2
Teachers	2	1	2	5
Total	36	9	12	57

Figure 5.1

Composition of Participants in each group

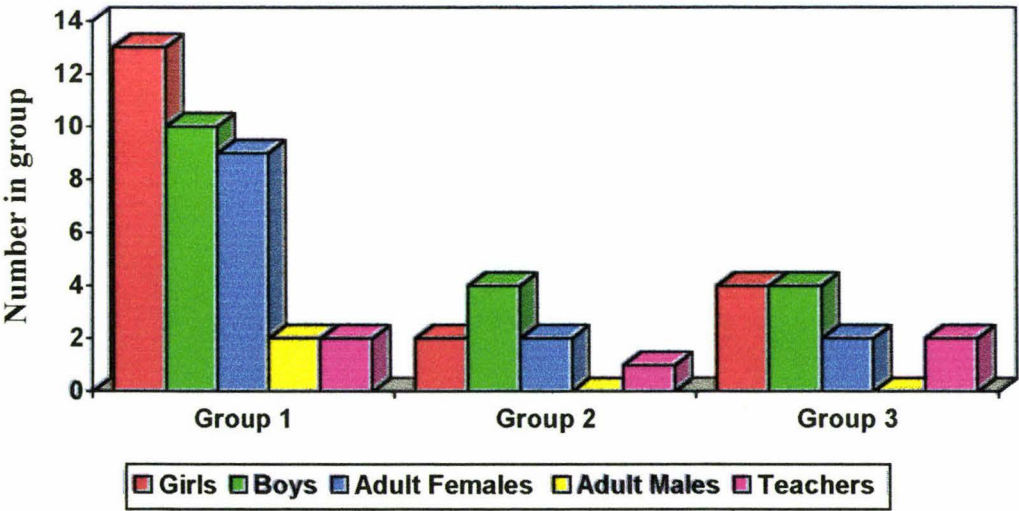


Table 5.2

Data Gathered From Target Children

Pseudonym of child	Audiotape recording (no. of minutes)	Observation in KO (no. of minutes)	Interview in ECC (no. of minutes)
E/1 Emily	45	11	16
J/1 Justin	15	11	20
S/1 Stacey		11	20
Jo/1 James		11	11
R/2 Rhys	22	11	22
E/2 Elton		11	18
L/2 Laraine		11	15
D/2 Declan			13
T/3 Thaddeus	45	11	17
S/3 Sheelah	33	11	17
H/3 Hugo		11	15
A/3 Anastasia		11	10
Total	160	121	194

**5.2 Audiotape Recordings in Kids Own**

In total there were 160 minutes of tape recorded in the Kids Own gallery, with girls recorded for 78 minutes and boys for 82 minutes. The researcher applied an analytical scheme to the data of verbal interactions of target children recorded with peers and adults at each exhibit. Following this analysis the verbal interactions recorded were allocated to 1 of 11 categories.

Since verbal communication is a vital component of scaffolding children's learning transcripts of the audiotape recorded conversations at exhibits were analysed to reveal the tone, content, quality and quantity of discussion which ensued at each exhibit amongst children teachers and adults in the gallery. Examples of 11 types of verbal interactions between children, child peers and adults were identified. Four categories of adult/child verbal interactions were identified where adults questioned, instructed, or encouraged children and read aloud the exhibit labels to

children. Neuman and Roskos (1991) identified 3 types of verbal interaction between children. The first is designating, where children give a label to an object; the second negotiating, where conversation served to establish agreement between two players on the meaning of an object or routine; the third coaching, where typically a child asks or expresses a need for help in some manner. These 3 were identified in this study as well as 4 additional types of comments where children confided in peers, questioned, requested help or responded to adults. Examples of each type of verbal interaction recorded are included here. The categories of verbal interaction recorded at each exhibit are reported in Table 5.3, followed by examples from each category at each exhibit. Children talked with peers about 6 of the 10 exhibits where verbal interactions were recorded in Kids Own. The greatest variety of verbal interactions was recorded when children were interacting in the Shadow Catcher exhibit and at the Grain Pit exhibit. Each of the 10 types of interaction will be discussed.

Table 5.3  
Categories of Verbal Interaction by Exhibit

Exhibit	Adults question	Adult instruct	Adults encourage	Adults read	Child designate	Child negotiate	Child coach	Child confide	Child/ adult talk	Child question	Child request
Grain Pit	*	*	*			*	*		*		
Kids Cave	*	*			*		*	*	*	*	
Shadow Catcher	*	*	*		*	*	*	*	*	*	*
Roll-a-Ball	*	*	*				*		*		
Trust-yr-Touch	*	*	*		*			*	*		
Sounds Like	*	*	*						*		
Light Catcher	*			*							
Klingons	*		*								*
UV Room	*		*		*		*		*		
Bongo Pipes	*	*	*								



5.2.1 Adults asked children questions

Adults were recorded asking children 32 open questions and 119 closed questions while interacting with exhibits in the KO gallery. Adults asked the most questions of children in the Shadow Catcher exhibit, where adults asked 44 closed questions and only 4 open questions. At the Kids Cave exhibit adults asked children many more closed questions than open questions. Closed questions at these exhibits were used to direct and control children’s actions. The numbers of open and closed questions adults asked children were almost equal when they were interacting on the Grain Pit, Light Catcher and in the UV room. Table 5.4.reports the number and type of questions adults asked children and examples follow.

Table 5.4  
Adults Asked Children Questions

Name of Exhibit	open questions (N)	closed questions (N)
Grain Pit	15	14
Shadow Catcher	4	44
Kids Cave	3	35
Roll-a-Ball	-	5
Light Catcher	2	2
Trust your Touch	2	5
UV Room	5	4
Klingons	1	6
Sounds Like	-	2
Bongo Pipes	-	2
Total	32	119

On the Grain Pit exhibit examples of the 15 open questions teachers asked children were: “What happens when you wind it the other way?” (Lisa); “Where’s it all coming from?” (Deidre); “Which way does that need to go?”(Lisa). In the Shadow



Catcher exhibit examples of open questions asked were: “What are you going to do this time?” (teacher/Naricca); “Now what are you going to do guys?”; (mother/Tessa). With the Light Catcher a mother asked 2 open questions: “What happens if you have a look through this?”, “What do you see?” (mother/Marise). About Kids Cave a teacher asked children 3 open questions, “OK What’s out here?”(teacher/Olivia). About the UV room adults asked 5 open questions. For example: “What do you think it is? (mother/Tessa); “Where does the rest go?” (teacher/Naricca). In the Klingons room an example of the open questions asked is: “How do you think you’re gonna be able to get up here?”(volunteer/Verna). At the Trust your Touch exhibit adults asked open questions such as: “What does it feel like?”(mother/Marise). Children often responded to these open questions with a short statement or actions rather than words.

Adults asked children 44 closed questions in Shadow Catcher. For example: “Elton Elton have you had your turn?”; “Can you see your fingers? Arms?” (teacher/Deidre); “Don’t wanna do one?” (teacher/Robina); “Lance are you ready?” (mother/Tessa); “Can you see your hair?” (volunteer/Verna). These questions appear to be asked as a means of encouraging children by making sure they know what to do and how to do it. Adults asked children 35 closed questions at Kids Cave, including these examples: “Shall I shut the door Thaddeus?” (teacher/Naricca); “Would you like to go through Kids Cave over there Emily?” (mother/Marise); “Will you go through again if I turn the light on?” (volunteer/Verna); “Is that the last person out?”(teacher/Lisa) “Are you all right?” (volunteer/Martin). “Can you see any light coming through?” (teacher/Naricca). These questions were phrased to determine how children were feeling, to provide reassurance and confirm what children did or didn’t want to do.

Adults asked children 13 closed questions at the Grain Pit exhibit “Nothing coming through there is it?”(teacher/Lisa); “Are you moving grain over there Rhys?”(teacher/Deidre); “Can you see where the grains go?” (volunteer/Verna). Questions here give the impression of cooperation and camaraderie between adults

and children interacting on this exhibit. Mother/Marise used exclamations about the Light Catcher, “Oh! Its beautiful isn’t it?”, to invite interaction. Adults prompted children with closed questions at the Trust your Touch exhibit, “Is it hard? “Is it soft?” (mother/Marise), as children did not describe what they were feeling. Adults asked children closed questions at the Roll-a-Ball exhibit. “Have you tried these roll-a-ball things over here?” (teacher/Deidre) was used as an opening invitation for children to ‘have a go’. Examples of the closed questions asked at the Sounds Like exhibit were “Can you hear the sounds they make Emily?” (mother/Marise). Adults asked children closed questions in UV room “Can you see anything different about Naricca?” (teacher/Naricca). Adults used closed questions much more frequently than open questions at all the exhibits. Closed questions were used to invite, direct, control, instruct, prompt, assist, and confirm children’s interactions with the exhibits in KO.

### **5.2.2 Adults gave instructions to children**

Adults instructed children on how to interact in Kids Cave, Grain Pit, Shadow Catcher, Trust your Touch, Roll-a-Ball, Sounds Like and Bongo Pipes exhibits. Adults accompanied their verbal instructions with demonstrations of what to do at the Grain Pit, Trust your Touch, Sounds Like, Roll-a-Ball and Shadow Catcher exhibits. The phrasing of the instructions reflected the different kinds of interactions possible on different exhibits. There were not more instructions where there were more interactions possible, rather the number of instructions appears to have been influenced by how much the adults were attracted to or interested in each exhibit. Examples are provided to indicate the instructions adults gave children at each exhibit.

Adults instructed children about Kids Cave mostly from outside the cave. For example volunteer/Martin instructed the children: “You can go in there, all sorts of things there are that you can feel with your hands”. Volunteer/Verna, talking to the children outside the Kids Cave, said: “You only go one way, don’t come back up otherwise when it’s dark you might get run over by somebody else going out”;



“and you only go in this door, and you crawl and you come out just down the slide there”; “Shhh one at a time, no pushing otherwise somebody might get squashed and I’ll leave the light on for a few times then I’ll shut the door. If anyone gets scared of the dark, bang on the door and I’ll open it and put the light on”; “It’s supposed to be a cave, it’s supposed to be dark”. Instructions given by adults to children from outside the Kids Cave were given to inform and reassure the children. These instructions were concerned with the physical and psychological safety and emotional well being of the children. The teacher inside the Kids Cave with the children said: “OK feel with your hands Don’t be scared, feel with your hands” (teacher/Olivia). Adult instructions inside the cave were given to direct the children in what to do and also to reassure them with an adult voice in the darkness.

On the Grain Pit exhibit adults made suggestions while interacting alongside children on how they could work the machine to ensure the grain flowed from one container to another. When the volunteer was talking to the children at the beginning of their visit she explained: “This big thing in the middle is our Grain Pit and pretty near all of you hafta help on that. There’s lots of handles to turn and you need to work together to get that one going” (volunteer/Verna). Instructions from mothers watching from outside the exhibit encouraged children with “keep going sweetheart” (mother/Marise). Instructions from adults working alongside the children on the exhibit included “You’ll have to go really fast, you’ll have to do it with your hand as well” (volunteer/Verna); “OK we have to wait for Lea to get it back up again.”(teacher/Lisa); “OK you go it’s your turn to go.”; “You’re going the wrong way Hugo turn it that way- that’s right keep going” (teacher/Robina); “If you will help I’ll turn it that way. See grains! That’s the way you’re turning it.”; “See look see all the grain going up” (teacher/Deidre). The adults appeared enthusiastic about interacting with the Grain Pit exhibit. Adults gave instructions to children, who indicated they felt that they knew what the exhibit was about and could confidently instruct the children on how to make the exhibit ‘work’.

In the Shadow Catcher exhibit adults instructed children in where to stand, how to stand and how to get a finer image. Only the instructions from the volunteer in the Shadow Catcher explained why and where the children should pose, they included “You gotta wait for a minute till this light comes before I can push it.”; “You have to be quite close to the wall to make the dark shapes, it won’t, you will get an image but it won’t be as fine the further away from the wall you get.”; “You were up to - you start here and there’s your shadow right up there so it’s taller than you so you must have jumped at the right time.” (volunteer/Verna). Other adult instructions concentrated on instructing children about how to pose. For example “OK go stand against the wall, make an unusual shape with your body” and “Rhys do something with your arms and legs” (teacher/Deidre).

At the Trust your Touch exhibit adults instructed children about what to do with the exhibit. For example: “Oh! Feel here Emily What does it feel like sweetheart?” “You feel that, no feel it first Emily.”; “Stick your hand right in” (mother/Marise).

With the Sounds Like exhibit adults instructed children on how they were supposed to interact with the exhibit. Examples of adult’s comments are: “You’re supposed to do it like this.”; “Hold the lid cos’ it might flop off”(mother/Marise).

In the Klingons exhibit adults instructed children by suggesting how they could climb the steep wall of the exhibit. “Oh I think you should be able to climb up there or maybe you could climb up here and jump across” (volunteer/Verna).

Adults instructed children about how to interact with the Roll-a-ball exhibit. Although there is a descriptive label on this exhibit for non-reading children the potential interaction may not be self-evident. An example of the instruction a teacher gave a child while she made an unsuccessful rearrangement of the track sounded like this. “Here’s a ball and you put it up here, then it rolls down the track here.”; “You can change the shape with these things in here so you can make it do



things”; “Put one up here and see- see that when it stuck that wasn’t a very good one. I bet you could make it better” (teacher/Deidre).

### **5.2.3 Adults encourage children’s interactions**

Adults encouraged children’s interactions at the Roll-a-Ball, Trust your Touch, UV Room, Grain Pit, Shadow Catcher, Sounds Like and Klingons exhibits in a variety of ways. Teachers spurred on children’s efforts on the Grain Pit by saying “Oh you’re working well there Hugo”; “Good boy Thaddeus” (teacher/Lisa); “Good job - that’s lots of muscles my goodness” (teacher/Deidre). A mother encouraged the children to interact with the Sounds Like exhibit by saying “You have a shake and see if you can guess which one’s what”(mother/Marise). In the UV Room adults’ enthusiastic exclamations encouraged the children to attend to the effect of the UV light. “Oh no! my shoes have gone different. Ahhh my shirt is a different colour” (teacher/Naricca); “Wow! What is it? Look at that!” (mother/Tessa). In the Shadow Catcher exhibit the adults’ excitedly acknowledged what the children were doing and encouraged them to continue their interactions by saying: “Yes go for it!”; “Oh cool kids” (mother/Tessa); “Fantastic Laraine I can even see your little pig tail”(teacher/Deidre) Adults encouraged children’s interactions with the Roll-a-Ball exhibit when they sounded as if they were excited with what they were doing and said: “Oh Wow! That’s pretty neat isn’t it?”; “Sure have a go” (mother/Marise). By the Trust your Touch exhibit a mother encouraged her child’s interaction when she suggested: “You might like to try this” (mother/Marise). In Klingons the adults were encouraging when they helpfully advised the easiest or safest route for a child to climb by saying “How about you climb up to that one, then you can jump across that one’s fairly soft. Whoa! You’ve obviously got slippery socks too haven’t you?” (volunteer/Verna).

### **5.2.4 Adults read labels**

Previous research has found visitors, both adults and children, do pay attention to labels on exhibits. However in this study on only one occasion was an adult recorded reading aloud the label instructions of an exhibit to a child. From the

Light Catcher exhibit label an adult read “It says -look at the light through me”. There were no examples on the audiotape of adults paraphrasing aloud the labels of other exhibits in KO. We can only conclude that the adults with these groups interpreted the labels of these exhibits.

### **5.2.5 Children designate labels to objects for peers**

This category consisted of the variety of ways children attempted to name or discover the names of objects. Most often one child would name an object they saw and expect a response or confirmation from a child peer at the same exhibit. Most of the labelling occurred when children opened the door of a Trust your Touch box to look inside. In the UV room they named objects they saw on the wall and in the mirror. For example: “Look at me, my shirt went purple.”; “These are good things.”; when pulling pieces from butterfly puzzle: “It’s a butterfly.”; “Glowing”; “Here’s the green.”; “Look at that big tattoo!”. At the Trust your Touch exhibit these excited exclamations: “It’s a mouse trap! It’s a trap it’s a mouse a mouse trap!”; “I can see a man.”. This label the child gave to what was actually a moulded foam head. “Duck” for a duck shooter’s decoy duck. In the Kids Cave: “Don’t get up, no just squishy stuff.”; “Anastasia it’s scary and there’s a bear.” (They may be talking about the sheepskin rug on the floor of KC). In Shadow Catcher Thaddeus points out Sheelah’s shadow: “that’s your shadow on the wall”. Elton labels the position of his shadow: “Look at me upside down I’m upside down! I’m Upside down! Look at my shape watch this”.

### **5.2.6 Children negotiate with peers for shared meaning**

The dialogue children shared while interacting on the Grain Pit exhibit illustrates how they were negotiating. Rhys negotiates with Lance and Declan on the Grain Pit “Here’s another one. I’ll take this off cos’ it’s all getting all stuck around that”; “Do I need to do some of that forward? Backward?”. Declan agrees with “Yes you do some of that and I’ll do this.” Rhys replies “I’m just going to do a lot so just let me do this.” Justin and Frances are working side by side on two handles on the Grain Pit. Justin says “I see what that does, slides down to unit three. I wonder



what's in there? It'll collect 15 stone; it will collect 15 and be rid of them. Hay! Should I have a - should we swap? Shall we swap?". In the Shadow Catcher Sheelah said "I went like this". Anastasia responded with "this way that way". Sheelah replied: "Yep I did a dance I wanna do it again".

### **5.2.7 Children coach, teach or guide the learning of peers**

On the Grain Pit: "Roll that one Hugo"; "Watch out Ellie I'm gonna wind it". Justin and Francis are standing side by side on the Grain Pit. Francis says "Someone else has to pull that up there so they go to the top don't they? See that's hard work isn't it? Somebody could do that right there, over there." Justin replies "turn it on, turn it hard while I steer it. I'm pushing there down which is very hard." Later Francis directs "Hey! Tip it over here."; "There's another handle over there on the other side." Declan instructs "Yes you do some of that and I'll do this." In the Shadow Catcher exhibit: "You wanna do another one Shaye? Get there quickly!" Laraine volunteers to activate the lights: "I'll do it." Hugo told Sheelah "You press it". In Kids Cave: "There's a down bit there."; "Well I'll go in the dark and you follow me."; "I'll go after you."; "Let's get out of here Anastasia."; "I'll go up next, cool fun!" In the UV Room the children talked as they worked on the puzzle side by side: "Look Hay! You're supposta make up these puzzles a butterfly"; "I'm gonna stick on mine." As Neuman & Roskos (1991) found peers often respond by providing verbal suggestions and in many cases actually demonstrating the procedure. A rare example of a child describing to a child peer how to interact with an exhibit occurred on the Roll-a-Ball exhibit when she said "If you put it/these in different places the ball goes in different ways."

### **5.2.8 Children make confiding comments**

Affective comments between child peers were spoken in the Kids Cave. Emily and her friend Emily confided to one another "We didn't even need anyone with us."; "I can't see anything."; "Fun in the cave ah?"; "Oh see uh ah didn't even need help any one of us." Comments between Thaddeus, Sheelah and Anastasia in Kids Cave



were “I’m scared.”; “Yukky scary scary”. Children also exclaimed to child peers with excited laughter and loud screams. A child exclaimed at the Trust your Touch exhibit “Comm’on this is scary.” as a response to seeing the moulded foam head. In Shadow Catcher for 2 of the 3 groups observed in Kids Own four children were recorded exclaiming to whomever would listen ‘Look at me, look at mine’ amidst lots of laughter while they were interacting in the exhibit.

### **5.2.9 Children talk to adults**

Children from inside Kids Cave talking to adults who were outside Kids Cave: “But will you go in there cos’ I’m scared?”; “Shut the door please really shut”; “Turn the lights on then I’ll go through”; “Yeah I’ll meet you soon Mother bye!”; “Meee someone else too it’s Thaddeus”; “I like the dark”; “Open the door” was a plaintive call in which the child sounded a bit frightened and definitely unsure. In the Shadow Catcher amidst great hilarity children made comments to adults such as “Look at mine look at mine Robina!” and “Look at me look at my picture.”; Hay! I made a funny one”; “What about my one?”; “Cheese Cheeeeeese”. This last comment is interesting because this child seems to be relating the interaction in the exhibit to posing for a photograph although no facial expression can be seen in the shadow.

### **5.2.10 Children request help from adults**

Children asked for help so they could interact in the Klingons exhibit: “Can you help Sheelah to get up there?” (Sheelah is asking for an adult to help her); “Could you please take my shoes off for in there?”; “Can you get me up there?”

### **5.2.11 Children ask questions**

Children asked questions during interactions with 8 of 10 exhibits they interacted with in the gallery. Children asked very few questions of adults at only 4 of the 14 exhibits in KO. The closed questions children asked adults were often to get

permission to have a try or have a turn with an exhibit. The many closed questions children asked of their child peers when they were in the Kids Cave appear to have been spoken to reassure the speaker that they were not alone in the dark. The closed questions children asked children on the Grain Pit appeared to be phrased to make conversation and often simply asked for agreement from the other child. Children asked only 3 open questions of child peers, for example: “what are you doing?” or “why don’t you have a go?”. The number of open and closed questions children asked adults and other children is reported in Table 5.5 and examples of their questions are discussed below.

Table 5.5  
Children ask Questions

Name of Exhibit	Children asked Adults		Children asked children	
	open (N)	closed (N)	open (N)	closed (N)
Grain Pit	0	0	2	13
Shadow Catcher	1	3	0	3
Kids Cave	0	4	1	35
Roll-a-Ball	0	0	0	2
Light Catcher	0	0	0	0
Trust your Touch	1	3	0	1
UV Room	0	0	0	2
Klingons	2	4	0	0
Sounds Like	0	0	0	1
Bongo Pipes	0	0	0	0
Total	4	14	3	57

In the Shadow Catcher exhibit children asked “Is it my turn?” and “Mum could you have a shadow?”. In the UV room: “Do you want a green one?” In Kids Cave most questions appeared to be spoken to keep in touch with child peers who were

also in the Kids Cave but could not be seen: “Emily are you tired getting up?”; “Yep Oh yuk Oh Ohh Oooh Isn’t this noise terrible?”; “I’m right up here Em, can you see me?”; “we didn’t even need anyone with us did we?” At the Roll-a-Ball exhibit children’s only questions were concerned with taking turns to interact with the exhibit: “Can I try it after now?”; “Oi! give me a turn?” Children asked open questions at Trust your Touch such as “What is it I can feel?”; “What is this?” and closed questions such as “Mum can I try that?” Children asked open questions in Klingons, “What is that? How do you get in there?”, that requested information, not ideas.

#### **5.2.12 Summary of data audiotape recorded in Kids Own**

The results show that verbal interactions occurred more frequently at particular exhibits. Four categories of adult/child verbal interactions were identified on the audiotapes recorded in KO. Adults asked children questions at every exhibit. Closed questions were the most frequently used adult strategy, used to direct and control children’s interactions in KO. None of the open questions asked by adults revealed curiosity about an exhibit, as they were all phrased to prompt children’s interactions. Most of the exhibits where adults gave instructions to children appear to be where adults had read or could see what interactions were intended by the exhibit creators, for example at the Grain Pit, Shadow Catcher, Roll-a-Ball, and Trust your Touch exhibits. Although adults gave children instructions at the Kids Cave exhibit these instructions emphasised safety and turn taking rather than focusing on how children might explore the exhibit through touching, as the exhibit creators had intended. Most often children interacted for longer periods of time when they were accompanied and encouraged by adults at an exhibit. Adults and children from all 3 groups spent extended lengths of time together working on the Grain Pit exhibit.

Children’s verbal interactions with children had an entirely different nature. Children labelled the objects they saw and negotiated with child peers to establish a shared understanding about the exhibits they were interacting with. There are 5



exhibits when children were coaching or teaching child peers about how to make an exhibit 'work'. This can be interpreted to show that 5 of the 14 exhibits in KO met the ECC staff goal of providing children with the opportunity to learn with and alongside others on the excursion. Children talked to adults when they needed help or for permission to 'have a turn' with an exhibit. Children did not ask questions at any exhibits that indicated they were curious about the phenomena to be explored or try to initiate a discussion about why or how the exhibit worked. The most popular exhibit for children was the Kids Cave. Few adults entered the Kids Cave and most of the children recorded chose to return to the cave without adult encouragement or accompaniment. The recordings inside Kids Cave show children did not talk about what they could feel, but they reassured and confided in one another when there were no adults present in the exhibit.

### **5.3 Field Notes of Children's Interactions**

The analysis of field notes considered how the children reacted to and interacted with the exhibits and other people while in the Kids Own gallery. The quantitative analysis revealed the number of exhibits children visited, the amount of time children spent interacting with exhibits and the number and gender of child peers and adults who were interacting with target children at exhibits during each 11 minute observation period. The target children's level of interaction with the exhibits was determined using Peterson & Lowery's (1972) Curiosity Index of Motor Activity (CIMA). Examples of children's interactions are provided below. The qualitative analysis involved looking for categories of peer interaction in the observed behaviour of young children in the gallery. Field notes for each child were analysed and examples of interactions between children at the same exhibit were recorded using the model of peer interactions developed by Cullen & St George (1996). The Teaching Continuum of Bredekamp & Rosegrant (1993) was used to guide the selection of examples of adult/child interactions from across the teaching continuum. Figure 5.2 reports how many minutes target children spent at the exhibits they chose to interact with in KO during the 11 minutes they were observed.





### **5.3.1 Exhibits where children interacted**

During the 11 minute period of each observation each child visited between 1 and 7 exhibits in the Kids Own gallery. Figure 5.2 displays the lengths of time children were observed interacting with exhibits in KO. On the Grain Pit, 9 of the 11 children were observed interacting, and 8 children interacted with the Kids Cave exhibit. There was no lessening of activity throughout the time each ECC spent in the Kids Own gallery. Girls and boys were equally involved with the exhibits in the Kids Own gallery. For 10 minutes of the 121 minutes of observations children were in the gallery and looking around but not directly engaged with a single identified exhibit. A significant portion of children's time was spent in housekeeping tasks, for example when children were waiting to enter or leave the gallery, or engaged in taking of or putting on clothing and shoes.

### **5.3.2 Number of exhibits visited by each child**

Children were observed interacting with 10 of the available 14 exhibits in the gallery. Figure 5.2 above shows, through the colour coding of each exhibit, how many exhibits each child visited during the 11 minutes they were observed. Factors that influenced the number of exhibits children interacted with were: the number of adults with each group; what the accompanying adults had been told about their role for the visit; and the time available for the visit to KO. These variables were different for each ECC group that visited.

The organiser for ECC 442 said the group from her Centre included many children who had visited before and held family membership in The Science Centre Inc. She considered the visit to KO a suitable excursion destination for the end of a long, wet winter term, when children and adults had spent weeks on end 'stuck in the classroom'. As a consequence this visit was treated as a relaxed and relatively unstructured time away from the classroom. The organiser did not suggest to the children or adults that she expected children to interact with all the exhibits in the gallery. The children in this group were the responsibility of the parent who transported them. Adults did not appear to escort children from exhibit to exhibit



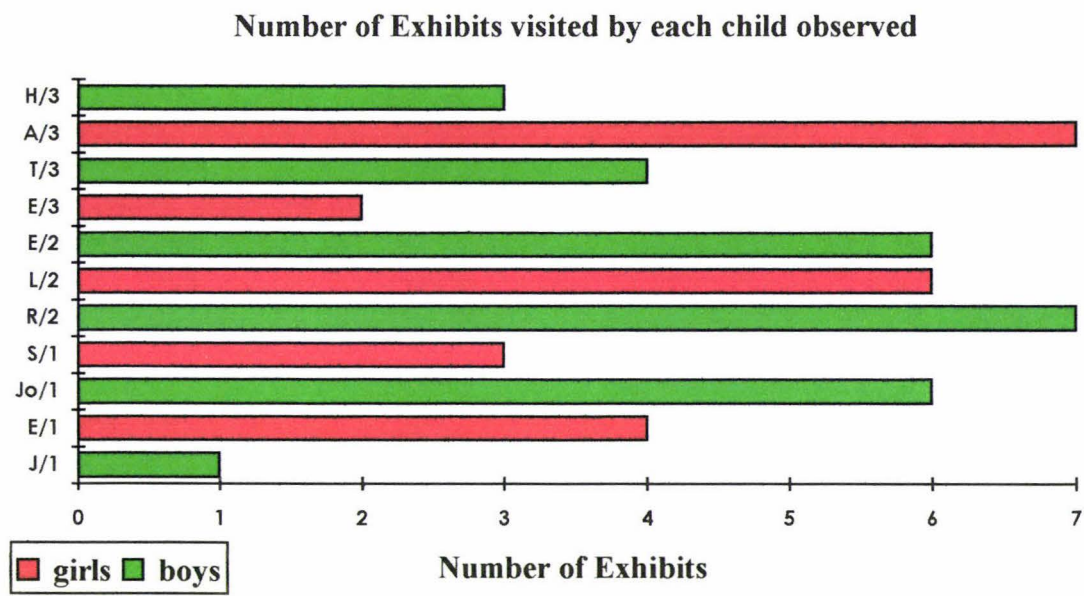
or actively try to ensure children visited all the exhibits. From their visit 4 children were observed at 14 exhibits during the 44 minutes of observations, an average of 3.5 exhibits per child. The group booked the Kids Own gallery from 10.00 a.m. until 11.00 a.m. They planned to arrive back at the ECC by 12.00 noon after the session ended.

The ECC 187 organiser explained to the two adults accompanying the group that she wanted the children to gain maximum benefit from the opportunity to explore a stimulating and new environment. She emphasised the purpose of the excursion was to provide an experience the children might not otherwise have due to the cost of admission or the lack of parental education. She instructed the parent helping and the teacher's aide to ensure that the children they were responsible for explored every exhibit in the Kids Own gallery. The group members were restricted as to when and for how long they could visit the Institution because they were dependent on the free transport provided by the Macdonald's Burger Buggy. This ECC have a regular booking at 10.00 a.m. every Thursday morning for the Burger Buggy to collect up to 8 children and 2 adults from the ECC and deliver them to a destination of their choice. The group members are returned to their centre 1 hour later. On the day of the planned pre-booked trip the Burger Buggy was unavoidably delayed, consequently it did not arrive until 10.15 a.m. which reduced the time the group could spend in KO. The adults in the group were aware of the time constraints and encouraged the children to make the most of the time they were in the gallery. From this ECC group 3 children were observed at 19 exhibits during the 33 minutes of observations, an average of 6.3 exhibits per child.

The ECC 454 organiser explained that this visit to KO was a special treat for Hugo and Sheelah, who were celebrating their 5th birthdays the following week. The excursion to KO was their last excursion with friends from the ECC. For this group the visiting time was not restricted as the children in the group attended the ECC daily until 5.00 p.m. They had independent transport to and from the Institution and KO was not being visited by any other group at the time. There was

an unhurried mood amongst the adults within the group. The group stayed in the gallery from 1.15 p.m. until 2.45 p.m. The adults allowed the children total freedom of choice in the exploration and interaction with exhibits. From ECC 454 4 children were observed at 16 exhibits during the 44 minutes of observations, an average of 4.0 exhibits per child. Figure 5.3 reports the number of exhibits each target child visited during the 11 minutes they were observed.

Figure 5.3



**5.3.3 Time children spent at each exhibit**

Children were engaged in interactions with exhibits for varying lengths of time as reported in Table 5.6. This appears to have been influenced by the presence or absence of child peers or adults and the likelihood of children being able to interpret without adult supervision what they could do with the exhibit. Visitors can interact on the Grain Pit without instructions. Three of the target children interacted on the Grain Pit, always with child peers and adults present, for 11, 9 and 6 minutes during the 11 minutes they were observed. The Kids Cave is an exhibit where interaction requires the visitor to crawl through on their hands and knees and rely on a sense of touch to guide them. Children were observed

repeatedly crawling through the Kids Cave with child peers. Klingons is an exhibit that provides physical challenges for children to climb the steep walls and slide down them. A child was observed interacting in this exhibit for 8 minutes and 6 of the 11 children were observed interacting in this exhibit. The presence of child peers did not appear to influence children's interaction in Klingons, but 3 children did request assistance from adults to clamber up the walls of the exhibit. Adults clearly enjoyed interactions in the Shadow Catcher as they invited children to enter this room and prolonged their interactions with suggestions on how to pose. They also made enthusiastic exclamations about the shadows frozen on the phosphorescent wall.

Table 5.6  
Number of Minutes children interacted at each exhibit

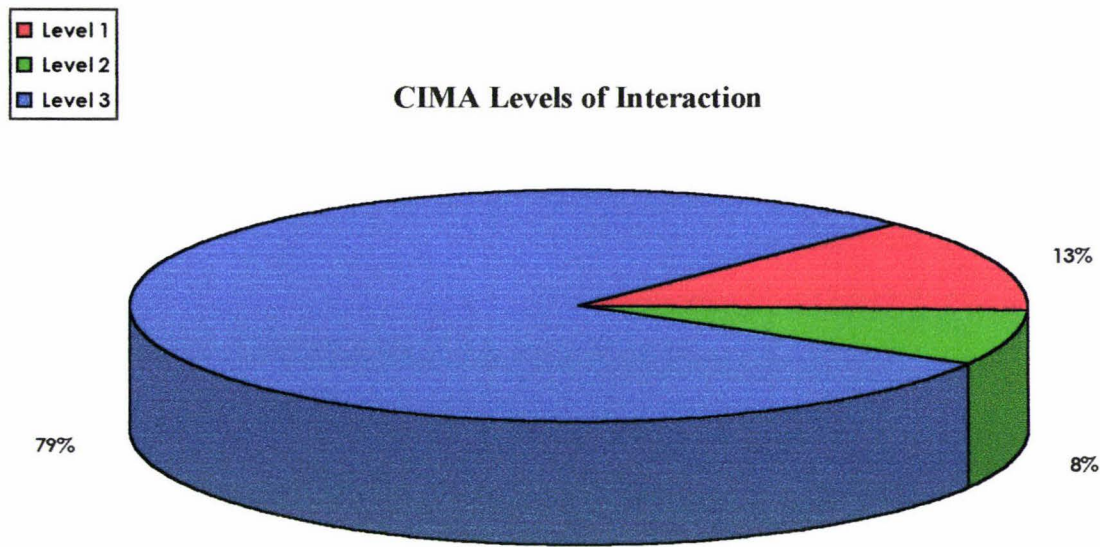
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**5.3.4 CIMA level of interaction children were engaged in**

Figure 5.4 shows the highest interactive level each child was engaged in at an exhibit during each minute of the observation. The level of interaction was determined by using Peterson & Lowery's (1972) Curiosity Index of Motor Activity (CIMA). Children often engaged in CIMA level 1 - Approaching the exhibit but not touching it - by looking at a number of exhibits before returning to interact with them. Only 8% of children were observed interacting at CIMA level 2 - Touching the exhibit but not carrying out the intention of the exhibit. An extremely high 79% of all the observed interactions were at CIMA level 3, which is carrying out the intention of the exhibit.

**Figure 5.4**



The data shows that on 16 occasions target children were observed interacting at CIMA level 1. Examples of these interactions include the following. Thaddeus sits on the carpet listening to the volunteer talk about the Kids Cave. Elton steps into the Klingons doorway he looks inside, then turns and runs out again. Thaddeus stands on the carpeted edge of the Grain Pit holding the surrounding bar with his hands and leaning back while watching what happens on the exhibit. Thaddeus is smiling and seems to be looking for a space to join the activity. Thaddeus moves around to stand behind handles 1 and 2, both of which are occupied by children.

Thaddeus watches. Thaddeus walks further around the Grain Pit to stand watching an adult female turning handle 3 he then walks back around to stand behind 2 boys standing together turning handles 1 and 2. Thaddeus turns his back on the Grain Pit and leans on the bar that surrounds it, then turns around again, walks back and positions himself on the opposite side of the tipping buckets on the Grain Pit. He leans over the bar, watching the blue conveyor belt, and looks down to see where the grain is being carried.

On 8 occasions children were touching the exhibit but not carrying out the intention of the exhibit maker or teacher for that exhibit. Examples of children interacting with exhibits at CIMA level 2 follow. Emily and her friend Emily are swinging on the surrounding bars of the Grain Pit platform with their backs to the activity of the Grain Pit itself. James at the Trust your Touch exhibit opens the left side bottom box 1 looks in at a mousetrap, then shuts the door. He then opens bottom box 2, looks in at a decoy duck and shuts the door. James did not carry out the intention of the exhibit as he did not put his hand into the boxes through the hole in each door or try to identify by touch the objects inside, nor did he discuss what he could feel. Elton is standing at the entrance of the Kids Cave. He turns to the adult sitting on a seat beside the entrance and asks "do you go in the dark?" The adult responds "No". Elton steps back and away from the Kids Cave entrance and says to a child peer standing beside him "pretty scary!" Then he turns and runs away from the Kids Cave to the Klingons exhibit. Laraine turned to face the Roll-a-Ball exhibit. She bends over and uses her hands to prize up the lid of the storage module beneath the exhibit mounted on the wall. Laraine drops the lid on her right hand. Laraine straightens up and rubbing her hand walks away from the storage module to the entrance of the Kids Cave.

Children were observed interacting with the exhibit in ways that were properly intended on 87 occasions during observations. An overwhelming number of observations were of children fully engaged in interacting with an exhibit and carrying out the intention of the exhibit creator or the ECC staff and volunteers, as

expressed by an Institution flyer, a label, or a teacher's expressed perception of its purpose. One example of CIMA level 3 interactions for each exhibit are included here. Elton grips handle 2 on the Grain Pit with both hands and braces his bare feet on the floor slightly apart and with knees bent. Elton looks up to where the scoops are fixed to a movable belt and begins to turn the handle with both hands. He bends his body and pulls on handle 2 with both hands so hard that his feet lose their grip and move around on the floor. All Elton's energy appears to be focused on turning the handle and his concentration on watching the scoops of grain travel upward to the top shoot on the Grain Pit. Elton steps to his left, grasps handle 1 with his left hand, and continues to hold handle 2 in his right hand. Laraine picks up the Light Catcher exhibit with a hand on each side using both hands to grip the A4 sized frame and lifts it up above her eye level. Laraine tips her head back and looks at the light through the Light Catcher. She tips the frame backwards and forwards, side-to-side tilting and tipping it as she looks through it towards the lights. In Klingons James climbs on hands and feet up on the cleated boards on the left side of the room to the shelf half way. He slithers down over the edge on his belly, then climbs up the cleated board and perspex wall again. When he gets to the top James slides down on his belly backwards on the green-felted sloping slide to the floor. Hugo is standing at the Trust your Touch exhibit. He feels briefly inside bottom box 1 with his right hand. He withdraws his hand and opens the box 1 door, looks in, then shuts the door. Rhys is bending over at the waist, looking down at the beetle puzzle on the floor of the UV Room. He kneels down and tries to slide pieces with both hands across the carpet in an attempt to fit the pieces together and make a complete picture of a beetle. Anastasia runs over to the Roll-a-Ball exhibit and puts a golf ball onto the track of coloured shapes. She stands in front of the exhibit long enough to watch the ball roll down the track, then turns her back on the exhibit and walks away.

### **5.3.5 Interactions according to gender**

The number of exhibits children engaged with during the 11 minutes was observed. The 5 observed girls visited 22 exhibits in the 55 minutes, therefore visiting 4.4 exhibits per girl. The 6 observed boys visited 27 exhibits in the 66 minutes,



therefore visiting 4.5 exhibits per boy. The observed number of exhibits visited by girls and boys showed there was an insignificant difference in the average number of exhibits visited by either girls or boys. Girls averaged 4.4 exhibits in 11 minutes and boys averaged 4.5 exhibits in 11 minutes.

Girls were observed more often interacting with exhibits that involved gross motor activity, for example the Kids Cave and Klingons exhibits. Boys interacted with exhibits that involved pushing buttons or turning wheels to make them work, for example the Grain Pit and Shadow Catcher exhibits. Girls tended to move around KO and engage in interactions with exhibits independently. Boys were observed moving around KO with adults and engaging primarily in interactions with exhibits where adults and child peers were already present.

#### **5.3.6 Revisits to exhibits**

Children looked at a number of exhibits, then returned to selected exhibit to engage in on amore advanced level of interaction. The CIMA level of interaction increased from level 1 to level 3 at most exhibits when they were revisited. For example, Anastasia flitted from one exhibit to another, spending a short amount of time at most exhibits. During the 11 minute observation Anastasia visited 7 exhibits and revisited 3 exhibits. Emily looked at, then 4 minutes later revisited and engaged in interaction at CIMA level 3 on the Grain Pit. Rhys engaged in CIMA level 3 activity for 3 minutes in the Shadow Catcher room, left the room for 2 minutes, revisited for 1 minute, went away for 1 minute, and then revisited for a further minute. Thaddeus revisited Kids Cave 4 minutes after his first visit. Thaddeus revisited the Grain Pit 1 minute after his first look at the exhibit.

Table 5.7  
Number of Peers and Adults Observed At Exhibits With Target Children

Exhibit	Teacher	Woman	Man	Girl	Boy	Total
Grain Pit	11	9	1	43	53	117
Kids Cave	5	3		24	7	39
Klingons		5	1	16	9	31
Shadow Catcher	6	12		14	20	52
Roll-a-Ball		2			1	3
Trust your Touch		1		1		2
UV Room		2				2
Light Catcher	1					1
Household Tasks		4			1	5
Total	23	38	2	98	91	252

**5.3.7 Influence of group composition on child interactions**

As reported in Table 5.7, children visiting KO with their ECC often have many child peers and adults present and available to interact with them and the exhibits. The amount of interaction observed varied according to the child and the exhibit they were interacting with. Each ECC group approached the inclusion of peers in the group differently. The children in ECC 442 group were organised with consideration of the available transport, the behavioural manageability of children for the accompanying adults, and sometimes for peer support of a diffident child. Each adult may only be responsible for a maximum of three children when travelling in private cars. During the visit some children were closely supervised by the parent they were with and encouraged to interact with all the exhibits in the gallery. Other children observed were allowed to move throughout the gallery as and when they chose without close adult supervision or encouragement.

The children in ECC 187 group were selected for a visit according to whose turn was due and the destination of the visit. Selecting children for peer compatibility was not an influential factor in the composition of the visiting group.

The children in ECC 454 group who were invited to go on the excursion were those who spend the most time in the childcare centre each day. The children were able to choose whom they wanted to hold hands with walking to the bus, who they sat with in the bus and whom they interacted with in KO. The organiser explained that she considers that children benefit from a visit to KO as it provides the opportunity to explore and practise with their child peers. This seems to coincide with the family grouping in the daily sessions of this childcare centre. Under 2-year-olds and 2 to 5-year-old children are within sight and sound of each other during meal times and free choice activity times. The Centre philosophy states that the physical, social and emotional needs of the children are of paramount importance.

The qualitative analysis involved looking for categories of peer interaction in the observed behaviour of young children in the gallery. Each observation of a child was analysed and examples of interactions between children at the same exhibit were recorded using the model of peer interactions developed by St. George & Cullen (1995).

Children showed their awareness of peers through passive observation. The children's activity was influenced by other groups in the gallery and/or others within their own group. The target children observed appeared to be very aware of the activity of other people in the gallery. For example, Laraine stood watching for other children in her ECC group to come out of the Kids Cave. Rhys collected his shoes when children from another visiting group prepared to leave. Thaddeus stood opposite the buckets on the Grain Pit watching the activities of the volunteer, 2 adult females and the other children from his ECC group of 4 girls and

3 boys. Emily walked around the outside of the Grain Pit watching peers interacting on the platform.

Children engaged in social interaction and discussion. Children were never observed alone in the Shadow Catcher exhibit. During observations in Shadow Catcher many of the verbal interactions included discussion, exclamation, and laughter, as well as enthusiastic physical activity.

An example of peer scaffolding was observed when children were observed demonstrated the procedure for interaction with an exhibit to a child peer. A girl is interacting with the Trust your Touch exhibit boxes by first feeling inside each box and then looking inside to see the object she has felt. James is walking alongside the girl watching her interactions. The girl continues to feel in each box as she calls over her shoulder "you can try this one".

Incidental peer scaffolding occurred during spontaneous conversations while engaged in exhibit interactions. Sheelah walks into the UV room and calls out "come and see, watch this Thaddeus look look at my skivvy it's changed colour!"

Peer scaffolding occurred when children encouraged one another to interact on an exhibit. The Grain Pit required a cooperative effort to move the grain around the complete circuit from storage bin to scoops onto buckets then conveyor belts. Everyone from the ECC 454 group was engaged in interacting on the Grain Pit together during their visit. Kids Cave could be explored alone but child peers offered encouragement and moral support to diffident children, notably Emily in the ECC 442 group and Thomas in the ECC 454 group. Other interactions were observed where children appeared to be encouraging one another to continue doing circuits of the Kids Cave, for example Anastasia and Hugo from ECC 454. No children were observed entering Kids Cave alone. In Klingons children were not observed helping each other to climb the walls but they did appear to enjoy

scrambling over the sloped surfaces together. One child was observed sitting quietly alone in this room (Laraine). Child peers do not appear to be essential to enable a child to interact with this exhibit.

### **5.3.8 Examples of adult/child interactions**

Each ECC planned their excursion considering which staff members and additional adults would be included. At the ECC 442 preparation and communication between the organiser and parents focused on the parents' availability to provide transport. This is one of the ways parents can help in the operations of the ECC as written in their policy handbook. The request for parents to provide transport for this excursion was made in a newsletter, and confirmed when parents signed a noticeboard list giving permission for their child to attend and confirming their availability to transport children. The organiser said the group that visited KO included many children who had visited before and held family membership in The Science Centre Inc. so she did not give the adults any verbal instructions about possible interactions. Factors which influenced the number of exhibits children interacted with were the number of adults with each group, what the accompanying adults had been told about their role for the visit, and the time available for the visit to KO. During discussions with the organiser from ECC 442 before the visit she did not think it necessary to request from parents written consent for them to be participants in the study. She had not considered that they could be recorded or observed interacting with the children in KO. The philosophy of this ECC implies that the staff will teach and parents will parent. ECC method requires the staff to demonstrate correct procedure to children who then repeat her actions. The role parents might take in KO was not discussed with parents, and it was only as they were leaving the ECC that they were given an information sheet from the Institution regarding some exhibits in Kids Own which suggested how they might interact with the children and exhibits. A significant number of ECC 442 parents used the occasion to socialise with other parents while they were in the Kids Own gallery. They stood and watched proceedings rather than interacting with the children and the exhibits. Some reasons why this happened could be that the philosophy of the ECC does not encourage parental interaction or participation

in children's work (activity in the ECC). Parents are therefore unlikely to expect, unless they are told, that they can and should take the initiative and encourage their children to explore this new potential learning situation. There may be few occasions when parents of this ECC are gathered together in a safe weatherproof environment with time to talk with one another. A number of parents had, in addition to their pre-school children, younger siblings, toddlers and babies with them on the trip for whom they were also responsible.

The ECC 187 organiser Denise suggested that inviting a parent on a Burger Buggy excursion to KO was used as an opportunity for parent education, and that her role was to explore with and alongside children to model curiosity and to scaffold children's learning.

The ECC 454 organiser Lisa considered a visit to KO provided an opportunity for adult education. The up-coming visit was planned at a staff meeting and staff members who had not visited KO before were the first to be included. For the ECC 454 staff members the physical and emotional well being of children is paramount. For example, during a conversation between the researcher and the organiser she explained that her role during the excursion to KO is to encourage children to explore the exhibits and ensure all children are doing something. This organiser explained that she relies on the KO exhibits to provide safe and appropriate experiences for her charges. Her personal philosophy was that the Grain Pit exhibit was beneficial "because it encourages cooperation which the world needs more of." More adults were found at exhibits where they could model, demonstrate and/or interact with the exhibit. For example, the Grain Pit has 6 points where an activity can be carried out, with handles to turn or buckets to direct. It also requires the actions of more than one person in order to move the grain through a complete circuit of the equipment. The Shadow Catcher has a descriptive label that explains what participants need to do. Since few 4-year-old children can read adults who are there will interpret the instructions for the children and join in the activity. The flyer about the Kids Cave suggests adults may crawl through with the



children. Both organisers from ECC 442 and ECC 187 chose to do so but other adults with the groups encouraged children to crawl through the Kids Cave with peers while they stood outside and watched. At the Klingons exhibit adults were observed physically assisting children to climb walls and also to console hurt children. Adults were not observed climbing the walls or sliding down the slopes of this exhibit. Neither were they observed looking through the windows of this exhibit to the shop area for a concave view.

As Bredekamp & Rosegrant (1993) suggest, teachers of young children make hundreds of decisions each day about which specific teaching behaviour or form of adult assistance is appropriate for this child in this situation at this point in his or her process of learning. There were numerous examples of interactions between adults and children in Kids Own from every category in the teaching continuum of Bredekamp & Rosegrant (1993). Selections of examples of adult/child interactions from across the teaching continuum are reported. During analysis of this data an additional category of non-teaching interactions between adults and children was identified. Examples of this interaction are also reported.

To 'acknowledge' is to give attention and positive encouragement. At 11.11 a.m. Justin is working on the Grain Pit, turning handle 4 is a boy at handle 1 and 2, and two boys stand on the support at the tipping bucket. Two girls are standing at handle 5. There are also two girls climbing and swinging on the bars surrounding the Grain Pit and four women, one man and one male volunteer standing on the carpet outside the Grain Pit platform watching proceedings. At 11.12 a.m. Justin calls to the male volunteer "Look what I got". The volunteer acknowledges Justin's comment and leans over the Grain Pit bar to see what Justin is showing him.

When 'Modelling' the teacher provides cues or prompts or other forms of coaching. For example, Elton is looking across the room to where Deidre is feeling

inside one of the Trust your Touch boxes. Elton calls out to Deidre “Can I have a try?” she replies “You sure can”. Elton walks over to the Trust your Touch exhibit and bends over to feel inside bottom box 2 while Deidre looks on.

‘Facilitating’ usually takes the form of temporary assistance given to help children get to the next step. James walked to stand in front of the Roll-a-Ball exhibit as the directress approaches it. Olivia suggests James move the wood. She points to the wooden shapes that are slotted into the exhibit. James rearranges a shape by pulling it out of a slot with his right hand and replacing it at a different angle in a similar place, vertical rather than horizontal. James takes a ball in his left hand and places it on the right side of the track as high as he can reach.

‘Supported learning’ allows the child to participate but with clearly available assistance. James is joined by one man and three girls in the Klingons exhibit. The man lifts James by grasping him under his armpits and lifting him to the level platform on the right-hand-side wall. James clambers to the edge of the shelf and jumps down facing forwards onto the floor.

‘Scaffolding’ occurs when children are assisted to work on the edge of their current competence. Thaddeus runs to the entrance of the Kids Cave where, unbeknownst to him, the door that turns on the light inside the cave is closed. Thaddeus begins to clamber up the ramp into the cave then slides back down again. Thaddeus is the 4th child to clamber in there; there are two girls and one boy inside the cave. When Thaddeus asks her Robina opens the door that switches on the internal light and he clambers back into and the cave with the light on.

‘Co-constructing’ is when a teacher completes an activity with a child. Emily emerged from the Kids Cave exit with a flushed face and mussed hair and smilingly waited for the directress Olivia and child peer Emily to emerge. Emily is standing

bent over at the waist, holding the curtain up to see who is coming out next. Standing beside her is the assistant directress Deborah.

'Demonstration' occurs when the teacher is the active participant and the child is an observer. For example, Hugo is standing on the Grain Pit at handle 4. An adult female is standing near the Grain Pit platform edge watching the action. An adult female is turning handle 3, which moves grain on the conveyor belt opposite Hugo's conveyor belt. There is a girl standing at the tipping bucket, a boy turning handle 1 and a boy turning handle 2. Everyone is turning handles except Hugo, grain is moving around, it is very noisy and no one is talking very much.

Children are given specific, 'direct instructions' to do something in a particular way. With Rhys in Shadow Catcher are his friend Lance and his Mother Tessa. Tessa is talking to the children about how to pose while miming how they should hold their bodies, arms and legs for an interesting shadow. Tessa directs Rhys by saying "Move one of your legs Ry!" then she says "see your fingers."

Also occurring are 'non-teaching interactions' between adults and children. Adults were observed actively attending to house-keeping tasks such as putting children's shoes on and tying laces, gathering up shirts and jackets, and taking children to the toilet. ECC 454 staff were concerned with the organisation of shoes and shirts on arrival and reminding children about the rules in KO for physical safety, for example Robina asked "Anastasia are you running?"

### **5.3.9 Summary of children's interactions observed in Kids Own**

Field notes recorded how the children reacted to and interacted with the exhibits and other people while in KO. During the 11 minutes each child was observed they interacted with as few as 1 and as many as 7 exhibits in the gallery. None of the children observed interacted with all 14 exhibits in the gallery. The pattern of

activity appears to be that upon arrival children rapidly chose exhibits and interact with them in ways the exhibit creators and ECC staff intended. Across the 40-90 minutes-length of the visit there was no reduction in the level of activity amongst the children visiting. In the field notes the adults were observed acknowledging children's actions and comments, providing cues and prompts, giving specific instructions, temporary assistance or demonstrating how to interact with an exhibit.. Adults were also observed working alongside children, cooperating with them to make an exhibit work. Adults were also observed attending to housekeeping tasks and monitoring the health and safety of children in their group. The number of exhibits explored appears to have been influenced by the time available and what the accompanying adults understood the objective of the visit to be. In the ECC group who visited KO for only 35 minutes the children in the group averaged 6.3 exhibits visited per child. This could be because the accompanying adults in the group had been asked by the organiser to help children explore all the exhibits in the gallery. Children from the other two ECC groups averaged 3.5 and 4 exhibits visited in their 11 minutes of observations. Adults accompanying these two groups had not been directed to encourage children to explore all the exhibits in the gallery. Adult/child interactions were influenced by what the organiser considered her role and the role of the accompanying adults to be. Although all ECC excursions require a 1:4 adult-child ratio the number of adults in the group appears to influence adult/child interactions also. In the largest group visiting from ECC 442 the adults spent most of their time talking with one another rather than interacting with the children and the exhibits.

Field notes recorded children spent time in passive observation of peers and were very responsive to the actions of other people in the gallery. When children were interacting at the same exhibit they willingly took turns, in particular on the Grain Pit, Trust your Touch and Kids Cave exhibits. The amount of time children engaged in interaction with particular exhibits appears to have been influenced by the presence of child peers and adults at activities where everyone had something they could do together. Children were observed scaffolding child peers by demonstrating procedures for interaction during incidental conversations about

what was happening at an exhibit, and by cooperating with peers to find out more about how an exhibit worked together. No children climbed into the Kids Cave or entered and stayed in the Shadow Catcher exhibit alone.

#### **5.4 Child Interviews in Their Early Childhood Centre**

From each Early Childhood Centre group the four children who had been observed in the Kids Own gallery were interviewed in their Early Childhood Centre during a normal session within 7 days of their visit about their experiences in Kids Own.

The 194 minutes of taped children's interviews in their ECC were transcribed onto computer file and then colour-coded according to which exhibit the child was talking about to organise the data for analysis. A table was used to guide the analysis of children's interview data. The comments made by each child about each exhibit were analysed and hierarchically ordered in categories with titles that reflected the complexity of their responses. Responses revealed that children had reflected on their interactions and were able to talk about their theories about why something happened during interactions with an exhibit. In the next category children described their theories about how interactions happened. At the next level children recalled the ways in which they explored exhibits and how they had experimented with exhibits, but comments which suggested they had reflected on the experience or had theories about why or how interactions had occurred were not included. At a simpler level children described their actions during interactions. Children named their favourite exhibit in KO. Few children recalled child peers accurately, which indicates peers were not remembered as significant others for children while they were in KO. Children explained there were some exhibits that they did not see while in KO. Children were asked if the exhibits were made of familiar materials. These categories are discussed below and examples included.

### 5.4.1 Children theorise why

In the most advanced responses children provided their theories about why something happened during their interactions with an exhibit. These children had reflected on their interactions and drawn conclusions about why something happened. The children explained their theories about why the shadows stay on the wall in Shadow Catcher when they moved away. Rhys explained “cos’ those lights flashed, the lights flashed.” Elton said “it’s cos you push the button.” For Thaddeus it was “the light.” In the Trust your Touch exhibit Emily explained the contents of the boxes felt “duck it was just soft.” Sheelah explained “and that one I felt that, and that had nothing, nothing just fluff, hard I feeled a bone, it was really hard. A ball feeled soft with fluff in it.” In the UV Room Rhys had rearranged the butterfly puzzle. Rhys explained “we put-did it together. I put the green one and this is the orange I took. There was plastic on them I took them off and put them on that one cos there was lots down the bottom.”

### 5.4.2 Children theorise how

At the next level children recalled experiences and explained their theories about how to interact with each exhibit. Thaddeus talked about what he had done around and beneath the Grain Pit exhibit. “I got between there.” (“you got between the conveyor belt?”) “No between both of them don’t know how I got there. I went down underneath there. (“What did you do?”) “found some grain and picked it up, it slipped down on the floor, just in the holes.” Thaddeus was asked “have you seen a machine like this before?” He answered “No but when that thing’s down I like putting my hand in it, when it feels lots of grain in it feels like a bit of seed.” When recalling his experiences in the Klingons exhibit Elton said “slide down down down down down down down down” (to get up?) “easy-peasy take your socks on it’s better. See that white feet that helps you get up.” and Thaddeus said “Yes I climbed up here with my hands, that’s the hard way” (pointing to the steeper slope) “I climbed just climbed right up to there, just slided down right here.” Sheelah said “Umm I went on those and then I climbed. I went on that one, yeah and your hands, and then I jumped, you had to go on your tummy.” In UV Room Thaddeus said “It’s lovely and you can’t take the line of the butterfly off and that pattern and that



pattern take off. You put it back on. You can put it different ways.” At the Shadow Catcher six children talked about their theories about how it works; some examples are when James explained what you have to do to catch shadows. “I’ll show you that you push button. your shadow comes on, onto the wall. All of you have to stay, near where you are and get your shadows there. I push the button and then are the lights.” Rhys explained the “you had to go and stand by the window and then you had to push the button, and then the light went. First that one, then that one, then that one, then that one, yellow green white.” Sheelah said “It had to go that one (red light ) then yellow.” and “that didn’t make that go on had to wait until that goes on. I made that one go on.” When discussing the Roll-a-Ball exhibit Stacey said “cos’ it got those blocks, and I put one up there I did.” Sheelah explained “It went, have to start from there and then it went there.” Thaddeus explained “Yes you can take these boards off put them back in there you can put them a different way. Look different colours, I took them out and put them back in.” Justin said “I just made a little goal and rolled and got a goal down there you just do!” Hugo said “you just put the balls on the top and they go down.” Rhys said “I made the ball go down these things those things. Up the top and it rolled everywhere.” On Bongo pipes Stacey said “I couldn’t reach the high ones, but there went bom! bom! bom!” and “I tried to change the pipes and I couldn’t, they stick.” Emily said “I made a sound with those, bang on those.”

#### **5.4.3 Children explored exhibits**

During interviews children explained how an exhibit worked, which showed how they had explored the exhibits in KO. Some examples are: when talking about the Grain Pit Stacey reported the path the grain is carried along. “Those move along when you do one. That goes round and those pick up, they go ---then down fell down. Yeah they go down that way. Oh they go into the seed thing, there they come again. Yeah, then it goes rrrd again.” Rhys explained “yeah but that thing moved, that thing turned” (“what happened then?”) “beans came.” And “All the stuff came in that was going up and they’re coming down and getting more. They go into that bit up there, and then they tip it in there and tip it in here.” In Kids Cave Justin explained “dark but there’s a little, you just get through there, but

someone has to look through there and the lights go on.” James commented “Yeah but that wheel wasn’t fun.” (pointing to a small wheel on the wall near the exit. Stacey described it “It was dark and gloomy. Wheels! they was inside it!” “I walked on that it made the loudest noise it went” (Stacey slapped her hand on her thigh to duplicate the noise). In Klingons Stacey explained “ I went up there and I had a accident I was trying to climb up and I couldn’t it was a bit hard. But I could climb up those. I slided down whooo! and I went upside down. But it was tricky to get on. But there’s a nice soft bit like that, on the ground it was.” At Light Catcher children described what they saw when they looked through. Anastasia said “All the lights all the colour lights.” And “I see-dd green only green.” Sheelah explained “Umm the place The Science Centre looked different.” Rhys said “I saw a star and the star was colourful. Lots of different colours green and blue and red yellow and blue.

#### **5.4.4 Children experimented with exhibits**

Comments children made about exhibits revealed that they had experimented with the exhibits. In the Grain Pit photo Justin explained “Mmm actually she’s tipping it down there.” Justin then traced the path the grain travelled around the Grain Pit and continued “That was too hard so I decided I would wouldn’t do that.” (“Which one was too hard?” was asked, and he pointed to the blue conveyor belt handle) “Ahh this one but the slider ones easier, and so’s the turning thing there, that thing.” Elton talked about the sound the gain makes as it goes round and tip down come in and come up When Elton was talking about the cups which carry the grain upwards he said “you help them cos’ they were stuck.” (“Was the handle hard to turn?”) “Yeah it wouldn’t go round. It was doing this (Elton made a tight fist of his right hand to demonstrate how he couldn’t turn the handle.) When asked “how could you make it move?” Elton explained “I couldn’t I went faster then it turned around then I went slow.” About the UV Room Hugo said “We pulled it and it was joined to the wall.” With Sounds Like Stacey explained that she had listened to the sounds made: “Yes, but I kept getting them wrong.” “I listened very carefully to them.” Stacey said “Yes I looked inside and I was wrong.” On the Bongo Pipes Rhys explained that he played on different pipes with different

paddles but they made the same sound: "I got one of those green things, I made a noise out of the hole there." Sheelah talking about the hologram said "I don't know what it is about. When I went at the back it didn't shine it went a different colour. It looked purple and green and blue and yellow."

#### **5.4.5 Children described their actions**

Some of the responses children gave to questions described their interactions with an exhibit. Concerning the Kids Cave Declan explained that he "Played in the tunnel. They got cars, the wheel car" ("car steering wheel?") "Yeah the round thing. I drive." Hugo explained "you can stand up and reach the sky" ("what did it feel like?") "hard!" Sheelah explained there were "No monsters, no cats, no crocodiles, no gorillas and I hurt my knee on that and that." When describing interactions with the Trust your Touch Rhys explained "I put my hand in the black stuff and feeled. Felt bumpy not real." Declan said "Umm crazy, it's a toy". Hugo said "hard". Thaddeus felt "yellow, bubbles felt all bubbles. It had a beak thing toy duck." Anastasia said "I feeled a you!" (possibly alluding to the foam moulded head). About Klingons Anastasia said "When I go down the slide I falled off. I slid down that part I climbed up those little things." (pointed to the cleats on the climbing wall). About the UV Room Sheelah said "My shirt was purple changed colour and I looked in the mirror - and I changed colour." Anastasia said "I maked it up. I leaved them. I stuck on it." With the Sounds Like exhibit five children explained that they opened the lids of the pottles to see what was inside. Emily said "taken lid up and I see-dd." Elton said "I was having the lids and see what's in." Four children confirmed that they had shaken the pots. Laraine said "I shake them like that." Rhys said "we shook them." Rhys emphasised that he had sorted the pottles by weight. Laraine and Elton talked about making a sound with the pottles. Laraine "Because I wanted to make a noise!" Elton said "I played those things."

#### **5.4.6 Children nominated their favourite exhibit**

Children were asked what was their favourite exhibit in KO. The two most favourite exhibits for children were 4 votes each for the Grain Pit and the Kids

Cave. Justin nominated both these exhibits as his favourite. James nominated the Klingons exhibit as his favourite and Laraine and Stacey liked the Bongo Pipes best.

#### **5.4.7 Children recalled peers**

After 20 exchanges between Emily and the interviewer about who visited Emily's house last night Emily recalled the name of the child who travelled with herself and her mother to and from KO. Emily also assured the interviewer that her younger brother Carl had gone on the visit too. Carl was at home sick in bed with his Dad on the day that she visited KO. The audiotape recorder which Emily wore reveals she moved around all the exhibits in the Kids Own gallery with her "best friend" Emily Fanshaw. It can be concluded that children showed little awareness of the contribution of child peers to their learning during interactions. When asking children to recall their experiences while in KO, some questions elicited responses of a different nature. For example children commented that they had not seen exhibits that were in the gallery when they visited or were not familiar with the phenomena or materials from which exhibits were made.

#### **5.4.8 Exhibits children did not see**

During the interviews children did not recognise or recall interactions with a number of exhibits. Four children did not recall seeing the Shadow Catcher exhibit which is down a narrow corridor at the back of the gallery. Five children did not see the Hologram which is hanging well above child eye level in the Kids Own gallery. Three children did not see the Light Catcher, a small A4-sized framed sheet of perspex. Declan explained he did not go into Klingons but not why.

#### **5.4.9 Familiarity of exhibit materials**

Rhys and Elton were not familiar with the term "pottles", which the interviewer used to describe the containers used in the Sounds Like exhibit. "Elton what did you do with these little bins these little pottles?" He replied "They're bins!" When

Rhys was asked “Why do you think these pottles were there Rhys?” He responded “I don’t know, they look like rubbish bins”. “They do look like rubbish bins, have you got any rubbish bins like that at kindergarten?” “Yes”. Rhys tactfully questioned the interviewer’s name for the containers the seeds were in, pottles- like rubbish bins and ,yes ,in this kindergarten there was a large plastic rubbish bin for kitchen rubbish.

#### **5.4.10 Children’s recollections**

To establish children’s unprompted recall of their visit to the Kids Own gallery, at the start of each interview the children were told “I’m really interested to find out about what you thought about being at the science centre last week”. Rhys responded with “do you know what I loved?” (“what did you love?”) Rhys replied “the tunnel” (“why?”) Rhys “cos its dark!” When Justin was asked about the toy he was holding in his hands he retold practically word for word a Thomas the Tank Engine story from a video his family had hired, but when asked “Justin can you tell me what you did when you visited the Science Centre last week while you were there?” Justin responded with “I don’t know, I’ve forgotten now”. During Stacey’s interview there were 14 reciprocal exchanges between Stacey and the interviewer before they began discussing Stacey’s recollections about her interactions in Kids Own. Stacey recalled a previous visit to a different exhibition. Consequently the interviewer introduced the photograph props to aid Stacey in her recollections of her interactions in KO four days previously. Justin immediately recalled whom he went on the excursion with and then recalled a previous exhibition called Sports Lab, which he had visited in a group from the ECC. Once again the interviewer introduced the photographs of the exhibits in the Kids Own gallery to assist Justin in his recollections of his visit four days previously.

#### **5.4.11 Summary of interview data gathered in the Early Childhood Centre**

The informal interviews with children revealed 7 categories of response, which were hierarchically ordered according to how much children had reflected on their interactions with the exhibits. During the interviews children answered the

questions about the exhibits with varying degrees of complexity. Some children had reflected on their interactions and developed theories about what happened as a result of their actions. Children related how they had made an exhibit 'work' and engaged in exploratory and experimental interactions. Some children responded to questions with clear descriptions of what they had seen or actions they had taken at exhibits. During the interviews children confirmed that while they were in KO they had not seen or interacted with some of the exhibits available. Interview responses also revealed that children were not consciously aware of who their peers were but were responsive to what other people in the gallery were doing.

### **5.5 Summary of Phase 2 of the Study**

Data recorded on audiotape and observed in KO, and the children's responses to informal interview questions, revealed where most verbal interactions occurred in KO. The exhibits where most verbal interaction between children, child peers and adults, where children were observed interacting for the longest periods of time with child peers and adults, and the exhibits that visitors nominated as their favourites were the Grain Pit, Kids Cave, Klingons and Shadow Catcher. There was no reduction in the level of interaction by individuals during their visit to KO. Although 14 exhibits were available in the gallery during visits few children recognised the static hologram exhibit hanging above eye level and beyond reach for hands-on interaction. There were 4 of the 14 exhibits where no interactions were observed during visits by ECC groups in the study. Children explained their theories about why something happened during their interactions with the Shadow Catcher and Trust your Touch exhibits and their responses revealed they had reflected about why and how things happened. Children recalled their interactions with some exhibits with enthusiasm and specific detail responding to the photo prompts. Girls and boys were equally engaged in interactions with exhibits during their visit to KO. Girls were not passively accompanying boys and adults on these excursions to KO. Girls without adults spent more time in Kids Cave and the Klingons exhibits with gross motor physical challenges. Boys spent more time on the Grain Pit and Shadow Catcher exhibits where adults were always working with them.



## **CHAPTER 6**

### **DISCUSSION**

This chapter will discuss some of the issues that arise from the findings of this study. Issues for exhibit creators regarding exhibit design, promotion, use and interpretation by young children and adults will be discussed. The issue of how gender influences the attractiveness of and subsequent interactions with the exhibits for young girls and boys will be discussed. The issues for ECC staff are also discussed; they include the factors that influence the quality of young pre-literate children's interactions with exhibits, child peers and adults in an interactive science gallery.

#### **6.1 Introduction**

The findings of phase 1 of this study suggest that ECC staff compose groups of young children and adults from their ECC to visit KO. ECC staff rely on interactions among their visiting group while they are at KO for children to learn about phenomena in the world and develop their concepts about how things work. Phase 2 of this study was conducted to find out how adults relate to children, how peers interact with one another, and the kinds of social interaction and physical exploration that children engage in while they are in the gallery. This study was an illuminative programme evaluation, the programme being the exhibition in the KO gallery of the Institution. To illuminate the programme provided in KO, data concerning the intentions of the exhibit creators and selectors, the perceptions of ECC staff regarding the gallery and exhibits, the interactions of children and adults in visiting groups and the recall of children about their visit to KO were all considered. The most significant findings revealed the nature of the interactions children have with the exhibits, child peers, parents and staff in the gallery. The issue of equity in selection, presentation, and appeal of exhibits according to the gender, age and development of visitors is discussed. Scientific literacy of the adults is considered and how adults interacted while in the gallery. In presenting the children's recollections of their visit to KO we are able to see through a child's eyes a view of exhibits made specifically for them.

## 6.2 Issues in Exhibit Design

Exhibits selected and created for installation in KO were intended to invite young children to interact with them. The Early Childhood Exhibits Advisory Committee and exhibit creators applied their collective knowledge about young children - their enthusiasm to explore through touch, be challenged by darkness, be physically agile, enjoy posting objects in boxes, engage in turning wheels and racing balls - to select and create exhibits for the Kids Own gallery in the Institution. They expected children would experiment, make predictions, and attempt to vary the outcomes and get information about how the exhibit worked through their actions. They wanted children to explore phenomena in the world.

Beiers & McRobbie (1992) and Tuckey (1992b) found a visit to an interactive science centre may enhance children's understanding and perhaps enable a child to make connections but it cannot teach unfamiliar concepts. A prominent feature of research on learning in science has been the importance of a child's prior knowledge, which they bring to each new learning situation. Exhibit creators did not assess young children's understanding of concepts to be explored through exhibits, but initially they relied on advice from the all-female Early Childhood Exhibits Advisory Committee to guide their selection and creation of exhibits for KO. The team of male exhibit creators did select what were, for them, everyday materials with familiar textures for surfaces in the Kids Cave and household objects in the Trust-your-Touch boxes. Children recognised the car wheel in the Kids Cave but did not comment on the variety of surfaces in the Kids Cave. In the Trust-your-Touch boxes some children did not recognise the mouse-trap and when the adults with them saw what they had tried to identify by touch, they were horrified to see a mouse-trap. Children could not name the spanner when they saw it. Some children were confused to see a sheep horn concealed in the Trust-your-Touch box, one child walking behind the exhibit to find the rest of the sheep. It appears the inclusion of some objects in exhibits may extend children's vocabulary or knowledge about common objects but the way they are presented may confuse children also.

Another issue in exhibit design is how appropriate and safe exhibits are for the target audience. ECC staff chose to take children to KO because they consider exhibits are appropriate and safe for young children. There is however a fine line between exhibits which provide a physical challenge for children and those which will ensure children will not be hurt interacting with them. Originally the Klingons exhibit was designed to have the children wear velcro elbow and kneepads to allow them to climb the steep walls safely. The velcro pads could not be made to fit all visitors and were dispensed with, so the exhibit was modified and cleats were added to allow young children to climb the walls. When interviewed children explained how they had experimented with friction, traction, angles and slopes while climbing the walls in Klingons. But this is the exhibit where children recalled they had hurt themselves and none of the children commented on what they had seen through the convex and concave windows of the exhibit. It is important that what exhibit creators consider as an exhibit evolves from the original design, issues regarding the appropriateness and safety of the exhibit for the intended users.

As Gelman, Massey and McManus (1991) found, it is one thing to provide hands-on exhibits designed especially for young children but another to guarantee that exhibits will be used as the creators and planners intend. Objects alone do not make a scientific experience. Objects have to be interpreted in scientifically relevant ways for experimentation to happen. Children's favourite exhibits were Kids Cave and the Grain Pit, and both provided the opportunity for active physical and sensory exploration of the exhibit with child peers. For example the Kids Cave creators intended a tactile tunnel adventure for young children. It is very dark inside the tunnel to ensure children will rely on their sense of touch to move through the tunnel. A volunteer talking to children about the Kids Cave explained "You can go in there, all sorts of things are in there that you can feel with your hands." ECC staff perceived that shy and quiet children who experienced the Kids Cave exhibit gained self-confidence when they had crawled repeatedly through the tunnel, initially with the light on, then in total darkness. Children nominated the Kids Cave as the exhibit they liked best, and ECC staff perceived the Kids Cave to be the most popular exhibit with children. In the field notes and tapes children always

entered the cave with child peers, never alone, and they talked with one another inside the cave more than at or in any other exhibit in KO. Adults outside the cave controlled the light source and instructed children in what to do but did not go into the cave to share the experience with children. Children inside the cave talked to one another, mostly about how spooky it was in the dark, but they did not talk about what they could feel or the different textures on each surface of the cave. Some children completed a dozen or more circuits, racing through the cave as quickly as they could, shouting and squealing in a very excited fashion. Children clearly enjoyed and interacted with the Kids Cave exhibit in ways that were not intended by the exhibit designers. They did not explore or talk about the sensory experience of multiple surfaces offered in this exhibit.

Children's patterns of using exhibits in alternative ways were also illustrated at the Grain Pit exhibit, which was advertised as a cooperative exhibit by the institution. The volunteer who talked to an ECC group suggested "This big thing in the middle is our Grain Pit, there's lots of handles to turn and you need to work together to get that one going". Teachers talked about the value of the Grain Pit as "encouraging cooperation which is what the world needs more of". During interactions at the Grain Pit children and adults took turns and cooperated as they talked about how to make the exhibit work. Children watched others, experimented with how to move the grain and responded to instructions from teachers and each other. Although children's talk during interactions with the Grain Pit did not reveal any discussion about why things happened, when interviewed the children recalled what was easy or hard to turn or move, how things felt and what they did on the Grain Pit. As intended, children engaged in conversation and interaction on the Grain Pit with adults and child peers. Although there were many examples of cooperative activity between children and teachers on the Grain Pit there were also examples of children swinging on the surrounding bars or crawling under the machine which were not intended interactions for the Grain Pit exhibit. Some children's interactions on the Grain Pit exhibit were not those intended by exhibit creators, volunteers or ECC staff.

The printed information available about exhibits in the form of circulars and labels were not read or acted on by the adults who accompanied children to KO. One child related during an interview how she had entered the Klingons exhibit, although she was not 5-years-old. Although this child was preliterate she recognised the number 5 above the doorway of the exhibit, but could not read the words on the sign that say '5 years old and under'. She assumed children under 5-years-old were not allowed to enter the Klingons exhibit. It should be remembered that preliterate young children can misinterpret all printed material.

The Trust-your-Touch exhibit is designed to be explored through touch first, then opened so the visitor can see if they have identified the concealed object correctly. Because most of the young children who visit KO are preliterate, for them to interact with the exhibit as the exhibit designers intend adults need to read the 'Try this' label above the exhibit for them. In this study adults did not read the instructions to the children and the children were not encouraged to identify the objects inside the boxes by touch, nor talk about what they could feel with child peers, parents or staff. Children opened the doors of the Trust-your-Touch boxes, named the objects they saw, then slammed the doors shut. Children need to interact with this exhibit through touch, not sight, and extend their vocabulary through description of how objects feel, not by merely naming the objects seen. To enable children to realise the potential learning experiences embodied in the Trust-your-Touch exhibit, it requires an adult not only literate but willing to interpret the label, or an informed volunteer, to guide the interactions of preliterate young children.

From these examples we can conclude there are several factors which will influence the experiences of child visitors to an interactive science gallery. Namely, the ability of the exhibit creators to devise safe, relevant, appropriate exhibits and to provide unambiguous cues and guidelines for interactions in an attractive, inviting gallery, and the ability of the EEC staff to ensure there are informed supportive child peers, adults or volunteers to enthusiastically share their

experiences. Consideration of all these factors presents a continuing challenge for exhibit selectors and creators in interactive science centres everywhere.

Research by McManus (1993) and Falk & Dierking (1992) found middle school and college students recalled visits to science centres as memorable events. In this study children recalled exhibits that had made the greatest demands on their attention and required the most active participation. During their interviews children gave detailed explanations about how the Shadow Catcher and Grain Pit exhibits worked, which showed that although there had been limited discussion in KO the children had observed, participated and thought about their interactions with the exhibits. During post-visit interviews children did not recognise or recall interactions with a number of the fourteen exhibits that were available in KO when they had visited. The placement and presentation of these exhibits could have been factors for why they were not seen. The Holograms were hanging approximately 2 metres above the floor and well beyond eye level for the children. The Shadow Catcher exhibit was located down a narrow dark corridor at the back of the gallery and some children did not go down the corridor. Not only does the selection and design of an exhibit affect how it may be interacted with by young children but attractiveness and placement in the gallery will affect if an exhibit is seen and interacted with at all.

### **6.3 Interactions According to Gender**

Israelsson (1993) states “science centres everywhere in the world tend to be the playgrounds of boys of all ages” (p. 941). She claims that science centres present science in a very masculine way and fail to form a true representation of what we see around us. As a result Israelsson (1993) suggests that female visitors will remain passive companions of sons, husbands or male students rather than active participants in the communication process. In this study ECC staff commented that the Kids Own gallery was rather dark and unimaginative, they felt it lacked visual appeal and was a very stark environment. These comments support Israelsson’s contention that galleries present science in a masculine way that has little appeal to



female visitors. However, ECC staff rated the exhibits in the KO gallery as appropriate for girls and boys, visually appealing and intellectually challenging for all young children. ECC staff felt that in order to explore most exhibits children need adults to interpret them. Girls and boys visited an equal number of exhibits during their visit but favoured different exhibits in KO. In this study girls were not passively accompanying boys and adults on excursions to KO, as Israelsson (1993) suggested. Girls were observed actively interacting with the exhibits and their child peers and most often they were interacting independently from the adults who had accompanied their ECC group. Boys were observed in interactions with exhibits where adults were working with them, providing supervision, encouragement, and instruction to guide their interactions. Girls and boys were equally engaged in interactions with exhibits during their visit to KO, however girls and boys showed preferences for different exhibits in the gallery. Greenfield (1995) found girls prefer life science topics whereas boys prefer physical science topics. In this study girls were more often observed in the Kids Cave and Klingons exhibits which contain sensory experiences and gross motor physical challenges. Girls nominated their favourite exhibits to be those which focused on sensory exploration as in the Kids Cave and Sounds Like exhibits. Boys were engaged in interactions with exhibits which involved pushing buttons or turning wheels to make them work, for example on the Grain Pit and Shadow Catcher exhibits. Boys nominated their favourite exhibit to be the Grain Pit. Koran Jr., Morrison, Lehman, Koran, and Gandara (1984) reported that in their study girls were attracted to a single exhibit and interacted with it using many of their senses, while boys tended to move through a series of exhibits rapidly. Kerrison & Jones (1994) found the girls in their study were more intellectually active and systematic, made more quantitative measurements and cooperated better socially with their child peers. In this study the girls tended to move around the gallery and engage in interactions with child peers at exhibits, they did not rely on adults to invite or guide their interactions. Boys were observed moving around the gallery and engaging in interactions with exhibits accompanied by adults and responding to the instructions of adults. In this study girls were not passive observers of men and boys while visiting the Kids Own gallery but active investigators of the exhibits. Girls cooperated with their child peers and relied less than boys on the encouragement, direction and supervision of

adults in the group. Girls did choose to interact with the exhibits that their female teachers were interacting with.

#### **6.4 Early Childhood Centre Groups in Interactive Science Galleries**

Neuman & Roskos (1991) argue from an interactionist perspective that children's learning is influenced by the social context through their collaboration with adults and peers during interactions with exhibits. Findings of previous research in interactive science centres suggest that interactions between people are at least as important for learning as those between the individual and the exhibit (Blud, 1990; Rennie and McClafferty, 1993; Tuckey, 1992a). Children's learning is influenced by the social context, through their collaboration with adults and more capable child peers as well as their interaction with the exhibits. On a trip to the Kids Own gallery all these important components of learning are likely to be present, through the selection of children in the group of child peers, parents accompanying the group, and the opportunity visitors have to explore the interactive exhibits in the gallery. ECC guidelines require, and management of the institution suggests, a 1 to 4 adult-child ratio when ECC groups visit the KO gallery. Many ECC groups aim to have and achieve a 1 to 1 or 1 to 2 adult-child ratios, which is achieved by inviting parents to accompany the group on the excursion. Tizard & Hughes (1984) suggest that the exchange of views between parents and children at home is better attuned to young children's needs than the question and answer technique of early childhood teachers in the ECC. However in this study parents did not use a question and answer technique that extended children's thinking or vocabulary while they were in the KO gallery. Perhaps parents felt they were in a 'classroom' environment and although willing to accompany their children and make up the numbers they did not interpret their role as being to teach children science concepts in the science gallery. According to Rennie and McClafferty (1993), the optimum group size is small so that students are more able to ask questions, receive answers and have their hands on the exhibits. These researchers found that in larger groups some students' experiences may be vicarious, providing fewer opportunities for interaction with adults and exhibits. In this study the children who visited in a group of 8 children and 3 adults were engaged in interactions with child peers and

parents more often than the children who attended in a larger group with the same ratio of adults to children. In the larger group of twenty-three children and eleven adults the parents were observed talking with friends or taking care of younger siblings rather than engaged in interaction with the ECC children at the exhibits. Tuckey (1992a) found that stable pairs of school children she observed spent more time at each exhibit visited and both members were able to interact fully with the exhibits. Carlisle (1985) found many children in his study observed exhibits as individuals then shared the experience with child peers. Primary school aged children took on the role of explainers to their child peers and overall sharing and cooperative behaviours predominated. In this study ECC staff were found to match children with child peers they knew and could relate to, who might have scaffolded one another's learning during the visit to KO. Children appeared to be very aware of the activities of children in other groups in the gallery and/or other children from their own group. Target children were observed gathering their shoes and preparing to leave the gallery when children from another group were preparing to leave. This reaction reinforces the conclusion that the young children visiting the gallery were not completely aware of which children belonged to their group. As Cullen and St George (1996) found despite the salience of peers in interactions in the gallery, during their interviews children did not recall the presence of particular peers by name or reveal children's awareness of how frequently they were exploring and experimenting with exhibits alongside peers from their ECC.

Stable pairs of children were not observed moving through KO together but children did talk to children on the same exhibit as themselves and their actions were influenced by the activities of other children in the gallery. This study found that although children were very aware of, and responsive to, what other people in the gallery were doing, they were unable to correctly recall by name the children and adults who were in their ECC group visiting KO. We can conclude that the actions and behaviour of their child peers influenced young children but they were not selective about who they interacted with at exhibits in KO. ECC staff should consider the compatibility of children's strengths interests and abilities when selecting a group to visit an interactive science centre.

Beiers and McRobbie (1992) report that the findings of previous studies on interactive science centres have shown that the intellectual involvement of participants increases with hands on involvement, that participants develop positive attitudes to science, and that they recall enjoyable experiences. In this study ECC staff suggested young children benefit from a visit to KO because it is an enjoyable experience in a positive learning environment for them. Pramling (1992) suggested that ECC staff should develop children's awareness of different phenomena in the world around them. In this study ECC staff felt that the children in their Centre would benefit because the adults who accompany the group became aware of a wide range of science ideas to share with children and enjoyed making discoveries with children. Staff suggested children benefit because the visit allows staff to tap a "hands-on extension to our programme" (232). Staff report that because there is a wide range of phenomena represented in the exhibits there is something that will address the interests or needs of all the children who visit the gallery. While in KO children can experience a wide range of activities that will challenge them physically, emotionally and intellectually, ECC staff conduct visits to an interactive science gallery because they consider the exhibits there will allow them to meet the goals stated in Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996).

Staff suggested children benefit from a visit to KO because the gallery provides opportunities to stimulate 'new' ideas and experiences for young children. A respondent wrote "They gain new knowledge and understanding of how things work in this world and are given opportunities to explore things related to the various schemas they are currently working on" (230). Gottfried (1980) found that there were many educational, motivational and social benefits for children who visit an interactive science centre. Many of the responses explaining why staff had organised visits to KO suggested that they considered the gallery a fun place to visit which provides an educational opportunity for young children, their family/whanau and staff. A number of respondents believed children benefit from their exposure to experiences in KO where they are challenged intellectually and physically with many problem-solving opportunities. Some staff commented that

children benefit from a visit to KO because it provides an alternative opportunity for children to try out their ideas and practise new skills when exploring the phenomena demonstrated in the exhibits. Staff suggested they encourage children while they are in KO to make the most of the opportunity to learn by exploring hands-on exhibits that are appropriate for them and provide excellent sensory experiences. Children benefit from such a visit because in the KO gallery they are allowed to touch and explore the exhibits, they are invited to identify and solve problems, they are encouraged to take risks, and they are allowed to build on their own interests and enhance their general knowledge. This study found the KO interactive science gallery is well patronised by the local ECC community because it provides appropriate, fun, hands-on experiences for groups from their ECC. ECC staff can encourage young children in their exploration of different phenomena in the world around them (Pramling, 1992).

### **6.5 Children's Interactions with Child Peers :**

Previous research has found there are typical patterns of behaviour amongst all visitors to interactive science centres where they orientate themselves for the first few minutes of the visit, then engage with chosen exhibits (Carlisle, 1985; Kubota & Olstad, 1991). In this study children scanned the environment and looked at or into many of the exhibits before engaging in prolonged interaction at any one exhibit. After children had tried out a number of exhibits they returned to spend more time at a particular exhibit. An overwhelming number of observations were of children fully engaged in interacting with an exhibit and carrying out the intention of the exhibit. Carlisle (1985) commented that initial interactions with exhibits are predominantly a solitary experience, then students often looked for a friend with whom to share an experience. The visit is a highly social experience - child talking to child, explainers, adults, and teachers. The findings show that young children observe the actions and body language of others in the gallery and by copying others children scaffold each another's learning. Many of the verbal interactions between children included discussion, negotiation, exclamation and laughter as well as enthusiastic physical activity.



The findings of previous research show that peer teaching does occur amongst older children when they are visiting an interactive science centre. Children 8 to 12 years of age do explain, instruct, discuss, demonstrate and cooperate when interacting with each other and the exhibits (Rennie & Elliot, 1991; Tuckey, 1992a; Carlisle, 1985). There were numerous examples of younger children scaffolding their peers in KO. Some examples involved children demonstrating to their peers what to do with an exhibit, but they did not always accompany the demonstration with an explanation about what they were doing. Incidental conversations during spontaneous free choice activities were occasions when children encouraged one another to interact with an exhibit. Peer scaffolding of the curriculum, where the curriculum is the interactive exhibits in KO, was observed between peers at a number of exhibits. An exhibit where peer scaffolding occurred very often was at the Grain Pit where cooperative effort was required to send the lupin seeds on a complete circuit and make the exhibit 'work'. Children discussed and demonstrated to one another what to do on the Grain Pit. Children did teach or guide the learning of child peers indirectly by suggesting what 'someone else' could do on the Grain Pit exhibit. Occasionally one child gave a direct instruction to another child at an exhibit. A child coached a peer at the Roll-a-Ball exhibit when she said "If you put it, these in different places the ball goes in different ways". A different form of peer scaffolding occurred in the Kids Cave where child peers offered encouragement and moral support to children who were scared or unsure of the darkness in the cave. Children's verbal interactions with child peers often included exclamations of surprise, humour, fear or revulsion. Children named or labelled objects for peers. This form of peer interaction occurred most frequently at the Trust-your-Touch exhibit. Most often one child would name an object they saw, and then wait for confirmation from the child peers alongside them. Children during interactions negotiated with peers to establish a shared meaning of the terms they used and the social role they would play.

Staff felt young children benefit from a visit to Kids Own because it gives them the opportunity to learn alongside and communicate with child peers and adults. KO is an interactive learning environment where social skills are encouraged, including



turn-taking and talking about our ideas with others. Staff suggested taking children on a visit to KO is good for their communication skills because they talk with one another during interactions, which provokes lots of discussion about how things work. These discussions extend children's language and vocabulary. The findings in this study do not support the ECC staff expectation that young children will discuss how things work in an interactive science gallery with child peers or adults. Children asked very few open questions and were not recorded talking about how things worked in the KO gallery. ECC staff suggested that after a visit to KO the children are eager to 'report back' on what they have seen to the whole group and talk about the experience with their child peers. During interviews many responses children gave revealed that they had experimented with the exhibits and tried out their ideas. Although children may not have talked about how something felt when they were in the Kids Cave or how difficult a handle was to turn on the Grain Pit, they had thought about how things felt during and following their interactions.

## **6.6 Children's Interactions with Adults**

Previous researchers have recorded observations of how adults interact with children while on a visit to an interactive science gallery. Visits in this study are self-led by female ECC staff, and most parents who accompany children on excursions from Early Childhood Centres are women. Meade and Staden (1985) suggest that due to previous experiences in their own education many women lack the knowledge and confidence to share physical science experiences with children. Responses show that parents and caregivers are, however, very willing to accompany their child's Early Childhood Centre group on a visit to KO. More than half of the additional adults accompanying groups volunteered to attend an excursion to KO. McManus (1987) found that adults visiting a science museum reported a general, non-specific expectation of acquiring knowledge, stimulating their general interest and in the broadest sense, enjoying themselves. According to McManus (1987) an important component of social interaction is the identity of the person with whom we interact, and adults modify their behaviour to suit the age of the person with whom they are visiting. In this study adults behaved according to the role they were fulfilling during the visit. The emphasis for ECC

organisers and parents in their stated values for the trip were that children practise communication and social skills and that their sense of belonging and well-being would be sustained. ECC staff did not emphasise that children might acquire what parents think of as specialised scientific knowledge. Knowledge about our everyday social interactions form part of our culture and are what guide our explanations of how and why people interact with one another. Many interactions can and do go on without discussion about where on the spectrum UV light is, what causes a semi-permanent shadow, why friction makes a handle feel warm, or other scientific matters. In this study many ECC staff reported how they prepared additional adult helpers for a visit to KO. Some staff used the flyer posted to them from the Institution to inform adults about the exhibits in KO and how to make the most of the visit for the children (refer Appendix D). Russell (1990) suggests some of the ways adults can get the most from a visit for the children. He contends that "it is fundamental to the whole thing that children feel in control, and that some of the most supportive things adults can do is to *listen*, show real, convincing evidence of interest in what the child is doing, and saying, and hardest of all, to *stand back* and SHUT UP!" (p.261). Russell (1990) suggests that the quickest way possible to stop people thinking for themselves is to give explanations. He believes adults should ask questions, not give explanations.

#### **(i) teacher interactions with children**

Birney (1988) reported that her study found adult verbal behaviour was managerial, directive, and controlling while in an interactive science centre. Volunteers talked with the children about the exhibits in the gallery and made suggestions about how they could interact with them. There were numerous examples of interactions between teachers and children in KO. Teachers acknowledged children's comments and actions and provided prompts and temporary assistance to help them explore exhibits. Teachers who were aware of their children's interests and abilities did assist them to work on the edge of their current competence. Teachers crawled inside the Kids Cave, redesigned the Roll-a-Ball wall and talked about how objects felt inside the Trust-your-Touch exhibit. Teachers were observed co-constructing with children by interacting with them at

and on exhibits and were active participants who demonstrated what to do for children watching them. Teachers also gave children specific instructions on how to interact with exhibits. As Gottfried (1980) and Rennie & Elliott (1991) found in previous studies, teachers in this study cited enrichment, a social experience and extension to the science curriculum available in their ECC as reasons for taking groups of young children to KO. Teachers in this study appeared to be confident in their role to teach the children from their ECC about the exhibits in KO. Teachers used the opportunities provided by the exhibits to model curiosity and take turns to engage in interactions with the exhibits.

## **(ii) parent interactions with children**

How do adults interpret their role when accompanying children on a visit to an interactive science centre? A problem identified in the literature is the quality of the experience for children in an interactive science centre gallery. According to Gelman, Massey and McManus (1991), accompanying adults may be unwilling or unaware of how to facilitate the visit as a learning opportunity. Alternatively, Russell (1990) suggests that accompanying adults may have all the answers, demonstrate the 'correct' use of exhibits and transmit their sometimes-unscientific ideas to the young minds of their captive audience. This category of verbal behaviour was non-existent between child peers. Gelman, Massey and McManus (1991) found the most frequent types of adult behaviour with children and interactive exhibits were prompting, and requesting or ordering children on what to do with an interactive exhibit. In this study adults were also recorded prompting, requesting and ordering children on how to interact with the Grain Pit, Shadow Catcher and Trust-your-Touch exhibits.

Gelman, Massey, and McManus (1991) suggest that when parents are visiting an exhibition where they can choose which exhibits they will encourage children to interact with, parents will be influenced by the degree to which they think themselves more or less competent to 'teach' about that exhibit. Although we all have intuitive understandings in the math and science domains often we cannot state what we understand. Adult understanding may be limited or even wrong.

With exhibits in KO where the appropriate action is familiar or understood adults were confident in their guidance of children's appropriate behaviour in the everyday social roles they play. For example: children were prompted to acknowledge greetings, take turns, use the names of peers and respond to instruction. Parents also used expected vocabulary to resolve conflict or solve problems regarding social interactions, but appeared to be less confident to use technical terms from the domains of maths and physics. Gelman, Massey and McManus (1991) suggest parents may not consider it is their prerogative to teach maths and physics terms to their charges even if they are knowledgeable and fluent in these terms. In this study parents watched children, attended to their physical needs and monitored their social interactions. In KO parents' interactions may have been dictated by and responsive to children's expectations of their parents' role since children asked parents for acknowledgment, reassurance, support and requested physical help but did not initiate discussion about why or how an exhibit 'worked'. Most of the questions children asked adults were for permission to 'have a turn' at an activity or confirmation that they were not alone in a dark space. The verbal interactions children initiated with adults were very functional and involved them talking about practical issues rather than the novel phenomena represented in the exhibits. In most verbal interactions between adults and children discussion was accompanied by an adult demonstration of what to do or how to interact with an exhibit.

On the Trust-your-Touch exhibit children did not interact with the exhibit as the exhibit creators intended. The findings in this study were the same as Gelman & Massey (1987) where adults did not read the few words on the sign of a similar exhibit for the children they were with. In their study Gelman & Massey (1987) observed parents standing or sitting off to one side watching while the children opened and closed doors and named the items inside the boxes. We can concur with their conclusion that adults who surely are able to interact so as to encourage their children's interest in sensory experiences do not always choose to do so.

The number of exhibits children interacted with during their visit to KO appears to have been influenced by the adults who accompanied them. How adults interacted with the children they accompanied was influenced by what adults had been told about their role while in KO and what they knew about the expected learning outcomes of the visit for the children. In the group where adults had discussed the intentions of the organiser for the visit they actively encouraged the children to interact with the exhibits, particularly those which appealed to the adults themselves. Children were most often observed interacting with the exhibits that could accommodate 4 or more people at a time in interactions that required cooperative rather than solitary activity. Adults clearly enjoyed the Shadow Catcher exhibit and prolonged children's interactions in there with their enthusiastic participation, action and comment. Adults worked on the Grain Pit exhibit alongside children and actively engaged in verbal interactions with children and physical interactions with the exhibit. Research by Blud (1990) found that children who had visited an interactive exhibition with their parents demonstrated significantly more understanding of the exhibits than children who had explored them alone. During the interviews children were keen to discuss why shadows were caught on the wall and the circuit the lupin seeds were transported around on in the Grain Pit exhibit. This provides good reason for ECC staff to continue to encourage parents to accompany their children on visits to Kids Own.

According to Fler (1991) children make significant cognitive gains from interaction with child peers and adults when exposed something new in their environment. Fler (1991) states that it is important in the interactive approach to teaching science for teachers who are scaffolding children's learning to begin by modelling the sort of questions they could ask since children are not able to easily develop their own questions. ECC staff suggested to adults that they should use open questions and talk with children while in the gallery. Analysis of the verbal interactions between children, their child peers and adults in KO revealed that adults asked mostly closed questions and were more concerned with the management and organisation of the children than sharing ideas or challenging children's thinking. Closed questions were used by adults to invite, direct, control,



instruct, prompt, assist and confirm children's interactions with peers and exhibits in KO. The number of instructions appears to have been influenced by how attractive or interesting the adults found the exhibits. When adults had identified a way to interact with an exhibit by reading the flyer, a label or watching others they sometimes interpreted the information for the children they accompanied. Only in the Shadow Catcher exhibit did an adult volunteer give reasons why the children should interact in a particular way. Adults encouraged children's interactions with exclamations of surprise, delight, approval and commendation. Adults did not use open questions to promote children's interactions or challenge their ideas about what an exhibit could do. Adults did not openly display curiosity about how exhibits worked or engage in discussions with children who may extend their vocabulary or understanding. More parents were found at exhibits where they could model, demonstrate and/or interact with the exhibit. Adults interpreted written descriptions for exhibits; they worked on exhibits alongside children and physically assisted children to climb on walls and to console them when they were hurt. Parents stood and watched children's interactions or talked with friends. Observations of adult/child interactions in KO also found adults attending to housekeeping tasks such as keeping track of children's clothes and ensuring all the children in the group remained in the gallery for the duration of the visit. Such actions may have been because parents consider it is not their prerogative to teach children or they do not feel they have the confidence, skill or vocabulary for the domains of science or technology represented in the exhibits of KO. Another possible reason that parents did not participate in interactions on some exhibits may be that they considered teaching to be the teacher's prerogative as suggested by Gelman, Massey and McManus (1991). In this study teachers did interact differently from the parents who accompanied ECC groups to KO.

## **6.7 Summary**

This chapter discussed some of the issues that arise from the findings of this study. Issues for exhibit creators regarding exhibit design, promotion, labelling and appropriateness for the target audience were discussed. Another issue discussed was how exhibit creators might encourage literate visitors to interpret printed



information for young children. The issue of the influence of gender on the exhibits girls and boys are attracted to, and consequently engage in interactions with, was also discussed. The issues for ECC staff include the factors that influence the quality of young children's interactions in an interactive science gallery. These factors include children's interactions with the exhibits, child peers, parents and teachers.

## CHAPTER 7

### IMPLICATIONS AND RECOMMENDATIONS

In this chapter implications derived from the findings of this study inform ECC staff how they might organise a visit to an interactive science centre to ensure it is a positive learning experience for young children from their ECC. Recommendations for exhibit creators regarding the selection, design, labelling, and promotion of interactive exhibits for an exhibition intended for young children and accompanying adults will be discussed. Suggestions are made for future research into the creation of exhibits for young pre-literate children and the interactions of unaccompanied children in an interactive science gallery.

#### 7.1 Implications for Early Childhood Centre staff

Early Childhood Centre staff in this study suggested many reasons why they have taken groups of young children to the Kids Own interactive science gallery. Staff report that such a visit allows them to address the four principles outlined in Te Whaariki Early Childhood Curriculum (Ministry of Education, 1996) of Empowerment; Holistic Development; Family and Community; and Relationships. ECC Staff believe children's sense of belonging in the community can be reinforced when they are taken to explore a local interactive science gallery. Staff indicated they consider an interactive science gallery designed specifically for young children a place where their health and well-being is protected and nurtured. Many staff planned for children to share with child peers and adults the experience of a visit to KO and encouraged them to practise their communication skills with child peers and to scaffold one another's learning. Staff consider the gallery an environment where children can learn through active exploration of hands-on exhibits, and where the opportunities for learning are equitable regardless of gender, age, ethnicity, or ability. The entry cost, hours of opening, and availability of volunteers are all factors that influence which ECC groups visit the Kids Own gallery. ECC staff believe that exhibits in Kids Own are designed to be accessible, appropriate and hands-on, particularly for young children. ECC staff chose to tap this resource, which they perceive as providing an excellent learning opportunity for young children and a valuable extension to the science programme in their early childhood centre.

When most ECC staff organise a group to visit KO they make planning decisions about who will attend and for what purpose, how many will visit and what staff anticipate children will gain from the experience. The findings of this study suggest the ideal group size is small, with children chosen to attend with their friends and a 1:1 or 1:2 adult to child ratio to ensure there is maximum opportunity for children's learning to be scaffolded by child peers and adults. ECC staff make administrative choices related to pre-booking the visit, informing parents about the visit and deciding when they will visit, how long the visit will be and what transport will be used to travel.

To ensure that young children gain the maximum benefit from a visit to an interactive science gallery as part of an ECC group, staff should prepare themselves, additional adults and children before the visit. To prepare themselves for a visit staff can attend teacher previews, refer to flyers mailed to their Centre from the institution, talk to colleagues about the environment and experiences available in the gallery and telephone the institution's booking officer to gather more information about current exhibitions. When staff know what is available in the gallery then they should assess children's knowledge and prior learning of the science concepts that could be explored through the exhibits available. Staff can then anticipate the type of open questions and suggestions they can make to extend children's thinking and understanding while they are exploring the exhibits. Staff should also carefully select the group who will visit a gallery together. They should match children of similar interests and abilities to increase the possibility of peer scaffolding. Staff should also match adults with children who know each other well and have an established rapport with each other. Such adults will be in a good position to facilitate children's learning by building on the children's existing interests, knowledge, and skills.

To prepare adults for a visit to Kids Own staff can give them information about the exhibits in the gallery and how they themselves might enjoy the visit. ECC staff should encourage adults to talk with children about what they are doing and to ask children open questions rather than give them answers or demonstrations about how

things work. ECC staff should assure adults that they do not have to know the answers, and that in fact it's better if they don't explain their theories on how an exhibit works. ECC staff should suggest to accompanying adults that they should read aloud to pre-literate children the labels and suggestions for interactions with exhibits. The most important message that staff can give to accompanying adults is for them to be enthusiastic, active explorers themselves and have fun while they support and encourage children to have a go at all the exhibits in the gallery.

Staff should prepare children for the visit by telling them where they are going, how they will travel, who they will be with, and what they can do in the gallery. Having children discuss what they might see and experience in the gallery and what the organisers' expectations are for the visit, plus what follow-up activities might be planned, will help prepare children to make the most of the experience.

ECC staff perceive that there are numerous ways in which young children benefit from a visit to an interactive science gallery. These include being provided with the opportunity to be stimulated with new ideas and experiences in an environment that contains hands-on interactive exhibits that are developmentally appropriate for young children. Children in small groups benefit from the opportunity for peer interaction and scaffolding to occur while they are exploring exhibits in the gallery with children of similar ability and interests.

## **7.2 Recommendations for Exhibit Creators**

The interactions of young children with exhibits in the findings of this study suggest when selecting exhibits creators need to think about why they are including an exhibit and what they intend children to gain from interactions with each exhibit in the exhibition. Exhibit creators need to consult the target audience, namely young children, about what they are interested in and know about when they are planning exhibits for young children. Exhibit creators need to assess the concepts young

children understand and create exhibits that are appropriate and safe for them before they are included in an exhibition.

There are a number of factors to be considered when exhibit creators are designing exhibits for young children. Such exhibits need to be fun; they need to be challenging but safe; and they need to be inviting and appropriate to the gender, age and ability of the children visiting. Exhibits should provide opportunities for children to find and solve their own problems. Because adults do not always choose to interact with children at interactive exhibits, ideally exhibits that are self-correcting and do not require adult interpretation should be included in an exhibition for young children. Self-correcting exhibits which don't have one correct way to interact or a single solution to a problem should be considered because they allow a child to explore and experiment alone or with child peers. Exhibits which are frustrating or insoluble may damage a child's self-esteem, discourage them from taking risks or attempting to problem-solve through their own persistence.

The majority of interactive science centre exhibits explore the world of physical science. Since this and earlier studies have found girls prefer life science topics and boys prefer physical science topics, including elements of both in the hands-on exhibits of a gallery for young children may increase their appeal for both girls and boys. Girls show persistence and tenacity in problem solving activities. Problem solving is not a novel skill for girls, but opportunities to practise those skills and to take risks with physical science interactive exhibits, which are not inviting to girls, predominate in many interactive science centres. To ensure girls will practise their problem-solving and risk-taking skills, exhibit makers need to create more hands-on science exhibits based on life science topics.

The findings of this study show that written instructions on exhibits designed for pre-literate young children were not read aloud or interpreted by the adults for the children they accompanied. A pre-literate child read the number 5 but misinterpreted the message that children younger, not older than 5 years should

enter the exhibit. Exhibit creators need to be extremely frugal with labels and written instructions and should consider including only essential information. The implications for exhibit creators are that they need to create labels, written instructions, and publicity pamphlets that are brief and inviting and contain suggestions about how adults might interact with the children at exhibits. Since labels and written instructions were not interpreted for the pre-literate children in this study, presenting instructions through cartoon pictures, recorded verbal instructions or a video with computer graphics are alternative ways to provide guidance for young children's interactions with exhibits.

### **7.3 Future Research**

Phase 2 of this study included a small number of participants, from only three ECCs, therefore findings cannot be generalised to all Early Childhood Centre groups who visit all interactive science galleries. However this Institution, like many others world wide, does provide galleries and interactive exhibits specifically for young children to explore, and these findings can contribute to theory construction concerning children's learning in an interactive environment. Further research could be conducted in other interactive galleries for young children to confirm the findings of this study.

Future study might trace the rationale, selection, creation, placement, and labelling of interactive exhibits for young children. Further research could focus on young children's interactions with exhibits that do not need adult interpretation. How children respond to alternative ways of providing instruction or suggestions for interactions, for example cartoon captions or computer or taped verbal prompts for interactions with exhibits, could also be investigated.



## BIBLIOGRAPHY

- Anderson, G. (1990)  
Fundamentals of Educational Research. Basingstoke: The Falmer Press
- Atkinson, A.H. & Green, V.P. (1990)  
 Cooperative Learning and the Teacher's Role. Childhood Education. Fall: 8-11
- Balling, J.D. & Falk, J.H. (1980)  
 A Perspective on Field Trips: Environmental Effects on Learning. Curator. 23, 229-240
- Bearlin, M. (1993)  
 Transforming Primary Science Teacher Education - A Longitudinal Study. GASAT 7 International Conference, Canada.
- Beiers, R.J. and McRobbie, C.J. (1992)  
 Learning in Interactive Science Centres. Research in Science Education. 22:38-44
- Biddulph, F. and Osborne, R. (eds) (1984)  
Making Sense of our World: An Interactive Teaching Approach.  
 Hamilton: Centre for Science and Mathematics Education Research.
- Birney, B.A. (1988)  
 Criteria for Successful Museum and Zoo Visits: Children Offer Guidance. Curator. 31/4: 292-316
- Blud, L.M. (1990)  
 Social Interaction and Learning Among Family Groups Visiting a Museum. Museum Management and Curatorship. 9:43-51
- Bredenkamp, S. (Ed) (1992)  
Developmentally Appropriate Practice in Early Childhood Programmes Serving Children From Birth Through Age 8. Washington: NAEYC
- Bredenkamp, S. & Rosegrant, T. (1993)  
Reaching Potentials Through Appropriate Curriculum and Assessment for Young Children Volume 1. Washington: NAEYC
- Bruce, T. (1990)  
Early Childhood Education. Kent: Hodder and Stoughton
- Bruner, J. (1983)  
Child's Talk: Learning to Use Language. London: Oxford University Press.
- Bruner, J. & Haste, H. (1987)  
Making Sense. New York: Methuen.

- Burns,J. (1994)  
Extending Critique Within Phenomenology. Paper presented to The Phenomenology Philosophy & Practice Conference, Brisbane.
- Catherwood,D. (1994)  
 Changing Views on Cognition in Early Childhood: Putting Some Cows Out To Pasture. Australian Journal of Early Childhood. 19:4 December: 25-29
- Carlisle,R.W.(1985)  
 What Do School Children Do at a Science Center? Curator. 28:27-33
- Crabtree,B. (1982)  
Challenges For Children Discovering Science Together. Auckland N.Z.: Playcentre Federation.
- Cullen,J. (1991a)  
 Young Children's Learning Strategies: Continuities and Discontinuities. International Journal of Early Childhood. 23 (1): 44-58
- Cullen,J. (1992)  
 Young Children's Perception of their Learning: A Metacognitive Perspective. In The Early Years: Policy Research and Practice. J.Cullen and J.Williamson (Eds.) West Perth: Meerilinga Young Children's Foundation. 110-122
- Cullen,J. (1995)  
 Road Safety Education and Preschool: A Reflective Dialogue Approach. Australian Journal of Research in Early Childhood Education. 1, 40-50
- Cullen,J. & St George, A. (1996)  
 Scripts for Learning: Reflecting Dynamics of Classroom Life. Journal for Australian Research in Early Childhood Education. 1: 10-19
- Delamont,S. (1992)  
Fieldwork in Educational Settings: Methods, Pitfalls and Perspectives. London: The Falmer Press
- Department of Education (1963-1988)  
Education Statistics of New Zealand. Wellington:Wellington Government Printer
- Department of Education (1981)  
Basic Equipment Code for Kindergartens. Wellington: Wellington Government Printer
- Department of Statistics (1997)  
New Zealand Official Yearbook. Wellington: NZ Government Print

- Diamond, J. (1986)  
The Behavior of Family Groups in Science Museums. Curator. 29:139-154.
- Edwards, C.P., Logue, M.E. & Russell, A.S. (1983)  
Talking With Young Children About Social Ideas. Young Children. 39(1):12-20
- Falk, J.H. & Dierking, L.D. (1992)  
The Museum Experience. Washington, DC: Whalesback Books
- Feher, E. (1990)  
Interactive Museum Exhibits as Tools for Learning: Explorations with Light. International Journal of Science Education. 12(1) January - March: 35-49
- Feher, E. and Rice, K. (1985)  
Development of Scientific Concepts Through the Use of Interactive Exhibits in a Museum. Curator. 28/1: 35-46
- Finson, K.D. & Enochs, L.G. (1987)  
Student Attitudes Toward Science-Technology - Society Resulting From Visitation To A Science-Technology Museum. Journal of Research in Science Teaching. 24(7):593-609
- Fleer, M. (1990)  
Scaffolding Conceptual Change in Early Childhood. Research in Science Education. 20: 114-123
- Fleer, M. (1991)  
Towards a Theory of Scaffolded Early Childhood Science Education. Australian Journal of Early Childhood. 16 (3), September, 1991
- Fleer, M. (1992)  
Introducing Technology Education To Young Children: A Design, Make and Appraise Approach. Research in Science Education. 22:132-139
- Fleer, M. (1995)  
The Importance of Conceptually Focused Teacher-Child Interaction in Early Childhood Science Learning. International Journal of Science Education. 17(3):325-342
- Flexer, B.K. & Borun, M. (1984)  
The Impact of a Class Visit to a Participatory Science Museum Exhibit and a Classroom Lesson. Journal of Research in Science Teaching. 21:863-873
- Gabarino, J. & Stott, F.M. (1989)  
What Children Can Tell Us. San Francisco: Jossey-Bass

- Gardner,R.(1996)  
How Do Early Childhood Teachers Support Young Children's Learning?  
Journal for Australian Research in Early Childhood Education. 1:47-55
- Gelman,R., and Massey,C. (1987)  
The Cultural Unconscious as Contributor to the Supporting Environments  
For Cognitive Development. Commentary on Saxe,Guberman,& Gearhart.  
Monographs of the Society for Research in Child Development. 52(2 Serial  
No. 216): 307-317
- Gelman,R. Massey,C.M. & McManus,M. (1991)  
Characterizing Supporting Environments for Cognitive Development:  
Lessons from Children in a Museum. In Perspectives on Socially Shared  
Cognition. L.B.Resnick J.M.Levine and S.D.Teasley (Eds). Washington:  
American Psychological Association. 226-256.
- Gennaro,E.D. (1981)  
The Effectiveness of Using Previsit Instructional Materials on Learning For a  
Museum Field Trip Experience. Journal of Research in Science Teaching.  
18(3): 275-279
- Gottfried,J.(1980)  
Do Children Learn on School Field Trips? Curator. 23: 165-174.
- Greenfield,T.A. (1995)  
Sex Differences in Science Museum Exhibit Attractions. Journal of Research  
in Science Teaching. 32(9): 925-938
- Hatano,G.(1993)  
Time to Merge Vygotskian and Constructivist Conceptions of Knowledge  
Acquisition. In Contexts for Learning Sociocultural Dynamics in Children's  
Development. E A Forman, N Minick & CA Stone (Eds). New York:  
Oxford University Press. 153-166.
- Hatch,J.A. (1990)  
Young Children as Informants in Classroom Studies. Early Childhood  
Research Quarterly. 5:251-264
- Hatch,J.A.(ed.) (1995)  
Qualitative Research in Early Childhood Settings. Westport: Praeger
- Hein,H. (1990)  
The Exploratorium The Museum as Laboratory. Washington: Smithsonian  
Institution Press
- Hetherington, E.M. & Camara, K.A. (1984).  
Families in Transition: The Processes of Dissolution and Reconstitution. In  
Review of Child Development Research. R.D. Parke (ed.) Chicago:  
University of Chicago Press. 399-439.

- Hoffman, S. and Wundram, B. (1984)  
Sharing is... Views From 3-year-olds and Thoughts For Teachers. Childhood Education. March/April:261-265
- Israelsson, A.M. (1993)  
A Science Center To Serve: The Missing Half. Paper presented at GASAT, Canada.
- Johnson, D., & Johnson, R. (1975)  
Learning Together and Alone. Englewood Cliffs, NJ: Prentice-Hall
- Johnston, J (1990)  
Changes to Early Childhood Services. Palmerston North: Corporate Policy Unit Planning & Development Directorate PNCC
- Jordan, B. (1993)  
Improving a Playcentre Science Programme Through Action Research. A Project Report Submitted in Partial Fulfilment of the Degree of Master of Educational Administration at Massey University.
- Kerrison, A.R. & Jones, B.L. (1994)  
Responses to an Interactive Science Exhibit in a School Setting. Research in Science Education. 24:201-207
- Koran, Jr. J.J., Morrison, L., Lehman, J.R., Koran, M.L. & Gandara, L. (1984)  
Attention and Curiosity in Museums. Journal of Research in Science Teaching. 21(4): 357-363
- Kremer, K. & Mullin, G.W. (1992)  
Children's Gender Behavior at Science Museum Exhibits. Curator. 35/1:39-48
- Kubota, C.A., & Olstad, R.G. (1991)  
Effects of Novelty-Reducing Preparation on Exploratory Behaviour and Cognitive Learning in a Science Museum Setting. Journal of Research in Science Teaching. 28: 225-234.
- Kuhn, D. (1990)  
Developmental Perspectives on Teaching and Learning Thinking Skills. New York: Karger
- Landsdown, G. (1994)  
Children's Rights In Children's Childhoods: Observed and Experienced. Mayall, B. (ed). London: The Falmer Press. 33-44.
- Marton, F. & Helmstad, G. (1991)  
Conceptions of Understanding. Paper presented to The Fourth European Conference on Learning and Instruction, Turku, Finland

- Marton,F., Hounsell,D. & Entwistle,N. (1984)  
The Experience of Learning. Edinburgh: Scottish Academic Press
- Mathison,S. (1988)  
 Why Triangulate? Educational Researcher. 17:13-17
- Mayall,B. (ed.) (1994)  
Children's Childhoods: Observed and Experienced. London: The Falmer Press
- McManus,P.M. (1985)  
 Worksheet Induced Behaviour in the British Museum. Journal of Biological Education. 19:237-242
- McManus,P.M. (1987)  
 It's the Company You Keep: The Social Determination of Learning-Related Behaviour in a Science Museum. International Journal of Museum Management and Curatorship. 6:263-270
- McManus,P.M. (1989a)  
 Oh Yes, They Do: How Museum Visitors Read Labels and Interact with Exhibit Texts. Curator. 32/3:174-189
- McManus,P.M. (1989b)  
 Memories as Indicators of the Impact of Museum Visits. Museum Management and Curatorship. 12: 367-380
- McNaughton,S. (1995)  
Patterns of Emergent Literacy Processes of Development and Transition. Auckland: Oxford University Press
- Meade,A. (1981)  
 Don't Take That Dress Off James! In Set 2 Item 2 Wellington: NZCER
- Meade,A. (1985)  
The Children Can Choose Wellington: New Zealand Council for Educational Research
- Meade,A., and Staden, F. (1985)  
 Once Upon a Time Amongst Blocks and Car Cases. In Set 2 Item 5 Wellington: NZCER
- Ministry of Education (1989-1994)  
Education Statistics of New Zealand. Wellington: Government Printer
- Ministry of Education (1993)  
Te Whaariki Draft Guidelines for Developmentally Appropriate Programmes in Early Childhood Services. Wellington: Learning Media



- Ministry Of Education (1996)  
Te Whaariki Early Childhood Curriculum. Wellington: Learning Media
- Moll,L.C. & Whitmore,K.F. (1993)  
 Vygotsky in Classroom Practice: Moving from Individual Transmission to Social Transaction. In Contexts for Learning Sociocultural Dynamics in Children's Development. E A Forman, N Minick & CA Stone (eds). New York: Oxford University Press.
- Morris,C. (1990)  
 Importing 'Hands-On' Science into Schools: The Light Works Van Programme. Physics Education. 25:263-266
- Morrison,H. and Kuhn,D. (1983)  
 Cognitive Aspects of Preschoolers' Peer Imitation in a Play Situation. Child Development. 54:1041-1053
- Neuman,S.B. Roskos,K.(1991)  
 Peers as Literacy Informants: A Description of Young Children's Literacy Conversations in Play. Early Childhood Research Quarterly. 6:233-248.
- Norusis,M.J./SPSS INC (1988)  
SPSS/PC+ V2.0 Base Manual for IBM PC/XT/AT and PS/2. Chicago: SPSS INC.
- Orr,L. (1997)  
Facilitating Literacy Skills Within an Early Childhood Programme. M.Ed. Research project, Massey University.
- Osborne,R., & Freyberg,P. (1985)  
Learning in Science The Implications of Children's Science. Auckland: Heinemann.
- Parlett,M. & Hamilton,D. (1972)  
 Evaluation as Illumination: A New Approach to the Study of Innovative Programmes In Beyond the Numbers Game. Hamilton, D., Jenkins,D., King,C., MacDonald,B. & Parlett, M. (eds) Basingstoke: MacMillan Education
- Peterson,R.W., & Lowery,L. (1972)  
 The Use of Motor Activity as an Index of Curiosity in Children. Journal of Research in Science Education. 9:193-200
- Pramling,I. (1983)  
The Child's Conception of Learning. Goteberg,Sweden: Acta Universitatis Gothoburgensis

- Pramling, I. (1989)  
Learning to Learn A study of Swedish Preschool Children. New York: Springer-Verlag
- Pramling, I. (1992)  
Oceans of Meaning Using Children's Ideas as Content in Preschool Teaching. Paper presented at OMEP's 20th World Congress Mesa Flagstaff, Arizona, USA
- Price, S. & Hein, G.E. (1991)  
 More Than a Field Trip: Science Programs for Elementary School Groups at Museums. International Journal of Science Education. 13: 505-519
- Prince, C. (1995)  
Promoting Awareness of the Natural Environment in Early Childhood: A Metacognitive Approach. Paper presented at The 17th Annual Conference of the New Zealand Association for Research in Education, Palmerston North, NZ
- Quin, M. (1990)  
 What is Hands-On Science, and Where Can I Find It? Physics Education. 25:243-246
- Rennie, L.J., & Elliot, M.T. (1991)  
 What students do at CSIROSEC. In Proceedings of the Sixteenth Annual Conference of the Science Education Association of Western Australia. M.W. Hackling (ed.) Edith Cowan University, Perth: Edith Cowan University, Dept. of Science Education. 117-125
- Rennie, L. & McClafferty, T. (1993)  
Using Visits to Interactive Science and Technology Centers, Museums, Aquaria and Zoos to Promote Learning in Science. Paper presented at The Annual Conference of the Australian Association for Educational Research, Fremantle, Western Australia
- Rennie, L. & McClafferty, T. (1995)  
 Don't Compare, Complement: Making the Best Use of Science Centres and Museums. In Set 1 Item 1 Wellington: NZCER
- Rogoff, B. (1990)  
Apprenticeship in Thinking: Cognitive Development in Social Context. New York: Oxford University Press
- Ruahine Kindergarten Association (1994)  
Staff List. Palmerston North: RKA
- Ruahine Kindergarten Association (1994)  
Equipment Inventories. Palmerston North: RKA

- Russell, I. (1990)  
Visiting a Science Centre; What's on Offer? Physics Education. 25:258-262
- Slavin, R. (1983)  
Cooperative Learning. New York: Longman
- Smith, A.B. (1995)  
Incorporating Children's Perspectives into Research. Challenge and Opportunity. Paper presented at The New Zealand Association for Research in Education Annual Conference, Palmerston North, December 7-10
- Snook, I. (1981)  
Ethics of Educational Research. Delta. 29:9-15
- Solomon, J. (1994a)  
The Rise and Fall of Constructivism. Studies in Science Education. 23:1-19
- Solomon, J. (1994b)  
Towards a Notion of Home Culture: Science Education in the Home British Educational Research Journal. 20(5):565-577
- Sorrentino, A. V. & Bell, P.E. (1970)  
A Comparison of Attributed Values with Empirically Determined Values of Secondary School Science Field Trips. Science Education. 54:233-236
- Stevenson, J. (1991)  
The Long-Term Impact of Interactive Exhibits. International Journal of Science Education. 13:521-531
- St George, A. & Cullen, J. (1995)  
Giving and Receiving: Emergent Scaffolding in the Classroom Life of Five-Year-Olds Poster. Paper presented at The Annual meeting of the American Educational Research Association
- Stone, C.A. (1993)  
What is Missing in the Metaphor of Scaffolding? In Contexts for Learning Sociocultural Dynamics in Children's Development. E A Forman, N Minick & C. A. Stone (eds). New York: Oxford University Press
- Stronck, D.R. (1983)  
The Comparative Effects of Different Museum Tours on Children's Attitudes and Learning. Journal of Research in Science Teaching 20(4):291-296
- Tammivaara, J. & Enright, D.S. (1986)  
On Eliciting Information: Dialogues with Informants. Anthropology & Education Quarterly. 17:218-238

- The Science Centre & Manawatu Museum (n.d.)  
The Volunteer Handbook. Palmerston North: The Science Centre Inc.
- Tizard, B. and Hughes, M. (1984)  
Young Children Learning. Cambridge: Harvard University Press
- Topping, K. (1987)  
 Peer Tutored Paired Reading: Outcome Data From Ten Projects.  
Educational Psychology. 7:133-145
- Tuckey, C.J. (1992a)  
 Children's Informal Learning at an Interactive Science Centre. International Journal of Science Education. 14(3):273-278
- Tuckey, C.J. (1992b)  
 Schoolchildren's Reactions to an Interactive Science Center. Curator. 35/1:28-38
- Tuckman, B.W. (1972)  
Conducting Educational Research (second edition). New York: Harcourt Bruce Javanovich
- Valsiner, J. (1988)  
 Ontogeny of Co-Construction of Culture Within Socially Organised Environmental Settings. In Child development within Culturally Structured Environments. Vol 2 J. Valsiner (ed.). Ablex, New Jersey
- Wellington, J. (1990)  
 Formal and Informal Learning in Science: the Role of the Interactive Science Centres. Physics Education. 25:247-252
- Wertsch, J. V. (1985)  
Vygotsky and the Social Formation of Mind. Cambridge: Harvard University Press
- Wertsch, J.H., Minick, N. & Arns, F.J. (1984)  
 The Creation of Context in Joint Problem Solving: A Cross-Cultural Study. In Everyday Cognition. B. Rogoff & Lave (eds.). Cambridge, MA: Harvard University Press
- White, R., & Gunstone, R. (1992)  
Probing Understanding. London: The Falmer Press
- Williams, M.J. (1990)  
 Understanding is Both Possible and Amusing. Physics Education. 25:253-257

Winegar, L. T. (1988)

Social Interaction and the Development of Children's Understanding.

Norwood, NJ: Ablex

### **A DESCRIPTION OF KIDS OWN GALLERY**

The Science Centre and Manawatu Museum was opened on February 26th 1994. It contains science and museum galleries. The science gallery called Kids Own is designed for use and enjoyment by young children new-born to 8 years of age. In August 1995 this gallery contained 14 exhibits with which the children could interact by using all or some of their senses to explore each exhibit.

The Science Centre & Manawatu Museum first published in 1994 a flyer that they continue to forward to every visiting group organiser with a confirmation of their booking to visit the Kids Own gallery. This publication includes a brief explanation of the purpose of the gallery and notes about some of the exhibits in the gallery.

#### ***Self Lead in Kids Own***

#### ***Handy Hints for Having a Great Time***

*Kids Own is a special place in The Science Centre & Manawatu Museum, dedicated to under eight year olds. The aim of this space is to give small children, who often miss out when larger people are around, an area where they can explore various concepts and have fun while learning.*

*'Self Lead' means you do not have a Science Education Officer with you during the time you are in this area. The group leader, a teacher or parent, is responsible for the behaviour and safety of your group. You will get the help of a volunteer trained to assist in this area. Your children pay \$2 rather than \$2.50 and any adults with your group are free.*

*Here are some suggestions to help you get the most from your visit.*

What follows are notes about The Kid's Cave, The Co-operative Building Area (replaced by the Grain Pit), Glow in the Dark, The Shadow Catcher and The Balloon Lady (the Hologram), then:



*These are just a few ideas to get you started. We are sure that you and your children will find many worthwhile ideas to explore for yourselves.*

*Kids Own is a very popular space and booking is essential to ensure your visit does not clash with another school and to qualify for the concession rate. Please phone 3555123.*

A flyer distributed at a Teacher preview on 2/3/94 described Kids Own as  
*A special area for younger children, full of wonderful learning experiences. Group visits will not normally receive an education programme from staff, but one could be arranged if you wish to explore a particular theme.*

In a *Science Education Programmes* until early 1995 flyer is the following statement about Kids Own

*An area of visual and tactile experiences for younger children, from pre-schoolers to S1. Some good chances for problem solving and co-operation, as well as a lot of fun.*

A major mail-out to all educational institutions in late 1994 included

***The Science Centre & Manawatu Museum 1995 Exhibitions At A Glance***

***Kids Own***

*A special hands-on area for young children. New additions and changing themes are planned throughout the year. This year we have a new price of \$1 per student for self lead in this area. Available only to under 8 year old child groups.*

*Kids Own is a special place in The Science Centre & Manawatu Museum, dedicated to under eight year old children*

## KIDS OWN GALLERY



A separate flyer in this mail-out included **Kids Own 1995** (January posting) stated *Kids Own is a special place in The Science Centre & Manawatu Museum Te Whare Pupuri Taonga o Manawatu, dedicated to under eight year olds. The aim of this space is to give young children, who often miss out when older children are around, an area where they can explore various concepts and have fun while learning.*

*Because Kids Own is a special place for special people this year we have a special price. Children visiting this area in pre-booked groups pay only \$1.00 each. Adult friends that come with them are still free. These groups are still "self Lead" - your group will still get the help of a volunteer trained to assist in Kids Own.*

**Kids Own 1995 ( June posting)**

*Kids Own is a special place in The Science Centre & Manawatu Museum Te Whare Pupuri Taonga o Manawatu, dedicated to under eight year olds.*

*because Kids Own is a special place for special people this year we have a special price. Children visiting from Early Childhood Centres in pre-booked groups pay only \$1.00 each. Adult friends who come with them are still free.*

*Kids Own will not be available between 11 September and 4 December. It will reopen with a new look in December.*

## **GRAIN PIT**

What is it? The Grain Pit is a large piece of equipment, similar examples of which are used to sort eggs, potatoes, apples and numerous other agricultural products. This grain pit has lupin seed in the bins which can be moved in a cycle by visitors manipulating handles that operate conveyor belts, scoops, and screws and carry the grain from point on the cycle to another. How can it be explored? The Grain Pit has 5 handles which children can reach to turn, these are numbered 1-5 for easy identification during observations. Handle 1 is the handle nearest the source of the grain, and by turning it grain can be moved from one storage bin to the next. Handle 2, when turned, enables children to move the belt that scoops grain into cups which are then carried up to a high shoot/slide. A bucket in which grain is collected from the shoot and can be tipped in two directions to dump grain onto one or other of two conveyor belts. Here children can position themselves in the observations this is referred to as the bucket. Handle 3 propels the grain on conveyor belt 1 towards a collection bin. Handle 4 propels the grain on conveyor belt 2 towards a collection bin. Handle 5, when turned, moves the grain from conveyor belt 2 storage bin to conveyor belt 1 storage bin. There are physical limitations of the exhibit. In order to keep the grain moving through the cycle 5 people need to be engaged in turning the handles for each stage of the operation. One person working alone on the Grain Pit may move from one station to another experimenting with the function of each handle, the buckets, the material from which it is constructed, how it can be accessed, how the grain feels, etcetera.

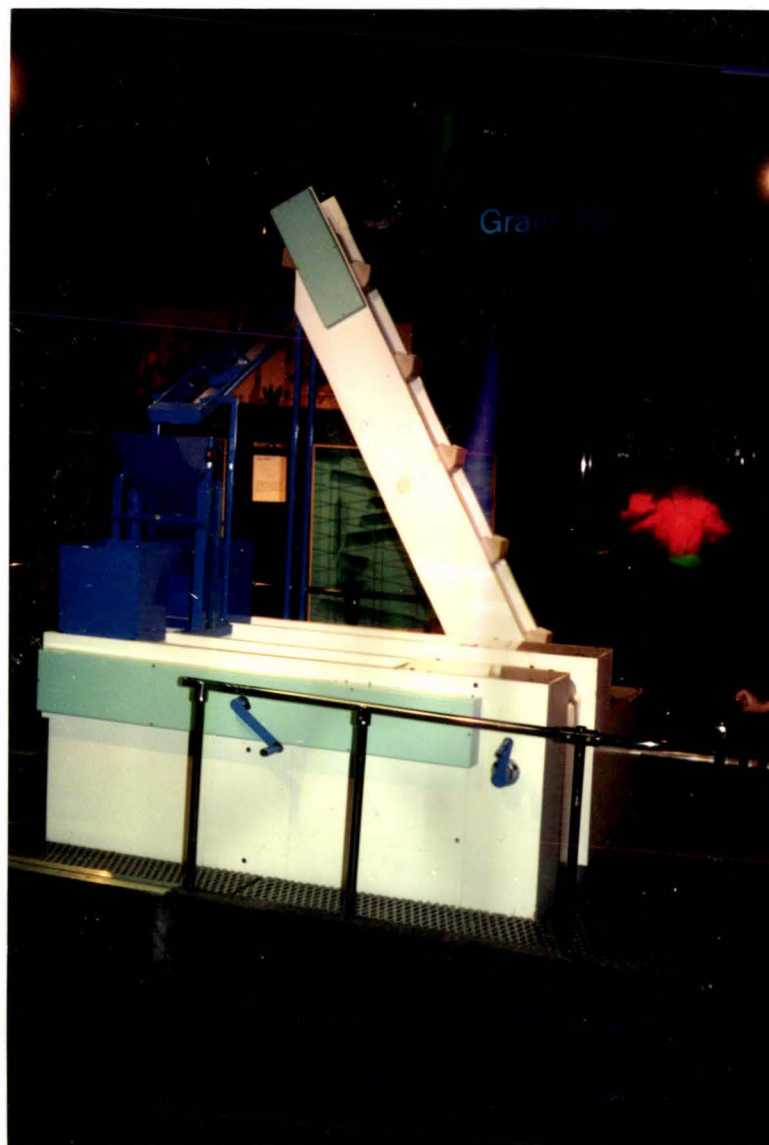
*Kids Own 1995 ( June posting)*

*Currently the feature in Kids Own, the grain pit is a cooperative exhibit on loan from Excite in Hamilton till 11th of September.*

Label on Exhibit: The Grain Pit has a name label hanging high above the exhibit.

*GRAIN PIT*

## GRAIN PIT





## **KLINGONS**

What is it? A room with walls which slope at different angles and degrees of steepness. The surface of each wall is clad in different material: carpet, rubber underlay and polished wood with cleats. How can it be explored? To use this exhibit the children must climb the walls and slide down them. Activity in this room is restricted to three children at a time. This activity provides young children with a physical challenge and sensory experiences.

A flyer distributed at a Teacher preview on 2/3/94 described Kids Own. The flyer included a brief comment about the Klingon exhibit:

*and experience the amazing Velcro climbing wall.*

Note that Velcro pads are no longer available for children to strap on before climbing the walls of the Klingons room.

Label on Exhibit: The Klingons exhibit has a name label on the wall facing the gallery. *KLING ONS*

There is a label above the entrance doorway that reads *under 5 only*



## KLINGONS



## KIDS CAVE

What is it? It is a tunnel that runs behind and underneath the Klingons exhibit. It is very dark and has many different materials covering the surfaces on the roof, walls, and floor. How can it be explored? Children can crawl through this tunnel and experience different textures, contours and sensations. It provides a physical and psychological challenge to young children. It provides a sensory experience affecting hearing and touch in particular.

*Self Lead in Kids Own (January 1994)*

*Handy Hints for Having a Great Time*

*The Kids Cave. Kids Cave is very dark and the children should crawl through the entrance with the name above it. It is big enough for an adult to go through too. Before the children enter the tunnel, talk about different textures and how things feel, e.g. soft, rough, bumpy. Send them quickly through the tunnel with the light on, if they need it. The volunteer will show you how to turn the light on. Turn the light off and send the children through. Tell them to move slowly and feel around. When the children have all been through ask each child to name one thing they felt; a different thing each time. There are at least 16 items in the tunnel. Talk about how things feel when we can see them and how they feel when we can't see. How do blind people find out about their world?*

A flyer distributed at a Teacher preview on 2/3/94

*Abandon sight and rely on the other senses in the tactile tunnel adventure,*

*Kids Own 1995 (January & June postings)*

*Kids Cave. This popular crawl in the dark experience has had a face lift so there will be new textures, contours and sensations!!*

Label on 'Kids Cave' Exhibit: There is a label above the entrance to the cave that reads *KIDS - CAVE*



## KIDS CAVE



## **SHADOW CATCHER**

What is it? A room which has a 3 lights which flash, causing any object between the light and the phosphorescent wall to create a shadow which remains for about 30 seconds or until another pose is recorded. How can it be explored? We can interact with the Shadow Catcher by posing in front of the light source while someone pushes the button to make the light flash. Then everyone stands away to see their frozen shadows on the phosphorescent wall. This is a small room which could not accommodate more than five children and two adults and produce a recognisable shadow for each individual. It was advisable not to look at the flash of light since it is so bright. With repeated use the mechanism tends to overheat and cannot be activated until it has cooled down.

*Self Lead in Kids Own* (January 1994)

*The Shadow Catcher*

*This is beside Glow in the Dark. Have fun 'catching' your shadow on the wall. Line up along the wall and push the button. Now step away and look at the wall. Challenge the children to make interesting and different shadows. Try jumping up or side profiles with tongues poking out or hand shadow pictures or...*

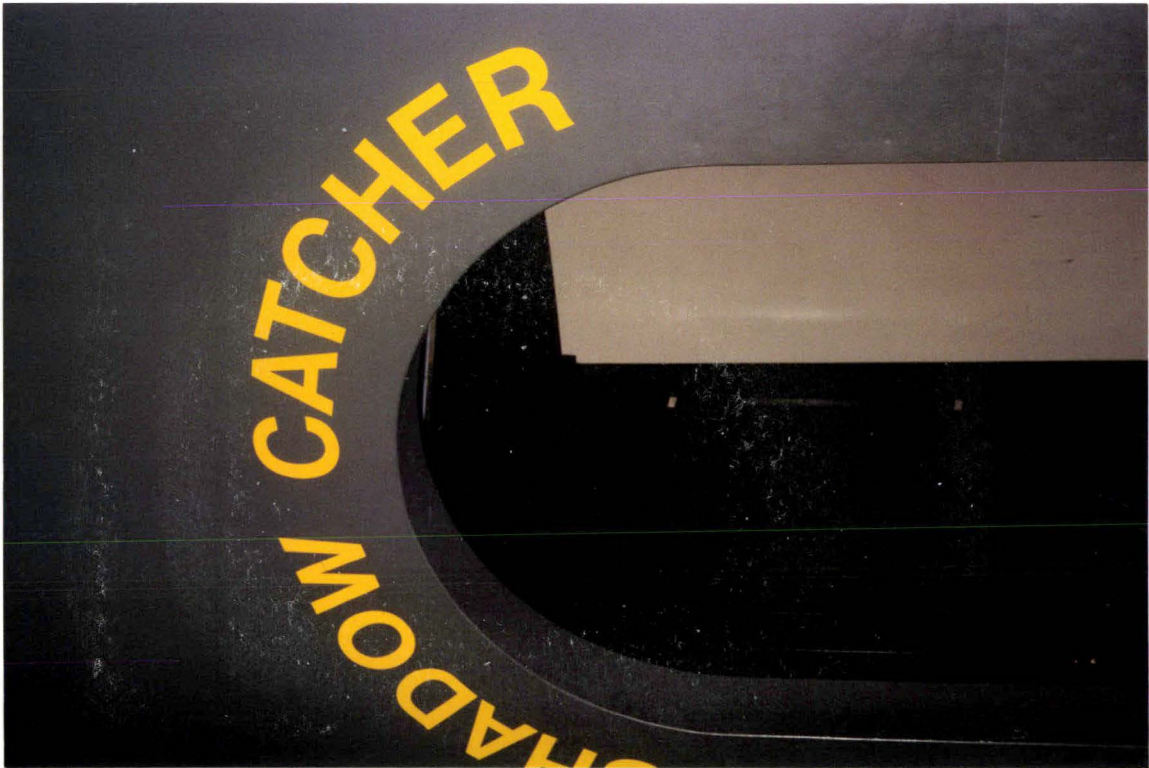
A flyer distributed at a Teacher preview on 2/3/94

*Have fun freezing your shadow onto the wall.*

Label on 'Shadow Catcher' exhibit: Outside the room above the doorway is *SHADOW CATCHER*. Inside on the wall of this room are directions on how to interact with the exhibit



## SHADOW CATCHER



# Try this !

Press the button.  
Before the green  
light comes on, stand  
in front of the curved  
wall. After the flash,  
move away from the  
wall. What do you  
see?

## So what ?

The wall glows after light hits it.  
This is called phosphorescence.  
The part hidden from the light by  
your body does not glow.



## GLOW IN THE DARK

What is it? A room whose sole source of light is Ultra violet light. On the walls and floor are movable pieces of fluorescent material. There is a bungy cord mounted at 6 foot above floor level with button control of the motor attached to the wall and another bungy cord attached to the wall. How can it be explored? Children can rearrange the pattern on a butterfly's wings or beetle's back with the fluorescent material. They can twang a bungy cord and watch the vibrations. Not all children can reach switch to activate the bungy cord.

*Self Lead in Kids Own (January 1994)*

### *Glow in the Dark*

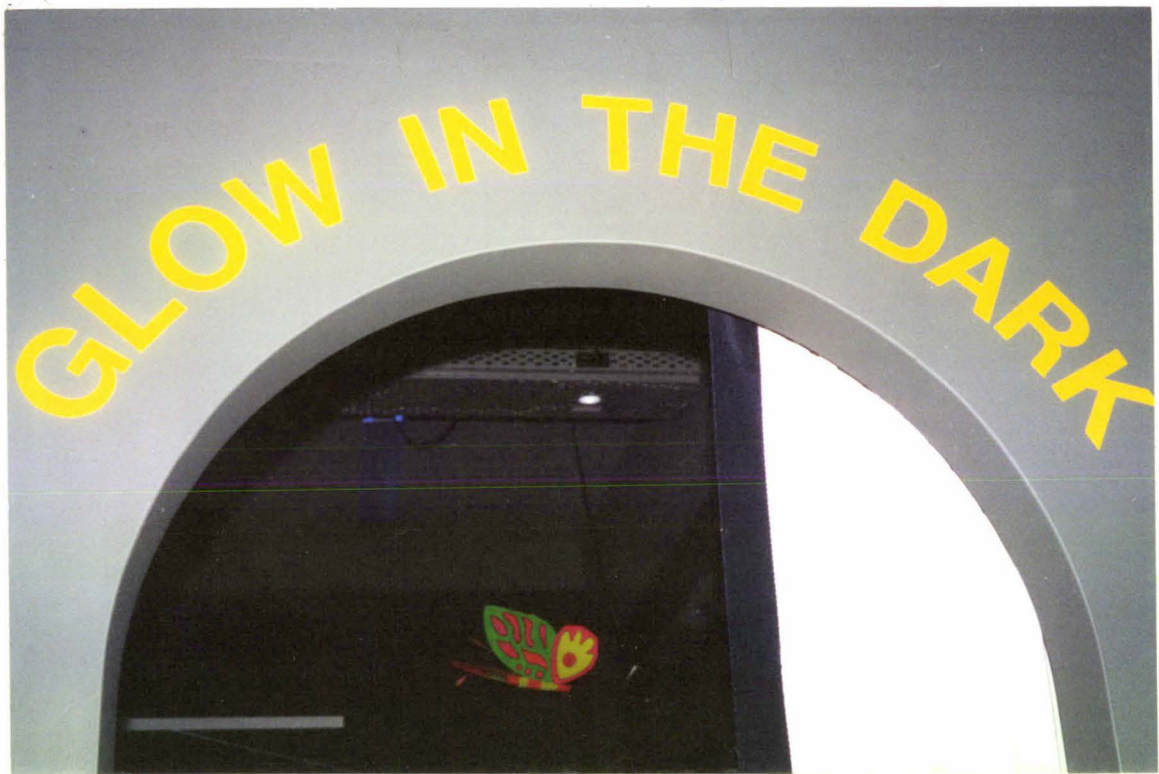
*This is a room at the end of Kids Own lit with ultra violet lights. There are many things you can try in here. Look at what you are wearing. Which colours glow? Do any parts of your bodies glow? You can see your finger nails glow if you place your hands on the dark carpet or wall. Do toe nails glow? Take off your shoes and see. Do teeth glow? Make the skeleton on the wall look as if it is running, jumping, sitting down or any other action you can think of. Use the cubes to make a skeleton, play O's and X's or make patterns.*

A flyer distributed at a Teacher preview on 2/3/94

*There will be plenty of problem solving in Kids Own, with wooden puzzles, Lock Kits and fluorescent puzzles in the UV room. This is scheduled for many uses. As part of your visit you could find out about the human skeleton by dressing up in fluorescent 'bones' or attempt the fluorescent puzzle cubes.*

Label on the exhibit: Above the doorway is written GLOW IN THE DARK. Inside on the wall are suggestions for interactions

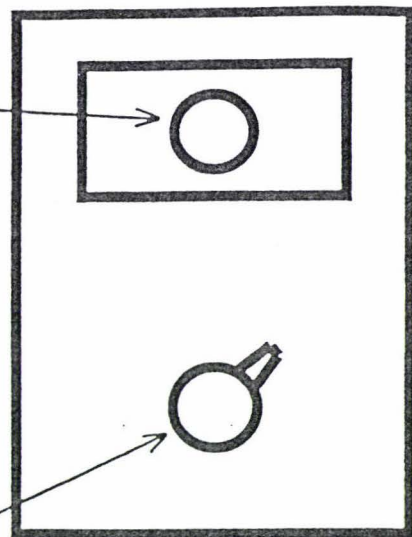
GLOW IN THE DARK



# Glow waves

Push the top button right in.  
This starts a motor which  
vibrates the string above you.

The string moves in waves.



Turn the bottom knob to change how fast  
the string vibrates.

Turn the knob until you can only see 3  
waves. The string should look something  
like this:



Now turn the knob until you have 7 wave  
Is the string moving faster or slower than  
when you had 3 waves?



## **ROLL-A-BALL**

What is it? Two cases mounted on the wall which contain slits into which small boards can be slotted and along which balls can run down on the slopes created.

How can it be explored? Students can arrange the position of the track and place the ball at a chosen start point before attempting to better the time it takes the ball to complete the course. They can explore angles, pitch, spaces, or distance with the boards and balls and cooperate and/or compete with a colleague or a stranger.

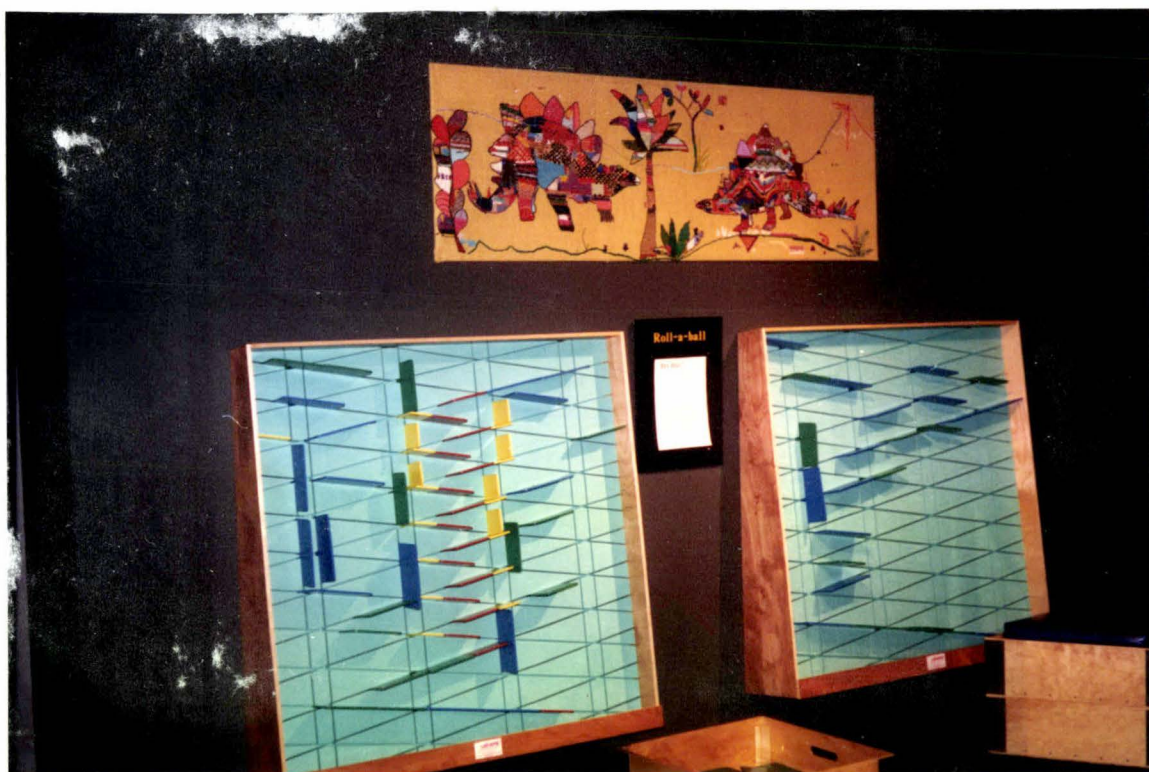
There is sufficient space for 3 children at each of the two roll-a ball exhibits

Label on exhibit: The labels between 'Roll-a-ball' exhibits were 'Roll-a-ball'

'Try this!' and 'Put the coloured shapes into the slots to make a track for a ball.

Which ball takes the longest to get to the end of the track?'

## ROLL-A-BALL



# Try this !

200

Appendix A



Put the coloured shapes into the slots to make a track for a ball. Which ball takes the longest to get to the end of the track ?



**TRUST-YOUR-TOUCH**

What is it? Eight boxes stacked in two rows of four atop the other four. Each box has a door with a circle shaped hole cut out of it. How can it be explored? Cotton fabric has been attached to the edges of the hole, which allows exploration of the contents of each box by touch only (through the cloth).

Inside each box is concealed an object

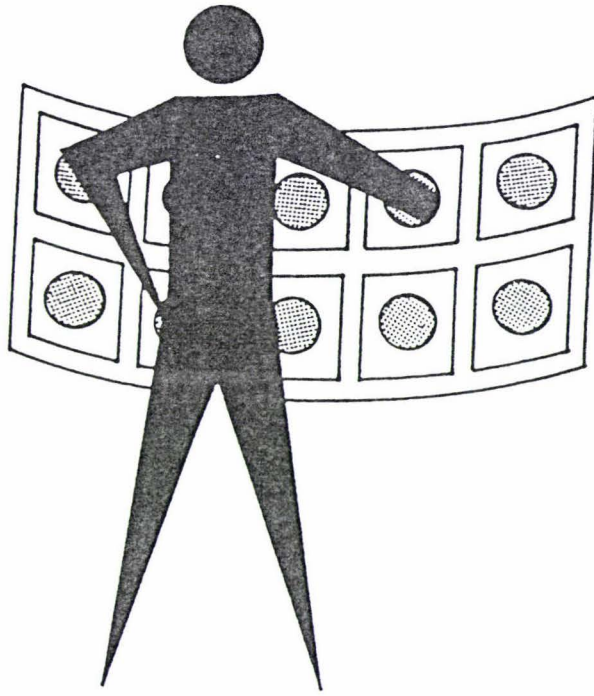
top 1	2	3	4
crescent	sheep	chromed	sponge
spanner	horn	tap	foam
bottom 1	2	3	4
mouse	decoy	shape-	moulded
trap	duck	-o-ball	face

Only one person at a time can fit their hand into a box. Shorter people can stand on a module to reach the top row of boxes. Label on exhibit: The label above the 'Trust your Touch' exhibit gives instructions on how to interact with it.

# Try this !

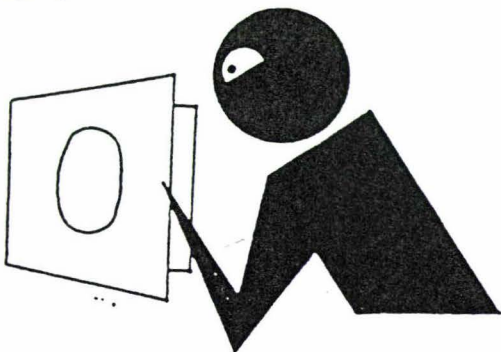
202

Appendix A



Can you tell what is in the box just by touching?

If you tell a friend what you can feel, can they guess what it is?



**Finally** you can check if you were right by opening the door for a look.

TRUST-YOUR-TOUCH



# So what ?

Humans rely a lot on their sense of sight and not much on their sense of touch. It can be hard to recognise even familiar objects by touch alone. It can be even harder when a layer of cloth stops you feeling any fine details or surface texture.

People who have lost their sight often learn to sharpen their senses of touch and hearing.



## HOLOGRAM

What is it? A metre square Hologram hanging behind the Grain Pit in the gallery. It is a picture which when viewed from different angles shows a lady blowing up and popping, with a large pin, a balloon. How can it be explored? By looking at the hologram from different angles and distances the way the light reflects off the surface will give a different view of a different picture. This exhibit cannot be handled by a visitor, but it can be visually explored and verbally discussed. In addition there are 4 small framed hologram pictures on the wall in Kids Own.

*Self Lead in Kids Own (January 1994)*

*The Balloon Lady*

*This is a hologram at child height. To see it clearly, stand 3-4m back, start on the left and walk slowly across. Look at the picture the whole time. Move your head around. can you see the fingers holding the pin?*

Label on exhibit: There is no label on the exhibit.

## **LIGHT CATCHER**

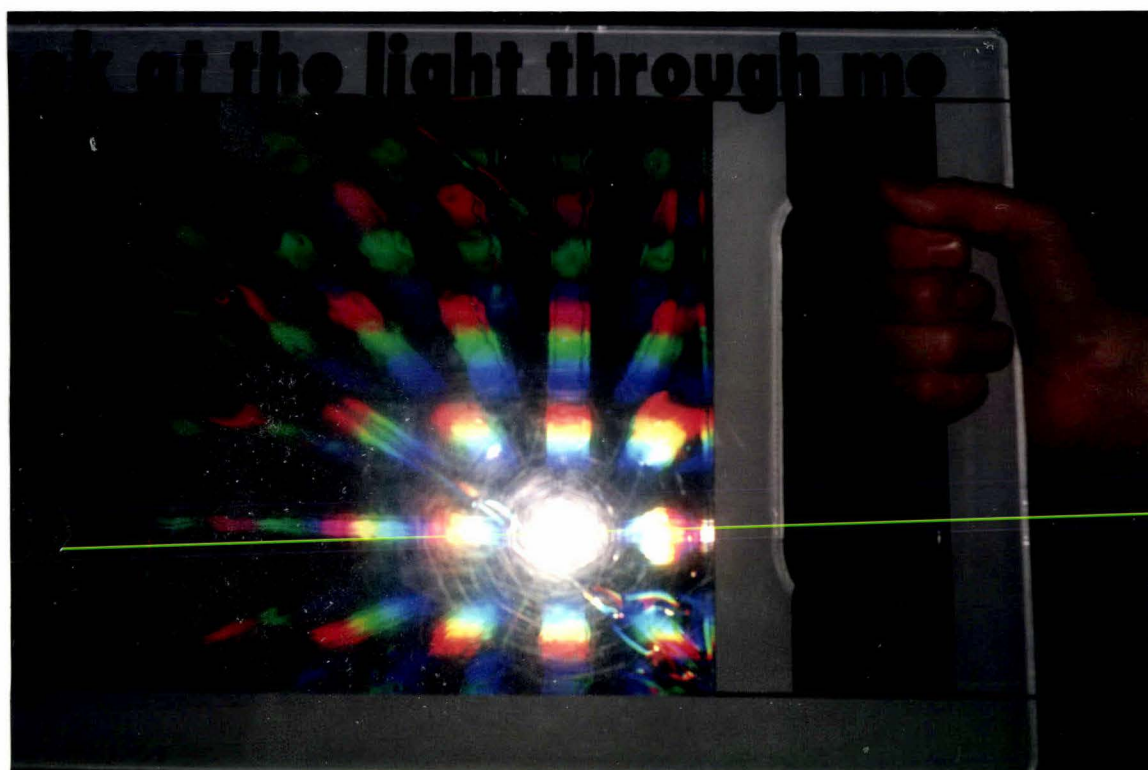
What is it? An A4 sized piece of perspex which has a plastic frame. How can it be explored? When held up to the light it behaves like a prism and refracts light, which enables the viewer to see a rainbow of coloured light from the fixed fluorescent lighting in the gallery. Interactions are limited to one or two people at a time.

Label on exhibit:

*Look at the light through me*



## LIGHT CATCHER



## **BONGO PIPES**

What are they? Two stands of 6 and 8 drain-pipes of various lengths mounted on a frame. How can they be explored? By hitting the ends of the pipes with green foam paddles. The intention in providing these exhibits is to allow visitors to create sound, and experiment with how they can produce different sounds by changing the length of the pipes and striking the pipes with the paddles provided. The highest pipes cannot be reached by young children. The connections between the elbow-shaped white pipes with the vertical and horizontal green pipes are rather stiff and difficult for a young child to manipulate.

*Kids Own 1995 (June posting)*

*Sneak Preview: We are trying out some 'Sounds Amazing' exhibits in Kids Own at the moment, so bring your children in and try them out too!!*

Label on exhibit:

**BONGO PIPES**

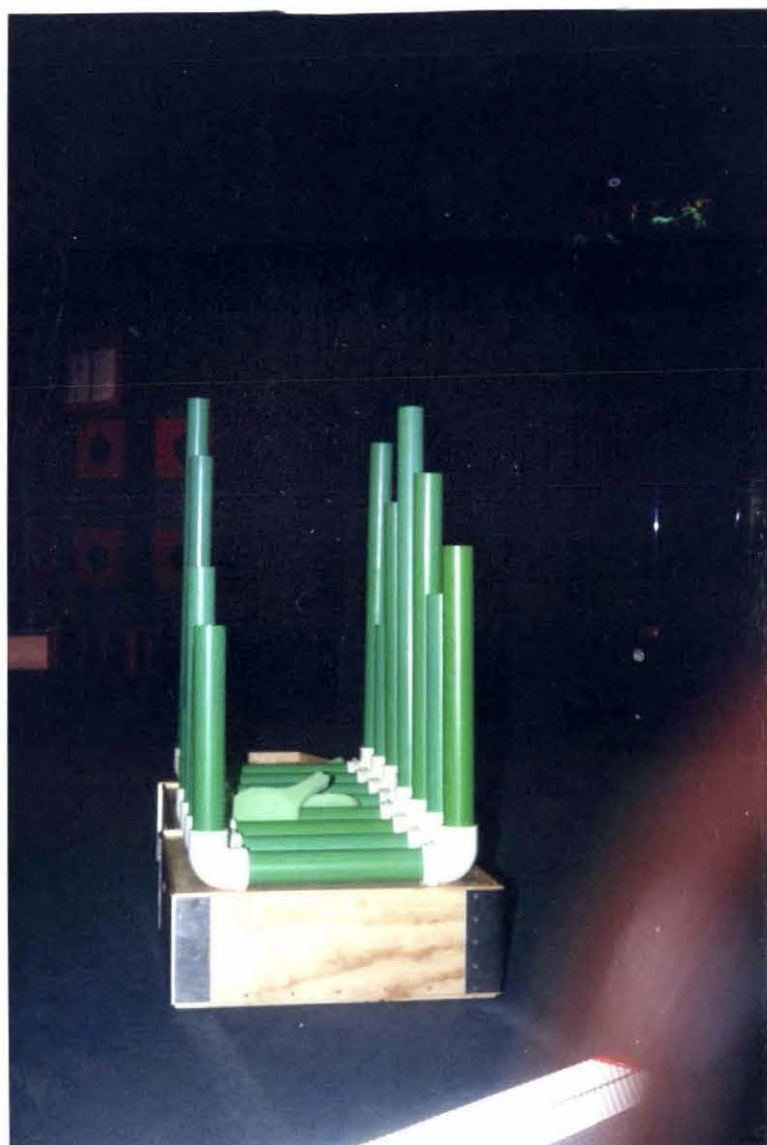
*Try playing a tune on these pipes.*

*What do you think causes the different notes?*

*Experiment with the way you hit the open end of the pipes.*

*Different tones can also be created*

## BONGO PIPES



# BONGO PIPES

210

Appendix A

Try playing a tune on these pipes.

What do you think causes the different notes ?

Experiment with the way you hit the open end of the pipes. Different tones can also be created.

## **SOUNDS LIKE**

What is it? Four low to the ground perspex fronted, sealed boxes, displaying different grains maize, red kidney beans, lentils, and wheat. In front of the boxes are four small plastic trash cans with lids to conceal the contents. How can it be explored? The children are invited to shake the trash-cans and try to guess which of the four grains displayed is in the can.

Label on exhibit

*SOUNDS LIKE...*

*Shake the small bins and listen carefully.*

*Can you guess which type of seed is in each bin by the sound alone?*

*Take off the lid to check when you think you have them worked out.*



## SOUNDS LIKE



# SOUNDS LIKE

Shake the small bins and listen carefully.

Can you guess which type of seed is in each bin by the sound alone ?

Take off the lid to check when you think you have them worked out.



4SB3857

Refer to: S Bryant/ML  
File No: 5050-3

25 August 1994

Ms J Ellis  


Dear Ms Ellis

### REQUEST FOR PERMISSION TO CONDUCT A RESEARCH PROJECT

Thank you for your letter, dated 10 July 1994. Your letter was referred to the Science Centre and the Manawatu Museum Trust Board and was considered at its meeting held last night.

I write to advise that permission has been granted for you to conduct a research project in the Science Centre in 1995, subject to the following conditions:

- Your research project receiving approval from the Ethics Committee of Massey University.
- Upon the completion of the research a copy of the report being provided to the Science Centre and Manawatu Museum.
- Providing appropriate identification each time you are on the premises.

Before commencing your research, you will need to show the Director, Mr Stuart Schwartz, the appropriate approval from the Ethics Committee.

I wish you well with your project.

Yours faithfully



S E Bryant  
SECRETARY TO THE BOARD

for M J Harding  
CITY SECRETARY

## Appendix B

Ruahine Kindergarten Association  
Staffing Committee  
Campbell Street  
Palmerston North

Private Bag 11222  
Palmerston North  
New Zealand  
Telephone 0-6-356 9099  
Facsimile 0-6-350 5635

FACULTY OF  
EDUCATION

DEAN'S OFFICE

12th May 1995

Dear Staffing Committee

Thankyou for granting me leave from my teaching position at Milverton Kindergarten July 10th to December 31st 1995.

I request your approval to include Ruahine Kindergarten Association kindergarten staff and children in my research. The research aims to provide The Science centre and Manawatu Museum with information which will enable it to improve the service it offers to early childhood centres. It aims to inform early childhood teachers about how they might gain maximum benefit for their students when using the Kids Own Gallery as an excursion venue and teaching resource for young children. The research has two parts. For the research affiliateship data will be gathered by questionnaire from all early childhood teachers in the Manawatu region who have access to the Science Centre and Manawatu Museum. To complete my M.Ed. thesis an indepth study of visits to the Kids Own gallery by three selected early childhood centre groups and follow-up interviews with staff and children from these groups will be conducted.

The research is being conducted under the Research Affiliateship Scheme of the Ministry of Education. All of the research will be carried out under the supervision of staff of the Education Faculty of Massey University.

Information gathered will be confidential and used for research purposes only. A summary of the findings will be provided to the participating institutions.

If you should require further information about the planned research please contact me daytime 3578523 evening 3588138.

Thanking you in anticipation.

Jill Ellis  
B.Ed. Dip Tchg EC

## Appendix B

National Te Kohanga Reo Institute  
Hankey Street  
Wellington

12th May 1995

Dear

My name is Jill Ellis and I am a kindergarten teacher in Palmerston North. I request your approval to include the Te Kohanga Reo staff and children of the Rangitane district in my research.

This research is being conducted under the Research Affiliateship Scheme of the Ministry of Education and all of the research will be carried out under the supervision of staff of the Education Faculty of Massey University.

The research aims to provide The Science centre and Manawatu Museum with information which will enable it to improve the service it offers to early childhood centres. It aims to inform early childhood teachers about how they might gain maximum benefit for their students when using the Kids Own Gallery as an excursion venue and teaching resource for young children. It includes a survey by questionnaire of all early childhood teachers who have access to the Science Centre and Manawatu Museum. As the records show that Te Kohanga Reo groups have used the Kids Own gallery of the Science Centre and Manawatu Museum I would like to ask them about their reactions to, and thoughts about, their visits to this facility.

Information gathered will be confidential and used for research purposes only. A summary of the findings will be provided to the participating institutions.

If you should require further information about the planned research please contact me daytime 3578523 evening 3588138.  
Thanking you in anticipation.

Jill Ellis  
B.Ed. Dip Tchg EC

MASSEY  
UNIVERSITY

Private Bag 11222  
Palmerston North  
New Zealand  
Telephone 0-6-356 9099  
Facsimile 0-6-350 5635

FACULTY OF  
EDUCATION

DEAN'S OFFICE



The President  
Central Districts Playcentre Association  
PO Box 539  
Fielding

Private Bag 11222  
Palmerston North  
New Zealand  
Telephone 0-6-356 9099  
Facsimile 0-6-350 5635

FACULTY OF  
EDUCATION

DEAN'S OFFICE

12th May 1995

My name is Jill Ellis and I am a kindergarten teacher in Palmerston North. I request your approval to include the coordinators and families of the Central Districts Playcentre Association in my research.

This research is being conducted under the Research Affiliateship Scheme of the Ministry of Education and all of the research will be carried out under the supervision of staff of the Education Faculty of Massey University.

The research aims to provide The Science centre and Manawatu Museum with information which will enable it to improve the service it offers to early childhood centres. It aims to inform early childhood teachers about how they might gain maximum benefit for their students when using the Kids Own Gallery as an excursion venue and teaching resource for young children.

The research has two parts. For the research affiliateship data will be gathered by questionnaire from all early childhood teachers in the Manawatu region who have access to the Science Centre and Manawatu Museum. To complete my M.Ed. thesis an indepth study of visits to the Kids Own gallery by three selected early childhood centre groups and follow-up interviews with staff and children from these groups will be conducted.

Information gathered will be confidential and used for research purposes only. A summary of the findings will be provided to the participating institutions.

If you should require further information about the planned research please contact me daytime 3578523 evening 3588138.

Thanking you in anticipation.

Jill Ellis  
B.Ed. Dip Tchg EC

## Appendix B

N.Z. Childcare Association (Central Districts Branch)  
 c/o Childcare Centre  
 Street  
 Palmers ton North

Private Bag 11222  
 Palmerston North  
 New Zealand  
 Telephone 0-6-356 9099  
 Facsimile 0-6-350 5635

FACULTY OF  
 EDUCATION

DEAN'S OFFICE

12th May 1995

Dear

My name is Jill Ellis and I am a kindergarten teacher in Palmerston North. I request your approval to include staff and children who are members of the Central Districts branch of the NZ Childcare Association in my research.

This research is being conducted under the Research Affiliateship Scheme of the Ministry of Education and all of the research will be carried out under the supervision of staff of the Education Faculty of Massey University.

The research aims to provide The Science centre and Manawatu Museum with information which will enable it to improve the service it offers to early childhood centres. It aims to inform early childhood teachers about how they might gain maximum benefit for their students when using the Kids Own gallery as an excursion venue and teaching resource for young children.

The research has two parts. For the research affiliateship data will be gathered by questionnaire from all early childhood teachers in the Manawatu region who have access to the Science Centre and Manawatu Museum. To complete my M.Ed. thesis an indepth study of visits to the Kids Own gallery by three selected early childhood centre groups and follow-up interviews with staff and children from these groups will be conducted.

Information gathered will be confidential and used for research purposes only. A summary of the findings will be provided to the participating institutions.

If you should require further information about the planned research please contact me daytime 3578523 evening 3588138.

Thanking you in anticipation.

Jill Ellis  
 B.Ed. Dip Tchg EC

## **1995 PERSONNEL MANAGEMENT & STAFF**

### **THE SCIENCE CENTRE & MANAWATU MUSEUM**

Jacqueline Aust (Development Officer)

Sally Babbage (Coordinator of Volunteers)

Marie Brannigan (Education Officer)

John Budding (Exhibit Technician)

Neville Gardner (Assistant Educator/Science)

Sally and Lyle Goggin (Mind Eye Gift Gallery proprietors)

Ruth Jefferies (Booking Officer)

Pamela Lovis (Curator of Natural History)

Joanne MacIntosh (Museum Education Officer)

Judith Millar (Senior Administration Officer)

Peter Millar (Visitor Service Officer)

Peter Millward (Head of Education and Science Services)

Kevin Rickard (Manager Cleaning Services)

Giles Russell (Exhibit Creator)

Paul Smith (Administration Assistant)

Stuart Schwartz (Director)

Harvey Taylor (Exhibitions Officer)

Maurice Verry (Weekend Manager)

Lufi and Andrew Withers (Lufis Cafe proprietors)

Emmanuel Yiannoutsos (Exhibit Creator)

TSC&MM Volunteers who attended workshop in July 1994 (approx. 35 people)

# Education Policy

The Science Centre

December 1993

This policy was developed by the Education Advisory Commr Appendix D includes Science Centre education staff and volunteers, local teachers who have used The Science Centre, Massey University and College of Education lecturers.

It has been designed to provide a sound base for the science education activities of The Science Centre and Manawatu Museum. As such it is an action document. The aims and objectives of the document should be reflected in the planning, execution, evaluation and refinement of both the science exhibition and education programmes.

The document should be reviewed annually to assess its on-going relevance. Changes should be made where necessary to ensure it is always a living document stating the underpinning educational outcomes of the science programmes within The Science Centre and Manawatu Museum.

The document is presented in layers. The first layer presents the general educational aims of The Science Centre. These are a global overview and state the general purposes of the science programmes.

The aims are followed by the more specific objectives. These are divided into school education and general public education. Strategies to achieve these Aims and Objectives should be planned, implemented and evaluated on an annual basis. Strategies have measurable outcomes and become the realities of exhibitions, programmes and activities.



## Aims

- to provide experiences that may be integrated into and enrich classroom based programmes
- to provide support for teacher development
- to act as a vehicle of support for other science education initiatives

## Objectives

- promote activities, exhibitions and interactive exhibits that meet the needs of specific groups of school visitors
- provide on-going support for the achievement of the aims of the New Zealand Curriculum Framework
- actively encourage students in the study of science and technology
- provide support for national and regional teacher associations such as NZSTA (New Zealand Science Teacher Association) and MAST (Manawatu Association of Science Teachers) and encourage interaction between their members
- promote liaison between educational groups such as schools and other organisations such as teachers' associations, Teacher Support Services, Colleges of Education, Universities, Polytechnics and appropriate representative businesses and industries
- develop an on-going system of evaluation of institutional science education programmes

## Education Policy

The Science Centre in Palmerston North aims to make science accessible, enjoyable, and relevant to people of all ages, cultures, interests and abilities.

The purpose of its programmes and activities is to:

- set science in a social and cultural context and show how science relates to our daily lives
- encourage people to be aware of, investigate and appreciate their environments
- promote science as a human activity
- promote awareness of New Zealand's scientific achievements
- value the importance of tikanga Maori and science as it relates to Maori knowledge, concepts and contexts
- help people explore the interaction between science and culture
- share scientific ideas with people and encourage them to search for their own understandings
- help people develop an understanding of the changing nature of science and technology and its application for people locally, nationally and globally
- show how science interacts and integrates with other essential learning areas of the New Zealand Curriculum Framework

## Objectives

- to find and meet the needs of the community
- encourage family interaction in science settings
- encourage community links in science
- encourage the public to use The Science Centre as a recreational activity
- encourage the public to use The Science Centre as a learning resource
- recognise the scientific skills of the local adult community and seek consultation where appropriate

- communicate with educational institutions on a regular basis <sup>u</sup> the use of The Science Centre as an educational resource
- promote and support; Regional and National Science Fairs, CREST, Science Badge, Science Certificate, BP Technology Challenge, Specialist Events including Conservation Week, Maths Week, Seaweeek. This may include the use of sponsored rewards and certificates
- promote information networks, including multi media as appropriate
- provide a venue for teacher meetings
- assemble and publish an annual guide to science and technology activities to assist teacher planning
- offer choices in levels of staff support and resources for school visits
- offer financial incentives to promote support and participation of teachers and parents during school visits
- provide varied learning experiences such as sleepovers, short and long term visits, role plays, workshops and drama activities

- provide services that the public finds innovative and scientific, <sup>Appendix D</sup> interesting, eg demonstrations, lecture series, holiday programmes, science "collectibles" evenings etc
- liaise with adult education centres such as Massey University, College of Education, Polytechnics etc



THE SCIENCE CENTRE & MANAWATU MUSEUM  
STATEMENT OF INTENT

Appendix D

To enrich the cultural fabric of the community by stimulating public interest and appreciation of natural history, cultural heritage, science and technology, and to increase awareness of the influence that these areas of human endeavour have on people's lives now and in the future.

This is achieved by:

- providing the best state of the art, hands-on interactive science centre, cultural and natural history museum that resources will permit
- acting in accord with the principles of Te Tiriti o Waitangi -The Treaty of Waitangi
- providing innovative and accessible opportunities for informal public learning and education programming designed to complement school curriculum goals
- being stewards of our natural and cultural heritage with a main focus being that of the Manawatu area - nga taonga tuku iho o Manawatu - through collection, preservation, exhibition and interpretation of significant artefacts and specimens; this stewardship should be in accord with the principles of kaitiakitanga
- providing interactive learning opportunities which enhance scientific literacy, encouraging the pursuit of careers in science and technology, and creating an interest in individuals not predisposed to science
- broadening public knowledge of this region, conducting research and disseminating knowledge
- meeting community needs through the best utilisation of the institution's resources as determined by involvement with the community
- meeting the highest standards of museological and educational practices

## **SCIENCE EDUCATION PROGRAMME BOOKING CONFIRMATION**

Dear

We are pleased to confirm your booking to visit **The Science Centre & Manawatu Museum, Te Whare Pupuri Taonga o Manawatu**. Please check the details below and let us know **as soon as possible** if any changes are needed.

**Group**

**Level**

**Date of Visit**

**Programmes and Times**

**Estimated Numbers**

**Self-Lead YES / NO**

**Cost per Student**

There is **no charge** for accompanying adults, so please bring as many as you can to help supervise. We recommend a ratio of **one** adult to **four** children for Early Childhood and Junior Primary groups.

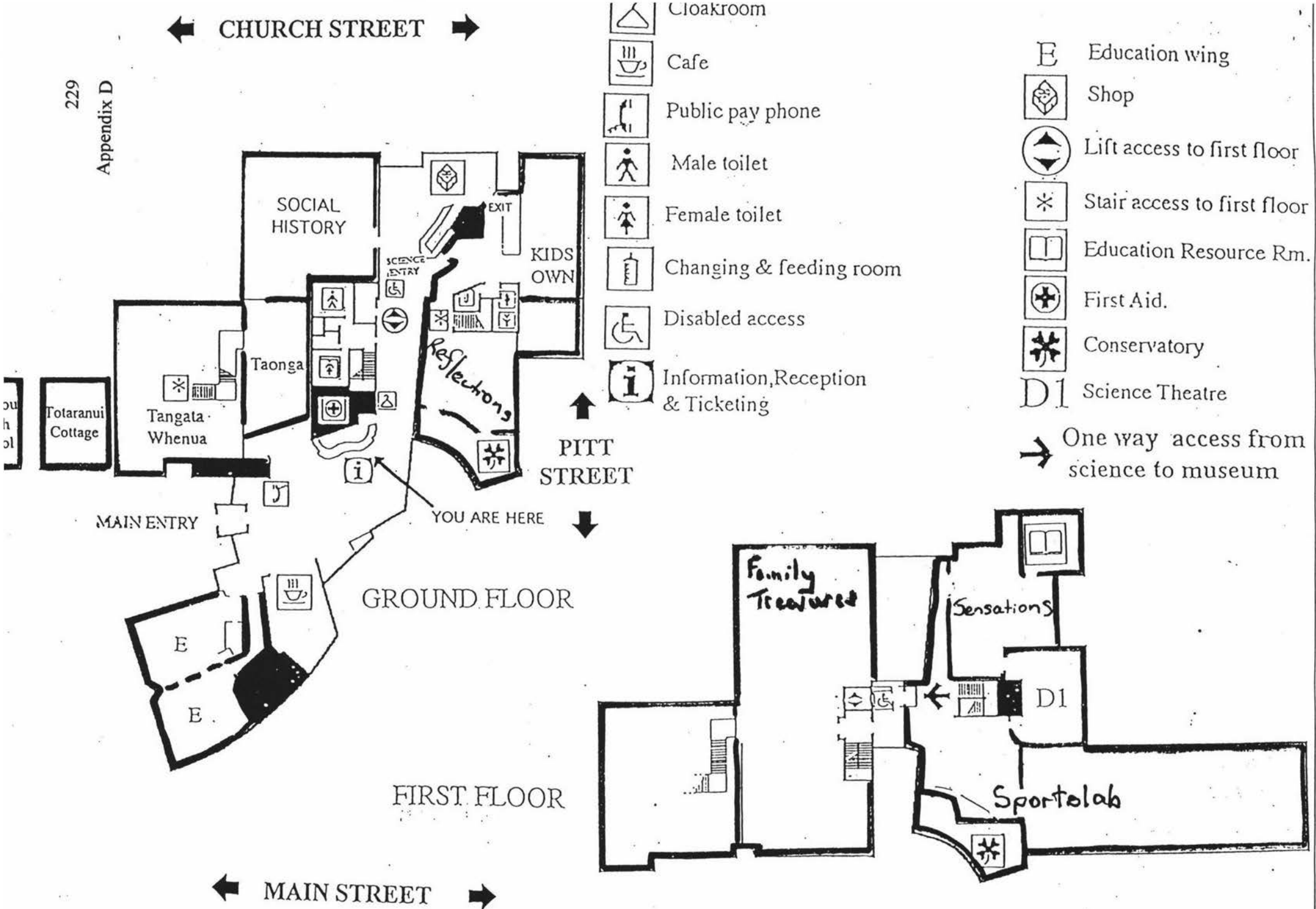
Please have your payment and total group numbers ready to give to the reception staff upon your arrival.

We have enclosed a map to help you locate car parks and the complex entrance. For further information, please do not hesitate to phone us on **06-3555-123**.

We hope you and your group will find your visit both enjoyable and educational.

Yours faithfully,

**RUTH JEFFERIES**  
**(BOOKINGS OFFICER)**





## Self Lead in Kids Own

### Handy Hints for Having a Great Time



Kids Own is a special place in The Science Centre & Manawatu Museum, dedicated to under eight year olds. The aim of this space is to give small children, who often miss out when larger people are around, an area where they can explore various concepts and have fun while learning.

'Self Lead' means you do not have a Science Education Officer with you during the time you are in this area. The group leader, a teacher or parent, is responsible for the behaviour and safety of your group. You will get the help of a volunteer trained to assist in this area. Your children pay \$2.00 rather than \$2.50 and any adults with your group are free.

Here are some suggestions to help you get the most from your visit.

#### The Kid's Cave

Kid's Cave is very dark and the children should crawl through the entrance with the name above it. It is big enough for an adult to go through too. Before the children enter the tunnel, talk about different textures and how things feel, eg soft, rough, bumpy.

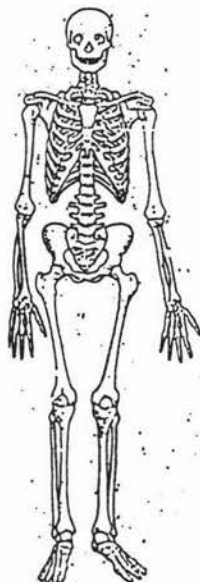
Send them quickly through the tunnel with the light on, if they need it. The volunteer will show you how to turn the light on. Turn the light off and send the children through. Tell them to move slowly and feel around. When the children have all been through ask each child to name one thing they felt, a different thing each time. There are at least 16 items in the tunnel. Talk about how things feel when we can see them and how they feel when we can't see. How do blind people find out about their world?

#### The Cooperative Building Area

Encourage the children to use the construction materials, the large wooden blocks and rods. The children work in groups, set them a task which requires cooperation and consultation. Here are some ideas:

- Build a house for a pet.
- Build a bridge across a river in flood.
- Make a multi level building.
- Let the group decide on their own project.





### Glow in the Dark

This is a room at the end of Kids Own lit with ultra violet lights. There are many things you can try in here.

Look at what you are wearing. Which colours glow? Do any parts of your bodies glow?. You can see your finger nails glow if you place your hands on the dark carpet or wall. Do toe nails glow? Take off your shoes and see. Do teeth glow?

Make the skeleton on the wall look as if it is running, jumping, sitting down or any other action you can think of. Use the cubes to make a skeleton, play O's and X's or make patterns.

### The Shadow Catcher

This is beside Glow in the Dark. Have fun 'catching' your shadow on the wall. Line up along the wall and push the button. Now step away and look at the wall. Challenge the children to make interesting and different shadows. Try jumping up or side profiles with tongues poking out or hand shadow pictures or...



DOG



BIRD



TORTOISE



SWAN

### The Balloon Lady

This is a hologram at child height. To see the it clearly, stand 3-4m back, start on the left and walk slowly across. Look at the picture the whole time. Move your head around. Can you see the fingers holding the pin?

These are just a few ideas to get you started. We are sure that you and your children will find many worthwhile ideas to explore for yourselves.

Kids Own is a very popular space and booking is essential to ensure your visit does not clash with another school and to qualify for the concession rate. Please phone 3555 123.



**Young Children in an Interactive Science Centre****Information Sheet**

Dear

My name is Jill Ellis and I am a kindergarten teacher in Palmerston North, I am also a graduate student of the Education Faculty Massey University. This research will investigate young children's reactions to the Kids Own gallery of The Science Centre and Manawatu Museum. The research is being conducted under the Research Affiliateship Scheme of the Ministry of Education with further data being gathered for a Master of Education thesis. All of the research will be carried out under the supervision of Dr. Janet Burns and Dr. Joy Cullen of the Education Faculty of Massey University.

The research aims to provide The Science Centre and Manawatu Museum with information which will enable it to further develop the service it offers to early childhood centres. It aims to inform early childhood teachers about how they might gain maximum benefit for their students when using the Kids Own gallery as an excursion venue and teaching resource for young children.

The research has two parts. For the research affiliateship information about the use of the Kids Own gallery in The Science Centre and Manawatu Museum by early childhood educators in the Manawatu region is requested on the attached questionnaire. You are invited to contribute to your centre's response to the questionnaire. It is assumed that, by filling in the questionnaire, the participant consents to taking part in the research. For the thesis your centre may be invited to participate in a follow-up in depth study of children from three early childhood centres visiting Kids Own in July/August 1995.

If you have any questions about this research please contact me at Massey University extension 4547 or a message may be left for me at the Education Faculty office on extension 4533, and I will get back to you.

Yours sincerely

Jill Ellis  
B.Ed. Dip Tchg

Massey University  
Faculty of Education

Young Children in an Interactive Science Centre

Questionnaire to Early Childhood Centres

This questionnaire is being sent to all the early childhood centres and Te Kohanga Reo in the catchment area of The Science Centre & Manawatu Museum. The intention is that this questionnaire will be filled out by those responsible for planning the programme in the centre, it may be most convenient to complete this questionnaire with input from everyone during a planning meeting. The use of the term staff throughout the questionnaire is intended to include playcentre parents, Te Kohanga Reo kai ako, childcare workers, Montessori directresses, Barnardos coordinators, and kindergarten teachers. Please answer the questions as fully and accurately as you can, by ticking the boxes or writing in the spaces provided. The answers given will be strictly confidential and used for research purposes only. The cooperation of the staff in your centre is very much appreciated.

The Questionnaire consists of four sections and should take approximately 30 minutes to complete.

Section 1

This section asks for a centre and staff profile.

1. For how many children is your centre licensed?  
(Please write the number of children in each age group.)

under 2yrs                      \_\_\_\_\_

2yrs and over                      \_\_\_\_\_

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2. How many staff in the centre have early childhood teacher training ?  
(Please write the number of staff in each category.)

	female	male	total staff
trained (100+ points)	_____	_____	_____
in training	_____	_____	_____
untrained	_____	_____	_____

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Section 2

Appendix E

This section asks about the knowledge early childhood centre and Te Kohanga Reo staff have about the Kids Own gallery in The Science Centre & Manawatu Museum.

7. How have staff in your centre heard about the Kids Own gallery in The Science Centre & Manawatu Museum? *(Please tick as many boxes as apply.)*

word of mouth	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
cinema	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
flyer	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Te Huia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Newspaper	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radio	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<i>(please specify.)</i>	<hr/>		<input type="checkbox"/>
Have not heard	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

8. Flyers from The Science Centre & Manawatu Museum are mailed to all ECC in the catchment area. How many of your staff have seen one of these? *(Please circle one.)*

all/most staff	some staff	no staff	<input type="checkbox"/>
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9. Is your institution a "Member school" of The Science Centre & Manawatu Museum? *(Please tick one.)*

Yes	<input type="checkbox"/>	<input type="checkbox"/>
No	<input type="checkbox"/>	

10. Does any staff member hold membership of The Science Centre & Manawatu Museum? *(Please write how many staff in each category.)*

individual member	<hr/>	<input type="checkbox"/>	<input type="checkbox"/>
as a family member	<hr/>	<input type="checkbox"/>	<input type="checkbox"/>
not a member	<hr/>	<input type="checkbox"/>	<input type="checkbox"/>

11. Have any centre staff visited The Science Centre & Manawatu Museum the following occasions? *(Please write the number of staff in each category.)* Appendix E

an open day \_\_\_\_\_

exhibit opening function \_\_\_\_\_

a teacher preview \_\_\_\_\_

as a member of the public \_\_\_\_\_

with ECC group \_\_\_\_\_

not attended \_\_\_\_\_


12. Children visiting the Kids Own gallery in pre-booked groups are charged \$1 each with accompanying adults admitted free of charge. Such groups are self led but a trained volunteer is present in the gallery on such occasions. How has this reduction in charge affected your decision to take a group of young children to Kids Own? *(Please tick one.)*

incentive ☐

neutral ☐

didn't know about it ☐

other ☐

*(Please specify.)* \_\_\_\_\_

☐

13. Has your centre **ever** taken a group of young children on an excursion to the Kids Own gallery in The Science Centre & Manawatu Museum? *(Please tick one.)*

Yes ☐

No ☐

☐

Please explain as fully as possible why you decided to go/not to go to the Kids Own gallery.

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14. What exhibits OTHER than in Kids Own, has your ECC visited in The Centre & Manawatu Museum? Please name the exhibitions.

Appendix E

If you have visited The Science Centre & Manawatu Museum please turn to Section 3 question 15 page 6. If you have not visited The Science Centre & Manawatu Museum please turn to Section 4 question 33 on the last page

## Section 3

## Appendix E

**This section asks about how staff organise excursions to the Kids Own gallery of The Science Centre & Manawatu Museum.**

15. Did you obtain further information from The Science Centre & Manawatu Museum before first taking a group of children on a visit? *(Please tick one.)*

yes ☐

no ☐

If yes, how did you obtain this information? *(Please tick one.)*

telephoned ☐

written ☐

visited in person ☐

referred to flyer ☐

other ☐

*(please specify.)* \_\_\_\_\_

16. Does knowledge of the particular exhibits influence your decision to go to Kids Own? *(Please tick one.)*

yes ☐

no ☐

don't know about particular exhibits ☐

**If your ECC or Te Kohanga Reo has made many visits to Kids Own please refer to your most recent visit to answer Section 3 questions 17-26, Section 4 questions 27-30.**

17. Were there any factors (apart from the educational purpose) which influenced your decision to visit Kids Own? eg transport; available adults;

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18. What is the size and composition of the group which visited?

age range of children      \_\_\_\_yrs to \_\_\_\_yrs  
number of girls and boys      \_\_\_\_girls      \_\_\_\_boys  
number of women and men      \_\_\_\_women      \_\_\_\_men


19. If additional adults were needed, how were they included? *(Please tick as many as appropriate.)*

by roster      ☐  
by invitation      ☐  
adult volunteered      ☐  
other      ☐


*(please specify.)* \_\_\_\_\_

20. What time of day did your group go on this excursion?*(Please tick one.)*

9.00am-12.00noon      ☐  
1.00pm-3.00pm      ☐  
other      ☐

--

*(please specify.)* \_\_\_\_\_

21. How long did this group spend in the Kids Own gallery? *(Please tick one.)*

30mins      ☐  
60mins      ☐  
other      ☐

--

*(Please specify.)* \_\_\_\_\_

22. Did you pre-book the group's visit to Kids Own? *(Please tick one.)*

Yes

☐

No

☐☐

23. What transport did you use to get to/from Kids Own gallery? *(Please tick one.)*

private car

☐

chartered bus

☐

Burger Buggy

☐

walking

☐

other

☐

*(Please specify.)*

\_\_\_\_\_

☐

24. What staff planning occurred in relation to the excursion to Kids Own?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

☐

25. If you took additional adults what did you tell them in advance about their role while in Kids Own?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

☐☐☐

26. What did you tell the children before the visit?

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

☐☐☐

Section 4

Appendix E

**This section asks staff about their experiences and perceptions of the visits they have made with young children to the Kids Own gallery in The Science Centre & Manawatu Museum.**

27. Which 5 exhibits did the children spend the most time with? *(Please tick the 5 most popular.)*

Kling ons	_____	<input type="checkbox"/>
Kids Cave	_____	<input type="checkbox"/>
building modules	_____	<input type="checkbox"/>
Shadow catcher room	_____	<input type="checkbox"/>
roll-a- ball	_____	<input type="checkbox"/>
Glow in the dark room	_____	<input type="checkbox"/>
tabletop activities	_____	<input type="checkbox"/>
grain pit	_____	<input type="checkbox"/>
trust your touch	_____	<input type="checkbox"/>
fish tank	_____	<input type="checkbox"/>
paddle sound tubes	_____	<input type="checkbox"/>
stick-EEs	_____	<input type="checkbox"/>
Humdingers	_____	<input type="checkbox"/>
Holograms	_____	<input type="checkbox"/>
needle pictures	_____	<input type="checkbox"/>
other	_____	<input type="checkbox"/>

*(Please specify.)* \_\_\_\_\_

28. Exhibits in the Kids Own gallery are designed to have features appropriate for young children. How many of the exhibits did staff find showed the following features? *(Please circle one for each feature.)*

physically accessible	all/most	many	some	none	<input type="checkbox"/>
visually appealing	all/most	many	some	none	<input type="checkbox"/>
intellectually challenging	all/most	many	some	none	<input type="checkbox"/>
needing adult interpretation	all/most	many	some	none	<input type="checkbox"/>

29. We are interested to know how **appropriate** you consider the exhibits to be for the group you accompanied? *(Please circle one response for each.)*

Under 2yrs	all/most	many	some	none
Over 2yrs	all/most	many	some	none
girls	all/most	many	some	none
boys	all/most	many	some	none
special needs children	all/most	many	some	none
Maori	all/most	many	some	none
European	all/most	many	some	none
others	all/most	many	some	none

*(Please specify.)* \_\_\_\_\_

30. If you had a volunteer available at the time of your visit to Kids Own, how did the volunteer help your group? If a volunteer was not available go to question 5.

31. In general, how do you believe children benefit from their visit to Kids Own?

32. How do you describe the exhibits in the Kids Own gallery to other adults in early childhood centres who have not yet taken a group of young children to the gallery?



33. Are there any suggestions you wish to make regarding the Kids Own Science Centre & Manawatu Museum which will enable it to further develop the service it offers to early childhood centre staff and Kohanga Reo whanau?

This image shows a single page of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

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**Thankyou for your cooperation**

Please return your completed questionnaire in the enclosed stamped addressed envelope by August 30th to:

Jill Ellis  
Massey University  
Faculty of Education  
Private Bag 11-222  
Palmerston North

## QUESTIONNAIRE PARTICIPANT CODE

Each questionnaire had a participant code of three numerals, for example 123, stamped on the top of their questionnaire. The first numeral represents a response from one of the 4 types of early childhood centre participating in the study.

1	=	Kindergarten
2	=	Playcentre
3	=	Kohanga reo
4	=	Childcare centre

The second two numerals were a random allocation to ensure each early childhood centre had a different participant code number. A random allocation of numbers was given to each Early Childhood Centre.

### IN-DEPTH STUDY PARTICIPANT CODE

The adults and the target children in the visiting ECC groups were given pseudonyms that are reported here. The staff accompanying ECC 442 are called Olivia and Deborah, a mum accompanying a target child is called Marise and the male volunteer is called Martin. Target children were coded and named E/1 Emily, J/1 Justin, S/1 Stacey and Jo/1 James. The staff member accompanying ECC 187 is called Deidre, the parent-help Tessa and a teacher's aide not mentioned in this study because she accompanied a severely disabled child and they are not recorded on audiotape. Target children were coded and named R/2 Rhys, E/2 Elton, L/2 Laraine and D/2 Declan. The staff accompanying ECC 454 are called Lisa and Robina, Naricca the student teacher and the female volunteer Verna. Target children were coded and named T/3 Thaddeus, S/3 Sheelah, H/3 Hugo and A/3 Anastasia

## UNIVERSITY

Private Bag 11222  
Palmerston North  
New Zealand  
Telephone 0-6-356 9099  
Facsimile 0-6-350 5635

FACULTY OF  
EDUCATION

DEAN'S OFFICE

## MASSEY UNIVERSITY

## Young Children in an Interactive Science Centre

## Information Sheet

Dear Parents / Whanau of .....

My name is Jill Ellis and I am a kindergarten teacher in Palmerston North. I am also a graduate student of the Education Faculty Massey University. I am conducting research which investigates young children's reactions to the Kids Own gallery of The Science Centre and Manawatu Museum. The research is being conducted under the Research Affiliateship Scheme of the Ministry of Education with further data being gathered for a Master of Education thesis. All of the research will be carried out under the supervision of Dr. Janet Burns and Dr. Joy Cullen of the Education Faculty of Massey University.

I understand that your child is one who will be visiting the Kids Own gallery in The Science Centre and Manawatu Museum during July/August with his/her teacher and other children from their early childhood centre. I would like to include your child as one of the twenty-four child participants in my study of children's reactions to the gallery and request your permission to do so. Participation would involve observation of your child's reactions to the exhibits in Kids Own and audio-taping her/his conversations while in the gallery. I request permission to talk with your child back at the kindergarten /childcare centre /playcentre about his/her visit to Kids Own and to audio-tape this conversation.

If your child takes part in the study, you or your child has the right to: (a) turn off the audio-tape recorder at any time, (b) refuse to answer any particular question, (c) to withdraw from the study at any time, (d) ask any further questions about the study that occur to you during participation.

Information will be reported for each group and it will not be possible for any individual to be recognised in any quotes used in the reports that are prepared from the study. Your child's centre will be given a summary of the findings from the study when it is completed. If you agree to your child's participation would you please sign the attached consent form.

If you have any questions about this research please contact me at Massey University extension 4547 or a message may be left for me at the Education Faculty office on extension 4533 and I will get back to you.

Yours sincerely  
Jill Ellis  
B.Ed. Dip Tchg

MASSEY UNIVERSITY

Young Children in an Interactive Science Centre

Consent Form for Child

I have read the Information Sheet for this study and have had the details of the study explained to me. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I understand that I am free to withdraw my child from the study at any time.  
That s/he may decline to answer any particular questions in the study.  
That my child can turn the audio-tape recorder off at any time.  
That my child will provide information to the researcher on the understanding that it is completely confidential.  
I understand that my child's voice may be recorded whilst s/he is speaking to a child who is wearing a radio-microphone. Therefore I agree/do not agree to my child's conversations being audio-taped while in Kids Own.

I give permission for my child to participate in this study under the conditions set out on the information sheet.

Signed \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

Private Bag 11222  
Palmerston North  
New Zealand  
Telephone 0-6-356 9099  
Facsimile 0-6-350 5635

FACULTY OF  
EDUCATION

DEAN'S OFFICE

## MASSEY UNIVERSITY

### Young Children in an Interactive Science Centre

#### Adult Consent Form

I have read the Information Sheet for this study and have had the details of the study explained to me. My questions about the study have been answered to my satisfaction, and I understand that I may ask further questions at any time.

I also understand that I am free to withdraw from the study at any time,  
That I may decline to answer any particular questions in the study,  
That during the interview I have the right to request that the audio-tape be turned off at any time.

I agree to provide information to the researcher on the understanding that it is completely confidential.

I understand that my voice may be recorded whilst I am speaking to a child who is wearing a radio-microphone therefore I agree/do not agree to my conversations being audio-taped while in Kids Own.

I wish to participate in this study under the conditions set out on the information sheet.

Signed \_\_\_\_\_

Name \_\_\_\_\_

Date \_\_\_\_\_

## CODES USED WHEN RECORDING OBSERVATION DATA

Each observation schedule includes the name of the institution the group are from, the date and time of the visit, and composition of the group (number of adults and children.)

The Target child's first name on top of each page thereafter first letter of name, for example Jill -'J'

f	=	child female
m	=	child male
F	=	adult female
M	=	adult male
V	=	volunteer
K O	=	Kids Own gallery

All exhibits are coded thus

KLO	=	Klingons
K C	=	Kids Cave
G P	=	Grain Pit
RaB	=	Roll-a-Ball
S L	=	Sounds Like
B P	=	Bongo Pipes
T yr T	=	Trust your Touch
H	=	Hologram
S C	=	Shadow Catcher
U V	=	Glow in the dark room
L C	=	Light Catcher



# INDIVIDUAL KIDS OWN OBSERVATION SCHEDULE

	Date:			Time:			Name of Group:				
	Name:			Gender:			Age:				
	Comp of Group:			Children:			Teachers:		Adults:		
<b>Exhibits</b>	<b>Time</b>										
Grain Pit											
Kling on											
Kids Cave											
Shadow Catcher											
UV Room											
Roll-a-Ball											
Trust-your-Touch											
Muffled											
Doppler Wheel											
Sounds Like											
Hologram											
Light Catchers											
Bongo Pipes											

**TOTAL KIDS OWN GALLERY OBSERVATIONS SCHEDULE**

	Girls Interactions *				Boys Interactions Δ				Adults Interactions +				CIMA				Level of Interaction			
	ECC1		ECC2		ECC3		Total	Girls Total	Boys Total	Adults Total	Teachers Total		1		2		3			
<b>Exhibits</b>																				
Grain Pit																				
Kling on																				
Kids Cave																				
Shadow Catcher																				
UV Room																				
Roll-a-Ball																				
Trust-your-Touch																				
Muffled																				
Doppler Wheel																				
Sounds Like																				
Hologram																				
Light Catchers																				
Bongo Pipes																				
Not Engaged																				

**Scene setting**

I am interested in what you thought about your visit to The Science Centre & Manawatu Museum. ( This will be phrased according to the label used to explain to the children where they were going, as the children may be told they are going to "The Science Centre" or to "Kids Own" or the "Museum" or just "on the burger buggy".)

What did you do while you were at the Science Centre?

What did you find out about while you were at the "Science Centre"?

Tell me about what you did to make something work?

How did you find out about that?

Why do you think your teacher took you to the Science Centre?

Tell me about something you could do there all by yourself?

Tell me about something you did with your friends?

Can you tell me how you made this exhibit work?

How did you get to know how to work this?

What did you find out when you did that?

Why do you think it did this/that?

Which exhibit did you like best?

**Interview Schedule for Children : Questions which are Exhibit Specific****1. Grain Pit**

Can you tell me what happened when you were working on the Grain Pit?

How did you get the grain to move without picking it up in your hands?

What happened when you turned this handle?

Why do you think this handle was harder to turn than that handle?

How could you get the bucket to move without touching it?

What did you need to do to get the grain in the scoops going up?

How did you make the scoops of grain go upwards?

I wondered why there were two conveyor belts, why do you think that is?

What do you think people use a machine like this for?

**2. Glow in the Dark (room)**

What could you see in the mirror in this room?

What do you think made your white clothes glow brightly?

How did you change the patterns on the butterflys wings?

Why do you think butterflys have patterns on their wings?

What did you find out about beetles with that beetle puzzle on the floor?

**3. Shadow Catcher**

Did you catch your shadow in this room?

What sort of shape did you make with your body for the frozen shadow?

What did you hve to do to make the lights flash?

What do you think makes the shadows stay on the wall?

When else do you have a shadow

Why do you think we don't have a shadow all the time?

Who was in the shadow catcher room with you?

What shape did they make for their shadows?

### **Interview Schedule for Children : Questions which are Exhibit Specific**

#### **4.Roll-a-Ball**

What did you do with this exhibit?

What happened when you put the ball on the track here?

Why do you think the ball dropped down there?

What could you do to make the ball roll down faster/slower on the track?

Why did you put the shapes in different places?

What happened to the ball when you changed the places of the coloured shapes?

How did you change the track?

Then what happened?

#### **5.Hologram**

This picture is called a hologram, have you seen a hologram anywhere else before?

Can you tell me what you could see happening in this hologram?

What did you have to do to see different things happening in the hologram?

How do you think this hologram was made so that we can see the balloon being blown up and popped all in the same hologram?

There are four little holograms on the wall here what can you tell me about them?

#### **6.Trust your Touch**

I think this exhibit is very tricky cos you need to think about what is in the box just by touching it and not by looking at it.

When you tried to feel in one of the boxes what did you think was in there?

What did you tell Mum/friend about what you could feel in there?

What helped you to think about what was in the box without looking?

When you looked in the box had you guessed what was in there?

What have you tried to find at home just by feeling for it? I always find money in the sofa!

#### **7.Light Catcher**

How did you hold this thing to look at the light?

What could you see when you looked through this light catcher?

Where have you seen lots of coloured lights like that before?

Have you looked through a prism and seen lots of colours anywhere else?

How do you think that helped you to see lots of colours?

Can you tell me what I should do to make a rainbow?

#### **8.Kling-Ons (room)**

It's pretty steep climbing in there! How did you manage to get to the top?

What did it feel like on your hands and feet?

Why do you think some parts of the wall felt different from other parts?

Who helped you to climb up there

What parts of your body did you use to climb up that wall?

What parts of the wall did you find easier to climb up?

Why do you think it was easier to climb there?

Why do you think it was hard to climb up there?

What could you see through the windows?

I wondered why the outside looks different through that oval window, what do you think?

Why do you think your legs felt warm when you slid down the green slide?

**Interview Schedule for Children : Questions which are Exhibit Specific****10.Kids Cave**

It's pretty tricky to get in the Kids Cave, how did you do it?

When you were inside the cave what could you feel?

Who was in the cave with you?

How did your voice sound inside the cave?

What could you see when you were inside the cave?

How did you get into the cave?

What parts of your body did you use to move through the cave?

How did the floor and the walls and the ceiling feel inside the cave?

Why do you think the floor felt warm or cold or soft or hard?

What things you touched in the cave felt the same as something at home or at the centre?

**11.Muffled**

When your friend was talking in this red part could you hear what they were saying?

Why do you think their voice sounded different when they talked in each one?

How were these two mufflers different from each other?

I wondered what makes our voices sound different when we talk in these mufflers, what do you think?

**12.Bongo Pipes**

How did you make a noise with these pipes?

How did you try to make different sounds from these paddles and pipes?

What else (besides paddles)could you use to make a sound from these pipes?

Why do you think hitting the end of the pipe made a sound?

I wondered if we could play a tune of those pipes, what do you think?

Where have you seen pipes like these before?

**13.Doppler Wheel**

What happened when you pressed the red butttn on the wheel?

How did the siren sound when the wheel was spinning?

Why do you think it sounded different as it spun around?

Where have you heard sounds like that before?

**14.Sounds Like**

Why do you think those purple pottles were there?

What did you do to these pottles?

What could you hear when you shook the pottles?

How could you guess what was inside the pottles?

Why do you think the different seeds sounded different when you shook them?

How did you work out which pottle matched which bin of seed?

6 July 1995

Facsimile

## Appendix K

UNIVERSITY

Private Bag 11222  
Palmerston North  
New Zealand  
Telephone 0-6-356 9099

**Jill Ellis**  
**C/- Faculty of Education**  
**MASSEY UNIVERSITY**

**Dear Jill,**

**Re: HUMAN ETHICS APPLICATION HEC95/73**  
Young Children in an Interactive Science Centre

Thank you for the amended Consent Form for the above research application. The amendments now meet the requirements of the Human Ethics Committee and the ethics of your project are approved.

**Yours sincerely**



**Professor Philip Dewe**  
**Chairperson**  
**Human Ethics Committee**

Copy to: Dr Janet Burns      Department of Education  
Dr Joy Cullen



## THE PRINCIPLES, STRANDS, AND GOALS FOR THE EARLY CHILDHOOD CURRICULUM

### **Strand 1: Well-being – Mana Atua**

The health and well-being of the child are protected and nurtured.

#### **Goals**

Children experience an environment where:

- their health is promoted;
- their emotional well-being is nurtured;
- they are kept safe from harm.

### **Strand 2: Belonging – Mana Whenua**

Children and their families feel a sense of belonging.

#### **Goals**

Children and their families experience an environment where:

- connecting links with the family and the wider world are affirmed and extended;
- they know that they have a place;
- they feel comfortable with the routines, customs, and regular events;
- they know the limits and boundaries of acceptable behaviour.

### **Strand 3: Contribution – Mana Tangata**

Opportunities for learning are equitable, and each child's contribution is valued.

#### **Goals**

Children experience an environment where:

- there are equitable opportunities for learning, irrespective of gender, ability, age, ethnicity, or background;
- they are affirmed as individuals;
- they are encouraged to learn with and alongside others.

### **Strand 4: Communication – Mana Reo**

The languages and symbols of their own and other cultures are promoted and protected.

#### **Goals**

Children experience an environment where:

- they develop non-verbal communication skills for a range of purposes;
- they develop verbal communication skills for a range of purposes;
- they experience the stories and symbols of their own and other cultures;
- they discover and develop different ways to be creative and expressive.

### **Strand 5: Exploration – Mana Aotūroa**

The child learns through active exploration of the environment.

#### **Goals**

Children experience an environment where:

- their play is valued as meaningful learning and the importance of spontaneous play is recognised;
- they gain confidence in and control of their bodies;
- they learn strategies for active exploration, thinking, and reasoning;
- they develop working theories for making sense of the natural, social, physical, and material worlds.