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Playing to engage: Fostering engagement for children and teachers in low socioeconomic regions through science and mathematics play-based learning

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Playing to Engage:
Fostering engagement for children and teachers in low socioeconomic regions through science and mathematics play-based learning

Stephanie Smith

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In the appendices (Appendix 12 and 13) I include two peer reviewed publications: one a journal article which I co-authored and which included initial findings of the current study, and a book chapter in press as follows:

Maher, M., & Smith, S. (2014). Asylum-seeker and refugee children belonging, being and becoming: The early childhood educator's role. Australasian Journal of Early Childhood, 39(1), 22-29.

Smith, S. & Maher, M. (2016 in press). The power of play-based learning: A pedagogy of hope for potentially at-risk children. In S. Lynch, D. Pike, & C. a'Beckett (eds.). Multidisciplinary perspectives on play from early childhood and beyond. Singapore: Springer Education.

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Key Terminology

Connected Outcomes Group (COGs) – integrated units of work developed by the NSW Department of Education implemented in NSW schools

Curriculum – the NSW adaptation of the Australian Curriculum utilised by the focus school

Lower Primary (Kindergarten to Year 2) - Children aged between five and eight years

Kindergarten – first year of formal schooling in NSW

Year 1 and Year 2 – the years of formal schooling following on from Kindergarten.

Early Stage One and Stage One- early phases of the curriculum

Early Years – this age bracket is identified as birth to eight years old

English as an Additional Dialect or Language (EAL/D) – an educational term used to describe children who come from multilingual families and whose home language is another language other than Standard Australian English (ASE)

Key Learning Areas (KLAs) – The structure of the Australian Curriculum is organised into the following Key Learning Areas: Literacy, Science, Mathematics, Science and Technology, Creative Arts and PD/H/PE

Targeted Early Numeracy (TEN) – a program across Kindergarten to Year 2. The TEN program was designed by the NSW State Government to provide additional support to children experiencing difficulty learning numeracy concepts in lower primary.

Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

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Stephanie Smith

Dedication

This thesis is dedicated to Leon, for lighting a fire within me and to all the other children who were able to flourish during this experience. They opened my eyes to a whole new way of teaching, and to the importance of fostering passion and celebrating what is unique in each of us. May your spark for learning continue to grow.

Acknowledgements

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- The Principal and Deputy Principal of the Case Study School for giving me the freedom and support to implement *Playing to Engage.* They were both willing participants in the classroom, believed in my concept and kept an open mind through the process.

- Participating teachers, executive staff, teaching assistants, parents and children, who successfully collaborated with me to make this research a reality.

They offered their time to complete surveys, contribute to interviews, undertake *Lesson Study* professional development sessions, and opened their classrooms to me.

- Professor Alison Elliott, for providing her expert knowledge on play-based learning and being a critical reader of this thesis.

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Abstract

Commitment to improving the literacy and numeracy results of children from low Socio Economic Backgrounds (SES) has long been a priority of the Australian Federal and State Governments. Upon entering formal schooling these children frequently start on a back foot compared with their middle and high SES counterparts. Often this is because of differences in their upbringing, including limited access to educational toys, more limited vocabulary as they engage with adults and other children and infrequent attendance at early learning facilities.

Over the past decade, as identified by the Australian Chief Scientist, the number of children selecting career pathways into areas such as science, technology, engineering and mathematics (STEM) has been steadily decreasing. Lack of engagement in these subject areas will limit job opportunities for children in the future, cause problems for the economy and diminish Australia's capacity to develop new technologies and advance science research. For these reasons it is imperative schools provide positive, engaging experiences in these areas.

To help address the specific needs of low SES children in improving their academic results and building greater capacity for engagement in the areas of science and mathematics, this thesis explored the implementation and evaluation of a study entitled *Playing to Engage* in a formal school setting. Specifically, *Playing to Engage* encompassed the development and implementation of a play-based program, *Active Learning* in a series of lower primary classrooms. Simultaneously, to help support and strengthen the outcomes from this program, a professional development package targeting science and mathematics play-based experiences was created, and a strategic campaign was implemented to engage parents and promote this style of learning in the classroom.

This study utilised a mixed methodology approach incorporating a single case study with action research and participant evaluation to present an holistic interpretation of

the research. These approaches provided a cohesive environment where the researcher was able to transition between leading the study and also being a participant, which added an innovative double helix representation to the traditional action research model. A significant focus of the methodological approach was helping teachers to evolve from a passive recipients of professional development, moving along the continuum into andragogy and ultimately higher order heutagogical dimensions where they were able to identify gaps in their own learning and source methods conducive to their personal learning style to meet their learning needs.

Throughout the study four meta-themes intertwined to impact on the discussion and findings. These included 1) teacher, parent and children's differing interpretations of the term play in a primary school context, 2) implementing an inclusive *Lesson Study* model of professional development specifically linked to play-based learning, science and mathematics to build confidence and versatility in teachers, 3) identifying the significance of and nurturing the development of 21st century skills in both children and teachers in preparation for an unknown, evolving future, and 4) the impact of an *Active Learning* play-based program on academic achievement including NAPLAN results. Without these four elements interacting with one another, the research would have been incomplete; together they cohesively encapsulate the vision of the study to improve engagement levels in children and teachers in low socioeconomic regions through science and mathematics play-based learning, and their achievement in national testing.

Chapter One

Playing to Engage

Playing to Engage

Fostering engagement for children and teachers in low socioeconomic regions through science and mathematics play-based learning.

Skills we expect of 21st century children such as collaboration, problem solving, technological prowess, and creativity are becoming an increasing focus for today's teachers. It is important to provide an environment that develops them as lifelong learners.

1.1 Introduction

The evidence strongly suggests that many children of low socioeconomic status (SES) find it more difficult to engage with the NSW curriculum upon entering the schooling system than children from middle or high SES backgrounds. This study implemented a play-based program for children in their early years of formal schooling and evaluated it over three years. The aim was to promote student engagement and capacity to be successful in their schooling.

Specifically, play-based learning aims to foster children's interest, knowledge and skills in mathematics and science. Current research indicates teachers find these subject areas the most challenging to teach. At times there can be a lack of confidence in the classroom, with teachers inadvertently effecting a negative influence on children's perceptions of science and mathematics. This study explored the role of parents in shaping the attitudes and learning behaviours of children in relation to the implementation of a play-based program.

The play-based program described in this thesis included a variety of activities tailored to link with the NSW Board of Studies curriculum Stage One mathematics and science outcomes. Implementation of the play-based program was undertaken by 13 classroom teachers, including the author, in a low SES school in south west Sydney, where 85 per cent of the children did not speak English at home. Parental engagement with the school and with their

children's education was low prior to the intervention. The play-based program was designed to complement and be easily integrated into the daily routine and general observation practices of teachers. This in turn meant all activities were intertwined with children's general interests and could accommodate the changing curiosities of their young minds.

This study investigated whether it would be possible to implement a play-based program in a primary school setting, not just in the author's classroom, but across the whole lower primary (children aged five to eight). Once realised, it would be necessary to evaluate the impact of the program on student outcomes, and what aspects were important in the successful implementation of such a program.

It was envisaged the participants in the study would be teachers of children in Kindergarten, Year 1 and Year 2, the author-researcher (also a teacher-participant), and the children's parents, many of whom were immigrants or refugees. The itinerant teacher supporting the English learning of children using English as a second language (ESL) would also participate in the study. The study took place from mid-2011 to the end of 2013.

1.2 Statement of the Research Problem

The overarching problem, which this research aims to address, is the lack of curriculum engagement by children from low SES backgrounds in formal school settings. Specifically, the subject areas of science and mathematics were targeted for study due to a range of factors. Current research shows teachers find these subject areas more challenging to teach due to a lack of confidence in their abilities and a deficiency of ongoing professional development. The roll-on effect of this over recent years has been the consistent decline in children selecting science, mathematics and information technology subjects in high school and more importantly as a career choice at university level. This could prove critical, as research indicates that by the time today's children graduate from high school, given the increasingly rapid evolution of technology, a plethora of new jobs will be available which currently do not exist.

Active Learning, a comprehensive play-based program focused on engaging children in science and mathematics was developed in response to these challenges. New issues arose with this method of teaching and learning such as overcoming differing perceptions by teachers, parents and children of the term *play* in a primary school context. This issue was compounded by teachers' previous free time experiences described as play, the need for them to transition from a teacher-directed philosophy into a child-centred paradigm, and a lack of understanding around how to create an authentic play environment. Supporting the implementation of *Active Learning* was a professional development package targeting appropriate play-based activities linked to science and mathematics. The challenge was in developing a packaging and delivery style which inspired passion among teachers and a desire to embrace *Active Learning* to create an experience which was sustainable without the researcher, and promoted in teachers a need to become life-long learners.

1.3 What Brought Me to the Study: My Learning Profile

1.3.1 Passion Driven Learning

I believe being part of the education profession has always been in my blood, and all my life experiences have been leading to this body of work. Throughout my career I have been fortunate to work in a range of cultural institutions as part of different education teams including the Australian War Memorial, National Archives of Australia, Questacon: The National Science and Technology Centre and Scitech. During my time living in the Northern Territory I contributed to the development and creation of play-based learning materials for children living in remote communities through my project work with Charles Darwin University, and I taught in a local Darwin school. Upon my return to New South Wales, I began teaching in a low socio-economic urban primary school where the student body was mainly children from migrant and refugee families and were around 10 per cent Aboriginal.

Although all of my professional experiences have had an education focus, there have also been a series of other significant themes running through my career. My work in cultural institutions enabled me to explore the benefits of learning outside the classroom and play-based approaches to teaching. I became aware of the importance of having hands-on resources

and activities available for children to engage with as a method of enhancing storytelling, understanding, curiosity and potentially extending learning opportunities. This knowledge changed my approach to classroom teaching and the way I interacted with teachers, parents and children. I became acutely aware of how different children were from each other and recognised the necessity to create learning experiences which met individual needs and passions. I also spent a significant amount of time in various roles with families, opening my eyes to the importance of creating positive, inclusive relationships. The final piece to the puzzle was my interest in science and mathematics, which evolved from my work in science centres and designing educational resources for Charles Darwin University initiatives in remote Aboriginal communities.

My progressive journey and unique experiences have bought me to this point and greatly influenced the direction and focus of this study.

1.3.2 Personal Beliefs Underpinning my Approach to the Study

It must be noted from the very beginning my position on teaching and learning. From the first moment I stepped into a classroom during professional experience as a student teacher my goal has always been to find each child's passions and to use them to engage each in the process of learning. I believe that any interest a child may have can be mapped back to the curriculum. If a teacher is clever about it, it is possible to prevent his or her personal interests and preconceived ideas limiting what a child should learn. Just as every child is different, every year's group of children varies greatly. The teacher can build on their varying interests, extending their motivation and sparking further interest. I do not believe in planning any lesson which does not include a child's voice, or without considering how learning relates to a child's world, what the real world context is and how the child can partner in or even drive the learning experience.

Play-based learning can be tailored to meet the needs of children beyond the age of five and provide vast opportunities to engage children's specific interests, while at the same time offering them opportunities to discover new passions. I strongly advocate learning experiences where children have the power to make their own choices, to offer opinions which

are heard and acted upon, to express themselves in ways they feel most comfortable and allow them to have real autonomy. People are not all the same: we do not have the same interests and skill sets. I believe every child has a unique set of abilities. This makes each child special, and a teacher needs to let each individual shine inside and outside the classroom. When a child has a desire to learn new information or skills, a teacher or possibly another child with the required skill set should be there to facilitate learning.

Learning should always be a fun, enjoyable experience for both children and the classroom teacher.

1.4 Rationale for the Current Study

1.4.1 Play-based Learning Approaches

There are a number of factors that link together to provide a rationale for the current study. Play-based learning has been the focus of researchers for many decades from Piaget, Vygotsky and Parten, to more recent leaders in the field (Berk, 2013). They are all strong advocates of the rich, engaging learning opportunities play provides to children of all ages. From a very young age children participate in play; it is seen as a natural occurrence. Suddenly, children reach formal schooling age and play is left behind in favour of classrooms, school uniforms, desks, worksheets and smartboards (Bartlett, 2011). From this stage in a child's life, play is generally seen as something children do at home and during recess, not as a legitimate pedagogy that has a place in the formal schooling classroom. For a tool which is seen to have so many benefits and is loved by children, it is interesting to consider why more teaching professionals do not use it as a key learning strategy in the classroom.

Under the collective Council of Australian Governments (COAG) *National Education Agreement* (Council of Australian Governments, 2008) the Commonwealth, State and Territory Governments acknowledge the significance of ensuring all young people have the best possible start in life as being central to the success and strength of families, communities and the nation as a whole. As Bartlett (2011) argues, play is a right of all children in the world. The Early Years Learning Framework (EYLF) (Australian Government Department of Education,

Employment and Workplace Relations, 2009), outlines the importance of play in supporting children's holistic development and learning for all children aged birth to eight. The EYLF has been integrated into early learning settings across Australia, but despite the broad age range included, it is seldom a focus for primary schools (Brooker, Blaise, & Edwards, 2014). While the EYLF has been mandated as the national early childhood curriculum, it has not been mandated for formal school settings where the Australian Curriculum and individual state interpretations of the Australian Curriculum are mandated. Implementing one set of curricula is challenging enough for classroom teachers, but having to decipher two, and overcoming the difficulty of marrying them into their teaching practices is frequently seen as unnecessary.

1.4.2 Context of the Current Study

This current study is located at one school in metropolitan Sydney, NSW, Australia. It is not a unique setting, but a typical situation found in all states and territories across Australia, which could enhance the transferability of the program developed for this study to schools serving children of similar demographics. The setting was comprised of children from low SES backgrounds, specifically Indigenous, immigrants and blue-collar worker families. These children faced many struggles on a daily basis including language barriers, family problems, lack of money, abuse (physical and emotional), and foster care, and many evidenced behavioural issues. For many of these children simply getting to school daily was and still is an achievement in itself.

Education equips young people with knowledge, understanding, skills and values to take advantage of opportunities and to face the challenges of the future with confidence (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008). This study sought to address the challenge faced by educators of enhancing engagement with the curriculum of children from low SES backgrounds who traditionally find it difficult to do so (Australia Association of Mathematics Teachers and Early Childhood Australia, 2006; Ministerial Council on Education, Employment, Training and Youth Affairs, 2008; Milne, & Plourde, 2010; Luke, Woods, & Dooley, 2011). This study therefore evaluated play-based learning as a strategy in a low SES school for promoting student engagement and capacity to be successful in the early stages of formal schooling.

The National Assessment Program for Literacy and Numeracy (NAPLAN) is a national assessment, instituted in 2008 in Australia. It replaced the NSW Skills Test, which was the state assessment that preceded NAPLAN. Since the introduction of NAPLAN, schools and classroom teachers, especially those in low SES areas, have experienced the tensions of the struggle to meet national expectations and suffered the recriminations of falling short. NAPLAN data clearly indicated the harsh reality for the school in which the study took place, along with other schools in the same region with a similar demographic. Children in these schools consistently perform at the lower end of the achievement scale in both literacy and numeracy. In the Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008) it is acknowledged that by comparison with other countries, Australian children from low SES backgrounds are under-represented among high achievers and over-represented among low achievers. With the consistency of these results over previous years, it was timely that a new approach to teaching and learning be piloted in order to help these children successfully engage with the curriculum and subsequently improve NAPLAN results.

Due to the public nature of NAPLAN and the spotlight on the schools' ranking based on this assessment, teachers often feel the pressure (Barblett, 2010) to focus much of their teaching on preparing children for this test, which occurs in years 3, 5, 7 and 9. Bartlett (2011, p. 27) sums up the situation as follows:

> The emphasis on standardised testing, attempting to constantly monitor, measure, and quantify what children learn, has forced teachers to spend more time engaging in so-called direct instruction and has substantially reduced opportunities children have for exploring, interacting, and learning on their own.

This current study also trialled a specific focus on enhancing children's all-round development (Organization for Economic Co-operation and Development, 2002), as opposed to focusing primarily on literacy and numeracy. The NSW Board of Studies (NSW BoS) literacy and numeracy documents strongly reflect the views of society and other state governments in the overwhelming importance placed on these subjects. The literature suggests that dispositions for learning, developed through play-based activities, enhance achievement in all curriculum areas (Claxton & Carr, 2004) since cognitive development and thinking are directly linked to linguistic development. This study could contribute to the body

of knowledge in the area of learning and teaching strategies that result in improved literacy achievement.

In the study, three parallel yet interweaving threads combine to form this study. Two, within the context of the study are children's learning and teacher learning. The third, parental engagement is discussed in 1.4.4 below.

1.4.3 Science Teaching Potentially Problematic

Current research indicates that primary teachers feel more comfortable teaching literacy than mathematics and science. Fleer (2009) suggests over the past decade there has been minimal change in teacher attitudes towards mathematics and science. A study by Universities Australia (2015) found a growing lack of interest in science and mathematics degrees at university due in large part to negative stereotypes and uninspiring teachers in school. It strongly recommended that the Australian government invest more in mathematics and science from Kindergarten onward, with an emphasis on hands-on activities that reflect everyday experiences.

This current study looked at whether a program foregrounding science and mathematics play-based learning could be used as a strategy to enhance teacher confidence in these subjects, and in turn increase student engagement. A further outcome of this study was the development of a model which links play-based activities and the curriculum in a cohesive fashion that is easy for teachers to access and use.

1.4.4 The Parent Factor

Reflecting societal views, play is for many parents an activity which children do every day at home (Burton, 2011) and is not a valuable asset to learning in the classroom.

The current study investigated perceptions of parents from low SES backgrounds in relation to play-based learning prior to the intervention and again at the end of the intervention. The success of the project would be reliant on an element of community engagement and support and the current study investigated what parent perceptions were in relation to play as pedagogy and how those perceptions might impact children's learning.

1.5 Research Questions

The key question of this study was: to what extent can play-based learning, specifically linked to science and mathematics, be used as an effective strategy to enhance student achievement and strengthen the partnership between home and school for children from low SES backgrounds?

There were also three subsidiary questions shaping the direction of this study:

- Can a play-based learning program influence the overall holistic development of children?
- Can a play-based learning program, targeted to science and mathematics, help improve teacher confidence in teaching these and other subject areas?
- Can a successful play program in primary school settings play a role in strengthening parent partnerships with the school in the education of their children?

To answer the research questions the study:

- developed a mathematics / science play-based learning program;
- implemented this play-based learning program comprehensively in Kindergarten to Year 2 classrooms in one low SES school in Sydney;
- provided ongoing professional development for participant teachers;
- evaluated children's engagement with learning and academic performance over the time of the study;
- used participant teacher evaluation to evaluate the effectiveness of the program; and implemented collaborative play-based learning program strategies to strengthen home and school partnerships.

1.6 Overview of Literature for *Playing to Engage*

1.6.1 Overview of *Playing to Engage*

For this study, *Playing to Engage* explored the impact of a science and mathematics focused play-based learning program on the achievement of children aged five to eight years who were from low SES backgrounds.

For many, play and school are seen as two very separate activities that do not belong together (Ortlieb, 2010). This study investigated whether play and learning in a school environment, working hand in hand, would influence academic outcomes for children, given they are naturally curious and eager to explore the world around them.

1.6.2 Challenges Facing Children from Low SES Backgrounds

Children from low SES backgrounds are at times disadvantaged before they start school (Tesse, 2012). For some children there is a language barrier, for others it is their parents' level of education, and for the majority it is a lack of income and access to early learning facilities before they enter formal schooling. Generally families find the stress of poverty and associated challenges draining and exhausting, causing them to struggle when providing engaging learning opportunities for their children (Milne & Plourde, 2010). According to Vail (2004), compared with other children from middle and high SES backgrounds, the majority of these children go into formal schooling on the back foot and for many this is the way it continues throughout their schooling.

Internationally and in Australia, there is a growing realisation that all children can benefit from play, (Australian Government Department of Education, Employment and Workplace Relations, 2009). The positive outcomes of exposing children to a play-based program are many. Henniger (2013) describes play as a crucial way for children to learn about language, develop intellectual concepts, build social relationships, strengthen physical skills and deal with stress. Although this study focuses primarily on science and mathematics, it was hoped the advantages would not be limited to these curriculum areas. The literature (Burton, 2011;

Synodi, 2010; Wood & Attfield, 2005) suggests children in play-based learning will also have improved skills in:

- socialising;
- problem solving;
- creative arts including drama, art, dance and music;
- literacy;
- communication; and
- questioning.

1.6.3 Making Changes

At times, the skills and knowledge of children are underestimated by teachers and parents specifically in low SES schools where teachers sometimes have lower expectations of children than is the case in high SES schools (Timperley, 2009). Poor performances on NAPLAN assessments, discussed earlier, can cause teachers to focus their teaching mainly on assessment (Barblett, 2010). It is possible, therefore, that some teachers have become so focussed on coaching children for NAPLAN, and teaching to the test, they have forgotten how to make learning fun. The consequences can be that children are not provided with a well-rounded education. A recent international study (Binkley, Erstad, Herman, Raizen, Ripley, & Rumble, 2012) claims children living in the 21st Century need creativity, critical thinking, problem solving, decision making, communication, and information and communications technology (ICT) literacy skills if they are to be successful adults.

1.6.4 The Teacher Factor

The literature (Meerah, Halim, Rahman, Harun, & Abdullah, 2011) confirms that primary school teachers feel less confident teaching children science and mathematics than other curriculum areas. Conversely, Maher (2007) shows that teachers feel significantly more confident teaching literacy than mathematics in the classroom. Meerah et al. (2011) demonstrate that science is another curriculum area where primary teachers frequently lack expertise. Given this lack of knowledge and skills in these curriculum areas, Sargeant, Burton and Bailey (2010) suggest teachers need extra support, guidance and professional

development to show them how to confidently teach science and mathematics in an engaging manner, and linked to real world experiences.

1.6.5 The Importance of 21st Century Skills

The aim of education is to prepare children to be successful in society. The children of tomorrow have access to information at their fingertips; what they require is a range of skills to be successful in the future workforce. These are termed 21st Century skills and include problem solving, effective communication, collaboration, creativity, analytic thinking, and decision-making on an ethical basis (Crockett, Jukes, & Churches, 2011). As Whitby (2013) discusses, every child needs an education which cultivates their capacity to think imaginatively, be creative, act flexibly, and independently, and to take responsibility for their decisions. With a focus on broader outcomes, education can provide children with a much more holistic approach to learning, therefore encouraging them to become resourceful and preparing them for life beyond school (Gonski, Boston, Greiner, Lawrence, Scales, & Tannock, 2011). The *Playing to Engage* program utilised strategies that would promote these skills.

1.7 Theoretical Framework

1.7.1 Adult Education

Although a number of theoretical frameworks were considered for this study, it was ultimately decided, given the context and the significance placed on improving teacher skills in the areas of play-based learning, mathematics and science, that adult education was the right fit. It will be argued that this study took place in the theoretical framework of adult education and professional development where a number of dimensions provide a rich and varied frame within which the study was designed and data were interpreted. Lave and Wenger's (1991) epistemology of situated learning, which has dominated adult education discourse for the past two decades or more, highlighted the importance of all participants in the study being intimately connected to learning both the process and the resultant practice. Learning was situated within the social environment of work and communities.

1.7.2 Teacher Professional Development

Extending the adult education discourse, the focus in this study was specifically on teacher professional development, which related directly to the nature of teaching in a given context (Adey, Hewitt, Hewitt, & Landau, 2004) of the school in which the study took place. It has become clear over time that teachers do not benefit simply from "a transmission-sequential notion of knowledge, such that the teacher takes what is given to him/her ... and 'delivers' it efficiently" (Adey, Hewitt, Hewitt, & Landau, 2004, p. 144). In the current study, seminal to implementing *Playing to Engage,* was the commitment of the teachers in the classroom to implementing a play-based program. Consequently, the researcher had to ensure that participant teachers were equal partners in determining the professional development foci, if they were to see and seek the benefits of the professional development potentially leading to improved outcomes for the children in their classes. The study utilised the framework of Moon (2004) who notes the following as important elements in effective professional development:

- a congenial climate;
- learners involved in collaborative planning;
- participants diagnosing their own needs;
- formulating their own objectives;
- playing a key role in planning and implementation; and
- evaluating their learning.

These elements and the theoretical framework form the basis of discussion, particularly in Chapter 5, which details the professional development run by the researcher and undertaken by the participant teachers in the study.

1.8 Overview of Methodology

1.8.1 Theory of Interpretivism

The current study took place within the paradigm called *interpretivism*. The interpretive nature of this study was built upon the understanding that there is not just one reality, but that reality is multi-dimensional and ever-changing (Merriam, 2009), and is interpreted differently by individuals depending on their connection with the issues at hand. Specifically, an

assumption that underpins the study is that participant teachers and parents have varying and diverse views on play as a vehicle for learning. As such, the study will endeavour to "portray the complex pattern of what [was] being studied in sufficient depth and detail" (Ary, Jacobs, & Razavieh, 2002, p.423) so that someone who was not there could understand the experience of someone who was.

1.8.2 Mixed Methodology: Case Study, Action Research, Participant Evaluation

Mixed methodologies were utilised as the best means to elicit data that would answer the research questions. The methodologies selected to best achieve this outcome were case study, action research and participant evaluation. To investigate whether there was greater engagement on the part of the children and any difference in achievement on NAPLAN, student attendance data and nationally provided NAPLAN data were also considered.

1.8.2.1 Case Study

This research utilised a case study methodology interwoven with action research and participant evaluation. "Case studies provide a unique example of real people in real situations" (Cohen, Manion, & Morrison, 2011, p. 289). As explicated by Yin (2013), in case study research the *context* is the element under study; here the context was play-based pedagogy in a primary school setting. The *case* denotes the parameters of the study; in this instance it was participant teachers' implementation of the program. When a holistic investigation is needed that will provide in-depth understanding, case study is an ideal methodology (Baxter & Jack, 2008) as it is designed to bring out details from the perspective of participants.

1.8.2.2 Action Research

Action research involves the continuous modification of a situation and theorising from the standpoint of action (Holly, Arhar, & Kasten, 2009). *Playing to Engage* employed an action research structure as part of the process to respond to implementation evaluation and to refine the detail of the program in each iteration. This type of action research, as Brydon-Miller, Greenwood and Maguire (2003) suggest, goes beyond the notion that theory informs practice, to a recognition that theory can and should be generated through practice. *Playing to Engage*

provided opportunities for primary teachers to not only improve their professional skills in science and mathematics (Fleer, 2009b; Maher, 2007) but more significantly it was an opportunity to engage children in these areas. As Denscombe (2007) states, the nature of action research is driven by the need to solve practical, real-world problems to improve practice, as was the case in this study. As such the study necessitated a conscious and purposeful consideration of pedagogy, androgogy and the concept of heutagogy.

1.8.2.3 Participant Evaluation

This was an evaluative study and as such embedded the notion of judgement. People constantly make judgements in their daily lives. Formal evaluation is an extension of and more structured approach to evaluation. Specifically, the study evaluated the strengths and areas for improvement of the play-based *Playing to Engage* program. Cohen, Manion, and Morrison (2011) highlight the important features of evaluation: "answering specific, given questions; gathering information; making judgements and taking decisions" (p.50). These authors hold that educational evaluation is important because it provides validation for improvements in educational policies and practices. In this study validation of practice and participant experience provided a platform for decision-making in the school where the research took place and in the wider context of the community in which it was embedded. The study sought the views of teachers, parents, and children, who contributed in one way or another to the evaluation of the *Playing to Engage* program.

1.8.2.4 NAPLAN and Attendance Data Informing the Evaluation

While the purpose of the study was not specifically to improve children's NAPLAN results, it was anticipated that the *Playing to Engage* program would demonstrate its value as a vehicle for learning. Attendance records would also provide data to inform the evaluation of the program as high attendance is often linked to academic achievement.

1.8.3 Methods of Data Collection

The following methods were utilised to collect data (see 3.3):

- Interviews with participant teachers and the school executive;
- Recordings of weekly team meetings
- Researcher and teacher reflective journals/field notes/anecdotal records
- Pre- and post-initiative parent surveys
- NAPLAN results

1.8.4 Methods of Data Analysis

Methods of data analysis (see chapter 3.4) were thematic analysis of the interviews, transcriptions of elements from the team meetings, and reflective diaries; descriptive statistics were used to analyse the numerical data.

1.9 Scope and Limitations of the Study

The scope of the study was within the context of adult learning and interpretivism paradigms. It was therefore bound by the parameters of the participants, primarily the teachers, as they constructed social and cultural meaning throughout *Playing to Engage.* It was imperative during the process that participants be willing to share their experiences, ideas and feelings in order to successfully progress the program through a series of scaffolded cycles. Therefore the researcher relied on the consistent, authentic contributions of teachers during all professional development and *Active Learning* sessions, as they retained control of the study.

The study had to juggle multiple viewpoints as individuals engaged with the program and developed differing connections to the issues associated with the experience. The scope of the study was therefore limited to the voices of the participants, as they shared their beliefs and journey throughout the process. This created a subjective environment from which the researcher needed to capture the depth and detail of the participants' thoughts in order to build relevance and common themes applicable to a broader audience.

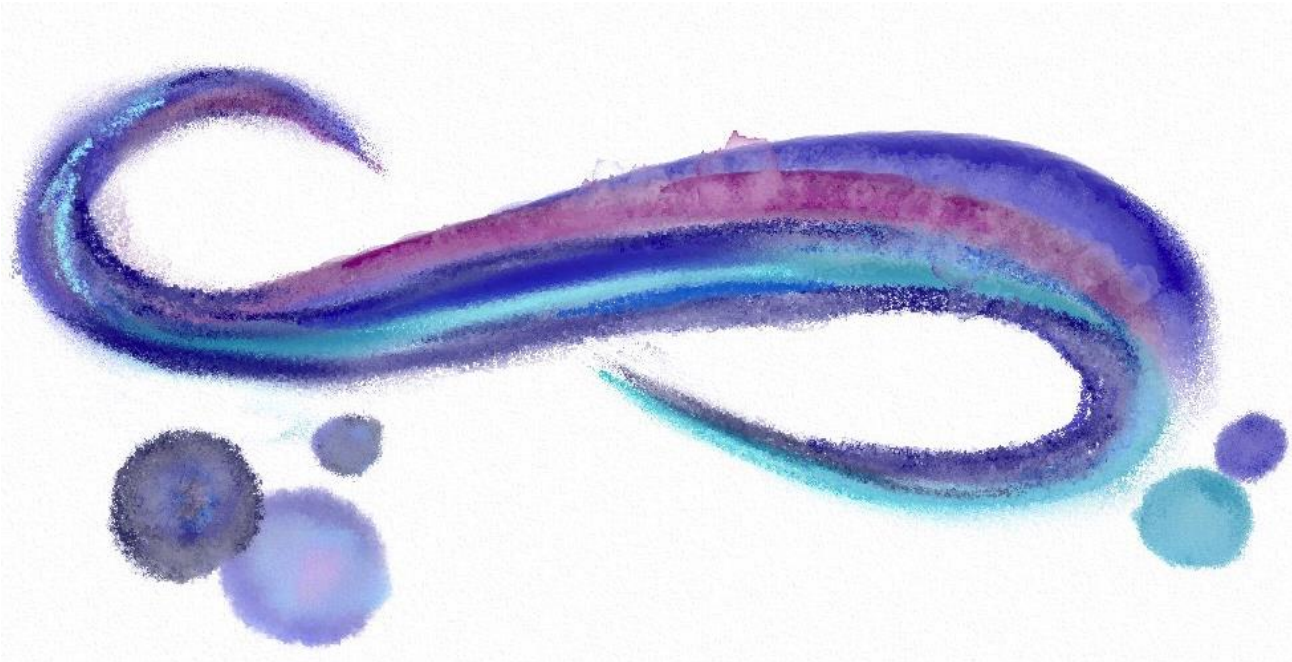
As the study took place in one school setting only, the findings are not necessarily generalisable to the general population or to all schools in Sydney nor to the wider Australian population, nor to school settings internationally. Nevertheless, the findings are compelling and the principles underpinning the *Playing to Engage* program are sound, as evidenced in the discussion chapters where there are strong links made to national and international research, discussed in Chapter 2. Therefore, other low SES schools which have a high enrolment of children of a similar demographic to those in the case study school, might wish to consider a play-based program similar to the one described in this thesis.

1.10 Outline of the Thesis

Chapter 1 provides a rationale for the study, an overview of its theoretical framework and the study design. It also outlines the methodologies used as well as the methods of data collection and methods of data analysis. It addresses the scope and limitations of the study. Chapter 2 constitutes the literature review and the methodology is described and justified in Chapter 3. Chapters 4, 5, 6, and 7 provide the study findings while Chapter 8 states the concluding remarks, considers the limitations and provides suggestions for further research.

Chapter Two

Literature Review



2.1 Literature Review Structure

2.1.1 Contributing Factors to the Study

The aspects prominent within my own developing understanding, and as described in the introduction, of passion-driven learning, non-traditional teaching methods and play-based learning have significantly contributed to the conceptual framework of this study.

The following literature review explores the impact of the following themes and how they affect teaching and learning in low SES classrooms:

- Educating children with knowledge and skills for the unknown future
- Teaching science and mathematics in primary school settings
- The influence of government, international trends and change makers on play-based learning
- The impact of play in formal schooling environments
- The Theoretical Framework
- Low SES student performances based on NAPLAN results
- Factors influencing low achievement
- Parental perceptions of play, science and mathematics

2.2 Educating Children with Skills and Knowledge for the Unknown Future

2.2.1 Welcome to 21st Century Learning

For the past century education has been stuck in the mode of the industrial revolution. This is well argued by Whitby (2013):

> [S]chools have spent more of the 20th century perfecting a 19th century model of schooling. A model where students proceed along a factory conveyer belt during which they are rigidly

> processed, inspected and finally graduated into a workforce with limited skills and expectation. (p. 24)

Classrooms evolved from chalkboards and rows of desks to Smartboards, computers and iPads, but for many practitioners and parents, daily teaching practices have not advanced at the same rate.

2.2.2 Factors Affecting Learning

Schools are currently hovering on the threshold of evolution, while at the same time struggling with a cohort of teachers grounded in old-school teaching pedagogies. A meta-analysis study by Hattie (2008), synthesising 52,649 studies that reported findings on 83,033,433 people, explored factors affecting children's achievement, including the child, the home, the school, the curricula, the teacher and approaches to teaching. He concluded that almost anything will have an effect on children's learning, but the effect or impact will differ, and some will be more cost-effective than others. Table 2.1 provides the average effect (d=0.40) for each of the major contributors to learning, according to Hattie (2009, p. 18).

Table 2.1 John Hattie's findings on factors influencing child achievement

Table 2.1 Average effect for each of the major contributors to learning

Contribution	*No.*	*Studies*	*People*	*Effects*	*d*	*SE*	*CLE*
Student	139	11,101	7,513,406	38,282	0.40	0.044	29%
Home	36	2,211	11,672,658	5,182	0.31	0.058	22%
School	101	4,150	4,416,898	13,348	0.23	0.072	16%
Teacher	31	2,225	402,325	5,559	0.49	0.049	35%
Curricula	144	7,102	6,899,428	29,220	0.45	0.076	32%
Teaching	365	25,860	52,128,719	55,143	0.42	0.071	30%
Average	816	52,649	83,033,433	146,626	0.40	0.062	28%

Hattie (2009) notes there is not much difference between these elements but that, within these averages, there is evidence that "some things work *better* and some things work *worse* relative to the many possible alternatives" (p. 18). In the current study, the students and their engagement were clearly the focus with the main influences being the home and the teaching. Hattie suggests one is better off asking not "…whether an innovation was having a positive effect compared to not having the innovation, but whether the effects from innovation were

better for students than what they would achieve if they had received alternative innovations" (p. 19).

Whitby (2013) says, "Australia has spent the past 30 to 40 years trying to perfect an industrial model of schooling that is no longer relevant, desirable or effective in improving student performance" (p. 24). The common denominator in every classroom is the teacher, and in many cases, without even realising it teachers have created learning environments dominated by disengagement. As discussed in Rowe's (2005) government-initiated inquiry into teaching literacy in Australia, "teachers must always draw on the techniques most suited to the learning needs and abilities of the child" (p. 11). His report goes on to state "given the importance of literacy competence to children's engagement and to their subsequent educational progress and life chances" (p. 17), it is vital we create sound foundations in this area. This report's recommendation supports the inclusion of literacy in the current study as a method of building engagement, confidence and the ability to access information to complete mathematics and science activities.

2.2.3 Engagement in Learning

A national engagement survey was conducted by Learning Frontiers (2014), a sub-committee of the Australian Institute of Teaching and School Leadership (AITSL), tasked with improving education for all. This survey found an alarming percentage of children were not engaging with current methods of teaching and learning in Australian classrooms (see Figure 2.1).

Figure 2.1: Results from engagement survey conducted by Learning Frontiers into teaching and learning practices in Australian classrooms

According to Victoria's Department of Education and Training (2013), risk factors of disengagement include:

- erratic or no attendance;
- low literacy or numeracy/poor attainment;
- lack of interest in school and/or stated intention to leave;
- negative interactions with peers; and
- behavioural issues including aggression, violence, or social withdrawal, significant change in behaviour, attitude or performance (p. 1).

Fredricks (2011) argues that with learning, engagement is likely to increase when teachers listen to children, create learning experiences which build connections with children's lives

outside the classroom, consider their opinion and offer opportunities to develop their ideas. There is no doubt engagement plays a significant part in creating a supportive environment conducive to learning. As discussed by Martin and Liem (2010), individual children's experiences with engagement in learning at school directly contribute to an increased feeling of motivation over time.

2.2.4 Digital Natives

'Generation Z' and the most recent (born after 2010) 'Alpha Generation' are digital natives. These are the children of the current schooling era. Most are living in a fast paced technological age and have had "significant access to computers at home" (Zevenbergen, 2008, p. 37) and to various forms of technology since the day they were born. According to Whitby (2013), outside the classroom children are never more than a click away from information; anything they want to know can be accessed in a matter of minutes, anywhere, anytime, using the internet or through social media. Nevertheless there is talk of the "digital divide" (Yelland & Neal, 2012p. 133) and how this is at times linked to disadvantage which can be overcome with provision of access to computers (Yelland & Neal, 2012).

The classroom needs to reflect the increasing changes in technology and society and what children experience "needs to be related to new technologies and pedagogical practices that are designed to support learning in diverse ways" (Yelland, 2011, p. 4) As Prensky (2001) holds, our children have changed radically. Today's children are no longer the people our educational system was designed to teach. We need to step away from standardised learning and create a learning environment which acknowledges the unique personalities and interests of children.

2.2.5 What Do Children Need to be Successful in the Future?

In order to meet the unidentified needs of our future world and prepare them for a range of jobs which do not yet exist, children require a vast array of life skills. Prensky (2011) is a strong advocate for teachers not becoming over-consumed with and driven by content, but instead suggests they should be focused on building strong connections with students, which is critical to finding the right education for them. It is essential there be an educational shift

towards student-focused and -directed learning approaches within the classroom. It is interesting to note that Christopher Pyne, Australia's current Minister for Education and Training, after directing a review of the Australian Curriculum (Donnelly & Wiltshire, 2014) specifically articulated one of the aims as ensuring the curriculum provides sufficient content but not an over-prescription of content.

The modern 21st century classroom should be a place where children have choices and are able to make decisions about their learning. Children of today are not frightened to question adults and ask why; indeed they need more of a response than "because the teacher said so" to be convinced (Whitby, 2013). A revolutionary study by Sugata Mitra (Mitra, 2005), *The Hole in the Wall*, explored the idea of tapping into children's natural curiosity by placing an English computer in a wall of a remote village of Kalkaji, Delhi. The results revealed that regardless of the language barrier the children's curiosity was sparked and they not only learnt how to use the computer, without any assistance, but also tapped into in-depth knowledge of complicated science theory well beyond their years.

The children of tomorrow have access to information at their fingertips. What they require is a range of skills in order to be successful in the future workforce including problem solving, effective communication, collaboration, creativity, analytic thinking, and decision-making on an ethical basis (Crockett, Jukes, & Churches, 2011). As Whitby (2013) says every child needs an education which cultivates their capacity to think imaginatively, be creative, act flexibly, independently and to take responsibility for their decisions. With a focus on combining outcomes across different curriculum areas we are giving children a much more holistic approach to learning, therefore encouraging them to become resourceful and preparing them for life beyond school (Gonski, Boston, Greiner, Lawrence, Scales, & Tannock, 2011). It is logical therefore, and was a strong focus in the current study, that technology should be used extensively yet appropriately in the classroom.

2.2.6 Making a Place for Technology in the Classroom

The 21st Century digital age plays a central role not only in providing access to current, up-to-date information but also in connecting classrooms globally, and is quickly becoming an

essential skill for future employment. As stated by White (2013), the establishment of technologies such as the Internet and iPhones have seen an evolution in the way people communicate and especially the way they learn. Teachers are now faced with the critical challenge of adapting their methods of teaching to incorporate ways in which children connect, communicate and collaborate (O'Connell, 2012). Male and Burden (2013), write that technology takes learners out of the passive role of being given information and places them in an active role where they can inquire, critique, create, collaborate and problem-solve. In a rapidly changing world digital fluency is vital for all children to engage in, in order to be successful.

2.2.7 Child-Centred Learning and Creativity

Just like in previous generations, the progression of technology has altered the way we interact and learn. The first world has progressed through an industrial revolution to a technological one, where people change jobs more frequently, more women are entering the workforce and knowledge and information are more accessible than ever before. Given these changes why should children not be able to make choices in their learning? Student-centred learning approaches are not revolutionary but more often than not classrooms are still being run as a teacher-centred learning environment (Weimer, 2013). Weimer also states that in many cases teachers are still making most of the learning decisions for children, and they are also performing too many of the learning tasks that children should be completing themselves.

Hand in hand with the notion of teachers relinquishing control of learning in favour of child-driven models is the discussion around creativity. As Robinson (2011) comments:

> …people worry about creativity in education. Critics think of children running wild and knocking down furniture rather than getting on with serious work. Being creative does usually involve playing with ideas and having fun; enjoyment and imagination. But creativity is also about working in a highly focused way on ideas and projects, crafting them into their best forms and making critical judgements along the way about which works best and why. (p.24)

The concept of creativity is multidimensional as it links to problem solving, critical thinking, transferability of knowledge and, on a basic level, presentation skills (Robinson & Aronica, 2015). Regardless of the discipline, creativity is central to being able to think "outside the box" and preparing children for the unknown future of employment. The National Advisory Committee on Creative Arts and Culture (1999) reported that creativity should not be limited to typical areas of drama, art and dance, when it is equally as important to the progression of science and mathematics. Fostering creativity and nurturing problem solving skills through play-based learning and development of 21st century skills were paramount in this study, as teachers are often less confident in their ability to teach mathematics and science.

2.2.8 The Impact of Changing Learners on Mathematics and Science Tertiary Enrolments

One thing known about the future is the negative impact of the decline in numbers of students selecting science and mathematics undergraduate degrees upon completion of high school. A review of participation in science, mathematics and technology in Australian education (Ainley, Kos, & Nicholas, 2008) found that over the past 30 years there has been a steady decline in senior high school students selecting science subjects. Table 2.2 shows the numbers of 2012 Year 12 students participating in science and mathematics subjects.

Table 2.2 *Year 12 cohort participation statistics for 2012* (New South Wales Department of Education and Communities, 2014)

Subject	Decline %
Biology	-10%
Chemistry	-5%
Physics	-7%
Multidisciplinary Science	-5%
Intermediate Mathematics	-11%
Advanced Mathematics	-7%

The report by Ainsley, Kos and Nicholas (2008) highlights the minute proportion of time primary schools devote to teaching science concepts on a weekly basis. They suggested this was a possible explanation for the increasingly low numbers of university students studying

science. In his report to Government, Australia's Chief Scientist, Professor Ian Chubb, forcefully advocated that the Government invest in an educational program to significantly increase interest in science and mathematics subjects at all levels of schooling (Office of the Chief Scientist, 2012).

The Australian Curriculum, Assessment and Reporting Authority (ACARA) is the national body responsible for drafting, revising and implementing the new Australian curriculum nationwide. The formal introduction of common standards has meant a shift for Australia towards uniformity, equity and quality in meeting the needs of 21st century learners. In designing a comprehensive curriculum for Kindergarten to Year 12 students to successfully meet the challenges and opportunities of the future, ACARA drew on the Melbourne Declaration's demand for a creative, innovative, resourceful, problem solving approach to curriculum development (Australian Curriculum Assessment and Reporting Authority, 2012). It is through the Melbourne Declaration that the Australian Curriculum and the *Early Years Learning Framework for Australia* (EYLF) are able to come together to support the education of future Australians and the diversity of 21st century skills they require to meet the demands of a changing world. There are numerous overlaps between the EYLF and Australian Curriculum. Connor (2012) specified overlaps between all the Outcomes in the EYLF and maps them to equivalence in the Melbourne Declaration Goals and the Australian Curriculum. Indeed in the state of Victoria, there has been some effort to meld the EYLF and the school curriculum, making a birth to 8 years continuum of learning (cf. Victorian Early Years Development Framework).

The following sections will address the complicated, nuanced endeavour that is primary school teaching and provide the basis for the argument for play as a legitimate and effective vehicle for learning.

2.3 Behind Closed Doors: Teaching Science and Mathematics

2.3.1 Effective, Quality Teachers

Regardless of the low SES factors that might impact children's learning, there is one consistent element across all schools: the classroom teacher. Hattie's (2008) extensive research into

teacher quality identifies "teachers as the single most powerful influence on achievement" (p. 4). In an extensive international study of high performing schools, McKinsey and Company (2007) concluded the success of children could not be separated from the quality of the teachers within the school community. Prior to this study, Rowe (2003) conducted a detailed analysis of specific teacher qualities, identifying a range of key skills and strategies utilised by highly effective classroom teachers, which are summarised in Figure 2.2.

Figure 2.2: Qualities of highly effective teachers

Although the classroom teacher is the most significant, there are other external factors that directly affect student achievement (Hattie, 2008). These other external factors include, but are not limited to:

- attracting and retaining the best teachers;
- using data to inform continual assessment;
- having high expectations for the achievement of all students;
- student engagement and motivation; and
- parent and community engagement (Hattie, 2008).

According to Dinham (2010), the biggest problem for Australian classrooms is not resources but the need for every child to have quality teachers and teaching experiences supported by effective leadership and professional learning. Gonzales and Lambert (2014) identified the need for schools to restructure to effectively meet the changing nature of teaching and learning in classrooms. Their study highlighted the importance of teachers developing new approaches to decision making and defining new leadership roles for themselves, stating:

> In spite of being the largest and most stable professional group, teachers have not been prepared, nor have they created opportunities, to take charge of change – to plan and act to fundamentally change the direction of schools so that children, families, and communities can be better served. (p. 7)

In recent years the NSW Department of Education and Communities has implemented an action plan to help combat the poor literacy and numeracy scores across the state. The Early Action for Success intervention strategy targeted building teacher capacity and quality to lift literacy and numeracy outcomes across Kindergarten to Year 2 in targeted schools, all of which were low SES.

At a cost of $261 million to the state government, targeted schools were provided with an additional Deputy Principal equivalent Instructional Leader to specifically focus on professional development in the areas of differentiated learning strategies and community engagement (New South Wales Department of Education and Communities, 2014). In total 141 Instructional Leaders across 199 schools were appointed. In 2015 an additional 116 schools covering 11,600 children from Kindergarten to Year 2 were included in the intervention at an additional estimated cost of $72.5 million. The existing Instructional Leaders prior to 2015 were employed for both Literacy and Numeracy interventions. However, in 2015 the additional Instructional Leaders were employed to target mathematics. It is evident from this expensive, time-consuming venture that there are many schools struggling to meet literacy and numeracy standards (New South Wales Department of Education and Communities, 2014).

2.3.2 The Teacher Effect

A fundamental strategy to improve literacy and numeracy outcomes, as identified by Hattie (2008), is devising targeted, effective professional development. By developing skills and knowledge in specific areas, teachers are better instilled with the highly effective, quality teacher attributes outlined by Rowe (2003). One of the biggest challenges when working with teachers is developing an environment where they are comfortable taking risks and sharing with each other. Hattie (2008) reported that most teachers believe teaching to be a private matter, best conducted in the privacy of their own classrooms. The industrial revolution encouraged a culture of closed classrooms where children are organised based on their date of manufacture, limited simply by their age (Robinson, 2010). Schools busily organise children around bell times and compartmentalise learning into specific subject areas dominated by teacher-centred practices. The culture that developed was based on the thinking that "I was taught this way and I turned out fine, why change something which isn't broken?"

Expectations, whether positive or negative, exist in every classroom; these in turn influence student performance and achievement (Rubie-Davies, Hattie, & Hamilton, 2006). In an evaluation of the impact of teachers on child learning, Nye, Konstantopoulos and Hedges (2004) found teacher effectiveness to be critical in promoting student achievement. The study also concluded the most crucial period of teacher influence for mathematics and reading to be during the early stages of schooling, and the effects are more pronounced in low SES schools. In a study of pre-service teachers, Finlayson (2014) found a significant contributor to their on-going mathematics anxiety was directly connected to their own learning experiences in the classroom. More specifically, many indicated it was a direct result of learning through traditional teaching models:

> The teacher gave the information and provided steps on how to solve the math problems; the students received the knowledge. Anxiety occurred when students were afraid to ask questions, thinking that their questions were not intelligent. (p. 5)

Luke, Woods and Dooley (2011) suggest difficulties arise in teaching children from low SES backgrounds when there is limited engagement and a lack of integration between everyday

school, and home life and culture. The foregoing studies provide a justification for a focus on improving teacher practice in subjects such as science and mathematics.

2.3.3 Give Children the Opportunity to Engage with Real-World Mathematics

In 2006, the Australian Association of Mathematics Teachers and Early Childhood Australia (2006) released a joint statement regarding their position on Early Childhood mathematics:

> [We] believe that all children in their early childhood years are capable of accessing powerful mathematical ideas that are both relevant to their current lives and form a critical foundation for their future mathematical and other learning. Children should be given the opportunity to access these ideas through high quality child-centred activities in their homes, communities, prior-to-school settings and schools. (p. 2)

To succeed in school and life, in this changing world, those who understand and can do mathematics will have significantly enhanced opportunities and options for shaping their futures (Fox, 2007; National Council of Teachers of Mathematics, 2000; National Association for the Education of Young Children and National Council of Teachers of Mathematics, 2009). This is true for all children around the world. For children to be successful and confident in mathematics and other related subject areas, such as science and social studies, Varol and Farran (2006) believe they should be exposed to mathematics early in their lives. It is essential that during these early years all children be provided with high-quality, challenging and accessible mathematics education (National Association for the Education of Young Children and National Council of Teachers of Mathematics, 2009) that will prepare them for more formal mathematics instruction in later life (Notari-Syverson & Sadler, 2008).

2.3.4 Significance of Mathematics

According to Clements and Sarama (2006) everything around us can be understood with mathematics. Little (2009) goes further, noting mathematics is embedded into our lives in many ways: practical, professional, recreational and cultural. In this digital age where the vast majority of jobs require some sort of technological skill, the importance of mathematics

is becoming more evident (Fox, 2007). A recent study on school readiness and future success by Duncan, Dowsett, Claessens, Magnuson, Huston and Klebanov (2007), reported that young children with a working knowledge of numbers were in a better position for later success in life.

More than a decade ago, work by Perry and Dockett (2002) focused attention on powerful ideas the children even in the prior-to-school years are capable of understanding and explaining. They found powerful thinking in areas such as algebraic reasoning, number sense and mental computation, connections and argumentation. Critical is that all were related directly to real-life situations. Perry, Dockett and Harley (2007) describe how they enabled teachers to identify these powerful mathematical ideas in the early childhood setting and then to map them back or show "how they were linked to the Developmental Learning Outcomes in the mandatory curriculum documents" (p.1).

2.3.5 Importance of Quality Resources

For children to develop mathematical skills and knowledge – arguably at any level – they require learning experiences and equipment that are engaging and meaningful to their world. Bosse (2007) describes the significance of aesthetically appealing materials as vital to engaging children in mathematics as well as the need for them to be used for modelling real-world events and experiences. If mathematics is contextualised into real life scenarios (Varol & Farran, 2006), children and adults can analyse, organise and make sense of the world.

As well as having quality materials to connect with, children require ongoing engagement with mathematics. Notari-Syverson and Sadler (2008) believe young children build important foundational knowledge and understanding of mathematics through everyday activities, especially when adults provide specific opportunities to learn and practise concepts and skills. Evidence shows children need to be provided with concrete experiences at a young age, be they items authentic to a scenario, environmental materials or child selected objects, particularly those to assist them with grasping the basics so that pictorial and symbolic mathematical learning can follow (McCulloch, 2001; Varol & Farran, 2006). By incorporating the use of *manipulatives* into the early years of formal schooling with an emphasis on the

thought processes of children, educators are provided with an opportunity to assess and meet the needs of every child as they construct personal mathematical knowledge (Ottmar, Decker, Cameron, Curby, & Rimm-Kaufman, 2014).

2.3.6 Fostering Passion for Mathematics and Science

It is overwhelmingly obvious that mathematics and science are important to our children's future success. As stated by Australia's Office of the Chief Scientist (2014), "at the core of almost every agenda is a focus on STEM: science, mathematics, engineering and technology" (p. 5). In this document, the Chief Scientist also draws attention to the consistently changing nature of technology and the evolution of skills individuals will need to be successful in the future workplace. Developing success in these areas is grounded in experiences teachers provide in the classroom, and the materials used to engage children but also, importantly, in teacher attitudes towards the subject areas. Without teachers who feel confident teaching and who have a passion for all curriculum areas, including science and mathematics, how can we expect children to be motivated and enjoy learning? Over the long term the lack of confidence in teaching some subjects could potentially reduce the number of young people choosing science, creative arts and mathematics as their fields of study at university (Office of the Chief Scientist, 2012).

The Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008) states:

> Excellent teachers have the capacity to transform the lives of students and to inspire and nurture their development as learners, individuals and citizens. They provide an additional source of encouragement, advice and support for students outside the home, shaping teaching around the ways different students learn and nurturing the unique talents of every student. (p. 11)

At present, there is a danger of focusing so heavily on "teaching to the test" in literacy and numeracy that children are losing their creativity and the holistic education they deserve (O'Keefee, 2012). Robinson (2011) articulated that society has developed a mentality of grouping people into two categories: academic and non-academics, smart and not so smart,

explaining how seriously polarising this outlook is in limiting the majority of children's potential and real capacities for success. Perhaps as Buxton, Lee and Santau (2008) suggest, if the links between teaching science and play can be comprehensively promoted to support the acquisition of key literacy and numeracy skills, teachers would be more willing to devote generous amounts of time to teaching these subject areas on a regular basis.

2.3.7 Necessity for Professional Development

When it comes to teaching science and mathematics in primary settings, Buxton, Lee and Santau (2008) argue that today's teachers are not adequately prepared to teach these subjects effectively, as they frequently lack content knowledge and the inquiry-based learning methods required to create valuable learning opportunities. As stated by Hargreaves (1994), teachers not only teach curriculum but teaching is heavily dependent on what teachers think and believe, and what they do in the classroom, which ultimately affects and shapes the learning experiences of young people. Education is reliant on teacher beliefs and values, and their understanding of what matters in relation to teaching the curriculum (Martlew, Ellis, Stephen, & Ellis, 2010). As Ainsley, Kos and Nicholas (2008) suggest, the only way to strengthen school science education is completely dependent on deepening teacher expertise.

A major factor in determining the curriculum areas targeted by this study was the significance of mathematics and science to future employment, and the need to develop skills in teachers to meet the demands of teaching in a changing world. Many adults recall feelings of frustration and disappointment from trying to make sense of mathematical and scientific concepts during their school days and have therefore since avoided these subjects and associated activities (Frid, Goos, & Sparrow, 2008/2009; Koralek, 2009). Children cannot be successful in mathematics and science without support. Teacher beliefs about mathematics and science will affect approaches to teaching mathematics and science (Varol & Farran, 2006). Like all subjects, they need to be professionally and positively taught. Content knowledge alone is insufficient for teacher preparation; subject matter cannot be divorced from sound pedagogy (Bosse, 2007).

Importantly, research into best practices for providing professional development to teachers, points towards the benefits of Active Learning (Birman, Desimone, Porter, & Garet, 2000; Desimone, 2011). Lieberman (2010) notes that active learning allows teachers to become more engaged in meaningful discussions, collaboration and practising key skills. It would appear the same expectations we have for children in the 21st century are identical to those seen as most beneficial to adult professional development. As the Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008) states, children should have an appetite for lifelong learning, just like the Australian Professional Standards for Teachers (Australian Institute for Teaching and School Leadership, 2012) ask for all teachers to participate in professional development to update knowledge and practice targeted to professional needs.

In a 21st century world teachers need a broader range of skills, knowledge and dispositions to adequately teach future generations. At every level in a school system, on-going professional development is needed to increase learning opportunities for teachers and adequately prepare them for change (Buxton, Lee, & Santau, 2008). Teachers are at present doing a disservice to children and schooling by insufficiently supporting engagement in targeted professional development, specifically in science and mathematics.

2.3.8 *Lesson Study* Method of Professional Development

Lesson Study is a group professional development strategy (Chichibu & Kihara, 2013). Beginning with the idea that improvement is possible through the detailed study of a single lesson, lesson study groups follow a cyclical process of planning, observing, reflecting and revising. Groups begin with a well-planned lesson taught by one member of the group and observed by the others. Through observation, the group gathers information about student learning and engagement. Subsequently, a member of the group provides a summary of what has been observed and learned, and another group member teaches a revised lesson. Cerbin and Kopp (2006) see it as an evidence–based approach to teaching improvement. In the best cases, teachers gain important insights into how their students learn from the lesson, where they get stuck, what changes take place, and how they interpret ideas (Cerbin & Kopp, 2006, p. 255).

2.4 The Influence of Government, International Trends and Change Makers on Play-Based Learning

2.4.1 The Big Wigs Making the Case for Play

Internationally over recent decades, major bodies such as The United Nations Children's Fund (UNICEF) have been calling for universal understanding of the importance of fostering children's mental, physical, emotional and spiritual development during the first eight years of life. Widening the scope to focus on the big picture of children up to age eight re-emphasises the critical importance of children being provided with the best start to life and learning; we are guaranteeing a child's future, and the future of their communities, nations and the world depends on it (United Nations International Children's Emergency Fund, 2006).

Australia is among a growing number of nations across the globe, including New Zealand, Ireland, Germany, Sweden, Italy, France, Canada, Scotland and Denmark, to develop policies and legislation specifically around early childhood education. Many have followed in the footsteps of New Zealand, which was one of the first countries to introduce a national early years curriculum. Countries, such as Singapore then adopted their kindergarten framework.

2.4.2 Australia's Commitment to Play

In Australia, the commitment to providing play-based opportunities and strengthening children's appetite for learning during the years from birth to eight can be seen through the collaboration of the Australian Federal, State and Territory Governments across the country. The emerging shift in perceptions about early childhood education has been a significant development over the past decade and a positive move on the path towards providing consistent, engaging learning opportunities for children.

The introduction of the first *Early Years Learning Framework for Australia* (EYLF) (Australian Government Department of Education, Employment and Workplace Relations, 2009), is evidence of recognition of the importance of early childhood learning nationally. The EYLF is

part of the National Quality Agenda agreed to by the Council of Australian Governments (COAG) to improve the standard of early childhood education across Australia. The wealth of conclusive international research around the significance of development in the early years helped mould the structure and content of the EYLF. The authors of the EYLF were also influenced by the principles laid out in the United Nations Convention on the Rights of the Child which states that all children have the right to an education that lays the foundations for the rest of their lives, maximises their ability, and respects their families, cultural identities and languages. The collective responsibility of providing every child with a quality, well-rounded education belongs to all education providers, early childhood settings and schools, parents, carers, families and the community (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008).

A study (Grieshaber & McArdle, 2010) on the state of play in Australia, however, outlines the requirement for further investigation into the actual reality of the implementation of play-based learning, and practitioners understanding of and confidence in this skill. These authors hold that it is necessary "to make room for play as fun and hard work" (Grieshaber & McArdle, 2010, p.16). This builds on research (Grieshaber, 2008, 2009) suggesting practitioners should be challenged to "push the boundaries of their theoretical and practical knowledge by making way for contradictions and inconsistencies that accompany all forms of diversity and difference" (Grieshaber, 2008, p.505). Play and what constitutes play-based learning is a complex, nuanced concept as the current study found.

2.4.3 Early Years beyond Early Childhood Settings

Education equips young people with knowledge, understanding, skills and values to take advantage of opportunities and to face the challenges of the future with confidence (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008). This process begins early in a child's life and must be nurtured to produce lifelong learners. The EYLF acknowledges the magnitude of children's learning and development during the first eight years, and places a strong emphasis on providing an holistic approach through play-based learning, using community to promote positive social interactions, a strong sense of self, and strong literacy and numeracy (Australian Government Department of Education,

Employment and Workplace Relations, 2009). In 2009, the then Minister of Education, Julia Gillard, summed up the National feeling stating, "this country needs to invest in the early years."

The early years are arguably the most crucial time in a child's development. Early Childhood educators and primary school teachers have the very important role of planting the seed and successfully fostering a child's desire for lifelong learning (Dockett & Fleer, 1999). Along with the EYLF, the Ministerial Council's Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008) has set the direction of education for forthcoming decades. This document mirrors the EYLF by acknowledging the period from birth to eight as ultimately setting the foundation for every child's social, physical, emotional and cognitive development. While there appears to be general cohesion in prior-to-school settings, as the EYLF is mandatory in birth to five sectors, the current study focussed on children aged five to eight years in formal schooling where the EYLF and play-based learning can be more problematic.

Primary schools are not required to implement or acknowledge the EYLF in any way. They deal primarily with State and National curricula from which they are required to meet identified outcomes and report on children's progress. The EYLF has many positive implications which would greatly assist children entering formal schooling including strengthening the transition between preschool settings and the formal classroom, especially for children in low SES schools. The EYLF also draws attention to the importance of "all young Australians becom[ing]: successful learners, confident and creative individuals and active and informed citizens (Australian Government Department of Education, Employment and Workplace Relations, 2009, p. 5). These are desirable qualities educators should be striving towards for all learners.

Linked to this is the element of equity within the drive to provide quality in education. As noted by Grieshaber (2009) there should be a balance between the prescription of the syllabus and schooling system and the "central level of informed professionalism at the school" where one should find "teachers claiming the expertise to recognise, value and use the resources that

all children and families bring with them to provide interactive teaching and learning that engages children and produces success" (Grieshaber, 2009, p.91). This became pivotal in the current study where engagement of children in learning and the engagement of parents in the education of their children was considered paramount.

2.4.4 Consistent Front for Play-Based Learning

The united front presented by early childhood professionals has been evidenced through the following policies and State Governments influence on the direction of education in Australia:

- Early Years Learning Framework (EYLF);
- Australian Children's Education and Care Quality Authority (ACECQA); and
- Melbourne Declaration on Educational Goals for Young Australians.

These key organisations and policies interweave throughout this literature review. Each recognises the importance of early childhood education, the significant role society plays in achieving this and the reality that today's children are future leaders with their success equating to Australia's prosperity. Alongside the developments in early childhood, Australia has taken a number of holistic steps towards improving the education system, including the implementation of a National Curriculum reflecting the need across the country for a shared learning vision. Teachers are becoming even more accountable through the Australian Professional *S*tandards for Teachers, which focuses on increasing the effectiveness and capability of the education profession as a whole.

2.4.5 The Gonski Effect

Another significant influence, in recent years, is the Gonski Report, which has been subject to the vagaries of changes in government. Nevertheless, it has played perhaps a temporary role in influencing the direction of teaching and learning for all sectors of education and concomitant funding in Australia. The Report not only highlights some of the substantial gaps in the Australian education system, compared with high performing countries around the globe, but also recognises the considerable division between high and low SES children's performances within the school system. Key findings identified by Gonski (Gonski, Boston,

Greiner, Lawrence, Scales, & Tannock, 2011, p. xxix) which notably impacted upon this study are listed below in Table 2.3.

Table 2.3 *Findings relevant to the study from the Gonski Report*

Finding 1	Australian schooling needs to lift the performance of students at all levels of achievement, particularly the lowest performers. Australia must also improve its international standing by arresting the decline that has been witnessed over the past decade. For Australian students to take their rightful place in a globalised world, socially, culturally and economically, they will need to have levels of education that equip them for this opportunity and challenge.
Finding 18	Strategies to address educational disadvantage in school are most effective when integrated with, and complementary to, approaches to support early childhood development.
Finding 19	The key dimensions of disadvantage that are having a significant impact on educational performance in Australia are socioeconomic status, Indigeneity, English language proficiency, disability and school remoteness.
Finding 20	There are complex interactions between factors of disadvantage, and students who experience multiple factors are at a higher risk of poor performance.
Finding 21	Increased concentration of disadvantaged students in certain schools is having a significant impact on educational outcomes, particularly, but not only, in the government sector. Concentrations of students from low socioeconomic backgrounds and Indigenous students have the most significant impact on educational outcomes.

Gonski, like many other leading international education experts (cf. Hattie, 2008), supports the push towards new, modern teaching and learning methods. A foundational principle of the current study was that it was necessary to step away from the past and into the 21st century.

2.5 The Impact of Play in Formal Schooling Environments

2.5.1 Child-orientation and Agile Learning Environments

The changing nature of teaching and learning in the 21st century has made agility essential: agility in educator's minds, agility in technologies and agility in learning environments (Bartels, 2012). What is evident, according to O'Connell (2012) is the need to move beyond teacher-centred to children-centred learning environments, where the focus is not on what the teacher does (Scoufis, 2013) but what each child can achieve. Children no longer need to sit in rows, quietly working on their own. They need space and resources to collaborate and environments which suit a diverse range of spontaneous activities. As identified by Hannafin, Hill, Land and Lee (2014) agile learning environments provide opportunities where children are able to identify learning goals and the means whereby they can achieve their objectives.

In this current study a balance is proposed between Vygotskian and Piagetian theory on teacher roles. On the one hand Piaget believed in children having the freedom to explore and construct knowledge through their participation in learning, while Vygotsky advocated for children to have guidance and support if they are to reach higher conceptual understanding (Piaget, 1971; Vygotsky, 1962). The nature of open-learning is described by Keengwe, Onchwari and Onchwari (2009) as:

> …helping learners use their minds well and be prepared for responsible citizenship, teachers must go beyond teaching only the subject matter, to also providing learners with the tools to become effective learners. In practice, teachers must strive to facilitate learning environments where a sense of inquiry is encouraged, and active learning and critical thinking are the foundation for creative problem solving and global citizenship. (p.12)

This style of learning in combination with an agile learning environment cohesively links with play-based learning strategies.

2.5.2 The Secret is Out!

> Some have argued that play is children's work but I would say that it is far more than this. Play is their self-actualisation, a holistic exploration of who and what they are and know and of who and what they might become. (Broadhead, 2004, p. 89)

Play-based learning is an integral part of children's journey to adulthood and its positive implications for young children have been the focus of many major research studies over recent decades. Leading researchers such as Piaget (1962) and Vygotsky (1987) have made significant contributions to the field in the way we look at, categorise and understand the positive impact play has on a child's development. Henniger (2013) describes play as a crucial way for children to learn about language, develop intellectual concepts, build social relationships and understanding, strengthen physical skills and deal with stress. Overall, play is a key element in enhancing children's all-around development (National Association for the Education of Young Children, 1995; Organization for Economic Co-operation and Development, 2002). Many of these holistic benefits of play will be independently addressed in later sections of this literature review.

2.5.3 The Piaget Impact

A key individual who has significantly influenced the way we view play is Piaget. His broad research encompassing play has provided the educational community with a scaffolded approach to categorising different types of play – functional play, symbolic play, construction play and games with rules (Piaget, 1962). His constructivist analysis of play-based learning has laid a solid foundation for authentic experiences which incorporate interactions with other children and adults, and hands-on manipulatives (Henniger, 2013). The purpose of hands-on objects and materials in play are to provide children with opportunities to assimilate new knowledge within existing schemas. Heidemann and Hewitt (2010) believe Piaget intended for adults to fulfil an indirect role in play-based experiences and only introduce new information as needed.

In a recent study, Trawick-Smith (2010) suggests that the narrow focus adopted in Piaget's research, with an emphasis on only Western cultures, has limited our ability to understand how children from other cultures play. Sanagavarapu and Wong (2004), identified the importance for educators to develop a great understanding of different types of cultural play, to provide appropriate play-based experiences. It is important to consider the types of play – often culturally driven – which children participate in on a regular basis and ascertain how these affect the experiences children have. Wong, Wang and Cheng (2011) indicate for play to be effective, it needs to be authentically child-initiated and self-motivated. More recently, then attention has moved away from a Piagetian only approach towards Vygotsky.

2.5.4 The Vygotskian Influence

Another strong advocate of play was Vygotsky. His approach places more focus on the socially interactive and language-framed nature of learning. He believed play to be a vehicle that would help children to reach their potential from their actual current level of development, which he referred to as the zone of proximal development (ZPD) (Vygotsky, 1987). The ZPD shifts as children learn and understand information. Through interactions with a more competent peer or adult, children can extend themselves and achieve beyond others of the same age. Bodrova and Leong (2007), co-authors of *Tools of the Mind: The Vygotskian Approach to Early Childhood Education,* add that when young children pretend, they often use bigger words than they normally would and extend themselves to attain more advanced skills of self-control, language use, memory, attention, cognitive skills and cooperation with others. Claxon and Carr (2004), offer a dynamic interpretation of learning dispositions by suggesting a series of adverbs which broaden the term's universal interpretation by advocating robustness, richness and breadth, which are promoted through play-based learning. These terms refer to children's ability to respond to learning in a positive manner despite the challenges, explore a wide variety of activities and spread the application of skills across different tasks.

Building on this, Fleer (2009b) discusses, for example, the "dialectical relations between everyday concepts and scientific concepts" as children learn. Within play-based programs,

she holds that the talking and interactions between children, and between children and adult, enhance concept development.

A central component to the Vygotskian theory is the link between children's social and cultural upbringing to their development (Henniger, 2013). Interactions with adults and other children directly shape the way children learn about the world around them. Agreeing with Piaget, Vygotsky related children's development of cognitive concepts to interactions with peers and adults. Bodrova and Leong (2007) describe the adult role as consisting of scaffolded support in the form of questions, demonstrations, direct instruction where appropriate, and modelling. In contrast, from a child's perspective, Paradise and Rogoff (2009) note that they "learn by watching, listening, and attending often with great concentration, by taking purposeful initiative, and by contributing and collaborating" (p. 102) with each other.

A significant element to a successful Vygotskian play program is a conscious promotion through the experience towards language development. It also places a strong emphasis on children being able to communicate and express their thoughts and feelings with others. For the purposes of this study, this Vygotskian definition of play for learning has been utilised as it encapsulates the essence of *Active Learning*. With a focus on social development and recognition of cultural relationships, this philosophy creates an inclusive atmosphere which allows children to draw on their past experiences and prior knowledge to create their own cultural capital in the classroom. Also, the ZPD promotes higher order thinking, the development of problem solving skills and collaboration vital to success in the 21st century.

2.5.5 Get Active

Not only in Australia, but internationally, the need for children to be actively engaged in their learning has been highlighted. For example, in Scotland the Curriculum of Excellence states:

> Active Learning is learning which engages and challenges children's thinking using real-life and imaginary situations. It takes full advantage of the opportunities presented by spontaneous and planned, purposeful play; investigating and exploring; events and life experiences; focused learning and teaching. (Scottish Executive, 2007, p. 5)

This curriculum conceptualises a sub-category of play, which it terms *Active Learning*, often utilised in early childhood settings and some primary schools by teachers. Unlike play, it offers an element of structure and teacher direction. This type of learning experience is characterised by hands-on experiences from which children can self-select (Stephen, Ellis, & Martlew, 2010). Through active learning pedagogical practices children are able to engage in a range of experiences which are designed to provide meaningful, engaging and thought provoking learning opportunities. McTighe and Wiggins (2007) emphasise that the success of active learning in any setting is in the design. For deep understanding to occur, activities need to be tailored to meet the interests of children. It is through these tailored experiences that children are able to move from being passive learners to a state of active learning in an environment in which they feel comfortable. This style of learning incorporates elements of Gardener's multiple intelligences (Gardner, 2011). It provides opportunities for all children to contend with learning in an authentic way.

In recent decades, the extensive lists of benefits associated with active learning methods have begun to attract the interest of global researchers and educators beyond the early years. It is now acknowledged by many (Scottish Executive, 2013) that this type of learning experience has an official place in formal school settings. This style of learning is often viewed as a shift away from traditional teaching approaches and, as Prince (2004) suggests, just the mention of the phrase active learning can have polarising effects on people. As with many changes, tensions arise when there is a move towards new practices, and the perceived challenges associated with such a shift. In this case, as discussed by Beetham and Sharpe (2013), teachers are required not only to change the way they think about the processes which support learning, but also the learning environment and their own role within the classroom.

2.5.6 Supporting Active Learning in the Classroom

In a review of the English primary education system (Alexandra, 2010), it was argued that active, interactive, learning experiences would be beneficial beyond the preschool years, especially as they capitalise on children's appetite for learning and practical activities. Perhaps if early learning educators were more widely recognised for the significant contributions they

make to the development of children in the early years, society would have a greater willingness to accept play-based strategies beyond the age of five (Howard, 2010). At present, the shift has begun in some countries at government policy level but given the "experimental" title of active learning, how far does it really filter down into everyday practise outside the sphere of early childhood education?

Despite the shift towards active learning and play-based learning there is still a broad perception that mathematics and science are boring. Brunsell and Fleming (2014) identified that when children struggle to see how what they are taught relates to real life experiences and thus the real-world, relevant teaching becomes difficult. As stated by Brown (2009), most children become much more interested when they can see how mathematics applications relate to real life. Without relevance, many across society think science and mathematics are boring and unrelated to anything in daily life (Office of the Chief Scientist, 2012). In terms of teaching science and mathematics, active learning forms a perfect synergy with these subject areas. Indeed, researchers have confirmed an active, enquiry-based approach has been associated with enhanced learning in science (Derling & Ebert-May, 2010; Kim, Sharma, Land, & Furlong, 2013).

Active learning encompasses a holistic way of teaching which has recently expanded beyond the realm of early childhood and primary school settings. For instance, Prince (2004) advocates active learning as an appropriate, hands-on method for teaching university engineering students. Other academic fields that practice active learning include medicine, (Schmidt, Coden-Schotanus, & Arends, 2009), science (Haak, HilleRisLambers, Pitre, & Freeman, 2011) and law (Brown, 2010). These disciplines also reported a diversity of additional benefits, such as skills development. Law students were better prepared for real-world situations when active learning pedagogies were employed. More importantly, the use of active learning teaching strategies helped law students to understand how they learn (andragogical and heutagocial principles) and how this knowledge assisted them in preparation for cases and ultimately in becoming life-long learners.

Such experiences with university pedagogy demonstrate that real-world problem solving promotes learning and is relevant to student engagement. In a recent study, Ince, et al., (2014) found that active learning linked "problem-based learning in cooperative groups, cooperative learning, project-based learning, inquiry-based learning, research-based learning, learning through invention" (p. 4) to students who were more motivated to learn and found learning easier. This study used the terms play-based learning and active learning interchangeably. The reason for adopting active learning terminology was to make the concept more acceptable to participants who may be resistant to considering play as a legitimate pedagogy.

2.5.7 Play, Play, Play!

In the past decade a number of countries including Norway, Sweden, New Zealand, Britain and Japan have emphasised the significance of play by embracing its place in formal curricula. Although this may also be true in Australia with the introduction of the EYLF for early childhood settings, the conundrum for classroom teachers in formal schooling is how to fit a play program into a set curriculum. The purpose of the current study was to integrate play into existing primary curricula using teaching practices based on Vygotskian ZPD theory, cultural and social relationships, language development and problem solving to improve communication skills and overall literacy.

However, Wong, Wang and Cheng (2011) found that despite the growing awareness and perceived benefits of play in primary settings, information about play and the desire for play-based learning remains inconclusive. They state that:

> In a society where academic achievement is highly valued teachers and parents hesitate to think of play as essential to child development; they are more likely to see it as an obstacle to children's academic success and future career prosperity. (p. 166)

It is evident there has not been the necessary acceptance across society in general, nor, importantly, amongst parents that play is a legitimate vehicle for learning in the formal school setting.

2.5.8 Challenging Perceptions of Play

The challenge for education professionals and advocates of play is how to alter the perceptions of teachers and parents. As suggested by a recent British study, teachers should capitalise on children's inherent desire for learning and practical experiences when they enter formal schooling and not dent their enthusiasm and confidence Stephen, Ellis, & Martlew, 2009). There is evidence of a growing number of positive benefits from play (Barblett, 2010) but theory is not enough, people need to see appropriate, well executed play programs in action if they are to believe. The central problem for classroom teachers according to Martlew, Stephen and Ellis (2011), is the ongoing struggle to successfully plan a play-based curriculum. Howard (2010) suggests at the classroom level there are structural and psychological barriers, which influence the effective implementation of a play-based approach. Harris, Michnick Golinkoff and Hirsh-Pasek (2011) found that 30 per cent of teachers had no time in their daily teaching for child-centred experiences or play-based learning.

Howard (2010) discusses the lack of a clear guiding fundamental philosophy for play as a major hurdle towards implementation. Expanding on this sentiment Broadhead, Howard and Wood (2010) state:

> The word 'play' is used loosely to mean anything that is undertaken 'playfully'… It also represents conflicting views in the discourse related to play: contradictory use of terminology and the conflation of teaching/instruction/planning with the word 'play' is problematic for both practitioners and parents – as well as society as a whole – in terms of our expectations of children, education and schooling. (p. xi)

Sometimes what is labelled as 'play' in a learning setting does not provide children with opportunities to make choices, problem solve, work cooperatively with others, develop rich language, or make cognitive gains (Gronlund, 2010). Gronlund (2010) says teachers often interpret classroom play in a variety of extreme ways. They leave children to play with minimal support and use play as an afterthought when they want to consolidate information

or encourage the learning of facts. Teachers will also pull individual children out for 'teaching time' while others are left to play.

Even when teachers implement an appropriate play program they are often unaware of what their role should be during the sessions. Howard (2010) explains that without adequate training and preparation, teachers are sceptical about adopting play as part of their general teaching practices.

Breaking down these obstacles to supporting teachers in implementing a successful play program and enabling society to see the value of play, especially for lower primary aged children, was a major focus of this study. Figure 2.3 outlines the differences between play-based learning strategies and traditional pedagogical practice.

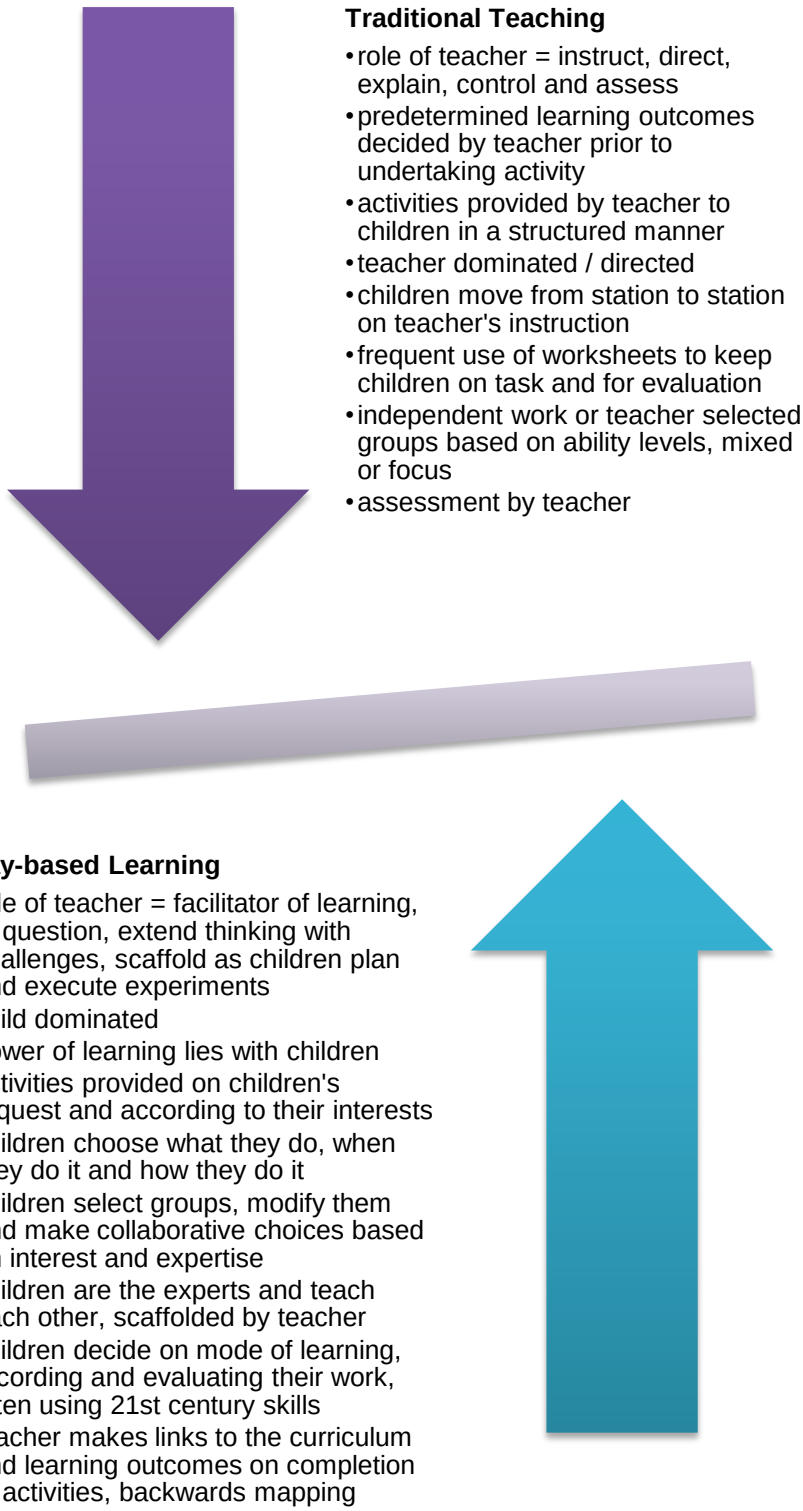


Figure 2.3 Comparison between traditional teaching and play-based learning (Smith & Maher, 2015 in press)

2.5.9 Advocating for Play in Primary Classrooms

Play as a learning tool has been an academic focus, especially in early childhood settings, for over a hundred years. However, throughout this time it has been a different story in schools as play has moved in and out of favour with teachers. Saracho (2011) describes play as a means by which young children are provided with an opportunity to express their ideas and symbolise and test their knowledge of the world around them. Synodi (2010) explains children's development is linked to social, personal, linguistic, physical, cognitive, moral, creative and artistic growth.

Figure 2.4 illustrates the diverse range of benefits associated with play-based learning. Although the relationships in Figure 2.4 look simple, they show how play influences every aspect of a child's development.

Figure 2.4 Benefits of play

In the classroom, play-based programs have the potential, according to Saracho (2011) to provide children with sound foundations in literacy, science, social sciences, mathematics, art, music and movement. Expanding on this, Lillemyr, Sobstad, Marder and Flowerday (2011) say children are able to engage in experiences that give them a strong sense of relatedness to

their immediate world. It is this sense of relatedness that contributes strongly to their intrinsic motivation for learning. This motivation coupled with child-centred play-based learning allows children to draw on their prior knowledge and experiences, select activities which ignite their passions and thus drive the learning themselves. Given this present study focuses on the whole curriculum, play-based programs have the potential to promote and foster the personalised learning needed to create experiences for each young Australian (Melbourne Declaration, 2008).

For lower primary, Wood and Attfield (2005) believe a well-developed play program has the capacity to enhance children's content knowledge across the curriculum. They argue that a successful play-based program involves using an approach based on curriculum-generated play to support the development of specific skills and knowledge, while at the same time responding to the interests of children.

2.5.10 Mathematics and Science Play-Based Learning Experiences

This current study is focused on creating play-based learning experiences linked to science and mathematical concepts. In a report issued by Universities Australia, Curtis (2012) says schools need to invest more time and energy in providing more engaging learning opportunities in science and maths from kindergarten. Fleer (1996) argues that through play children are able to develop scientific and mathematics skills, processes and thinking that are vital for developing more complex scientific and mathematical concepts later in life. More recently, Fleer (2009a) describes the need for children to be exposed to practical activities with clear aims from a very early age. Play is a great medium, especially when linked to science and mathematics as it allows children to take risks in a safe environment, problem solve with other children and explore the world around them.

Important work undertaken by Haug (2014) shows clearly that there is room for both planned and spontaneous teachable moments within play-base science learning. He identified that "when students reinforce new knowledge and connect their empirical findings to theory, [this] can be considered as planned teachable moments" (Haug, 2014, p.79). Spontaneous teachable moments are when the teacher adapts to specific students' needs. Haug's (2014)

findings recommend that teachers be provided with additional support to be able to better "plan for and effectively utilize the consolidation phases" (p.79). This became an import consideration in the current study.

A report by UNICEF (2002) describes children as too slowly developing, or simply failing to develop critical thinking skills. McTighe and Wiggins (2013) state, "effective educators know from research that rote learning of mathematical facts and skills does not promote mathematical reasoning, problem solving, or the capacity to transfer learning" (p. 9). For all children, but specifically for children of low SES, it was posited that a play-based program would foster problem solving skills and positive mindsets. Carr and Claxton (2004) argue such a learning experience would promote active engagement, concentration and goal-directed motivation to promote quality learning, as well as improving communication skills. It is important for children to 'play' with abstract ideas in science and mathematics in a creative manner, in order to not only allow for greater problem-solving capacity, but also provide the opportunity for new, imaginative solutions not previously thought of (National Advisory Committee on Creative Arts and Culture, 1999). The significance of this is evidenced in a study by Van Oers (2010), which explored children experimenting with graphic marks to find the best method for communicating meaning with others during mathematical play. An important factor in establishing this learning platform, stimulated by inquiry, was the successful application of questioning techniques by both teachers and children.

2.5.11 Importance of Questioning to Effective Teaching

The use of open-ended questioning techniques in play-based learning approaches is a vital component in creating successful child-orientated experiences. Pagliaro (2011) describes teachers being most comfortable leading a class, pushing content, and checking for evidence of knowledge because this is what they were trained to do. However, in this process teachers often get caught up in a cycle of asking lower order questions. According to Brookfield and Preskill (2012), teachers feel concerned about and are resistant to taking opportunities to engage in conversations and discussions with children as they consider this digression will distract from covering vital content. These authors state, "if they [teachers] lecture, so their argument goes, at least this ensures that the material is 'aired' in children's presence" (p. 10).

Much of classroom questioning is therefore a rigid, traditional pattern used simply as a device to check facts and the memorisation of information (Fusco, 2012).

According to Dewey (1938) and Vygotsky (1978), education should primarily be about developing children's thinking, not by telling them what to think but by helping them find their own pathway to meaning. Creating an environment conducive to open-ended questioning and discussion between teachers and children is important to developing critical thinkers and problem solvers. McTighe and Wiggins (2011) argue essential questioning in the classroom is vital in stimulating thought provoking enquiry and ultimately helps to spark more questions in children. They go on to state, "by tackling such questions, learners are engaged in uncovering the depth and richness of a topic" (p. 3). Therefore, by successfully incorporating questioning into play-based learning scenarios teachers are in fact helping to embed knowledge and create an environment conducive to child-centered learning. All teachers should strive to develop and deepen understanding of important ideas, and develop processes which can be transferred by children inside and outside the classroom (McTighe & Seif, 2010). Evoking enquiry though questioning plays a significant part in the success of *Playing to Engage,* as it instigates the evolution of teacher-directed learning to child-centered approaches.

2.5.12 Play-Based Learning Versus Teacher Instruction

This study is premised on the proposition that children need a combination of Dewey, Pigetian and Vygotskian pedagogy when it comes to play-based learning in the primary classroom. At this stage, indeed at any stage of learning, it is imperative that children understand why learning is important and how key concepts link to the real world. Without an element of Vygotskian guided instruction, children may miss out on vital knowledge and key information which underpin the phenomenon or concept being explored.

If children are to be successful learners they need to be able to engage with knowledge and skills taught explicitly and apply their understandings to other experiences (McTighe & Wiggins, 2013). Marsh and Dredge (2013) argue that all teachers need to constantly ask

themselves whether they are teaching for transferability, and carefully create lessons which allow children to demonstrate their understanding of key concepts in other learning settings.

Ultimately, the teaching process leads to the question: how do teachers know whether children are learning successfully? In Australia, there is an intense focus on the National Assessment Program for Literacy and Numeracy (NAPLAN) as a measure of student learning. The next section of this literature review critiques this approach.

2.6 Theoretical Framework

2.6.1 Adult Education

As the literature that informed this study was explored, a number of theoretical perspectives emerged as possible frameworks in which to nest the study and that could be used to interrogate its findings. Specifically, social cognitive theory (Bandura, 2001; Bandura, Barbaranelli, Caprara, & Pastorelli, 1996) with an agentic perspective was attractive if the intervention was sustainable and participant teachers were able to continue the program after the study was completed. However, this theory predominantly focuses on child development with little emphasis on adult learning. Bronfenbrenner's (1994) bio-ecological model would provide clear links for participant teachers at a microsystem level and school leadership at a mesosystem level to interpret the study findings in terms of enhancing learning. However, this model does not provide a sufficient framework for the incremental development of participant teachers, nor does it include sufficient focus on the agency of learning.

Adult education and professional development, as a theoretical framework, does align well with all the intentions of this study. This framework encompasses a number of dimensions that provide a rich and varied frame within which data can be interpreted and study findings understood. Lave and Wenger's (1991) epistemology of situated learning, which has dominated adult education discourse for the past two decades or more, highlighted the importance of all participants, in this case teachers, being intimately connected to learning, process and resultant practice. Learning is situated within the social environment of work and communities. Participants become an important part of a collaborative community of learners

(Ollis, 2011). They work together as a collective and in groups to develop "a community atmosphere of trust and appreciation" (Beavers, 2009, p. 27), which is a key factor in effective adult learning. Through this method of learning, participants are able to participate in *Playing to Engage* and develop different skills linked to play, science, mathematics and 21st century learning to implement an intervention.

Within a broad, overarching framework of adult education teachers are able to plan and implement their own professional development so that it relates directly to the nature of teaching in a given context (Adey, Hewitt, Hewitt, & Landau, 2004). No longer does the tenet hold that a teacher can benefit simply from "a transmission-sequential notion of knowledge, such that the teacher takes what is given to him/her ... and 'delivers' it efficiently" (Adey, Hewitt, Hewitt, & Landau, 2004, p. 144). Rather, there is a tension between the symbolic or knowledge capital (Bordieu, 1992) the learners themselves wish to increase and professional development beyond that required by employers.

Teachers are known for their dedication as they strive for continual improvement. They therefore approach professional development with predetermined notions of what they need to learn (Merriam & Brockett, 2007). When professional development leads to teachers being able to see the positive effects of their learning it is most effective. In endeavouring to achieve these positive outcomes, this study makes use of Moon's (2004) framework. Moon (2004) notes the following as important elements in effective professional development: a congenial climate; learners involved in collaborative planning; participants diagnosing their own needs, formulating their own objectives, playing a key role in planning and implementation, and finally, evaluating their learning.

In terms of evaluation of learning and the effectiveness of the program, this study used aspects of reflection in action as well as of action and practice, described by Schon (1987) as dimensions of adult learning. The dimensions of:

- situated learning combined with the establishment of a community of learners where trust is developed;
- the desire to extend knowledge capital; and

- the power of reflective practice,

also provide a rich and diverse framework within which this study can be designed and data analysed and discussed. Teacher experiences also directly affect the direction of the action research cycles, influence the professional development process and in many cases are driven by the passions of the children.

The work of Schon (1984, 1987, 1995) highlighted that teachers not only reflect on action and their practice after the lesson or the day or the week, but also they reflect in action as this is the basis of dynamic classroom interactions. He proposed that, with professional development including the metacognitive contemplation of what reflection-in-action encompasses, teachers can enhance their reflection-in-action whilst interacting with students in their class thus improving practice. These aspects became important in the current study as teachers' confidence to embrace a play-based pedagogy strengthened.

The next section sketches the backdrop to this study and describes the elements and themes that were woven together to form its basis.

2.7 NAPLAN Testing in Schools

2.7.1 NAPLAN Testing

NAPLAN is a Federal Government assessment program which is conducted across the country annually. Children in Years 3, 5, 7 and 9, on the same days, complete tests in Reading, Writing, Language Conventions (spelling, grammar and punctuation) and Numeracy. In Reading, Language Conventions and Numeracy assessments children record answers either through multiple choice or constructed responses, being a numeric answer, a word or a short phrase. For writing, each child is presented with the same writing prompt to draft an extended response. According to the Gonski Report (Gonski, Boston, Greiner, Lawrence, Scales, & Tannock, 2011) there is an unacceptable number of children across the country not meeting the minimum standards of achievement in literacy and numeracy, with a high proportion of these children being from low SES backgrounds.

2.7.2 The Purpose of NAPLAN

NAPLAN has highlighted the importance of literacy and numeracy for all key stakeholders including teachers, parents and children across the nation. According to the Australian Curriculum, Assessment and Reporting Authority (ACARA) (Australian Curriculum Assessment and Reporting Authority, 2013) website, NAPLAN is described as:

> the measure through which governments, education authorities, schools, teachers and parents can determine whether or not young Australians have the literacy and numeracy skills that provide the critical foundation for other learning and for their productive and rewarding participation in the community. (p. 1)

ACARA also identified two significant, overarching benefits of the assessment program as being firstly, a means to drive improvement in achieving outcomes and secondly, accountability to the community. Dooner (2011) articulates that this method of assessment does not take away from regular, ongoing assessment practices conducted by classroom teachers, but what it does do is provide schools with data to analyse and compare progress, identify trends and inform policy decisions.

Conducting NAPLAN annually creates an opportunity for meaningful evaluation and constructive reflection, especially in relation to assessment of teaching and learning practices (Harris, Chinnappan, Castleton, Carter, De Courcy, & Barnett, 2013). The post NAPLAN reporting database available to school executive staff and teachers allows for responses to questions to be individually broken down and critically analysed. This enables schools to identify areas of strength within and across cohorts of children but also ascertain areas of weakness where high proportions of children are under performing.

2.7.3 Validity of NAPLAN Results across Years

Some researchers maintain that while there is internal validity in each year's NAPLAN results, it is not possible to compare across years (cf Watson, Handal, Waters, & Maher, 2013; Wu, 2009, 2010). In contrast, the New South Wales Department of Education and Communities (NSW DEC) (National Assessment Program, 2013) maintains it is possible to

effectively compare NAPLAN results across multiple years due to "[a] rigorous equating process [which] is undertaken each year to ensure that results can be compared. As a result, changes in the performance of schools and school systems over time can be identified" (p. 7). In a technical report published by the ACARA (Australian Curriculum, Assessment and Reporting Authority, 2014) the process is described as:

> The horizontal equating design involved a two-step procedure that combines common-person and common-item test equating methods. The common-person equating was achieved through the equating sample. The equating was carried out using secure equating forms that were administered with the NAPLAN 2013 tests for reading, spelling, grammar and punctuation, and numeracy. Each student in the equating sample completed an equating form in addition to the NAPLAN 2013 tests that the full cohort to which they belong completed. (p. 40)

2.8 Factors Influencing Low Results

2.8.1 Low SES Challenge to Academic Achievement

The statistical data overwhelmingly highlights the gap between results of children across the nation compared with children from low SES backgrounds. In an analysis of Australian school figures Tesse (2012) found children of low SES were disadvantaged before they even entered formal schooling and that they faced a whole host of challenges once they got there. Milne and Plourde (2010) suggest there are key factors which affect the performance of children from disadvantaged backgrounds including parental level of education, migrant status, lack of access to early learning facilities, Indigenous affiliation and income level. The work of Cologon (2014) proposes that teachers undertaking professional development focussed on fostering inclusive language and communication in relation to children whose home language is not English. She further recommends that teachers professional learning provides them with the skills and confidence to meet the needs of children from potentially disadvantaged backgrounds.

2.8.2 Comparing SES and Child Development

Torff and Sessions (2009) regard the educational gap between high SES and low SES learning to be the most troublesome problem in today's schools. It is an unfortunate fact that parental financial status is an enabler of opportunities, which can directly and indirectly affect children's overall development. Willingham (2012) discussed the significant effect financial status has on fundamental academic skills including reading and mathematics achievement, basic phonological awareness, the amount of information the child keeps in their working memory and the extent a child can regulate their emotions and thought processes. In a longitudinal study Rowe (2012) found parental education level had a significant impact on the quantity and quality of verbal interactions between adults and children. In the case of low SES families the study revealed interactions between parents and children were shorter and children's vocabulary did not develop as well as their middle and high SES counterparts.

Being from a low SES family can mean parents are unaware of basic developmental milestones their children may miss out on. Badger (2013) believes parents from disadvantaged families speak less often to their children and use a much more limited vocabulary. They are less likely to engage their children in meaningful, deep conversations (Milne & Plourde, 2010), or communicate with children using complex sentences. According to Bradley and Corwyn (2002), low SES parents do not purchase as many toys and resources that have educational benefits, such as exploring colours, shapes, letters and numbers. These researchers also conclude that such families are less inclined to purchase books, and the children spend more time watching television than engaging in activities as a family. The fact is, as research has highlighted, the issue of poorer spoken language upon entry into formal schooling for those from disadvantaged backgrounds is a major concern (Zill & Resnick, 2006). A recent study undertaken by the Australian Institute of Teaching and School Leadership (AITSL) (2015) found the difference in time devoted to learning experiences at home between middle and low SES children varied by 6,000 hours by the time children reach Year Six.

Children of low SES may be less likely to have access to quality early learning facilities due to their financial status and, consequently, the play-based learning experiences these facilities provide. The Australian Early Developmental Census (2012) states in the local community

surrounding the focus school only 60.9 per cent have attended non-parental early childhood education and/or care. Ming and Powell (2010) suggest children from low SES backgrounds miss out on important opportunities which would allow them to acquire essential skills, and as a result, they enter formal schooling behind their peers who have attended early learning facilities or who are from homes where there is a high level of awareness of the necessity to provide stimulating activities and experiences. "While middle class children learn to read, create, persist and problem solve at home and through after-school and summer experiences, parents stressed by poverty are far less likely to be able to ensure those opportunities for their children" (Australian Institute for Teaching and School Leadership, 2015, p. 1). According to Davies, Davis, Cook and Waters (2007) children from low income families are significantly more likely to experience difficulties building relationships and are therefore more likely to feel the effects of social exclusion. All of this is evidenced in the AEDC 2012 findings from focus school communities, which present a bleak picture of those children entering formal schooling who are developmentally vulnerable or at risk. Table 2.4 shows the high percentage of these children in various categories.

Table 2.4 Results from the AEDC 2012 data collection for the immediate local community around the focus school

Domain	Developmentally Vulnerable (below 10 per cent)	At Risk (below 25 per cent)
Physical health and wellbeing	15.7%	12.9%
Social competence	10%	12.9%
Emotional maturity	8.8%	8.6%
Communication skills and general knowledge	10%	22.9%
Language and cognitive skills	10%	7.1

2.8.3 Schooling Dynamic

It is not only early developmental factors that affect children from low SES backgrounds. Once these children enter formal schooling they typically feature lower attendance rates and a decrease in the number of years they attend schooling, compared with children of high SES backgrounds (Bradley & Corwyn, 2002). One of the most noteworthy outcomes of the Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008) was to ensure that socioeconomic disadvantage ceases to be a significant deterrent to academic success and achieving educational outcomes. It must be acknowledged there is a serious need to address the learning challenges of children from low SES backgrounds and find alternate methods of teaching. *Playing to Engage* aimed to meet the learning needs of these children and help them build a passion for lifelong learning. It was important to take the opportunity to help disadvantaged children have a more equitable start in education in the earliest years of life (Early Childhood Development Unit, 2006).

2.8.4 Refugee and Migrant Status

One of the driving factors often associated with low SES is the high percentage of language backgrounds other than English (LBOTE), persons who are learning English as an additional language or dialect (EAL/D), which is predominantly linked to the increased number of refugees and migrants living in Australia. In 2012, the NSW DEC recorded the number of LBOTE children in government schools as being 230,000, which equates to a record 30 per cent of all enrolments (Statistics Unit, Centre for Education Statistics and Evaluation and Multicultural Programs Unit, 2013). Within the classes in this case study, over 80 per cent of the children were from LBOTE. As stated by the Institute of Education University, London (2009),

> …every learner is entitled to an equal opportunity to achieve and fully develop all his/her talents and potential, including those in other languages, and that different approaches are required for particular learner groups in order to make that possible. (p. 2)

In a study of Bangladeshi families' transitions into English speaking classrooms Sanagavarapu (2010) found it was essential for educators to acknowledge and address the

challenges children face in learning a new language in order to make the transition a smoother process. A major component in building language confidence in children with EAL/D, is providing authentic opportunities for talking and listening to occur between both peers and teachers. According to Aliakbari and Jamalvandi (2010) speaking is considered one of the central elements of everyday communication, and thus mastering speaking ability should be an ultimate goal within the classroom. Best practice means creating real world occasions where children can explore language in a safe environment, supportive of trial and error. In a study by Lopez, Correa-Chavez, Rogoff and Gutierrez (2010), they found children from different cultural backgrounds engage in a process of observing and listening before "pitching in" when they are ready. In reality oral language skills underpin much of children's development in literacy including reading, comprehension, vocabulary and writing (Martlew, Ellis, Stephen, & Ellis, 2010) and should therefore be the top priority in all classrooms, not only for EAL/D children but all children. Vygotsky (1987) stated that through talk children are able to make sense of the world around them.

In the case of EAL/D learners, play provides an opportunity for children to interact in authentic real world situations with other children, to practice sentence structure and grammatical features without the pressure of a formal learning situation. Paradise and Rogoff (2009) said "[w]hat is called informal learning is often taken to be learning that everyone engages in 'naturally', by virtue of being human; its grounding in sociocultural practices and their social institutions goes unnoticed" (p. 102). It also places them on a level playing field where they have an opportunity to build cultural capital with other children. Buxton, Lee and Santau (2008), identified that teachers need to understand having children from linguistically and culturally diverse backgrounds in the classroom is hugely advantageous, and they should draw attention to the cornucopia of knowledge they bring to the classroom. Recognising the significance of and utilising children's cultural backgrounds became an important element in the professional development offered to teachers in the current study.

2.9 Parent Perceptions of Science and Mathematics

2.9.1 Long Lasting Memories

Just as important as addressing teacher professional development is acknowledging the practices of parents (Graham, Nash, & Paul, 1997). Giovacco-Johnson (2009) describes the importance of creating effective partnerships between parents and teachers, where strengths, perceptions and expectations of children are shared. In a New Zealand study on mathematics intervention, it was found that creating partnerships and involving parents in the intervention process proved to be the dynamic force in the program's success (Maher, 2007). LeFevre, Skwarchuk, Smith-Chant, Fast, Kamawar and Bisanz (2009) discuss the notion that parents receive strong and consistent messages from teachers and the wider community that reading is important, and they need to involve their children in literacy activities, but the picture is less clear concerning the promotion of numeracy skills development. At any education level, Warren and Young (2002) argue parent participation should underpin all aspects of school policy. By creating effective partnerships between learning facilities and parents, children are more likely to be given consistent messages regarding academic expectations (Berk, 2013).

Howard (2010) argues that for play programs to be successful they must essentially satisfy all key stakeholders' requirements, being children, teachers and parents. She is referring here to the psychological barriers within society which hinder the acceptance of play as a legitimate vehicle for children's learning, including practitioner knowledge and understanding of play, parental attitudes towards play and related feelings of confidence in play practice. One of the anticipated benefits of this study was to position play-based learning as an effective strategy for providing engaging learning experiences in the areas of science and mathematics for low SES children.

2.9.2 Challenging Mindsets

In countries such as Hong-Kong where academic achievement dominates classrooms, Wong, Wang and Cheng (2011) state teachers and parents found it difficult to embrace play-based learning. Expanding on this point, research into parent perceptions conducted by Singh and Gupta (2011) found that while parents believed in the importance of play in children's lives,

in reality the pressures of academic achievement in the classroom made them question its place, causing them to suppress their support of play-based learning. This is significant to the current study as the parent stakeholder group involved a wide variety of cultures, and the program would benefit from parental support. An aim of the study was to bring the school and community together in order to increase the engagement and performance of these children and empower parents in their children's learning.

It was important in this study, given the context, to understand that partnership with families may be impacted by past experiences with authority and schooling, limiting their preferences for engagement (Sanagavarapu, 2010). To give voice to parents was seen as vital in enhancing the learning outcomes of children (Boyle & Petriwskyj, 2014). Collaboration in this study would be with parents whose experiences themselves in other countries and cultures may be so different from the Australian context, would potentially be a challenge, but important nevertheless.

It would be necessary to ensure that authentic partnerships be established specifically for children from a range of family backgrounds (Adams & Shambleau, 2007). As highlighted by Garcia (1991) and more recently by Hoddinott (2006), we have been aware that children from linguistically diverse backgrounds will have diverse needs, as will their parents. This would encompass the majority of children in this study. The work of Sanagavarapu (2010) showed that language barriers precluded immigrant parents "from accessing information on school needed to prepare their children adequately for school" (p.27) and that culturally appropriate ways needed to be found to provide parents with the requisite information for them to be able to support their children's learning. As there were a number of Aboriginal children in the school taking part in this study, it is useful to consider initiatives which have led to enhanced outcomes for Aboriginal children such as that by Maher and Buxton (2015) which highlighted a) the importance of relationship especially with Elders in the community; b) the need to have Aboriginal ways of knowing, being and doing as a key pillar; and c) that teachers need to understand that children are developing at the "cultural interface, the contested space between two knowledge systems" (Nakata, 2007)

There are a number of gaps in the literature which the current study helps to bridge. In a recent article Bartlett (2010) reports an interview with play activist Kathy Hirsh-Pasek who expressed a need for the academic community to present cleaner, stronger definitive studies into the positive implications of play for children in primary school settings. Xu (2010) discusses the necessity to further examine the impact of low SES on children's social interactions and development of other skills. An article by Trawick-Smith (2010) suggests children of low SES and those of non-Western cultures have often been under represented in studies surrounding play. It has proved difficult to find articles and research on the benefits of play for lower primary aged children. Given the recent introduction of the EYLF, which targets children aged 0-8 years, and the importance it places on play, there was a need for research into the effective integration of play with lower primary aged children to determine if it would enhance their development in literacy and numeracy. Thus the current study was born.

2.10 Conclusion

2.10.1 Putting It All Together

These themes, discussed in Chapter 2, of national and international policy evolution, the importance of the development of 21st century skills, the need to incorporate play-based learning in primary classrooms, the implications of low SES on student performance, teacher confidence and knowledge in teaching science and mathematics, as well as parent perceptions in these key learning areas (KLAs) weave together to form the backdrop against which the current study took place, and which informed the interpretation of the data.

Chapter Three

Design and Methodology

3.1 Design and Implementation of the Study

3.1.1 Introduction

The key question of *Playing to Engage* was: to what extent can play-based learning, specifically linked to science and mathematics, be used as an effective strategy to enhance student achievement and strengthen the partnership between home and school for children from low SES backgrounds?

There were three subsidiary questions shaping the direction of this study:

- Can a play-based learning program influence the overall holistic development of children?
- Can a play-based learning program, targeting science and mathematics, help improve teacher confidence to teach these and other subject areas?
- Can a successful play program in primary school settings help strengthen parent partnerships with the school in the education of children?

This study therefore developed a play-based program, implemented it across increasing numbers of classes in a low SES school, and evaluated that program from the perspective of the participant teachers and parents. Being explored was the relationship between children of low SES, aged five to eight, and the impact of a predominantly science and mathematics focused play-based program on enhancing their overall achievement in outcomes related to the Key Learning Areas of the curriculum and engagement with learning in school. The analysis of NAPLAN results and the collection of anecdotal records, interviews and teacher diaries provided rich data for analysis. The study also investigated the skills and knowledge of primary teachers and their capacity to offer engaging and effective mathematics and science learning experiences. Although not a main focus of the study, the program was extended to include three Kindergarten to Year Four support unit classes within the school – classes which catered to the needs of students with disabilities or severe behavioural issues.

This chapter begins with the justification of interpretivism as the paradigm which positions the study, followed by the design and scope of the study and a description of key participants. A discussion of the three aspects of the mixed methodology adopted is then undertaken followed by a discussion of the study validity and reliability. Chapter 3 concludes with a

description and justification of the methods of data collection and analysis. Appendix 4 details the cycle by cycle implementation of the study program, including examples of activities developed to showcase children's learning and engagement. Some examples of programs specifically developed for this study are also included at the end of this chapter.

3.1.2 Epistemology of Interpretivism

The present study is qualitative in the interpretivist paradigm "which takes the position that social and cultural phenomena emerge from the ways in which the actors in a setting construct meaning" (Schensul, 2012, pp. 75-76). In this case, teacher and parent attitudes to play-based learning and how they changed during the study were explored. The multi-cultural nature of the families who participated in the study added additional complexity and richness to the study.

The interpretive nature of this current study is built upon the understanding, developed from a detailed study of the literature, that there is not just one reality, but that reality is multi-dimensional and ever-changing (Merriam, 2009), and is interpreted differently by individuals, depending on their connection with the issues at hand. This study has attempted to "portray the complex pattern of what is being studied in sufficient depth and detail" (Ary, Jacobs, & Razavieh, 2002, p. 423) so that someone who was not present could understand the experience of someone who was.

Interpretivism considers realities to be multiple, and looks particularly at the context in which the behaviour takes place to try and understand it (Ary et al., 2014). Interpretivism "is characterised by a concern for the individual … to understand the subjective world of human experience" (Cohen, Manion, & Morrison, 2011, p. 17).

The advantages of working within an interpretivist paradigm were:

- It was possible to give voice to participants (Richards & Morse, 2013), to harness their enthusiasm as they became equal partners in the development of new cycles of the implementation of the program and as partners in this study. This promoted the

answering of the research questions and the interpretation of their reality within that framework.

- Participant beliefs and their journey to embracing a play-based pedagogy would in all likelihood be idiosyncratic, multifaceted, and complex. It was necessary to work within a methodological approach that produced qualitative evidence to describe this adequately (Ary et al., 2014).
- This researcher was interested in understanding "the subjective world of human experience" (Cohen, Manion, & Morrison, 2011, p.17) of both participant teachers and parents, and needed to be able to interpret how they made sense of their world, and the experiences they had in that world, specifically in relation to schooling and how this framed their perceptions of play-based learning.
- This researcher guided the study and the cycles as the study unfolded. Participant teachers retained the locus of control, noted as important by Ary et al. (2014). These teachers played a key role in determining the direction of each cycle of the study. They determined the activities to be implemented, the extent to which they felt comfortable embracing a new approach to learning and teaching, and how it would work within a relatively formal school setting.

The limitations of working within a paradigm of interpretivism were the "risk … that they [researchers] become hermetically sealed from the world outside the participants' theatre of activity" and are "criticized for their narrowly micro-sociological perspectives" (Cohen, Manion, & Morrison, 2011, p. 21). Furthermore, by definition, interpretive research must be subjective, and potentially limited to the experiences only of the participants. The study is situated in both context and time. Individual perceptions determine what are considered facts, and what is truth is deduced by the researcher from a particular viewpoint.

To achieve validity and reliability in interpretive research, Richards and Morse (2013) maintain that rigour at all stages of the research is key. In the current study the following is highlighted:

- As suggested by Richards & Morse (2013), rigour in the design phase was achieved by working from the strengths of the researcher. This meant establishing a

comprehensive background to the study, working inductively, and using appropriate methodology and design.

- Rigour while conducting the study was achieved using appropriate data analysis methods, being responsive if strategies were not working, synchronising data collection and analysis, and coding reliably. Additionally, there was frequent participant member checking and thesis supervisor cross-analysis of samples.
- Finally, rigour when writing up this study was achieved by providing an adequate study history and audit trail, and linking findings to the literature.

3.1.3 Design of the Study

A complex research design guided this study, as complex interactions and nuanced decisions were made throughout. Consequently, a mixed methodology comprising elements of action research, case study and evaluative research was implemented.

Predominantly, this study is about the development, implementation and subsequent evaluation of an innovative *Active Learning* program designed to increase the academic performance of Early Stage One and Stage One (Kindergarten, Year 1 and 2) children, aged 5 to 8 years, in a single low SES school.

The action research aspect of the design comprised the development, over the course of the study, of a targeted science and mathematics play-based program in consultation with other teachers and introduced in stages to the children, starting with Year 2 and filtering down to Kindergarten (see 3.1.4.3 for the timeline of the study and which teachers and classes were involved in which phase of the action research). Throughout this process all teachers were involved in the development of:

- age appropriate activities;
- the structure of the sessions;
- formal methods of recording observations; and
- reflective practices.

Within this process every element of the program's implementation was scrutinised and evaluated including the program itself, the professional development offered to participating

teachers, the learning journey of the children, teacher self-efficacy, executive staff input and parent experiences. This exemplified the participant evaluation component of the research design and the multiple sources of data which characterise case study.

Table 3.1 *Phases of Playing to Engage*

***Playing to Engage* Implementation Phases**
Phase One **Assessing the Situation from the researcher's perspective**
• Analysis of pre-intervention NAPLAN data for low SES schools within the region and specifically the case study school • Examination of internal data and student reports for 412 children in the lower primary for 2009 and 2010, the two years prior to the introduction of the *Active Learning* program • Review of day-to-day teaching programs conducted within the school in science, mathematics and play-based activities • Analysis of executive staff and teacher perceptions regarding play • Analysis of attendance data The findings from this situational analysis acted as base-line data in relation to parent and teacher understanding of play-based pedagogy, current learning and teaching approaches used in the lower primary, and student achievement on NAPLAN which, in turn, could be applied to subsequent phases of the study. The findings from Phase 1 could then be compared with the findings from the post-intervention analysis in Phase 4.
Phase Two **Preparing the Groundwork**
• Extraction of relevant mathematics and science outcomes and indicators from the NSW Board of Studies syllabus for Early Stage One and Stage 1 • Investigation of Questacon: National Science and Technology Centre early childhood and primary hands-on programs

- Exploration of a wide range of play programs, play-based activity books and teaching resources to extract potential activities
- Development of a range of mathematics and science activities based on information from Phase 1, the NSW syllabus outcomes, school programming and the interests of participating children
- Holding formal discussions with other teachers involved in implementing the program and Stage supervisors to seek their input to refine the *Active Learning* program.

All the information gathered during Stage 2 was used to develop a template for the play-based program. This included:

- identifying which activities were to be used in the first semester program and if possible, extension activities to be employed;
- the justification for including the activity, be it the NSW curriculum or the EYLF, children's interest, or gap in knowledge;
- developing a format for selecting, categorising and archiving activities;
- determining the resources required;
- recording methods for anecdotal accounts; and
- consolidation of the program for play-based learning.

Phase Three

Program Implementation

- Participating teachers undertook a series of professional development workshops during weekly lower primary syndicate meetings. Topics included the format of a *Lesson Study* (see 2.8.8 for description), becoming familiar with activities, describing the learning opportunities they would provide with links to the NSW curriculum, and reflecting on the program and its process of implementation. At this stage all teachers became comprehensively familiar with and immersed in the program (see 3.1.4.2 for list of participants and the cycles in which each was involved; see Appendix 4 for a detailed description of the program)

- As part of the program but before the play-based program began, parent surveys (see Appendix 7) were sent home to ascertain parent views on play as a vehicle for learning in the formal school setting. Completed questionnaires from parents were analysed using content analysis and the results used to develop a practical school-to-home communication system about the program and play-based activities.
- In collaboration with teachers participating in the program, weekly play-based sessions were implemented.
- Early in the implementation of the program there were informal weekly meetings to discuss activities and for the researcher to provide general support in running activities. Teachers were also provided with opportunities to team-teach to aid understandings of the program and promote skill sharing.
- Consistent monitoring, changing of activities, reflection – both as a learning community and independently – occurred throughout the program. Only data provided by staff who gave informed consent were used for the current study.

Process of class and teacher implementation

Although teachers participated in *Lesson Study* sessions (see 2.8.8) together, the play-based program was implemented across the support unit, Early Stage One, and Stage One, in stages as follows:

- two classes – Year 2 and a composite Year 1/2
- three classes – both classes stated above, plus an additional Year 2 class
- five classes – all classes in Stage One
- ten classes – all Early Stage One, Stage One, and Support Units

Phase Four

Analysis of the Data

In 2013, after the program had been running for one year, an analysis similar to Phase 1was carried out. The results of the post-program analysis could then be compared with the data from Phase 1. This process was repeated in 2014. The discussion of NAPLAN

results (see Chapter 7) is based on 2013 and 2014 data. The 2013 data reflects the results for students who participated in the program for one year while the data collected in 2014 was from students who had experienced the program for two years.
One of the main features of the study was the development of an innovative school program designed to increase the academic performance of Stage 1 (Years 1 and 2) children. Another feature of the study was that an evaluation of the program was developed. The evaluation was informed by an analysis of class NAPLAN data, a parent questionnaire, teacher interviews and an analysis of documentation associated with the development and implementation of the program.

3.1.4 Scope of the Study

3.1.4.1 The School

The study took place in a school located in a suburban area of South-Western Sydney. The local community is comprised of families from low SES, refugee, migrant, and Aboriginal backgrounds. Most were welfare recipients. Across the school, English as an additional language / dialect (EAL/D) children dominate classrooms representing 85 per cent of the school cohort. The school also has a large Support Unit made up of seven additional classes to support children with additional needs. The teaching personnel at the school was made up of two-thirds temporary staff due to permanent teachers being on maternity and sick leave, having found other jobs or retiring. Participants in the study remained constant over its five terms, except for teacher 7 (T7) who left the school and was replaced by teacher 8 (T8). The next section in this chapter details the participants, and Section 3.1.4.2 details participants involved in particular timeframes.

Prior to the study, the school struggled with consistently low NAPLAN results and significant behavioural issues warranting the implementation of a school wide initiative known as Positive Behaviour Interventions and Supports (PBIS). The below average academic achievement resulted in the school making the National Partnerships Federal Government financial support benefits list, aimed at helping schools set manageable targets in an attempt to help children reach national benchmarks. In partnership with this funding, the school's executive team enforced a stringent school-wide teaching and learning policy, outlining daily

lesson structures, specific methods of teaching, and templates for lesson planning. This policy covered all areas of the curriculum, which at the time was literacy, mathematics, COGS (explained in Terminology), and health and physical education.

The school also explored a number of options prior to the commencement of the current study, including hiring a mathematics and literacy consultant. The mathematics consultant helped direct teachers away from standardised textbook teaching, and implemented a Targeted Early Numeracy (TEN) program across Kindergarten to Year 2. The TEN program was designed by the NSW State Government to provide additional support to children experiencing difficulty learning numeracy concepts in lower primary. A typical program involved children spending 10 minutes a day in small focus groups playing scaffolded number games. Children are designated into levels based on the strategies they employ to complete calculations. If students, for example, required concrete materials to complete a calculation they were placed in one group, while students who were able to articulate how they reached an answer using their knowledge of numbers were placed in another.

The school's literacy consultant was employed one day a week for three years to implement a reading, comprehension and writing program from Kindergarten to Year Six. The program consisted of specific, set lessons taught on a daily basis and repeated weekly, which covered modelled reading, guided reading and a two-week writing cycle.

Across the whole school, before the program was introduced, parents, children and teachers were somewhat disengaged from learning and teaching, as evidenced by high absenteeism. Teachers were finding it challenging to teach in this context, as evidenced by high teacher turnover and low teacher morale. Parents generally did not respond to invitations from the school to attend information sessions or parent-teacher conferences. The mundane routine of teaching and learning was characterised by low student achievement levels as well as high levels of behavioural issues and poor attendance rates. There was no Parent and Community Committee and generally limited attendance by families at school functions. Teachers complained quietly about the policy, fearing they may lose their jobs if they were considered

not to be supporting the direction of the school; and they took a high proportion of days off, resulting in the casual teacher costs being over budget by $100,000 per year.

3.1.4.2 Key Participants

In order to maintain the case study school's anonymity and protect individual identities, aliases have been assigned to each of the key participants. Also provided is a brief biography of each teacher to provide context for their role in the school community and in this study as it unfolded.

Table 3.2 *Stage structure across New South Wales schools*

Stage	Grades	Age
Preschool	N/A	3-5 years old
Early Stage One	Kindergarten	5-6 years old
Stage One	Year One and Two	6-8 years old
Stage Two	Year Three and Four	8-10 years old
Stage Three	Year Five and six	10-12 years old

Principal Leader of the case study school who has expert knowledge in teaching science and technology. This person has previously worked as a science teaching consultant.

Deputy Principal Second in charge of the case study school. This person is a strong supporter of collaborative teaching and play-based learning in the classroom.

Stage Supervisor A teacher who oversees the programming, teaching and assessment of all teachers at a given Stage (e.g. Kindergarten to Year 2).

Early Stage One A team of three kindergarten teachers, each with 20 children in their class.

Stage One	A team of five teachers (two Year 1 classes, two Year 2 classes and a 1/2 composite class), each class with between 21 and 26 children.
Support Unit	A team of four teachers (children range in age from Kindergarten to Year 6), each class with between 8 and 15 children. Children in these classes have been diagnosed with one of the following: • Moderate Intellectual Disability and Autism • Severe Intellectual Disability • Moderate Intellectual Disability • Mild Intellectual Disability • Autism
Teacher Participants	Reference to the combined group of Early Stage One and Stage One teachers participating in the study
Researcher	Stage One classroom and coordinator of the project.
T1	Beginning teacher with three years' experience at two different schools. Throughout the project taught Stage One, and philosophically believes in play-based learning methods.
T2	Mature age beginning teacher with four years' experience at two different schools. Throughout the project taught Stage One.
T3	Recent graduate filling a temporary position. During the initial Phase this teacher taught Year 2 adjoining the Stage One classroom. In later Phases engaged as a participant while teaching Kindergarten. Has a very structured teaching style dominated by a strong teacher-centred presence, regimented routines, tough behaviour management system and frequent assessment schedule.

T4	Five years' teaching experience predominantly in upper primary settings (Years 3 to 6), filling a temporary position. Engaged as a participant while teaching Kindergarten for the first time.
T5	Eight years' teaching experience and supervisor of the Kindergarten and Preschool teams, as well as fulltime teacher of Kindergarten class. Limited knowledge of The Framework prior to taking on supervisory role. Strong advocate across Preschool and Kindergarten for structured learning activities, whole class teacher-directed teaching and structured small group activities.
T6	Ten years' teaching experience and supervisor of the Stage One team (Year 1 and 2). School representative for Australian Curriculum implementation, highly focused on literacy.
T7	First year back in class after five years' maternity leave. Very nervous about managing fulltime teaching, becoming increasingly familiar with the Stage One curriculum and new school policy.
T8	First year beginning teacher, filling a temporary position. Open to new ideas and trialling different methods of teaching.
T9	Seven years' teaching, with Kindergarten to Year 6 experience. This teacher is very supportive of play-based learning for all ages. Has a background in fine arts and drama.
T10	Fifteen years' experience teaching Special Education, mainly children with behavioural issues. She is extremely confident in what she already knows and has taught the same way her entire career. Lacks confidence in front of other teachers and is nervous about new methods of teaching.

T11 First year beginning Special Education teacher. Has experience teaching lower primary (Kindergarten to Year 2) children with intellectual disabilities.

T12 Experienced early childhood teacher. Strong advocate for play-based learning in early childhood and primary settings. Frequently discusses the pressures from other staff and parents. Has previously pushed for more learning to occur between Preschool and Kindergarten children but has met heavy opposition from other teachers, including supervisor.

T13 Assistant Principal responsible for curriculum.

ESL Teacher Responsible for managing new arrivals program for the school, implementing Teaching English Language Learners (TELL) across the school and providing in-class learning support for ESL children.

3.1.4.3 Timeline of Study

Table 3.3 *Timeline for 2011*

Date / Timeframe	Activity / Task	Contributors	Comments
July - September (Term Three)	Cycle One of *Active Learning*, the play-based learning program	researcher	Trialled the play-based learning program in single Year 2 classroom with 23 children. Timing and activities are detailed in Chapter 4
October – December (Term Four)	Cycle Two of *Active Learning*	researcher and T1	Trialled the play-based learning program with two, Year 2 classes
19 December (end of Term Four)	Interview with T1	researcher and T1	Formal recorded debrief of program

Table 3.4 *Timeline for 2012*

Date / Timeframe	Activity / Task	Contributors / Participants	Comments
January to June (Term One and Two)	Cycle Two continues	researcher, T1 and ESL Teacher	The second year of the program. The collaborative partnership now incorporates the ESL Teacher and two Year 2 classes. Sessions run twice a week on Wednesdays and Fridays
4 February (Term One)	Pre *Active Learning* survey is sent out to parents (see Appendix 7)	researcher	Survey was sent out to Year 2 families; 37 out of 60 were returned by parents within a two week period
14 June (Term Two)	Whole School Science Day	Planning Committee researcher, Principal, T1 and ESL Teacher Participants Whole School Preschool to Year 6	Mystery theme with experiments for children to conduct. Each teacher had a specific experiment to execute and whole classes, in Stage groups, rotated throughout the day. *Questacon Science Play* and *Science Squad* also conducted shows for all children from Preschool to Year 6
14 July (Term Three)	Whole school Professional Development Conference	Contributors: researcher Participants Executive staff and all teachers Preschool to Year 6	One Hour interactive workshop on *Active Learning* and how to incorporate play-based learning into every classroom
23 August (Term Three)	Formal introduction of the play-based *Active Learning* principles and examples from practice. Interview with participants on their initial response to play-based learning	Contributors: Researcher and Deputy Principal Participants T2, T3, T5, T7, T9, T10, T11, T12 and T13 (Assistant Principal)	During this session a cross-section of teachers from Preschool to Year 2 (including Support Unit) discussed their feelings towards play-based learning and *Active Learning*, looked at current research and case studies.

30 August (Term Three)	Second session of Lesson Study	Contributors Researcher and T1 Participants T2, T3, T5, T7, T9, T10, T11, T12 and T13 (Assistant Principal)	During this session teachers watched *Active Learning* being run by the researcher and T1. Following this they gave feedback and asked questions, as well as planned to deliver their own *Active Learning* session.
6 September (Term Three)	Third session of *Lesson Study*	Contributors Researcher Participants T2, T3, T5, T7, T9, T10, T11, T12 and T13 (Assistant Principal)	During this session the teacher participants ran their own *Active Learning* session with the researcher and T1's classes. Following the session they provided feedback to each other and discussed how *Active Learning* could fit into their teaching practices.
22 September (Term Three)	Whole School Science Day	Planning Committee researcher, Principal, Deputy Principal, T12, Community Liaison Officer and ESL Teacher Participants Whole School Preschool to Year 6	Each Stage group was given specific experiments to execute throughout the day. *Jolly Pops* (an Indigenous science group) also conducted shows for all children from Preschool to Year 6
October to December (Term Four)	Cycle Three of *Active Learning* begins	Participants researcher, T1, T2, T3, T4, T5, T6, T7, T9, T10, T11	Participants begin trialling *Active Learning* in Stage groups. Three Kindergarten classes (T3, T4 and T5) Three Year 1 classes (T6, T7, T9) Three Year 2 classes (T1, T2 and researcher) Support Unit (T10 and T11)
14 December	Toy Audit	researcher	All the toys distributed throughout Kindergarten to Year 2 were recalled, cleaned,

			catalogued and redistributed based on age and needs
20 December	End of Term evaluation	Participants Early Stage One teachers (T3, T4 and T5) Stage One (T1, T2, T6, T7, T9)	In Stage groups the participants were asked a series of questions in order to evaluate the program, future direction and professional development and resourcing needs.

Table 3.5 *Timeline for 2013*

Date / Timeframe	Activity / Task	Contributors	Comments
January to December	Cycle Three of *Active Learning* continues	Researcher, T1, T3, T4, T5, T6, T7, T8, T10, T11	All teachers remain the same except for two changes: Year 1, T8 replaces T7 Year Two only had enough children for two classes, removing T2 from the study
15 February (Term One)	Pre *Active Learning* survey is sent out to parents of children who would be joining the *Active Learning* program	researcher	Survey was sent out to families across Kindergarten to Year 2 who had not previously been asked to complete a survey. Eighty-eight out of 152 were returned by parents within a two week period
29 April (Term Two)	Whole day Science Professional Development session	Researcher, T3, T4, T5, T6, T7, T8, T10, T11	Once teachers became comfortable delivering simple play-based activities, described in Chapter 4, they were ready to be supported with extending the program into science and mathematics
30 April (Term Two)	Teachers are given consumables, essentials and role play kits	researcher	Each participating class was given an essentials kit (see Chapter 4.14.3) and a consumables kit (see Chapter 4.14.4) Each Year group (Kindergarten, Year 1 and Year 2) were given specific role play boxes to match their units of work and age group.

28 June (End of Term Two)	End of Term evaluation	Participants Early Stage One teachers (T3, T4 and T5) Stage One (T1, T6, T8, T9)	Teacher participants, with colleagues from the same year group, were asked a series of questions in order to evaluate the program, to determine future direction and to ascertain professional development and resourcing needs.
17 July (Term Three)	Cycle Four of *Active Learning* begins in Year 2 classrooms	researcher, T1 and ESL teacher	This was the beginning of full day team teaching in Year 2 and establishment of Integrated Units. *Active Learning* transformed into a completely children driven experience.
20 September (End of Term Three)	End of Term evaluation	Participants Early Stage One teachers (T3, T4 and T5) Stage One (T1, T6, T78, T9)	Teacher participants were asked a series of questions in order to evaluate the program, future direction and professional development and resourcing needs.
15 October (Term Three)	Whole School Science Day	Planning Committee researcher, Principal, Deputy Principal, T1, T6, T8 and ESL Teacher Participants Whole School Preschool to Year Six	Mystery theme with experiments for children to conduct. Each teacher had a specific experiment to execute and whole classes in grade groups rotated throughout the day. *Questacon Science Circus* also conducted shows for all children from Preschool to Year Six
14 December	Post *Active Learning* survey (identical to the pre *Active Learning* survey) was sent out to parents of Kindergarten, Year 1 and Year 2 children. These were the same parents who had	researcher	After a year of the program in Year 2 and part-year in Early Stage One and Year 1 parents were given a post *Active Learning* survey to complete. Out of 147 surveys, 106 were returned.

	completed the pre *Active Learning* survey		
20 December (End of Term Four)	End of Term evaluation	Participants Early Stage One teachers (T3, T4 and T5) Stage One (T1, T6, T8, T9)	In Stage groups the participants were asked a series of questions in order to evaluate the program, future direction and professional development and resourcing needs.

3.2 Methodology

3.2.1 Methodology

As described in the previous section, the *Playing to Engage* study implemented a play-based approach in Year 2, and later in Year 1 and Kindergarten classes over 10 school terms in 11 classes. This involved 226 children and 13 teachers.

Playing to Engage employed a mixed methodology approach linking a single case study with collaborative action research and participant evaluation, which intertwined to create a comprehensive framework. Such a methodological framework was considered an effective way of answering the research questions posed by the study. Mixed methodological or integrative methods of research (Collins & O'Cathain, 2009) can provide rich data within a single study. In this case, data included the analysis of NAPLAN scores and student attendance, augmenting qualitative processes which involved the gathering of anecdotal records from participant teachers to inform the evaluation of the program. Interviews with participants were used to elicit their views on aspects of the program that were working, what further professional development they required, and to inform the evaluation of the program. This collaborative approach, as argued by Bryman (2006), provided an opportunity to enhance people's understandings of the research through the integration of multiple sources of data into one cohesive study (Yin, 2013). As stated by Alise and Teddlie (2010), mixed method – or more specifically in this study – mixed methodological research offers a promising means to address complex issues. Ultimately, the approaches employed by this study have been

utilised to answer the research questions, as they weave together in a naturalistic paradigm to provide a rich and comprehensive answer to the research questions.

A summary is provided of the methodologies used, the method for data collection and the method for data analysis, to provide a short overview.

Table 3.6 *Methodology, data collection, data analysis summary*

Methodology	Method of Data Collection	Method of Data Analysis
Case Study	Interviews	Transcription and analysis Thematic analysis
Action Research	Weekly team meetings Researcher field notes	Transcription and analysis Thematic analysis
	Teacher reflective journals	Thematic analysis
Participant Evaluation	Teacher reflective journals	Thematic analysis
	Pre- and post-initiative parent surveys	Parent questionnaire data were analysed using descriptive statistics and a composite narration of the frequency prioritised responses for the free response questions
	NAPLAN results	Any identified positive trend in student performance data was able to be triangulated with the qualitative data collected from the interviews and weekly team meetings

In the next section a description is provided of each of the methodologies and a justification for their selection in this study.

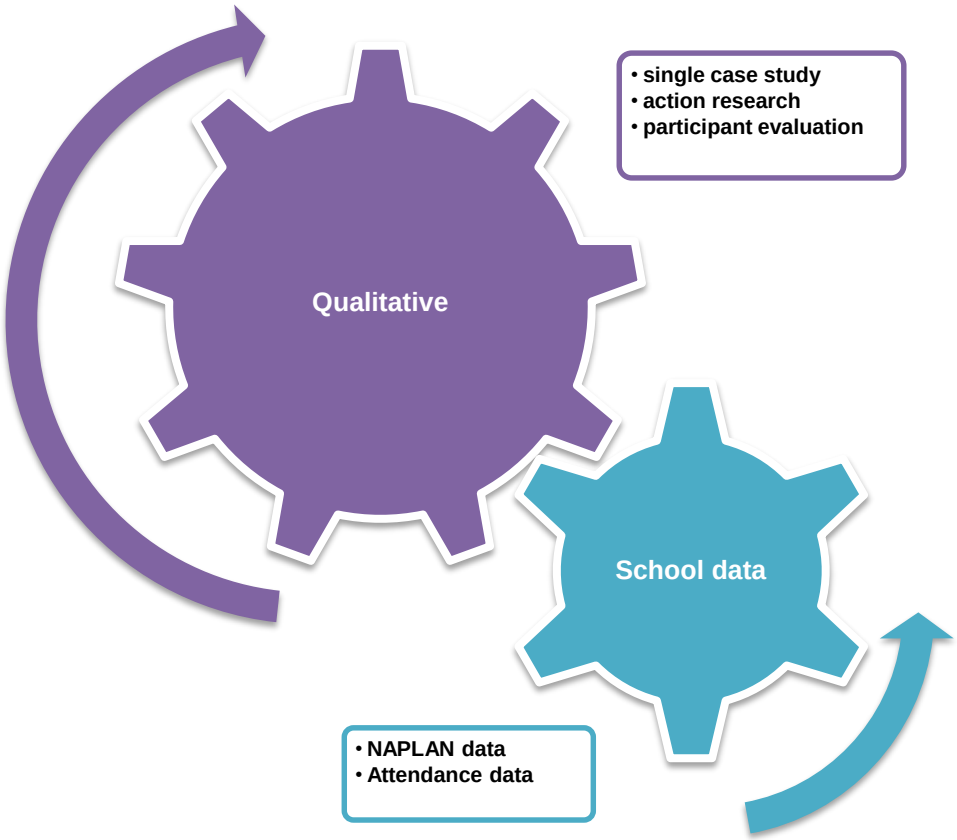


Figure 3.1 The relationship between methodology and data collection

3.2.2 Case Study

A single case study is an inquiry concerning a particular event, object, phenomenon or state of affairs (Evers & Wu, 2006). Yin (2013) describes a case study as ultimately needing to be of a significant nature; it should be of general public interest, and should entail issues of national significance. As highlighted in the literature review, there is a national crisis facing future generations, if children do not develop a keen interest in science and mathematics and do not choose to study these subjects in the later years of secondary schooling and at tertiary level. *Playing to Engage* sought to contribute to knowledge of effective ways to enhance children's learning in this area through a single case study.

When a holistic investigation is needed that will provide in-depth understanding, case study is an ideal methodology (Baxter & Jack, 2008) as it is designed to bring out details from the viewpoint of participants. Case studies tend to be selective rather than a form of sampling

research (Evers & Wu, 2006; Baxter & Jack, 2008; Yin, 2013). The current study sought to investigate whether teachers, parents and most importantly the school, in the single case study, would adopt a play-based approach to the teaching of science and mathematics. It was necessary to establish what parent and teacher beliefs and practices related to play-based learning were before the implementation of *Active Learning,* and while they experienced the intervention program and considered the outcomes for children.

A case study, noted by Yin (2013), is applicable to the current research in three respects, because it explains complex links in real-life interventions, describes the real-life context in which the intervention has occurred, and describes the intervention itself. One of the advantages of using case study methodology was the close collaboration between the researcher and participants (Yin, 2013). As such, participant teachers were able to tell their stories and present their views of their experiences of the intervention (Cohen, Manion, & Morrison, 2011). Case study methodology allows the research to answer 'how' and 'why' questions (Baxter & Jack, 2008) and illuminate the particular case by gathering data from a number of sources.

Playing to Engage employs a descriptive case study approach, as it focuses on a particular phenomenon and the real-life context in which it occurs (Yin, 2013). Although the study concentrates on one school it includes multiple classes (11 in the final phase), across two stages, Early Stage One and Stage One. The unique nature of case study research allows for an example of an activity to be studied in-depth using a variety of methods to create a detailed description (Hetherington, 2013). This was important in the current study, as it was not clear at the outset how the program would evolve and what the level of participation would be from teachers.

While developing the research design, based primarily on the work of Yin (2013), aspects of case study, as developed by Evers and Wu (2006) were included. Evers and Wu (2006) hold that case study can be shaped by external factors such as culture and language. With a very high proportion of children not speaking English at home, it was not initially clear how much cultural and language impacted the study. It is this inclusion of external factors such as culture

and language that allows the study findings to be applied beyond the single case (Evers & Wu, 2006; Cohen, Manion & Morrison, 2011). Consequently, findings from this study may be transferred to schools with similar characteristics and circumstances; that is, schools with high numbers of low SES and EAL/D students. It is the inclusion of generic factors which strengthen the circumstances for the generalisation of case study findings to other contexts with similar demographics.

3.2.3 Action Research

Action research involves the continuous modification of a situation and the incorporation of theory in the form of action (Holly, Arhar, & Kasten, 2009). The current study employs action research as a mechanism to respond to the challenges of developing and refining the *Playing to Engage* program. As such, the development process occurs as iterations. Consequently, quality teacher interactions, the development of appropriate resources and reliable assessment become anticipated outcomes that are continually improved upon as the program is progressively implemented.

Action research enables teachers to become actively involved in the research process. Consequently, teachers are then able to provide authentic reactions to and evaluations of data from a teaching perspective. The combination of research and teacher action worked hand-in-hand to enable the program to be modified and adapted to meet the needs of teaching staff and children over the course of the study. In general, the case study was fueled by the simultaneous development of a play-based learning program using an iterative action and research process that actively and purposefully responded to theory and reflection to improve practice.

This type of action research, as Brydon-Miller, Greenwood and Maguire (2003) suggest, goes beyond the notion that theory informs practice, to a recognition that theory can and should be generated through practice. As a result *Playing to Engage* was able to provide opportunities for primary teachers to improve their knowledge and professional skills in teaching science and mathematics. More significantly, participants saw the program as an opportunity to enhance the engagement of children in these curriculum areas. By creating partnerships

between the researcher, teachers, parents and children, the process of research and action were integrated as one process.

For action research to be successful Denscombe (2007) states practitioners must be participants, not just in the sense of taking part in the research but also being a partner in the research. From the outset of the study the researcher and participant teachers held equal stakes in *Playing to Engage*. Throughout the project all stakeholders shared in the development of activities, running the *Active Learning* sessions, leading reflective sessions, reporting and data collection. Wherever possible and when opportunities arose, all stakeholders were either participants in play-based science and mathematics experiences or they received information about the activities provided.

Playing to Engage required a hands-on approach to addressing science and numeracy challenges in a specific primary setting. As Denscombe (2007) states, the nature of action research is driven by the need to solve practical, real-world problems. This study allowed all key stakeholders to make a contribution to the project, regardless of their previous research experience. They were in a position to provide feedback on activities, suggest content direction and provide views to inform the evaluation of the program. Importantly, the program was not dependent on the researcher for development, implementation and evaluation. As a consequence of the study, the *Playing to Engage* program can continue to be refined and implemented after the study has been completed.

Action research provided multiple benefits for all stakeholders, including children, teachers, parents, and the researcher. The use of an iterative process (see Figure 3.7) allowed all participants to engage in the study in a productive manner and promoted reflective practices. Each class was given the flexibility to adopt their preferred implementation plan and way of recording children's learning.

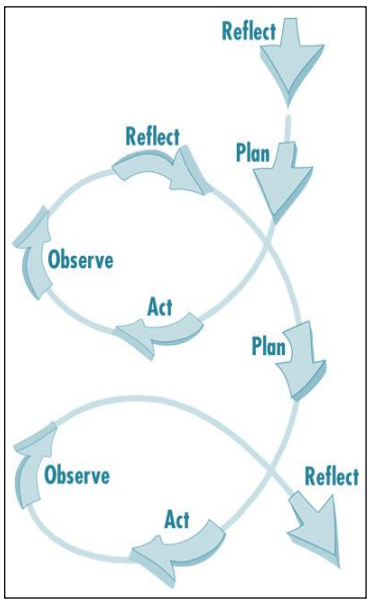


Figure 3.2 Components of the action research iterative cycle (Northern Territory Department of Education and Training, 2009)

In the *Playing to Engage* study, action research provided a strong model for the development of successful partnerships between the researcher, participant teachers, and parents, and the opportunity for tailored professional development in the concept of *Lesson Study* (see 2.3.8) theory underpinning a play-based approach to learning and teaching specifically in mathematics and science. Through the cyclical process, teachers were able to reflect on previous practices and consider better ways to engage children in science and mathematics through play-based learning experiences. More broadly, this study and the cyclical process provided teachers with pedagogical knowledge and effective skills which could be applied to all aspects of their daily teaching practice.

3.2.3.1 Applying 'gogy' principles

Within this study, the play-based learning program related to teaching children, so pedagogy was important. However, as with all teacher professional development, participant teachers would need to take responsibility for the program if it were to be sustainable. Therefore andragogical principles came into play. For this program to be successful the action research model needed to consist of a dual cyclic process. In one strand the researcher had to guide the other participants through the research journey. The other strand involved teacher participants (including the teacher as researcher) being led through the research process.

Throughout the iterations, there were constant interactions between the two strands as both influenced the direction of the study (see 6.1.1 for diagrammatic representation).

This study provided a challenge to teachers in relation to how they viewed their creation of learning opportunities in the classroom, and through this process gave children greater ownership of, and voice in, the direction of their learning, while at the same time providing evidence to parents and executive staff that play is a viable vehicle for learning.

This study had a clear focus on the learning and teaching of children aged 5-8 years, so pedagogy and how best to engage children was important. However, as the leader of the initiative, the researcher was responsible for 'teaching' the other teacher participants. As with all sustainable professional development the adults were expected to take responsibility for their own learning. Consequently the study moved beyond pedagogical principles to incorporate andragogical frames.

3.2.3.2 Andragogical Principles

Pedagogy refers to the art and science of teaching. It is the manner in which teachers place parameters on classroom learning experiences by ultimately controlling what learning occurs and when it is appropriate (Taylor & Kroth, 2009). Taylor and Kroth (2009) imply the theory of pedagogy indicates that less value is placed on practical experiences, with greater focus on authority and teacher control. It is for this reason that andragogical principles resoundingly resonate with this study. According to Connor (2006), in recent times andragogy has come to refer to learner-centred education of all ages, with, as Bandura (2005) suggests, less distinction between teacher and learner. In the case of children and *Active Learning*, there is a dimension of andragogical principles that integrate with pedagogy to denote the learner centred teaching focus (Ashton & Newman, 2006).

Within the context of this study, andragogical principles also relate to the process by which professional development and the implementation of the program among teachers was conducted. Essentially, the educators were placed at the centre of the phases of the action research learning process, therefore creating a bond between action research and andragogy.

Blaschke (2012) states an andragogical approach to teaching and learning actively involves identifying learner needs. In the current study, in relation to the teachers, this included aspects such as specific skill development in the areas of play-based learning, science and mathematics, and planning how to meet their articulated needs. As learners in the study they were able to direct the professional development sessions by suggesting play-based learning experiences and experiments they were interested in trialling.

Throughout the study, the researcher functioned as a mentor, building teacher participant skills and knowledge and ultimately working towards the goal of developing teacher capacity for self-direction (Merriam, 2001) in offering play-based learning opportunities. McAuliffe, Hargreaves, Winter and Chadwick (2008) highlight andragogical principles as a method through which the researcher is able to show learners how to find information, relate it to learner experiences and promote problem-solving in a real world context. In the case of *Playing to Engage,* teachers were directed towards current research on play (see reference list), and supported in locating interesting, relevant play-based mathematics and science activities. The teachers were mentored in confidently delivering such activities through professional development sessions.

A more recent perspective on teaching and learning that is still being developed is heutagogy (Kamenetz, 2010). Heutagogy extends the metacognition and analysis around andragogy to a point where people can identify and articulate their preferred learning style and how this impacts on their teaching (Kamenetz, 2010). In the current study, this perspective on teaching and learning became increasingly evident amongst participants.

3.2.3.3 Achieving Heutagogical Principles

Hase and Kenyon (2007) coined the term heutagogy to describe a method of creating autonomous, self-determined learners who were the major agents in their own learning. Kamenetz (2010), wrote that under the heutagogical paradigm, the teacher's role was primarily to teach learners how to teach themselves, arguing that in the 21st century, andragogical principles no longer sufficed in preparing learners for the future. This newer exemplar entailed a strong focus on being self-reflective, both of which occur as a result of

personal experience (Hase & Kenyon, 2007). As discussed by Blaschke (2012), heutagogy is primarily an extension of andragogical principles, where learners progress from competency in self-learning to a capability to know how they learn.

There was a two-fold connection between heutagogical principles and the *Playing to Engage* study which were tantamount to being mirror images of one another. The first was the researcher. She provided opportunities for teacher participants to become autonomous, independent learners, conscious of their own preferred way of learning. The second was the teacher participants. They needed to begin to develop in children the capacity to become self-determining, self-actualising learners, able to create new knowledge from their existing knowledge and experiences. Ashton and Newman (2006) drew attention to the necessity for educators to develop learner capacities for learning – not only skills and knowledge – through this process. To actualise this, it became necessary that teachers relinquish some control to the children in their play-based learning and teaching sessions. The researcher helped teacher participants to make their own choices about the implementation of the *Active Learning* program in their classrooms. For the teacher participants, it was letting go of teacher directed learning in favour of a child directed focus.

3.2.4 Participant Evaluation

The lynchpin in this study was the effectiveness of the intervention to enhance children's learning. The initiative was again contingent on teacher confidence and ownership of the initiative. Consequently, evaluation of all aspects of the initiative was fundamental and ongoing. It fed the action research and made summative evaluation possible.

Participant evaluation, as the third research methodology, worked hand in hand with action research as identified by Ham (2010). The nature of action research as previously stated, is to solve an immediate real world problem. The research in the current study considered the experiences and opinions of multiple stakeholders including children, teachers and parents during the implementation of *Active Learning*. Participant evaluation was crucial to the authenticity of the action research. It gave all participants the opportunity to have direct influence over the outcomes of the study to improve children's learning. Also, as articulated

by Zhoa and Ji (2014), it was distinctive because it emphasised the role of participants as researchers.

Participant evaluation fitted neatly within the action research iterative process because it provided the evaluations that fed each iterative cycle and moved the study forward. Participant evaluation adds value because of its close link to the study, "…arguably more likely to be comprehensively valid, and to provide rich multiperspective data" (Ham, 2010, p. 27). It provides a rich evidence base, unique because teacher and children's contributions occur in a natural setting (Zhao & Ji, 2014). Consequently, the analysis of unanticipated behaviours and activities are incorporated, which in turn directly influence the direction and outcomes of the study.

Questionnaires, researcher anecdotal records from classroom observations and professional development sessions, teacher interviews, and parent views on play-based learning prior to the implementation of program and thereafter, all contributed to the participant evaluative process. Specifically, these methods of data collection were used to evaluate the usefulness of professional development and inform decisions that tailored these sessions to participant needs. They informed the impact of activities on the engagement of children with learning, and demonstrated learning. They also informed the ways the program should be amended within each action research cycle

A key component of the effectiveness of participant evaluation is to make sure participants consider the same questions (Danielson, Tuler, Santos, Webler & Chess, 2012). This helps to create conditions where responses can be used in a comparative fashion, incorporated into robust discussions and used to generalise information – key to the evaluation of the effectiveness of *Playing to Engage*.

3.3 Methods of Data Collection

The methods of data collection in the current study fall loosely into two categories:

Qualitative data derived from

- Interviews with participant teachers and the school executive;
- Recordings of weekly team meetings
- Researcher and teacher reflective journals/field notes/anecdotal records

and numerical data derived from

- Pre- and post-initiative parent surveys
- NAPLAN results

3.3.1 Qualitative Data

3.3.1.1 Interviews

Interviews provided a substantive data source for this current study. An interview is "an interchange of views between two or more people on a topic of mutual interest, sees the centrality of human interaction for knowledge production, and emphasises the social situatedness of research data" (Kvale, as cited in Cohen, Manion & Morrison, 2011). If one is seeking a means of data gathering to obtain a rich, in-depth experiential account of an event or episode in the life of the participant (Fontana & Frey, 2005), then interviews are the answer. A research interview is a "conversation initiated by the interviewer for the specific purpose of obtaining research-relevant information, and focused by content specified by research objectives of systematic description, prediction, or explanation" (Cannell & Kahn, as cited in Cohen, Manion & Morrison, 2011). Interviewers use an interview dialogue to obtain information from interviewees. This study used interviews as a source of information to mirror and record a true and accurate picture of participant teacher views, within the action research element of study, on what alterations or amendments should be made to the activities offered in *Active Learning* sessions. Within the case study and participant evaluation aspects, the interviews provided data on participant views of elements that would lead to areas for improvement of the initiative, and to its sustainability and success.

The purpose of this study was to investigate to what extent a play-based learning program can enhance children's engagement and achievement, specifically in the curriculum areas of mathematics and science. Consequently, these aspects were the focus for this researcher. (Cohen, Manion & Morrison, 2011). Of specific interest was how participant views served as a legitimate vehicle for learning and how their views might change during the study. Participant feedback afforded information about their feelings of reticence or anxiety about their capacity to implement play-based science and mathematics activities so that professional development could be tailored to their needs.

In this study, semi-structured interviews were utilised. A semi-structured interview is a commonly used interview technique "where a schedule is prepared that is sufficiently open-ended to enable the contents to be reordered, digressions and expansions made, new avenues to be included, and further probing to be undertaken"' (Cohen, Manion & Morrison, 2011, p. 182). The semi-structured interview schedule allows for the development of a set of interview questions around themes that address the research questions in a flexible way. Questions were asked in an order that was appropriate to the discourse that evolved as the interviews progressed (Gibson & Brown, 2009). Interviews were recorded and transcribed and later classified and coded (Wilson & Sapsford, 2006).

The framing of questions was a consideration when preparing the interview schedule for this study. Initial interviews were structured to elicit participant views on the value of play as a vehicle for learning and to ascertain participant willingness to consider a novel pedagogy. Interviews were conducted with all participant teachers in the case study school as their inclusion in the action research cycles began. Throughout the interviews, prompts and probes (Morrison, as cited in Cohen, Manion & Morrison, 2011) were used to obtain comprehensive responses to the questions asked. Through prompts, responses could be clarified, while probes enabled participants to extend or elaborate on a point made, to clarify or qualify their response (Morrison & Patton, as cited in Cohen, Manion & Morrison, 2011). Probes functioned as follow-up or 'why' questions. Gibson and Brown (2009) identify the distinctive skills required when conducting semi-structured interviews:

- remember the questions that are to be asked;
- ask questions at appropriate times;
- bring the conversation around to the topics of interest without disrupting the natural flow of conversation;
- sense when a topic of enquiry has been exhausted;
- help the participants to make links between the topics being discussed;
- manage the duration of the interview; and
- evaluate the analytic relevance of the information as it is being produced (p. 99).

This researcher interacted collegially with participants on a daily basis, and more formally during weekly team meetings. This contributed to a more trusting relationship, recommended by Gibson and Brown (2009), than would be the case with one-off interviews. This was one of the positives to emanate from the complex multiple-methodologies utilised in the current study.

Convenience sampling was utilized in this study as in convenience sampling, participants are included in the sample on the basis of potentially being involved in the research by virtue of being in the given context (Cohen, Manion and Morrison, 2011). For this study, all participant teachers were interviewed because they were involved in *Active Learning* and chose to be a part of the study.

Overall, the specific type of semi-structured interview utilized in this study, taking place alongside the weekly team meetings, had its advantages. The most important advantage was that in the more formal interviews at the start and end of each term, this researcher as interviewer had control over the interviews. Given that participant teachers had been working closely together for the whole term, another advantage was that such direct exposure allowed for greater depth of interaction and probing. The interviews provided a platform for this researcher, as interviewer, and the interviewees to express their personal point of view (Cohen, Manion, & Morrison, 2011). On the other hand, interviews have some limitations. First, interviews have their own implicit rules about following the interviewer (Wilson & Sapsford, 2006). In this study, there was more limited opportunity for this to occur as the participant teachers had been colleagues for a time, and this researcher, as leader of the *Active Learning*

program and a participant as well – was an outsider. Indeed, there was initially no evidence of 'underlying obedience' (noted as a limitation by Wilson & Sapsford, 2006). Another disadvantage of interviews is that the interview process is prone to subjectivity and bias on the part of the interviewer. Transcriptions inevitably lose data because it is impossible for the teacher-researcher to transcribe everything that took place during the interview. Another disadvantage of interviews is that the whole process is very time-consuming (Cohen, Manion, & Morrison, 2011).

In the current study the interviews were structured and conducted only by this researcher, to enhance the trustworthiness and credibility of the data. The questions included would range from: simple, direct background questions to more in-depth probings of participant beliefs about play-based learning. It was recognised that some interviewees may require probing when responding to open-ended questions, as they might not fully understand what is being asked or may be feeling uncomfortable in the interview environment. A selection of appropriate probing questions would be pre-determined. The interviews were conducted in a sensitive way within the weekly team meeting time and therefore in a non-threatening environment (Cohen, Manion & Morrison, 2011).

3.3.1.2 Weekly Team Meetings

Weekly team meetings were conducted in the same way as interviews, but differed in that they were less formal and completely participant teacher directed. This was a time for participant teachers to reflect, consult, request assistance, evaluate their practice, the activities provided to their classes, and the effectiveness of the *Active Learning* program as it progressed. Weekly team meetings were recorded and relevant parts transcribed and analysed in the same way as the interviews.

Tables 3.7 to 3.9 summarise the meetings held throughout the study, the activities involved and who contributed to them.

Table 3.7 *Meetings held throughout 2011*

Date	Activity	Contributors
28 April	Initial meeting with Principal regarding the implementation of *Playing to Engage*	researcher and Principal
October (Term 4)	Initial meeting with T1 regarding implementation of Cycle 2	researcher and T1
12 November	Debrief meeting after classroom visit	researcher and Principal
19 December (end of Term 4)	Post implementation Interview with T1	researcher and T1

Table 3.8 *Meetings held throughout 2012*

Date	Activity	Contributors
1 February	Planning meeting Cycle Two Term 1	researcher, T1 and ESL Teacher
4 February	Pre *Active Learning* survey is sent out to parents (see Appendix 7)	researcher
24 April	Planning meeting for whole school Science Day	researcher, Principal, T1 and ESL Teacher
10 June	Final preparation meeting for whole school Science Day	researcher, Principal, T1 and ESL Teacher
18 June	Whole school Professional Development Conference planning session	Researcher, Principal and Deputy Principal
16 July	Debrief and reflection on Professional Development conference session	Researcher, Principal and Deputy Principal
30 July	Planning session to establish parameters for Lesson Study	Researcher and Deputy Principal
15 August	Planning meeting for whole school Science Day	researcher, Principal, Deputy Principal, T12, Community Liaison Officer and ESL Teacher
23 August	Formal introduction of the play-based *Active Learning* principles and examples from practice. Interview with participants on their	Contributors: Researcher and Deputy Principal Participants T2, T3, T5, T7, T9, T10, T11, T12 and T13 (Assistant Principal)

	initial response to play-based learning	
16 September	Final preparation meeting for whole school Science Day	researcher, Principal, Deputy Principal, T12, Community Liaison Officer and ESL Teacher
19 September	Meeting with Principal regarding expansion of program	researcher and Principal
9 October	Planning meeting regarding the implementation of Cycle Three of *Active Learning*	researcher, T1, T2, T3, T4, T5, T6, T7, T9, T10, T11
20 December	End of Term evaluation	Participants Early Stage One teachers (T3, T4 and T5) Stage One (T1, T2, T6, T7, T9)

Table 3.9 *Meetings held throughout 2013*

Date	Activity / Task	Contributors
29 January	Planning session Cycle Three of *Active Learning* continues	Researcher, T1, T3, T4, T5, T6, T7, T8, T10, T11
15 February	Pre *Active Learning* survey is sent out to parents of children who would be joining the *Active Learning* program	researcher
4 April	Planning meeting regarding professional development session around science	researcher, Principal and Deputy Principal
29 April	Feedback with teachers regarding Science Professional Development session	researcher, T3, T4, T5, T6, T7, T8, T10, T11
28 June (End of Term 2)	End of Term evaluation	Participants Early Stage One teachers (T3, T4 and T5) Stage One (T1, T6, T8, T9)
17 July (Term 3)	Planning meeting for implementation of Cycle	researcher, T1 and ESL teacher

	Four of *Active Learning* in Year 2 classrooms	
17 September	Planning meeting regarding whole school Science Day	researcher, Principal, Deputy Principal, T1, T6, T8 and ESL Teacher
20 September	End of Term evaluation	researcher, Early Stage One teachers (T3, T4 and T5) Stage One (T1, T6, T78, T9)
14 December	Post *Active Learning* survey (identical to the pre *Active Learning* survey) was sent out to parents of Kindergarten, Year 1 and Year 2 children. These were the same parents who had completed the pre *Active Learning* survey	researcher
20 December	End of Term evaluation	researcher, Early Stage One teachers (T3, T4 and T5) Stage One (T1, T6, T8, T9)

3.3.1.3 Journals

A journal, or diary, was kept by this teacher-researcher and by all participant teachers as a valuable means of collecting data. A journal is a written record of observations, thoughts and reflections (Pine, 2009), "…an ongoing attempt by teachers to systematically reflect on their practice by constructing a narrative that honors the unique and powerful voices of the teachers' language" (Mills, 2011, p. 86).

Journals are not, however, merely narrative accounts of what is happening in classrooms. They include this, but additionally include participants' feelings associated with the action research process (Mills, 2011). Cochran-Smith and Lytle (as cited in Mills, 2011, p. 86) suggest that journals might incorporate:

- the essence of what is happening with students in classrooms and what this means for future teaching episodes;
- a collection of descriptions, analyses, and interpretations;

- records of classroom life in which teachers write observations and reflect on their teaching over time;
- a way for teachers to revisit, analyse, and evaluate their experiences over time; and
- clear evidence on what goes on in school through the teachers' eyes.

Journals have significant advantages. First, journals provide honest descriptions by participant teachers of what they see happening in their classrooms (Pine, 2009; Mills, 2011). In some studies, teachers are the authors as well as the only audiences to read journals (Pine, 2009), however in the current study participant teachers agreed to and therefore knew their journals would be provided to this researcher as a source of data. Second, journaling offers "a rich means for describing practice; for recording and examining beliefs, assumptions, questions, and challenges; and for expressing feelings and identifying problems" (Pine, 2009, p. 194). Third, journals can serve as way of documenting and tracking teacher development in relation to a particular issue (Pine, 2009) because "[u]nlike interviews, which usually occur only once or on a small number of occasions, diary data can be gathered over a much longer timeframe" (Gibson & Brown, 2009, p. 78). Last, journals can be an effective scaffold for teachers to reflect on their teaching, develop new insights, identify problems, assess the effectiveness of learning and teaching, and plan future actions (Pine, 2009). Therefore, journals can serve the next iteration in an action research process.

In this study, participant teachers kept a journal on a weekly or daily basis, depending on their preference. They included both intellectual and emotional reflections. This researcher, as a participant used the process of journaling to reflect on broader issues about the *Active Learning* program. The journal became a repository of a variety of data sources: readings, online resources, discussions and anything else relevant to the study. Journal reflections of participant teachers enabled this researcher to identify their needs and anxieties and decide on what would be appropriate professional development for them. This researcher's own journal enabled conclusions about what she needed to improve, what was being achieved and where further action and thought was required. Journal reflection and writing, as described by Pine (2009) and Mills (2011), became a purposeful and strategic way of adapting practice

to the ever-changing demands of the *Active Learning* program, and for maintaining focus on the research process and student learning.

3.3.2 Numerical Data

3.3.2.1 Parent Pre- and Post-intervention Surveys

Surveys are a method commonly used in educational research (Tuckman & Harper, 2012). A survey is a "useful technique in education …and… has undeniable value as means of gathering data (Tuckman & Harper, 2012, p. 10). These authors caution that analysis of survey data may be misleading without a basis for comparison and "would require comparison data" (p. 9). They further recommend that this comparison data include a follow-up survey.

One of the research questions addressed in the current study was whether a play-based program could play a role in strengthening parent partnership with the school in the education of their children. One means of gathering this data was to survey parents pre- and post-intervention to gauge their views on play as a legitimate pedagogy in a formal school setting. The survey was piloted with Education academics and adjustments made on the strength of feedback. In the design, care was taken to ensure the data would be used comparatively with other data gathered from interviews with participant teachers and with the post-intervention survey data.

3.3.2.2 NAPLAN Results

The National Assessment Program – Literacy and Numeracy (NAPLAN) is an annual assessment for students in Years 3, 5, 7 and 9. It has been part of the school calendar since 2008. NAPLAN tests the sorts of skills that are essential for every child to progress through school and life, such as reading, writing, spelling and numeracy. The assessments are undertaken nationwide, every year, in the second full week in May.

NAPLAN is made up of tests in the four areas (or 'domains') of:

- reading
- writing
- language conventions (spelling, grammar and punctuation)
- numeracy.

NAPLAN tests skills in literacy and numeracy that are developed over time through the school curriculum. (Australian Curriculum, Assessment and Reporting Authority, n.d.)

In the design of the current study it was conceptualised that children's NAPLAN achievement data would provide supplementary data to the qualitative data to see if it would add another dimension to the study. The importance of NAPLAN data to the current study is discussed in detail in Chapter 7.

3.4 Methods of Data Analysis

3.4.1 Interviews and Weekly Meetings

Weekly meetings and group interviews were recorded and sections relevant to the study transcribed. General conversation and school administrative matters were not transcribed. The more formal group interviews at the start and the end of each term of the project were recorded and transcribed (see 3.1.4.2 for specific timing and number of participants in the interviews).

Transcription and analysis are two important steps in processing interviews. Cohen, Manion and Morrison (2011) note that transcriptions are "decontextualized, abstracted from time and space, from the dynamics of the situations, from the life form, and from the social, interactive, dynamic and fluid dimensions of their source; they are frozen" (p. 367). In order to capture the original interviews and avoid data loss, all data should be recorded. When transcribing the interviews, Richards and Morse (2013) recommend that note not only be taken of what was recorded, but other data such as the tone of voice, the mood of the interviewees, and the emphases placed by the speaker, also be noted. Consequently, all interviews were transcribed in accordance with these requirements.

The interview transcripts were analysed using the following procedure:

(1) hand coding data framed with the intention of capturing participant voice,
(2) sorting data into related categories,
(3) analysing categories to identify recurring patterns and themes,
(4) clustering and specifying the range of participants,
(5) making contrasts and comparisons,
(6) subsuming particulars into generals when appropriate to do so, and
(7) ensuring conceptual coherence (Coble, Selin & Erickson, 2003).

3.4.1.1. Thematic Analysis

In processing qualitative data, data analysis is a reflexive, reactive interaction between the researcher and the recorded, transcribed data, which are already an extension of the social interaction between the researcher and participants (Cohen, Manion, & Morrison, 2011). Qualitative data analysis involves organising, accounting for and explaining the data (Cohen, Manion, & Morrison, 2011). Essentially, only one form of data analysis was used for interviews and team meetings in this study; specifically, thematic analysis.

Thematic analysis was used to analyse all qualitative data. It is defined as "a method for identifying, analysing and reporting patterns (themes) within data" (Braun & Clarke, 2006, p. 79). It organises and describes data in detail and sometimes can go beyond this, leading to interpretation of aspects of the phenomenon (Richards & Morse, 2013).

Thematic analysis has a number of advantages. It is flexible, in that this kind of analysis can usefully summarise key features of a large body of data and provide a detailed description. This might highlight differences and similarities across the data set. As such, novel insights might be gained that will be able to inform practice (Braun & Clarke, 2006). However, it also has disadvantages. Flexibility can complicate analysis as there are inevitably a number of things within the data that can be highlighted. Additionally, the judgements are made by the researcher and are therefore subjective.

3.4.1.2 The Essence of Themes

Thematic analysis is a qualitative analytical method used to discover themes. A theme "captures something important about the data in relation to the research question, and represents some level of patterned response or meaning within the data set" (Braun & Clarke, 2006). The ideal would be that a theme represent both prevalence and significance. A number of authors, however, stress that prevalence does not guarantee significance (Braun & Clarke, 2006; Cohen, Manion, & Morrison, 2011; Fereday & Muir-Cochrane, 2006). When a theme is able to capture the essence of an important aspect of the research topic, it is determined as a theme. Determining whether a theme does indeed capture such essence is a judgement that has to be made by the researcher. Consequently, the most significant influence on determining a theme is researcher judgement (Braun & Clarke, 2006).

3.4.1.3 Approaches to the Development of Themes

Three primary approaches to the development of themes are as follows: a) theory driven; b) prior data or prior research driven; and c) inductive or data driven (Boyatzis, 1998). The theory-driven approach is where researchers begin with theory and then formulate evidence or indicators that would support it. Prior-research-driven thematic analysis is where researchers identify themes on the basis of prior research. Such prior research is often related research or a pilot study undertaken by the researcher. Data-driven analysis is where researchers identify themes directly from raw information (Boyatzis, 1998). The choice among the three forms of thematic analysis will be determined by "how and why researchers are coding the data" (Braun & Clarke, 2006, p. 84).

A six-phase guide to thematic analysis has been described by Braun and Clarke (2006, pp. 87-93):

Phase 1: familiarising yourself with your data;
Phase 2: generating initial codes;
Phase 3: searching for themes;
Phase 4: reviewing themes;
Phase 5: defining and naming themes; and

Phase 6: producing the report.

In the current study inductive or data-driven thematic analysis was employed to analyse all the qualitative data. The guidelines stated above were flexibly applied and tailored to different data sources.

The interviews were conducted and recorded after inviting and receiving informed consent from participant teachers, as each new cohort joined the *Active Learning* program. While the interviews and team meetings were recorded on a small audio device, this researcher kept field notes to record non-verbal cues, which assisted in the coding of the data into themes. To enhance validity of the data, field notes were written up the same day as the interviews.

An example of an actual thematic analysis is shown in Table 3.10. This is an excerpt from an initial group interview at the start of the study in August, 2012. Eight participant teachers from Kindergarten to Year 2 were being introduced to the *Active Learning* program. The unit of text analysis was a 'speech turn' in the conversation. Each sentence or exchange was written in full. Alongside is noted the interpretation of the text followed by a categorisation of the text. The final part of the analysis was the generation of a theme that captured the essence of the text. Table 3.10 is followed by Figure 3.3, which shows each of the three categories or meta-themes generated from the examples shown in Table 3.10 (beliefs about play-based learning, professional development needs and 21st century skills). Each of these became a findings and discussion chapter. Table 3.10 also shows the themes identified within each category identified and are summarised in Figure 3.4.

Table 3.10 *Thematic analysis of an initial group interview*

Text	Summary	Category	Theme
I had a bad experience at my previous school with play. There was just no structure; kids were all over the place	Teachers associate play with unstructured chaos in the classroom	*Beliefs re Play-based Learning*	Misconception of the value of play-based learning

and the teacher had no control			
Well I've done drama role play stuff with children	Teachers pigeon-holing play to one area of the curriculum	*Beliefs re Play-based Learning*	Formal schooling = no classroom play
As an executive staff member in all my years of teaching I've <u>never</u> seen a good play program	Bad examples of play leave a lasting impression	*Beliefs re Play-based Learning*	Misconception of the value of play-based learning
The teachers I supervise in the preschool do a lot of play-based activities but they don't have the same curriculum requirements that we do	Teachers see play as a prior to formal schooling activity. Curriculum is too crowded for play-based learning. Play is not seen as a valuable vehicle for learning	*Professional Devleopment*	PD: Managing curriculum content and related activities
I think it's important for children to play so I use it as a reward for early finishers, especially iPad time. Sometimes if we have had a really good day and I get through all my teaching I love taking the kids outside for a sports game	Teacher see play as free time, reward activity not a method of teaching and learning	*Beliefs re Play-based Learning*	Misconception of the value of play-based learning
In Kindergarten we do play every day in first term in that half hour before parents arrive. What else can you do in half an hour? Plus it means while the kids are busy I can pull individual kids out for testing their reading and number skills.	Teachers use play as a busy activity while they complete work with other children	*Beliefs re Play-based Learning*	Misconception of what play-based learning might look like within formal school structures
Yes, I love running play sessions once a week in my classroom. I set up a range of structured literacy activities for children to select from.	Teachers are reluctant to relinquish decision-making to the children. Teachers see play only in a structured context	*Beliefs re Play-based Learning*	Misconception of what play-based learning is

They write in their work books which activities they have done and move around when I ring the bell.	where teacher retains control through activity selection,		
No, I'm not a trained early childhood teacher so play is really not my thing	Teachers do not have the required skills to offer play-based learning opportunities	*Professional Devleopment*	PD: Managing curriculum content and related activities
I let my children play computer games when it's wet weather	Teachers use technology as a toy	*21st Century Skills*	Development of 21st Century IT skills need to be a focus
It really doesn't suit the children in my class; they need constant structure and teacher direction otherwise nothing would get done	Teachers hold pre-conceived ideas about what play is. Determine it's lack of suitability before trialing	*Beliefs re Play-based Learning*	Misconception of what play-based learning is

Question Two: What have been your experiences conducting play-based learning in a primary school context?

- **Beliefs re Play-based Learning**
  - **Misconception about the value of play-based learning**
  - **reason**
    - it's a free time activity when learning is done
    - is not real learning
    - useful to keep children busy
    - unstructured
    - not suitable for particular children

- **Professional Development**
  - **Teachers feel inadequate**
  - **reason**
    - lack of skills in developing activities
    - belief it's an early childhood / preschool activity
    - reluctant to relinquish control

- **21st Century Skills**
  - **Teachers lack of understanding of how to use technology for learning purposes**
  - **Reason**
    - Technology as a toy

Figure 3.3 Theme outcome for initial group interview

3.4.2 Analysis of Parent Questionnaire

Over the course of the study the same survey questionnaire was given to parents to gauge their feelings and thoughts about play in primary settings before the implementation of *Active Learning* and after their child had been involved in the program for a year, 18 months and two years, depending on when their child's teacher joined the program. Appendix 7 presents a snapshot of the survey results with responses grouped by stage of implementation. To provide a representation of the sample group a selection of typical comments is provided in the findings and discussion chapters.

Parent questionnaire data were analysed using descriptive statistics and a composite narration of the frequency of prioritised responses for the free response questions (Cohen, Manion, & Morrison, 2011).

Parent views on play as a vehicle for learning: pre-intervention

- **Beliefs re Play-based Learning**
  - **Misconception about the value of play-based learning**
  - **reason**
    - it is something children do on their own
    - it is for sport
    - it is something that is valuable for children to do at home
    - it has no place in the formal classroom
    - school is for learning; play is not learning

Figure 3.4 Theme outcome from initial parent survey

3.4.3 Analysis of Numerical Data

Analysis of the numerical data was used to provide a measure of validity to the deductions made from interpretation of the qualitative data. This process provided a rich complexity of information to complete the study. Any identified positive trends in student performance data were triangulated with the qualitative data collected from the interviews and weekly team meetings. These trends could then be used to inform the practices of participants.

3.4.3.1 Analysis of the NAPLAN Data

As NAPLAN is not a pass/fail test, individual performance is shown on a national assessment scale for each test. Each test scale has ten bands, and the single scale allows students, teachers and parents to monitor a child's progress across years and compare results to previous years (ACARA, n.d.).

> The second lowest band at each year level represents the national minimum standard for students for that year level. A result at the national minimum standard indicates that the student demonstrated the basic literacy and numeracy skills needed to participate fully in that year level. The performance of individual students can be compared to the average performance of all students in Australia (ACARA, nd.).

Once completed, student performance analysis is provided to schools by ACARA. In the current study, academic performance of children was considered by using the NAPLAN results of children who participated in the program from 2013 and 2014. These results were compared with those of students from previous years who did not participate in the program. Findings from these comparisons are discussed in Chapter 7. Permission to provide teachers and parents with the opportunity to take part in the study and to implement the program was obtained through a State Education Research Approval Process (SERAP) from the NSW Department of Education and Communities (DEC). Only data provided by staff who gave informed consent were used for the current study. The DEC provided permission to use the non-identified class NAPLAN data.

3.4.4 Validity and Reliability

Denzin (2012) stated, "those of us in the mixed methods qualitative inquiry community need a new story line, one that does not confuse pragmatism for triangulation and triangulation for mixed methods research" (p. 80). Denzin (2012) was essentially criticising the idea that mixed methods research refers only to those using both qualitative and quantitative methods. He proposed that mixed qualitative methods can provide a depth of insight and useful data in particular circumstances. It is argued that the present study is a case in point, albeit that statistical analysis of NAPLAN and attendance data provides a measure of credibility to claims of success of *Playing to Engage.* This study took place at one site and was researched using a case study methodology. It provided a rich basis for continuous improvement of

learning and teaching as the intervention – the program – was implemented using action research. Through ongoing participant evaluation of the intervention and its outcomes, triangulation is essentially built-in to ensure validity.

An *ad hoc* mix of methods can threaten validity (Morse & Niehaus, 2009). If used strategically, however, triangulation provides an alternative to validation, rather than being seen as a tool to provide validation. As noted earlier (see 3.1.2) rigour in the design phase, in the conduct of the study and in its writing up, as recommended by Richards and Morse (2013), contributes further to validity and reliability.

3.5 Description of the Implementation of the Program

A detailed description of the implementation of the program, by each phase of the research and by each cycle of the action research, is provided in Appendix 4. The detailed descriptions capture through words and pictures student engagement, student learning, student problem-solving skills, student creativity in approaches to learning and the wide range of student interests displayed. Below are four descriptions included in Appendix 4. As this study's primary focus was on children's engagement and learning, in order to diligently report what took place, it has been necessary to take the description of each example a step further to capture the learning and increasing sophistication of children's problem-solving capacity.

Each of these descriptions are referred to a number of times in the findings and discussions that comprise Chapters 4, 5, 6 and 7. The first of these is called 'Going Greenhouse'.

3.4.1 Going Greenhouse

Four children sat at tables in a row with their lab coats on, waiting for a short clip to start on the Smartboard (see Figure 3.5).

Figure 3.5 Children making a greenhouse

It was the first time this study had trialled a visual procedure with the children. As the clip started they listened and gathered the required materials from the table in front of them. The clip ran again and again, running for approximately three minutes, so if they missed something they could pick it up second time around and check that they were on track.

Evidence of their extended thinking derives from the following:

- On completion of the greenhouse one of the girls asked if she could make another one, but this time using a different type of seed to see what would happen.
- Another child commented on his excitement in making a greenhouse but could not understand why it was not green.
- The children were able to select where in the classroom they set up their greenhouse. Many chose a sunny spot on the windowsill and talked about the plants' need for sunlight to help them grow. One child chose a dark spot on a table, as he wanted to see if there would be a difference between those in the sun and his.

3.5.2 Pyramids and Pillars then the Strongest Bridge

Stage One – children were given minimal instruction except to design a tower which would stay up. Based on the work of other children the majority made pyramids, which was surprising as it was not the four sided rectangular shape this researcher had anticipated. The children talked a lot about the difficulty in using the large marshmallows and asked for small marshmallows.

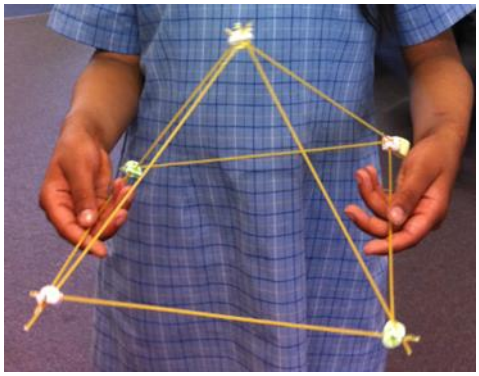


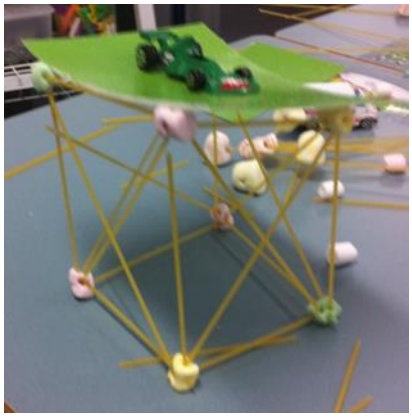
Figure 3.6 Stage 1 children making pyramids

Stage Two – this time the children were given different types of marshmallows and two varieties of spaghetti. They also had a children's science book with some structural ideas for their towers. Although the towers started to get bigger and children began working in pairs, they still resembled pyramids. Some could see that the triangle was a strong shape but they were trying to use four pieces of spaghetti to get the same shape as crossing two pieces over in an x.

Figure 3.7 Stage 2 children making pyramids

Stage Three – before the *Active Learning* session started, there was discussion with the children about strong shapes and they looked through pictures that showed the use of triangles in their construction. There were also two stations, one with marshmallows and spaghetti and the other with plasticine and spaghetti. A couple of the girls experimented with crossing the pasta over to help support the sides of their tower, and so the building began. The children

discussed the differences between the building materials and how much easier the plasticine was to work with because they could mould it into different shapes.



The Strongest Bridge

For this activity, children were given the challenge of building a bridge using only cardboard boxes, newspaper, masking tape and a ruler.

Stage One – along with the information above the bridge needed to be at least 30 centimetres off the ground.

There was only one bridge. A group of about six children gathered as a team for the challenge. One particular child took a lead role, which suited the group. Along the way they constantly measured and communicated with each other as they progressed with their construction. The bridge was a success.

Stage Two – this time the children needed to design a bridge that was at least 30 centimetres off the ground and could hold the weight of a tape dispenser in the middle.

Before they began the challenge they were shown the bridge from the previous challenge. How they had made it was discussed, and how it could not hold any weight in the middle because of its design.

The challenge attracted some of the same children but also some new competitors and a new leader. The finished product easily held the weight of the sticky tape dispenser. The children were excited and wanted to try out other objects. We found a large tub and placed it on top of the bridge. The children roared with laughter and delight. As the leader picked up the tub his brow furrowed. He picked up the tape dispenser in his other hand and with a little hefting said, "it's much bigger but the sticky tape dispenser is still heavier". The children searched around the classroom for something else which was heavier, and in the end they settled for one of the smallest children in the class. When he sat on the bridge it miraculously stayed up!

What was interesting here was the transfer of knowledge and principles understood from the pillars activity to the bridge activity. This example also highlights the fluid nature of the groupings of children working on an activity and the pictures evidence their focus on the task at hand. It also led to them constructing a real bridge to provide pedestrian entry into the wetland they had created.

3.4.3 Building a Chicken Coop

Investigations with the children always began in interesting ways, for example the chicken coop evolved from an Easter science experiment to hatch a plastic egg in water. When the children were asked what would happen when the egg was placed in the cup of water many of them thought a real chicken would hatch. Their surprising responses prompted this researcher to get fertilised chicken eggs and an incubator so they could watch real chickens hatch and experience the process for themselves.

The children were so engaged by the activity they wanted to keep the chickens. This prompted them to write a letter to the Principal and Deputy Principal stating their case as to why the school needed chickens. Once their request was approved the children began to think about what this really meant and how the chickens could be cared for long term. Based on their area of interest the children formed committees; one group researched chicken coops, argued for the one they believed best suited the animals and purchased it online. Another group surveyed areas around the school suitable to house the chickens, took measurements, created diagrams and liaised with the Principal and chicken coop children as to their plans. The third group researched ongoing food costs by visiting the local Bunnings and Pet Barn to compare prices and purchase an appropriate water tank, feeder and pellets for the chickens. When the flat pack coop arrived the children followed the instructions and built the house with the assistance of the Deputy Principal.

This example demonstrates the increasingly sophisticated thinking the children displayed, specifically in the planning phase.

3.5.4 Sensory Garden

The gardening centre was a favourite with many of the Year 2 children and the Support Unit. In one session a little girl asked if real vegetable and fruit seeds could be planted, as she was not only interested in seeing them grow but wanted to look at the different seeds. She suggested a range of seeds she wanted such as watermelon, pumpkin, zucchini, corn and tomato, and the researcher purchased them.

A little boy took over running the station during *Active Learning*, as he was excited about the growing process. He wanted to house the plants in the school greenhouse, before transplanting them into the garden. During the session the boy organised children, talked them through the process of selecting a seed they would like to plant, writing their name and the plant name on the side of the cup, as well as the actual planting. It was interesting to listen to the conversations between the children as they discussed the differences between the seeds. Children read the back of the packet to ensure they were planting them correctly.

This activity expanded into a discussion about creating a real garden. A number of the seed packets were herbs and flowers, which prompted a group of children to design a sensory garden to plant with children from the Support Unit. They researched (including tasting, smelling and feeling), and selected plants such as Aloe Vera, thyme, parsley, mint, sage and

basil among many others. When it came time to plant, the Year 2 children guided children from the Support Unit through the process. It was interesting to watch the interactions and hear the children asking questions and engaging the Support Unit children in a hands-on process. They drew on their knowledge of reading seed packets, and also planted others as seedlings, from their greenhouse selection.

3.5 Conclusion

The nature and complexity of *Playing to Engage* called for a mixed methodology approach with solid foundations in action research within a single case study. The case study elements, for example a complex context and multiple sources of data informed the stages of the action research cycles. These action research cycles over two years linked to participant evaluative process which allowed all key stakeholders, including teachers, parents and children, an opportunity to actively contribute to the research process in the evaluation of the study. To support these qualitative methods, the research also analyses the children's NAPLAN scores as one means of establishing improved learning outcomes for children. Significant improvements in the children's achievement in NAPLAN provided a measure of confidence in claims of the success of the program.

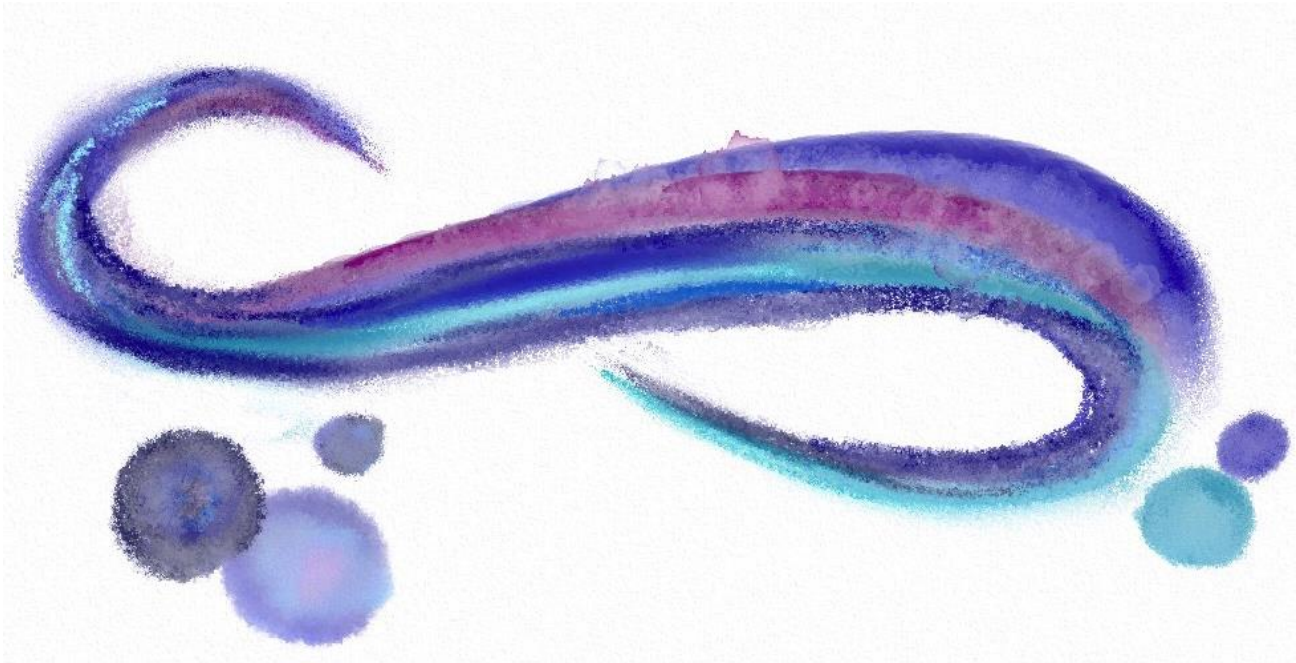
The findings and discussion chapters follow, reporting under the following meta-themes:

- Chapter 4 Play Contested

- Chapter 5 Professional Development
- Chapter 6 21st Century Learners
- Chapter 7 NAPLAN and Attendance Data

Chapter Four

Play Contested



Chapter Four – Findings and Discussion
Taking on the Notion of Play in a Primary School Setting

4.1 Introduction

Chapters 4 to 7 present the findings and discussions from the four meta-themes identified throughout the study. The meta-themes are:

- The challenges with play as a method of teaching and learning in a primary school.
- Transforming teacher thinking and practice about play-based learning in science and mathematics through professional development.
- Developing 21st century skills in both teachers and children.
- The analysis of NAPLAN data and attendance records.

This chapter focuses on play as a method of teaching and learning in a low SES primary school context, as perceived by teachers, children and parents. The subsequent discussion is informed by drawing on the findings from the thematic analysis of data collected through regular interviews with participants, weekly team meetings, researcher field notes, teacher reflective journals and parent surveys. The surveys have been encoded using descriptive statistics and a composite narration of the frequency of prioritised responses for the free response questions (Cohen, Manion, & Morrison, 2011). These methods of data analyses combined with the diversity of data sources present a comprehensive set of findings and discussion around play.

4.2 Findings From Initial Teacher and Executive Staff Interviews Regarding Play-based Learning in the Classroom

At the outset of the study all participating teachers and executive staff were interviewed to provide a baseline record of their opinions and perspectives prior to the implementation of *Playing to Engage.* The findings from questions specifically

linked to teacher understandings of play as a legitimate pedagogical approach to teaching and learning are reported in this chapter. The two questions asked were:

- Question 1: What is your view about the feasibility of implementing play-based learning in your class? (see Table 4.1)
- Question 2: In what ways have you conducted play-based learning in a primary school context? (see Figure 4.2)

Teacher responses to these questions were analysed thematically as shown in Table 4.1.

Table 4.1 *Question 1: What is your view about the feasibility of implementing play-based learning in your class?*

Text	Summary	Category	Theme
I think in Kindergarten, like we've already been doing, play is great for doing art activities which you can't fit in at other times.	In Kindergarten children do play. Play is good for art activities	*Beliefs re Play-based Learning* Play is an add-on and good for only certain curriculum areas	Formal schooling = no classroom play
If you're going to do play, it needs to <u>look</u> legitimate. Make sure you write the activities down so it looks like you planned …	Play is not a legitimate vehicle for learning	*Beliefs re Play-based Learning*	Misconception of the value of play-based learning
Play is good but I just don't have time; my literacy stuff takes the whole morning, I need the whole two hours in the morning and half an hour after lunch to fit in modelled reading, build a sentence, spelling, handwriting, writing and guided reading, and that only like 20 minutes on each. Then I have an hour to do maths drills, numeracy	Curriculum is too crowded for play-based learning. Play is not seen as a valuable vehicle for learning	*Beliefs re Play-based Learning* Formal School structures impose inflexible structures which lead to one type of teaching.	Misconception of what play-based learning might look like within formal school structures

and a strand. Plus the afternoon is taken up with COGs. I just don't have the time for kids to play.			
I'm busy at lunch marking work, writing reports or setting up for learning. I don't have time, and I'm not giving up my lunch or recess to setup for play.	Teachers feel too busy already to take on a new initiative	*Professional Devleopment*	PD needed on replacing current workload, not adding to it
And how would I get five year olds to use iPads without breaking them? I'm not using my personal phone. And what would the others be doing while I teach some how to use the iPads?	Teachers doubt children's capacity with IT and their capacity to manage it	*21st Century Skills*	Development of 21st Century IT skills need to be a focus
Assessment is another problem I foresee. What would I write as assessment? What should I do? Write that they are having fun?	Teachers are insecure about the link between children's activities and formal assessment structures	*Professional Devleopment* Teachers insecure about assessment within play-based learning	PD: Assessment of authentic tasks and links to curriculum
My concern is, also, what about assessment? How do you gather data on what the children are doing? Do I have to record information on kids from other classes and how do I make sure there is enough data on my kids?	Teachers are not sure of how to record information on children in play-based learning situations to inform assessment	*Professional Devleopment* Teachers insecure about assessment within play-based learning	PD: Assessment of authentic tasks and links to curriculum
I'm just not sure myself. I don't know a lot about play and I can't even think of any activities. I think it would take a lot of work and planning for my children to be able to do Active Learning.	Teachers are not confident in their ability to think up authentic tasks	*Professional Devleopment*	PD: Managing curriculum content and related activities
My problem would be giving them (children) the	Teachers are reluctant to relinquish decision-	*21st Century Skills*	Collaborative problem solving

choice of who to work with. I mean, how do they know who's best for them to work with on an activity? It's my role as teacher to do that.	making to the children. Teachers unsure of their role in this context		need to be a focus
If I'm supposed to be the teacher, how can I know with a challenge, say, that they're learning anything, if I'm not organising it? They need my direction on what to do next if we want to assure the outcome.	Teacher should be in control otherwise she cannot be sure of learning. Children need this direction.	*Professional Devleopment* Teachers wary of moving away from teacher-directed learning and teaching	PD: Scaffolding opportunities, teachable moments and direct instruction within play-based learning

A summary of this analysis is shown in Figure 4.1.

Question 1: What is your view about the feasibility of implementing play-based learning in your class?

- **Beliefs re Play-based Learning**
  - **Misconception about the value of play-based learning**
  - **reason**
    - is an add-on
    - is not real learning
    - there is no time for play
- **Professional Development**
  - **Teachers feel inadequate**
  - **reason**
    - teachers are too busy
    - assessment unclear
    - lack expertise in developing activities
    - reluctant to relinquish control
- **21st Century Skills**
  - **Teachers lack skills to promote these skills**
  - **Reason**
    - Unclear how to promote these skills
    - Role in IT related skills development unclear

Figure 4.1 Summary of thematic analysis for question 1 conducted during initial group interview

All initial interview questions were analysed using the same thematic analysis. A summary of the analysis of question 2 is shown in Figure 4.2.

Question 2: Have you ever conducted play-based learning in a primary school context?

- **Beliefs re Play-based Learning**
  - **Misconception about the value of play-based learning**
  - **reason**
    - it's a free time activity when learning is done
    - is not real learning
    - useful to keep children busy
    - unstructured
    - not suitable for particular children

- **Professional Development**
  - **Teachers feel inadequate**
  - **reason**
    - lack of skills in developing activities
    - belief it is an early childhood / preschool activity
    - reluctant to relinquish control

- **21st Century Skills**
  - **Teachers lack of understanding on how to use technology for learning purposes**
  - **Reason**
    - Technology as a toy

Figure 4.2 Summary of thematic analysis for question 2 conducted during initial group interview

4.3 Findings From Post Intervention Teacher and Executive Staff Interviews Regarding Play-based Learning in the Classroom

At the conclusion of Cycle Four, teachers were once again interviewed to ascertain if their perceptions about play-based learning pedagogies had evolved throughout the study. The questions were changed from the initial interview questions to the following:

- Question 1: What has been your experience with play-based learning throughout the study? (see Figure 4.3)

- Question 2: To what extent do you see play-based learning, as a teaching pedagogy, continuing in your classroom now the program has finished? (see Figure 4.4)
- Question 3: How do you feel about providing play-based science and mathematics play-based experiences? (see Figure 4.5)

All follow-up questions were analysed thematically consistent with the analysis of the initial questions. Figures 4.3, 4.4 and 4.5 show the summaries of these analyses.

Question 1: What has been your experience with play-based learning throughout the study?

- **Beliefs re Play-based Learning**
  - **play-based learning does have a place in the classroom**
  - **reason**
    - teachers can articulate how play and the curriculum fit together
    - teachers are able to successfully create play activities linked to the curriculum
    - identify with play as an appropriate method of teaching and learning
    - recognise the wide range of benefits play has including cross-curricula and development of social skills
    - minimal behavioural issues

- **Professional Development**
  - **Teachers feel more confident**
  - **Reason**
    - can independently and collaboratively plan and develop play-based learning activities
    - independently sort new activities themselves
    - define their role in *Active Learning* sessions as facilitator
    - feel they have been understanding of questioning techniques

- **21st Century Skills**
  - **Teachers feel more confident**
  - **Reason**
    - technology can be used purposefully in the classroom for learning
    - articulate the roll on effect of *Active Learning* in other classroom activities
    - identify positive outcomes of children working together and learning from each other

Figure 4.3 Summary of thematic analysis for question 1 conducted post-intervention

Question 2: To what extent do you see play-based learning as a teaching pedagogy continuing in your classroom now the program has finished?

- **Beliefs re Play-based Learning**
  - **play-based learning has a place in primary classrooms**
  - **reason**
    - continue regular *Active Learning* sessions in stage groups
    - like to try extending play-based learning into other classroom activities
    - understand how play-based learning and assessment work together
    - see benefits of curriculum integration through play
    - enjoy the productive and engaging nature of the program

- **Professional Development**
  - **Teachers feel more confident**
  - **Reason**
    - move towards offering more child-centered learning experiences
    - now know how to scaffold this type of learning for new children / next year
    - enjoy using different methods of data collection like iPads and Google Docs
    - confident in process now ready to offer more child initiated activities

- **21st Century Skills**
  - **Teachers feel more confident**
  - **Reason**
    - explore using more technology in literacy and numeracy
    - enjoy learning with children
    - children are more independent learners

Figure 4.4 Summary of thematic analysis for question 2 conducted post-intervention

Question 3: How do you feel about providing play-based science and mathematics play-based experiences?

- **Beliefs re Play-based Learning**
  - **play-based learning provides engaging opportunities**
  - **reason**
    - focus on real world learning
    - hands-on approach to understanding science and mathematics concepts
    - multiple opportunities for children to demonstrate learning
    - freedom for children to self-select method of learning and problem solving approach which suits them
    - create opportunities which cover wide range of skills and abilities
    - gives children a comfortable entry point

- **Professional Development**

- **Teachers feel more confident**
- **Reason**
  - can research and design play-based activities
  - building links between science and literacy, science and the arts etc.
  - taking into consideration children's interests and passions
  - collaborative planning environment to bounce ideas around
  - greater support and resources

- **21st Century Skills**
  - **Teachers feel more confident**
  - **Reason**
    - challenges provide opportunities for children to apply skills to a different situation
    - using technology to support learning
    - problem solve issues

Figure 4.5 Summary of thematic analysis for question 3 conducted post-intervention

4.4 Findings From Initial Parent Questionnaire

Prior to the commencement of *Active Learning* in Year 2, a questionnaire was sent home to parents encouraging them to share their thoughts and understandings of play in primary school classrooms. The data collected were analysed using the same thematic analysis methods for the teacher interviews. The questions asked were:

- Question 1: What is your understanding of play in the classroom? (see Figure 4.6)
- Question 2**:** To what extent do you think playing helps your child to learn in the classroom? (see Figure 4.7)

***Question 1:* What is your understanding of play in the classroom?**

- **Beliefs re Play-based Learning**
  - **Play has no place in the classroom**
  - **reason**
    - free time activity
    - a reward for being good
    - an activity for the playground and home environment
    - keeping children healthy
    - fun

- activities like board games, computer games and drawing

Figure 4.6 Summary of thematic coding for question 1 from pre- *Active Learning* Parent Survey

Question 2: To what extent do you think playing helps your child to learn in the classroom?

- **Beliefs re Play-based Learning**
  - **Play is not a beneficial learning tool**
  - **reason**
    - play is about developing social skills
    - limited educational benefits
    - is a tool for giving children's minds a break from learning
    - builds creativity

Figure 4.7 Summary of thematic coding for question 2 from pre- *Active Learning* Parent Survey

4.5 Findings From Post Intervention Parent Questionnaire

At the conclusion of the study, parents of Kindergarten and Stage 1 students were asked to complete an identical questionnaire to the pre- *Active Learning* Parent Questionnaire. Figure 4.8 shows a summary of the analysis of this parent post-intervention questionnaire.

***Question 1:* What is your understanding of play in the classroom?**

- **Beliefs re Play-based Learning**
  - **Play has a place in primary school classrooms**
  - **reason**
    - play includes reading, singing, counting
    - develops fine and gross motor skills
    - helps develop mental strategies like problem solving and critical thinking
    - builds social skills
    - fun way of learning
    - great way for children to express themselves, their ideas and skills
    - encourages independence

Figure 4.8 Summary of thematic analysis for question 1 from the post- *Active Learning* Parent Questionnaire

Question 2: To what extent do you think playing helps your child to learn in the classroom?

- **Beliefs re Play-based Learning**
  - **Play does help my child to learn**
  - **reason**
    - children want to learn because they love this style of teaching
    - helps them understand difficult concepts
    - makes learning more enjoyable
    - improves self-confidence
    - it's engaging
    - learning without knowing it

Figure 4.9 Summary of thematic analysis for question 2 from the post- *Active Learning* Parent Questionnaire

4.6 Findings From Teacher Journals on Children's Pre *Active Learning* Ideas About Play

To ascertain children's understanding of play-based learning prior to the implementation of *Active Learning* (see Figure 4.10) teacher journals were thematically analysed using the same process outlined above.

Children's perspectives on play-based learning prior to study

- **Beliefs re Play-based Learning**
  - **Play is not learning**
  - **reason**
    - free time
    - break from learning
    - fun
    - play time
    - time to muck around

Figure 4.10 Summary of thematic analysis of children's perspectives on play-based learning prior to the commencement of the study

4.7 Findings From Teacher Journals on Children's Post *Active Learning* Understandings of Play

Figure 4.11 presents a summary of the thematic analysis of children's responses recorded in teacher journals post- Cycle Four.

Teacher perceptions of children's understandings of play-based learning post study

- **Beliefs re Play-based Learning**
  - **Play is how we learn**
  - **reason**
    - learning with others
    - different way of learning
    - share my skills and knowledge with others
    - I can teach others
    - choice
    - learning my way

Figure 4.11 Summary of thematic analysis of teacher perceptions of children's understandings on play-based learning post- study

4.8 Defining Play

4.8.1 Misconceptions of Play

The overarching finding of this chapter, which presented itself repeatedly throughout the thematic analysis of data, was the diverse and widely varying interpretations of the term *play* held by key stakeholders. This, in turn, significantly impacted how the program was implemented and the methods adopted to influence the implementation of *Active Learning* in classrooms. Initially across all groups, parents, teachers and children, there was a common misconception that play was not a valuable learning tool in primary school settings. This was especially the case for parents (see Appendix 7) and teachers. The analysis of initial teacher interviews and actions of executive staff (see Appendix 4; 4.2.4), showed that both groups overwhelmingly believed play held no place in the effective education of children. This was because it was not "teacher directed, explicit and structured", as indicated by a senior executive staff member.

Gronlund's (2010) account of an earlier study attributed similar findings to the lack of general consensus about what play is and the diversity of experiences of stakeholders affected their judgement about the value of play for learning.

4.8.2 Formal Schooling = No Classroom Play

Analysis of early data highlighted that while teachers' and parents' views on play were aligned, children had a vastly differing interpretation. A significant theme reflected in the pre-program parent questionnaire was parents' misinterpretation of the term play as an outdoor, weekend activity. For teachers, team meetings and interviews revealed the consistent view that play consisted of unstructured activities, seriously lacking sound curriculum links, and did not promote learning. From the children's perspective, play was associated with free time as evidenced by their consistent substitution of the term with *Active Learning* during Cycles One and Two. None of the key stakeholders offered a single link between play and learning in the classroom. From the perspective of informing subsequent stages of this study, the initial views and understandings of teachers, parents and children provided a basis for changing the thinking about play.

In the context of the current study, teacher and parent perceptions of play significantly impacted the range and variety of educational experiences and activities which were offered within lower primary classrooms. Guided by the views expressed in NSW curriculum documents, school-wide policy documents, notions of formal instruction and teacher ideas about what a lesson should look like, there was little space left for play and play-based opportunities as promoted by this study. There was an expectation on the part of participants that when children entered primary school their modes of learning needed to change. This was evident, for example, in the same Executive staff member being responsible, throughout the project, for overseeing the Preschool (prior-to-school class) and Early Stage One (Kindergarten class) teams even though there was no interaction between the two groups. There was no sharing of ideas or collaborative professional development. Preschool and Kindergarten were seen as two discreet and separate phases of education. In Kindergarten, children were

suddenly required to sit at desks, complete bookwork and participate in a range of regimented programs. This parallels the findings of Weimer (2013), whose research indicated that children were expected to conform to the narrow boundaries of the classroom teacher who predominantly dictated learning experiences.

4.8.3 Defining the Term *Play* for this Study

These findings identified and called for the need to establish a collective definition of *play*, if the researcher was going to bring together teachers, parents and children to reorient their thinking and practice around play in the classroom. The word play has a variety of meanings depending on the context and the role of the adults involved. As shown above, play took on different definitions depending on the participants' prior experiences. In addition, play was perceived differently in the context of the home, early childhood settings, the school playground and 'free time' in the classroom. An important reoccurring theme in teacher interviews was that play-based learning within the classroom was yet another 'type' of play for them to come to terms with.

Early childhood teachers identified play as a way for young children, aged birth to five years, to explore and discover the world around them., This mirrors a Piagetian (1971) mindset (cf. Howard, 2010; Harris, Michnick Golinkoff & Hirsh-Pasek, 2011). Gronlund's (2010) study of primary school teachers identified play as an outdoor and free time activity rather than something which occurred during classroom learning time. Similarly, parents who had young toddlers at home viewed play as children engaging with toys, blocks and stuffed animals (Wong, Wang, & Chang, 2011). These same parents who also had slightly older primary school aged children perceived play as recess and lunchtime activities, as well as outdoor sporting ventures.

In this context it was important for all key stakeholders to embrace play as involving child-centred learning experiences, coupled with meaningful adult interactions and questioning techniques. This in turn would help differentiate it from their perceptions of play and set this type of play apart from other modes.

4.9 What Does Play Look Like in a Primary School Context

4.9.1 *Active Learning* Secretly Play

The findings from the qualitative analysis made it necessary to take the key elements of play and re-configure them. This included a new title for the program, without losing the essential fundamental nature of the meaning of play in the context of a holistic journey that explores who children are and where they can go (Broadhead, 2004). Play-based learning is the core component of the *Active Learning* program, developed as part of *Playing to Engage.* It became evident that if the program was to overcome and disassociate key stakeholders from their negative perceptions of play, the program title would have to include the word play. Thus *Active Learning* was adopted.

Consequently, *Active Learning* aimed to provide a play-based program to meet all key stakeholders' requirements of teaching and learning in the classroom. As envisioned in the EYLF, education should be about offering play-based learning opportunities which embody a strong sense of self, social interactions, community, literacy and numeracy. Fundamentally, the current study needs to help teachers realise that children today have changed dramatically from those of the past. More than ever there is a need for personalised, tailored learning experiences (Prensky, 2011), especially to engage children from low SES backgrounds. Furthermore, the *Active Learning* program needed to highlight the global understanding that effective pedagogy for the early years can extend beyond preschool. Essentially, the strategies used to engage pre-schoolers can be successfully applied in older grades.

4.9.2 Successfully Introducing *Active Learning* into Primary Classrooms

The *Active Learning* play-based program became a feature of weekly teaching and learning in all Kindergarten to Year 2 classes, including Support Classes, and was later introduced to other curriculum areas. It was extended beyond the identified age range outlined by EYLF to include Years 3 and 4. This is an idea championed by Prince (2004). Paralleling the findings of Alexandra (2010), the program challenged

conventional views of play and asked teachers, parents and children to experience play as a much loved part of children's lives, to give it an educational dimension. The key was to develop a program that did not need to be mandated by the school Executive, as was the case for the initial trialling of the program. Rather, the program aspired to excite teachers so they would commit to the pedagogy of play and offer *Active Learning* as a play-based learning program in their classrooms.

Although the concept of play is familiar and alive in early childhood settings, as acknowledged by the Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008) it is not prevalent in the school context. In the current study, once this style of learning and teaching was adopted, it enabled both teachers and children to begin to develop the 21st century skills of creativity, problem solving, critical thinking, transferability of knowledge and presentation skills (Robinson & Aronica, 2015). Play in this context meant giving children the freedom to make their own choices, access the curriculum from a more comfortable platform and differentiate the learning themselves (Prensky, 2011).

4.10 Teachers and Play

4.10.1 Overcoming Negative Perceptions of Play in the Classroom

From the outset of the study, as Prince (2004) anticipated, teachers were reluctant to consider a play-based approach to learning and teaching. Lave and Wenger's (1991) epistemology of situated learning (cf. 2.1.1), highlighted the importance of participants, in this case teachers, being intimately connected to the learning process and resultant practice. Initially this was not easily achieved. Teachers struggled with the term play and had difficulty using it in their classrooms. It was not simply classroom teachers who found the concept challenging but also the school Executive. O'Connell (2012) suggests that school leaders would find it difficult to conceive of play as a potential strategy to meet the learning needs of today's children. During the first phase of the study, when the researcher was implementing an action research process to improve her skills in delivering play-based learning, the principal would regularly

visited the classroom to observe the quality of lessons. After observing four sessions he said "It's amazing. They are all engaged and nobody is mucking about." This comment reflects the typical response of the school Executive leadership who expected chaos and not much evidence of learning, if 'play' was taking place.

Teachers not only found it challenging to conceptualise what play-based learning would look like, but also their role in delivering it, and how it would enact the curriculum. It must also be noted that support staff, who were present in the lower primary rooms from time to time supporting children with additional needs, also initially found it difficult to connect with the concept of the play-based learning experiences.

4.10.2 Pinpointing Specific Issues when Offering Play-based Learning Experiences

During the *lesson study* professional development sessions (see 2.8.8) the nine lower primary teachers were asked to articulate challenges which would prevent them from incorporating play into their weekly timetables. The diagram below displays themes commonly mentioned by the participants, and which are addressed in the discussion.

During lesson study sessions and group interviews, teachers and executive staff generally fell into three categories when thinking about play:

1. Those who were concerned about not having enough time, considering the pressure of meeting curriculum requirements. The following response was typical: "Play is good but I just don't have time; my literacy stuff takes the whole morning; I need the whole two hours in the morning and half an hour after lunch to fit in modelled reading, build a sentence, spelling, handwriting, writing and guided reading, and then only like 20 minutes on each. Then I have an hour to do maths drills, numeracy and a strand. Plus, the afternoon is taken up with COGs. I just don't have the time for kids to play."

2. Those who expressed lack of knowledge and concern about resources. They felt they could not confidently present play sessions as evidenced in the following comment, typically voiced by a number of teachers: "I'm just not sure of myself. I don't know a lot about play and I can't even think of any activities. I think it would take a lot of work and planning for my children to be able to do this, and where would I get and store the resources?"
3. Those who expressed concern because of experiences in the past, when play had been free time and not a time for learning related to the curriculum. One such teacher noted: "If you're going to do play, it needs to look legitimate." This captured the views of those who felt play was not going to lead to learning.

4.10.3 Adopting the Title *Active Learning*

It is for these very reasons the official program adopted the title *Active Learning*. It must be noted that this alternative term did not come without its own set of prejudices, which will be addressed later in this chapter. The teacher perceptions mirrored those in the literature; for example, the structural and psychological barriers found in Howard's (2010) study; the lack of time noted by Harris et al. (2011); and the insecurity around planning for play-based learning as expressed in the study by Martlew, Stephen and Ellis (2011).

Understanding teacher concerns offered a point of entry, to begin transforming impedimentary thinking and promoting play-based learning as a dynamic tool that could withstand and counter teacher arguments against play-based learning. Perceptions had to change. Prensky (2001) argues teachers should be motivated not so much by content as by a focus on process, searching for methods of learning that meet children's needs and interests. To assist, an operational definition of the *Active Learning* program was developed as follows:

Active Learning **program**

The *Active Learning* program consists of a range of engaging developmental play activities as promoted in the EYLF and which link to the NSW Curriculum. As well, the program takes into account Primary Connections and COGs being taught as part of regular classroom practice. Sessions generally run for an hour and can be conducted inside and outside the classroom by a single teacher or, where possible, multiple teachers. During play children are able to move freely around the room and self-select the activities in which they would like to participate. A conscious effort is made to vary activities across all of the Key Learning Areas (KLAs) – providing purposeful activities that engage children and have an intentional focus on outcomes, as well as including at least one science, one mathematics and one role play activity per session.

The teachers' main roles during *Active Learning* are to ask questions, to focus on teachable moments and encourage sharing of knowledge with other children, to record anecdotal observations and to provide materials and resources to enhance learning experiences.

4.10.4 Let it go! Let it go!

Initially, teachers found it challenging to establish their role in the *Active Learning* sessions. According to Scoufis (2013), this was to be expected. A typical response by T3 captures this: "what should I do? Write that they are having fun?" For all the lower primary teachers the notion of student-choice was frightening. Weimer (2013) reasoned that teachers were used to creating detailed weekly, even termly programs filled with teacher-directed activities and experiences that were packaged neatly into

separate Key Learning Areas (KLAs), even though there is significant research to suggest other more integrated approaches are more relevant (Scottish Executive, 2007). For some, preconceived perceptions regarding the capabilities of children from low SES backgrounds and EAL/D learners made them question the capacity of children to learn in such an environment. For example, T7 noted "they [children] couldn't possibly do that"; another concurred: "they are all lowbees" (T5), and this was supported by T9: "they can't speak English." The *Active Learning* program asked teachers to take a step back, utilising Sugatra Mitra's "grandma effect" and let the children show (teachers) what they could do independently (Scoufis, 2013) and with the support of other children (Vygotsky, 1962), rather than by teacher directed experiences.

As predicted by Howard (2010), many teachers, during Cycles Two and Three, struggled to define their role. Consequently, ongoing support and reminders about the agreed process of implementing *Active Learning* were required. Mirroring Weimer's (2013) experience, some teachers would sit down at a station and complete the activity. This was not *Active Learning*. Such a practice only encouraged children to copy the teacher and adopt the mindset of 'this is what the teacher wants'. Or teachers would provide the answer instead of encouraging the children to find it for themselves (Scoufis, 2013), or most commonly they would answer for a child. For example, child one would say, "What are they making?" and the teacher would respond, "a rocket ship" instead of encouraging the children to communicate with each other. The literature emphasises that this would be typical and was to be expected because teachers resist change (Fullan, 2003) and it is only if their beliefs change, that teacher practice will change (Darling-Hammond, 2003).

Fleer (2009) argued that the program itself should be designed to promote positive interactions between children and adults. It was a matter of changing thinking, encouraging teachers to celebrate children's perspectives, and allowing children to express themselves and their individuality. Teachers gradually reached the understanding that one approach does not suit all and that they needed to withhold

their personal judgements and the urge to do things for the child. This change in thinking and practice was achieved, as discussed earlier, through the *Lesson Study* professional development (also see 5.3.2).

4.10.5 The Evolution towards Child-Centred Developmental Play

By Cycle Four of the action research, the transformation from teacher-directed to child-directed learning could quite clearly be seen. By this Cycle children were confidently self-selecting activities and running stations themselves; the program had completely turned previous planning and programming on its head. Teachers had acknowledged the importance of ascertaining the specifics of children's prior knowledge and experiences, and accepted their diverse interests and abilities. Mirroring the findings of Timperley (2009), teachers who were initially sceptical were surprised during the *Lesson Study* process to see children, similar to those in their own classes, productively and earnestly engaged, learning and, importantly, being able to demonstrate that learning. Teachers saw for themselves the increased level of student engagement which, in turn, increased student learning. The outcome of increased student learning played a significant role in motivating teachers to change their practice.

The *Active Learning* program helped teachers enter into a positive mindset regarding the capabilities of low SES and EAL/D learners. During reflective conversations after *Active Learning* sessions teachers, support staff and parent helpers would frequently comment on the achievements of individual children. Specifically, they noted the depth of children's knowledge on particular subjects and the skills they were able to demonstrate and share with each other. As observed by Saracho (2011), children began to relate knowledge and skills learnt during science and maths lessons to a wide range of KLAs. This demonstrated the ability of children learning to transfer new knowledge to new situations.

4.10.6 Sit Back and Relax, Let Them Play – uh-oh!

At the other end of the spectrum was the issue of teachers becoming too relaxed. Gronlund (2010) suggested this might happen with the result that teachers may sit

back while children ran free. During Cycle One a neighbouring teacher (who later became T6 in the study) said, "…if you're going to do play it needs to look legitimate. Make sure you write the activities down so it looks like you planned them and then do whatever you want." It became a learnt skill to assist child interactions by finding a balance between being too standoffish and hovering during lessons.

From the outset of Cycle Two, effective interactions were modelled by more experienced teachers to establish expectations with other teachers around appropriate and meaningful interactions (Beetham & Sharpe, 2013; Bodrova & Leong, 2007; Vygotsky, 1962; Wong, Wang & Chang, 2011). It was of significant benefit to teachers to be working in teams, as it meant they shared a responsibility to each other. This study emphasises that much of the success of play-based learning, indeed the quality of student learning, is dependent on the level and type of adult-interaction within the play. Teachers had to learn the art of questioning to lead children in concept development. This was modelled during the *Lesson Study* process and taught during professional development sessions. Teachers had to learn, through observation, when there was a teachable moment, when direct instruction would be appropriate, and when they could stand back, and allow child-child interactions to support learning.

4.10.7 Managing Curriculum Content

Active Learning required a sound understanding of the NSW Curriculum documents for Stage One. For the program to be successful and allay teacher concerns about the lack of time to conduct the program there needed to be sound and robust curriculum links. Martlew, Stephen and Ellis (2011) suggest the ongoing struggle to implement a successful play-based program in a primary setting is in establishing curriculum content as a vital component of that program. They go on to say that often this link is made after the event, rather than before it. The implementation of *Active Learning* more closely paralleled the approach suggested in the EYLF document:

> Educators draw on a rich repertoire of pedagogical practices to promote children's learning by:
> - adopting holistic approaches;
> - being responsive to children;
> - planning and implementing learning through play;

- intentional teaching;
- creating physical and social learning environments that have a positive impact on children's learning; and
- assessing and monitoring children's learning to inform provision and to support children in achieving learning outcomes. (DEEWR, 2009, p.14)

In this instance, the teacher notes the learning taking place as a result of classroom activities and relates that learning back to the curriculum, rather than starting with the curriculum and insisting children engage in specific activities to meet the curriculum learning outcome. In the current study, this was largely overcome by modelling, as explained in Chapter Four. Curriculum links were made explicit from the activities observed during *Lesson Study* processes.

4.10.8 Dual Role of the Researcher

Each Cycle of the action research presented new challenges. In exactly the same way children were scaffolded into the *Active Learning* process, teachers were provided with ongoing support to help make the overall experience more manageable. For the researcher this meant oscillating between the role of researcher and participant not only while the program was being implemented but also when it was being evaluated. The notion of the researcher fulfilling a dual role and traversing between the two, and leading teachers to do the same, will be discussed in detail in Chapter Six (see 6.1.1).

4.10.9 Building upon Teachers Strengths in Specific KLAs

The current study predominantly focused on building skills and confidence in children and teachers in the areas of science and mathematics, although this later infiltrated all curriculum areas. During Cycle Two, teachers could confidently select art activities, develop role play scenarios and fill the mystery box with recycled materials, but they found the idea of creating mathematics and science options daunting. There were separate issues for each of the main curriculum areas. In relation to mathematics difficulties, as identified by Notari-Syverson and Sadler (2008), tentativeness revolved around the notion of presenting play-based learning experiences and linking them to real world scenarios. This was also, in part, due to

teacher hesitancy because of their lack of knowledge of mathematics concepts and how they could be related to real world scenarios. T7, for example, noted, "I need to rely on the textbook and prepared worksheets because I am not confident." Teacher insecurity around science concepts was even more extreme. Similar to the Buxton, Lee and Santau (2008) study, in addition to not understanding science concepts themselves, teachers felt uncomfortable letting children complete experiments independently, and were unsure how to promote children's access to practical activities. This became evident through their questions and observations in the initial group sessions, as the following exchange demonstrates:

> T4 – It's so much easier to make a craft station, just to put out paint and pencils.
>
> T3 – My favourite science experiment is the mini greenhouses because I don't have to think and there is one possible outcome.
>
> T5 – It's much easier and less messy if I just run the science station myself. If the kids pour the stuff it's just so messy.
>
> T4 – I put out the dice and counting games we use for Maths groups but the kids don't want to play them.
>
> T7 – It's just too hard for our Kindergarten kids to do activities by themselves.
>
> (researcher field notes, 17 August 2013).

In order to support teachers and build a culture of confidence, activities and experiments in science needed to be selected as part of the program. Throughout this Cycle a number of *Lesson Study* opportunities were provided for teachers to observe science learning opportunities including the modelling of positive interactions, questioning techniques and ultimately how to facilitate learning. In reflective diaries, teachers mentioned that they needed to engage more deeply with science content themselves and learn the foundational knowledge behind the science experiments they wanted to provide for children. The teachers' lack of confidence meant that

initially they did not engage with children in particular activities and avoided conversations. The teachers were constantly reminded that it was okay not to have all the answers and that knowing you do not have all the answers in itself is good modelling for children.

4.10.10 Teachers Lift Their Science Game

By Cycle Three of the action research, teachers had become more confident presenting a range of basic science experiments, which they had been trained in through the professional development *Lesson Study* sessions. For the science experiments, stations could only cater for a few children, three or four at a time. This meant each experiment station would have to be provided week after week over multiple weeks, to provide opportunities for all children in the class to have a turn. Working with small groups of children week after week gave teachers time to reflect on their experiences and become better prepared for the next session. This was a key factor in increasing teacher confidence and expertise (Ainley, Kos & Nicholas, (2008). Teachers had also become more confident in asking to be observed by peers so they could receive constructive feedback. At times they video recorded the station activities and brought this to the next professional development meeting so the whole group could view it and provide feedback and advice.

During Cycle Three, open-ended activities such as the mathematics and science bridge building challenges were being encouraged. The next step was to convince teachers that science experiments which had multiple answers and no single predetermined solution were great tools for encouraging the development of 21st century skills. An emphasis was also placed on how science is partly about the journey taken to develop scientific skills, although the outcome in terms of children's concept development is also important. This was achieved through *Lesson Study* observations and by the end of Cycle Three, teachers were becoming confident using open-ended inquiry.

4.10.11 The Importance of Working Together

In the case of mathematics, collaborative preplanning allowed a team of teachers to identify and list key concepts and design activities to support and consolidate learning in the classroom. This in turn gave teachers time to mentally prepare and strengthen their own background knowledge before interacting with children. At this stage, teachers were clearly starting to move between pedagogy and andragogy as models of teaching and learning. This transition will be discussed in detail in Chapter Six (see Figure Eight). During the group interviews, T1 discussed the benefits of being part of a collective group:

> T1: It made me feel more confident to be able to work with other teachers and not have to do all the planning myself. In the beginning I didn't have as many ideas for science and maths activities, but being part of a group meant I could benefit from and explore ideas with other teachers before settling on options for our session."
> T4: …being part of a group helps to keep the planning on track and moving along. It's easy when working with others to keep a focus on creating real-world, meaningful experiences.

This shift to collaborative thinking, also described by Prensky (2011), played a significant role in promoting the move away from standardised teaching to the realm of child choice and individualised learning.

4.10.12 Children Running the Sessions

By the completion of Cycle Four, Year Two classrooms were sufficiently capable to be used to showcase the idea of running sessions completely through child choice. Hattie (2008) argued there is a need to challenge conventional ways of teaching and strive towards new, contemporary approaches to promoting learning; here, the reliance on children's interests determining the activities was a significant departure from Cycle Three, as it involved backwards mapping to the curriculum once an interest was identified. Curriculum outcomes could then be placed at the forefront during interactions with children and explicit teaching could be linked to the inquiry-based activities provided.

The collaborative community of Early Stage One and Stage One teachers provided a safe environment where teachers could experiment with cross-curricular activities and explore child-choice options. In the same way as identified by Desimone (2011), the elements of safety and confidence promoted in *Active Learning* helped teachers collaborate and become involved in meaningful discussions not only with other teachers but with children and parents as well. The sessions were also authentic opportunities for teachers to – as discussed by Beetham and Sharpe (2013) – re-think their role in the classroom and become a facilitator of children's learning. Teachers documented children's learning as recommended by EYLF (Australian Government Department of Education, Employment and Workplace Relations, 2009) and in the focus groups they discussed the academic achievements of individual children. Children's progress was noted on the "tracking sheets" provided for each activity (see Appendix 9). Additionally, teachers highlighted children's talents, articulated observations and shared their desire to extend the skills they had obtained through *Active Learning* into other areas of their practice.

4.10.13 Not Common Practice

The activities described in Chapter Four and experiences provided for children may seem like good, sound pedagogy which educators would expect to find in any classroom in the early years of formal schooling. The reality is, initial teacher resistance to play-based learning indicated that before the intervention was implemented traditional teacher-orientated learning predominated. At the start of the study, teachers followed a model of teacher-directed learning as presented by Smith and Maher (2015 in press) with little to no child-centred opportunities. In addition, Ainsley, Kos, and Nicholas (2008); Buxton, Lee, and Santau, (2008); Martlew et al., (2010) and Varol and Farren, 2006 described that considerable uncertainty about curriculum knowledge, specifically in mathematics and science, was being expressed by teachers. As evidenced by the New South Wales Department of Education and Communities (2014), this problem was not limited to this case study school. A

significant number of schools across the State required the intervention of a permanent literacy and numeracy executive teacher consultant.

Data gathered from teachers in the case study school highlighted the fact that science had previously been taught in isolation from other subject areas and often conducted in a mad panic around reporting times. Teacher reflective diaries noted that prior to *Active Learning*, the experiments undertaken were so structured they came with a pre-determined outcome. After engaging in *Active Learning*, teachers noted that in the past they had therefore missed meaningful science processes with their children.

Generally, the teaching of mathematics or science meant teachers stuck close to traditional methods of explicit teaching practices, gave instruction in isolation from other Key Learning Areas, conducted whole class teacher-led sessions and utilised worksheets without providing opportunities for 'hands-on' development of skills. Teachers in the final group interviews noted that the *Active Learning* sessions provided children with deep-learning experiences, real-world contexts and facilitated the application of a variety of mathematical concepts to a single task (see examples in Chapter Four from Cycles Three and Four of the action research process).

4.11 *Active Learning* as a Term

4.11.1 Issues with *Active Learning* Terminology

Active Learning offered many of the qualities also provided by play-based learning, without the perceived negative connotation of the term *play*. Throughout every Cycle of the action research, children were able to engage in a wide range of hands-on learning experiences across all KLAs. Brunsell and Fleming (2014), recognised that those experiences helped children build a connection between what they know and see. For example, when children built a chicken coop, using knowledge and skills across a range of KLAs, they used hands-on practices that had been missing from the School's programs prior to the implementation of *Active Learning*.

For teachers, the title *Active Learning* linked the concept of tailored activities embedded in curriculum content with real-world experiences, as articulated by McTighe and Wiggins (2013). The title did not contain the word play which, according to the teachers made them feel "more at ease" (T5) with the concept of offering play-based learning experiences in the classroom. The challenge was to find a pathway to help teachers get past their psychological barriers as identified by Howard (2010) and acknowledge the benefits of play. Having the *Active Learning* program with terminology that promoted curriculum content was an essential starting point.

4.11.2 Teacher-Directed Links

A challenge with using the term *Active Learning*, however, was that there was again a variety of understandings amongst participants of what that term meant. For many of the 10 teachers involved in the study, it embodied the notion of teacher-directed structure. In the past teachers had, at times, set up a number of stations, divided the children into groups, allocated a group to each station, and then directed the children to stay at that station for a specified amount of time. When that time was up, the teacher would direct the children to move in rotation to the next station. When the term *Active Learning* was initially chosen for this study, this is what the teachers conceptualised. This image was overtly reinforced by the School's Literacy Consultant, who was viewed as an "expert", and was not initially supportive of any change. It took considerable ingenuity to dissuade the teachers from such an interpretation and for them to embrace *Active Learning* as the play-based, child-driven and activities-based program envisioned by the intervention.

The significant advance that distinguished *Active Learning* from other programs was the incorporation of student choice and direction as a dimension of its pedagogical approach (Robinson & Aronica, 2015; Weimer, 2013). For example, when a group of students decided they wanted to design and build a bird feeder (see 4.15.5) teachers were asked how they would respond. Some of their responses included:

T3 - choose a location in the garden and put birdseed in it, project done.

T5 – The activity is finished. Send it home.

T7 – buy some birdseed.

Instead, some of the children separated themselves into different groups while others floated in and out of different groups based on their interest. The children guided the learning experiences themselves. They considered specific colours that attracted birds. They investigated which paint was the most durable in the elements, and which birds were native to the bird feeder location. They investigated bird sounds that best attracted birds and the appropriate birdseed. They managed the long term costs and sourced the bird seed locally. These responses demonstrated the children's increasing ability to think creatively and to direct their own learning experiences. During this process, teachers practised mapping activities to curriculum outcomes as recommended by EYLF (Australian Government Department of Education, Employment and Workplace Relations, 2009)

4.11.3 That Feeling of Comfort

As Cycle Three teachers and executive staff came to see the improvement in children's learning outcomes with the implementation of *Active Learning*, the program took on a different significance. The Assistant Principal, during a group interview commented, "I had a bad experience with play at my old school, but *Active Learning* has structure, which is the only way to run it". Ultimately, the association of *Active Learning* with curriculum and structure helped change teacher beliefs (Darling-Hammond, 2003) and, as Fullan (2011) discussed, teachers no longer resisted the changes required to implement the *Active Learning* program.

4.12 Parents and Play

4.12.1 Buy In

When Cycle One was completed and the opportunity to extend the Program into other classrooms and Stages arose, it afforded a perfect opportunity to showcase the *Active Learning p*rogram to parents. Given that this was a three-way partnership, as articulated by Giovacco-Johnson (2009), to improve student outcomes through a partnership between children, parents and teachers, it was important that parents also understood the concepts behind *Active Learning*. Including parents had the dual effect of building essential partnerships (Milne & Plourde, 2010) between low SES parents and the school in a less threatening environment, and opened a window into classroom learning – a new experience for some parents. The inclusion of parents in *Active Learning* sessions was an incremental process. Initially, they watched and applauded children's presentations; then they began to support their children's inquiries at home. Later, they provided examples from their own cultures that related to the activities undertaken in class.

4.12.2 Parent Perceptions of Play in the Classroom

Appendix 7 provides a summary of initial parent views on play. The survey questionnaire was distributed to all 152 families of lower primary children before Cycle Three began, thus 152 initial surveys distributed to parents across two years. Of these, 88 returned the completed survey. Only one mentioned play as a positive means for children to learn.

As predicted by Wong, Wang and Cheng (2011), parents struggled with the concept of play as an appropriate way for children to learn in a school context. This negative view of play as a way of promoting learning was evidenced in the responses of nearly all parents. What was also evident was the lack of understanding about what the term play meant in a learning environment. In their survey responses a number of parents discussed their interpretations of play and what it looked like for them and their children at home:

> "I always play with my children in the backyard, so they don't have to do that at school."
>
> "On the weekend during footy training – running, kicking football and tackling."
>
> "We played three times a week including tennis, football, soccer and boxing. Active sport it help with hand eye coordination."

4.12.3 "I See the Benefits of Play, But…"

Many parents could see the benefits of play in terms of developing social skills, friendships and sharing, but more referred to experiences such as hide and seek, bike riding and playing ball as being to develop physical skills, rather than academic skills. When asked to what extent they thought play helped their child in the classroom a significant proportion, 68 per cent, gave responses similar to those listed below:

> "limited"
> "Classroom. No. No play"
> "In the classroom play need to be small"
> "…not too much have free time in the classroom to play."

The teacher participants dealt with these perceptions by consistently inviting the parents into the classroom. One of the benefits of initially holding the sessions on Friday afternoons was parents were always nearby, and available to pop in. Often with low SES families, parents may not work full-time and would be able to come to the school. The sessions were constructive. During one group interview a parent explained, "I really struggle with reading, so I don't see how I could be helpful in the classroom. But with *Active Learning* I could help children with painting and share my skills from Samoa." Another described her experience during the sessions, saying, "I didn't feel pressured, as everyone was so busy doing their thing."

At the end of 2013, 147 families received a follow-up questionnaire (see Appendix 7). Of these families, 120 had previously been invited to complete the initial questionnaire. The response rate to the follow-up version was much higher than at the

beginning of the program; this time 106 were completed and returned. The higher response rate in itself is significant as it may reflect greater parent engagement with the program.

By the end of Cycle Four, parents held significantly different perceptions about play compared with those at the beginning:

> "As children play they learn. Solve problem. Share. Play well with others."
>
> "It helps to develop their fine motor skills which they need to grow and learn."
>
> "Playing help children to learn about stuff in a fun way."
>
> "…developing fine and gross motor skills. Also learning while playing and solving problems while developing mental strategies."
>
> "Help kids to exercise. Get better imagination. Talk betterer."
>
> "I think it is invaluable – any activity which gets a child interested and thinking is healthy for their minds."

4.12.4 Influencing Perceptions by Building Home-School Connections

Another reason for the change in perceptions was the number of children who took their work home, be it models, writing, craft items or experiments. The fact that they began making things at home, for example the tricycle (see 4.15.6) meant connections between school and home were being made. Children started bringing to school the things they were working on at home. They began to enquire about experiments, and ask for various procedures, recipes and instructions to share with their families. Giovacco-Johnson (2009) argue that by sharing strengths, perceptions and expectations effective partnerships are created between home and school, and as a result learning will be enhanced.

4.13 Children and Play

4.13.1 Play is Free Time Right?

The hardest obstacle for children to overcome in relation to the term play, was their initial association of play with free time. It was important to make the *Active Learning* sessions engaging and promote an environment where the children were driven by their own passions through practical activities (Alexandra, 2010). However, there was also a need to make the distinction that class time was a time for learning. It was important for their retention of concepts and their ability to apply knowledge that they understood activities were often situated in a real world context and had educational value. As the program expanded, teachers noted how broadening the *Active Learning* program from mathematics to include literacy and other curriculum areas extended children's desire to learn (Stephen, Ellis & Martlew, 2010).

This study has shown that prior to the *Active Learning* program being implemented children were not able to apply explicitly taught skills across tasks. This was evidenced in the school's NAPLAN and general assessment results. Children were often disengaged, as evidenced by high absenteeism. Their attitude to learning was hampered because they were not encouraged to think for themselves. They were used to playing 'guess what's in my head' – the teacher's head – and then providing the response they thought the teacher wanted, without understanding the reason for it. *Active Learning* increased the children's independence and ability to think for themselves. It encouraged them to engage pro-actively with learning and to collaborate with children across the class. Interestingly, teacher reflections also showed that *Active Learning* had the same effect on them.

4.13.2 Scaffolding Learning

During Cycles One and Two, as with the teachers, the children also required support as *Active Learning* was implemented. The majority of science and mathematics activities required scaffolding, as the children were not used to having so much

freedom and choice in their learning. Also, due to their associations of play-based learning with free time, ingenuity was called for to change their mindsets. Adjustments were therefore continually made before the each ensuing session to ensure the children understood the need to focus on learning, as recommended by Bodrova and Leong (2007). Adjustments often took the form of suggested pathways; for example, the mystery box challenges required the building of a boat or animal. Scaffolded questions during activities were used to focus children's attention. Consequently, options for the completion of craft activities became more purposeful. During this time the children relied primarily on help from their teachers to answer their questions rather than sourcing an answer themselves or consulting another child. These strategies could then be imparted to participant teachers during professional development sessions.

By the launch of Cycle Three the basic foundations of when and how adjustments were made had been teased out and used to support new classes engaging with the program for the first time. The children became comfortable making decisions for themselves and asking other children for advice or help.

By Cycle Four the children were so engaged by the *Active Learning* program, they were self-motivated, running learning stations themselves, suggesting ideas and initiating their own learning opportunities. *Active Learning* opened the children's minds to the idea of the teacher not being the central source of all learning opportunities (Weimer, 2013). Drawing on the children's interests to create learning opportunities fuelled discovery and an environment where they wanted to push themselves. This increasing engagement and taking the initiative (see Appendix 4) paralleled Sugata Mitra's (2005) findings. It enabled children to see themselves as experts, as well as volunteers and community members with varying and complementary skills. These perceptions have been shown to be valuable in children's learning (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008).

4.14 Conclusion

4.14.1 Overcoming the Perceptions of Play

Many in society hold a negative view of play-based learning in primary settings, as evidenced by teacher and parent comments. The key to overcoming the prejudices of play as legitimate pedagogy was education-in-action. This was achieved by developing a common understanding amongst teachers, parents and children that the *Active Learning* experience was primarily about learning. By opening the classroom doors and creating a transparent learning experience, and adopting the term *Active Learning,* teachers and parents were able to experience the learning first hand. Practitioners wishing to consider implementing a play-based program should expect a similar reaction from participants in their context. Hopefully the strategies utilised in this current study will prove useful to others wishing to implement a similar program.

The changing of perceptions regarding terminology was only one part of the process. If the teachers were really going to accept play as a legitimate learning tool, and begin redefining what play looked like in primary classrooms, they were going to need engagement in professional development. A key component to the success of *Playing to Engage* was its professional development workshops and creating teachers and parents who were confident providing mathematics and science play-based learning experiences for children. This is discussed in Chapter 5, ahead.

Chapter Five

Professional Development

Chapter Five – Findings and Discussion Transforming Thinking and Practice Through Professional Development

5.1 Introduction to Findings

Throughout *Playing to Engage* professional development was a key component to the success of the study. Over the course of the Cycles teachers engaged in a variety of hands-on experiences to build skills and relationships between teachers to sustain the professional development as an ongoing process after the study was completed. Throughout the study teachers participated in interviews and completed reflective journals. The findings from these data sources were analysed thematically in this chapter, similar to the data in Chapter Four. Also presented in this chapter are the findings of the analysis of the field notes on the professional development sessions conducted implemented in Cycles Three and Four.

5.2 Summary of Initial Interview Data Analysis of Professional Development

At the beginning of the study participant teachers and executive staff were asked a series of questions linked to their previous experiences in teaching science and mathematics in the classroom. The thematic analysis of this data was used to inform the direction of professional development throughout the study.

5.2.1 Initial Interview Questions

During the initial interviews teachers were asked:

- describe how you teach mathematics in your classroom;
- describe how you teach science in your classroom; and
- how do you feel about teaching mathematics and science to children?

Figures 5.1, 5.2 and 5.3 present summaries of teacher responses to each of these questions.

Question 1: Describe how you teach mathematics in your classroom.

- **Teaching Methods**
  - **Overwhelmingly deliver teacher-directed experiences**
  - **reason**
    - meeting policy requirements
    - same daily format – warm up, NAPLAN question, TEN Time and one Strand (Number Monday and Tuesday, other Strand Wednesday to Friday)
    - it's the way I have always taught
    - easier to manage and control children when they work as a whole class
    - worksheets make my job easier and marking
    - only use small groups for TEN Time
    - written assessment every second Friday
    - production line, need to meet assessment standards quickly

- **Professional Development**
  - **Teachers have conformed to a whole school model**
  - **reason**
    - have done the TEN training and worked with the Mathematics consultant
    - this is better than the textbooks we used to teach with
    - already have a way of teaching mathematics, why change?
    - lack expertise in developing activities
    - to meet outcomes must only teach one strand at a time
    - teach to the middle
    - I use the Smartboard to demonstrate how to answer mathematics problems and for games at the beginning of lessons but not during activity time

- **21st Century Skills**
  - **Teachers follow established programs and routines**
  - **Reason**
    - unclear on how technology links to teaching mathematics
    - assessment only works if children work independently
    - mathematics strictly limited to the middle session, maximum one hour and ten minutes a day

Figure 5.1 Summary of thematic analysis for question 1 conducted during initial teacher group interview

Question 2: Describe how you teach science in your classroom.

- **Teaching Methods**
  - **Minimal opportunities to teach science**
  - **reason**
    - teach science only through COG units (sporadically throughout the term, but some terms not at all)
    - only time available is after lunch in the hour before children go home

- lack of resources
- predominantly use books and Smartboard notes to teach concepts such as lifecycles, push and pull etc.
- a lot of prep for little gains
- these are low SES children they need literacy and mathematics skills
- only do science sporadically for reporting purposes

- **Professional Development**
  - **Teachers focus on child achievement levels in other curriculum areas**
  - **reason**
    - teachers are too busy with literacy and numeracy
    - focus is on meeting NAPLAN requirements
    - hard to find good science activities for small children
    - the curriculum is already too full, I can't do everything in the time I have

- **21st Century Skills**
  - **Teachers follow established programs and routines**
  - **Reason**
    - I don't have any technology in my classroom
    - better to do whole class activities where the children watch me do the experiment and then we talk about it
    - children struggle to read, write and count they can't think critically or problem solve

Figure 5.2 Summary of thematic analysis for question 2 conducted during initial teacher group interview

Question 3: How do you feel about teaching mathematics and science to children?

- **Teaching Methods**
  - **Great, because it's only a small part of my day**
  - **reason**
    - policy requirements mean I focus more on literacy, mathematics and then other curriculum areas
    - like to do more but don't have time
    - really only skimming the surface
    - focused on improving NAPLAN results

- **Professional Development**
  - **Teachers lack confidence in teaching mathematics and science**
  - **reason**
    - alright with mathematics because mostly use worksheets and pre-designed games
    - teaching science is challenging

- **21st Century Skills**
  - **Not as important as meeting curriculum requirements**

- **Reason**
  - technology and science don't really go together
  - no need to think the policy outlines everything

Figure 5.3 Summary of thematic analysis for question 3 conducted during initial teacher group interview

5.3 Summary of Analysis of Participant Reflective Journal Entries Written During Cycle Two

Throughout *Playing to Engage* participant teachers kept reflective journals on their experiences. Figure 5.4 presents a summary of the thematic analysis from Cycle Two.

Cycle 2 Participant Journal Analysis

- **Teaching Methods**
  - **School Policy dominated**
  - **Reason**
    - focused on achieving better NAPLAN results
    - content and assessment driven
    - I don't have a say over how or what I teach

- **Professional Development**
  - **Teachers have conformed to a whole school model**
  - **reason**
    - I've done so much training and development I cannot handle any more information
    - we have already had a mathematics consultant
    - tired of being told what to do

- **21st Century Skills**
  - **Teachers stringently follow established programs and routines outlined in Policy documentation**
  - **Reason**
    - Smartboards are hard enough to use
    - same daily routine
    - no need to be creative; the policy is well structured

Figure 5.4 Summary of thematic analysis of participant reflective journal entries written during Cycle 2

5.4 Summary of Researcher Field Notes on Professional Development Sessions

Figure 5.5 presents the thematic analysis of researcher reflections on the teacher participant professional development sessions conducted throughout the study. These include:

- all the school professional development sessions;
- *Lesson Study sessions*; and
- science and mathematics content workshops.

Researcher Reflective Journal Analysis of Professional Development Sessions

- **Whole School Professional Development Session**
  - **Consistent lack of understanding around play-based learning**
  - **Reason**
    - session promoted great discussion among staff about play-based learning
    - they struggled to design simple play-based activities using provided hands-on materials
    - created activities which teachers thought were play-based but really still teacher-orientated
    - teachers could not easily develop play-based activities to link with next terms unit of work
    - recycled ideas from TEN lessons, lacked creativity
    - could not comprehend how to re-define their role in the classroom
    - resistant to change in practice

- ***Lesson Study***
  - **Teachers found change in practice challenging**
  - **reason**
    - lacked confidence
    - nervous about running small group play-based science activities
    - need for personalised professional development
    - deficient in how to incorporate open-ended questioning techniques into activities
    - require explicit instruction regarding questioning techniques to be built into planning documentation
    - generally still reverted back to making learning decisions for children
    - concerned classroom would descend into chaos if running *Active Learning* alone or if explicit teaching was not part of every activity
    - require science and mathematics specific professional development session

- **Science and Mathematics Workshop**
  - **Teachers lack confidence in providing play-based science and mathematics activities**
  - **Reason**

- confident running role play activities and craft but lacking quality science and mathematics orientation stations
- find it challenging to let go and not conduct experiments for the children
- not confident in asking open-ended questions during experiments
- do not know or understand the science behind certain activities
- only know TEN mathematics games
- struggling with ideas on how to turn mathematics outcomes into play-based activities

Figure 5.5 Summary of thematic analysis of researcher anecdotal records collected during professional development sessions

5.5 Summary of Post Study Interview Analysis of Professional Development Sessions

During the post-study interview session participant teachers were asked two professional development questions:

- Question 1: Describe how your approach to teaching mathematics and science has changed.
- Question 2: Describe how *Playing to Engage* has impacted on your teaching.

The thematic analysis for these questions is presented in Figure 5.6 and Figure 5.7.

Question 1: Describe how your approach to teaching mathematics and science has changed.

- **Teaching Methods**
  - **New outlook on providing mathematics and science experiences**
  - **reason**
    - more confident creating play-based experiences linked to science and mathematics outcomes
    - enjoy running small group activities during *Active Learning* linked to science and mathematics
    - increased ability to facilitate learning experiences
    - enjoy asking open-ended questions
    - feel more confident having other teachers working with me to develop activities
    - feel more prepared before conducting sessions
    - not as teacher-directed
    - more relaxed teaching environment
    - richer bank of assessment data on individual children

- **Professional Development**

- **Teachers are more confidence in teaching mathematics and science**
- **reason**
  - more creative when designing mathematics and science lessons
  - do a lot more integrated learning
  - process of *Lesson Study* helped develop trust amongst participants in trialling new activities
  - keen to adapt approach to other areas of my teaching
  - appreciated the hands-on professional development
  - like flexibility of tailoring *Active Learning* program to individual Stage needs

- **21st Century Skills**
  - **Can integrate skills and technology into learning experiences**
  - **Reason**
    - collaborating with other teachers has worked well and will continue
    - children are more independent learners
    - understand importance of developing 21st Century skills with children
    - increasingly enjoy using technology in the classroom
    - children ask a lot more questions
    - the problem-solving challenges have helped children apply science and mathematical skills to other tasks

Figure 5.6 Summary of thematic analysis for question 1 conducted during the post study group interview

Question 2: Describe how *Playing to Engage* has impacted on your teaching.

- **Teaching Methods**
  - **New outlook on classroom teaching approaches**
  - **reason**
    - feel more confidence being a facilitator of learning
    - can see how much the children have grown and have more independence
    - can see how engaged and excited children are about this style of learning
    - better relationships with children, understand more about their learning styles, needs and passions
    - covering more content than ever before
    - find it easier to write reports as have abundance of assessment data in all KLAs

- **Professional Development**
  - **Teachers display attributes of andragogical / heutagogical learners**
  - **reason**
    - more interested in learning about / researching open classrooms, project based learning and creating real world, authentic tasks
    - greater desire to team-teach with other staff on a regular basis
    - increased motivation
    - deepened my knowledge and expertise
    - sharing experiences with other teachers has increased confidence

- **21st Century Skills**
  - **Articulate benefits of 21st Century skills**
  - **Reason**
    - can see the skills and knowledge children bring to *Active Learning* sessions and share with others
    - find technology an easier method of gathering and sharing assessment and reporting data
    - the skills children are developing through *Active Learning* are transferring into other areas
    - minimal behavior issues during sessions
    - more reflective about my practice

Figure 5.7 Summary of thematic analysis for question 2 conducted during the post-study group interview

5.6 Summary of Participant Reflective Journal Entries Written During Cycle Three and Four

The analysis of participant journal entries collected during Cycle Three and Four is summarised thematically and presented in Figure 5.8.

Cycle Three and Four Participant Journal Analysis

- **Teaching Methods**
  - **More versatile in approaches to teaching and learning**
  - **Reason**
    - identify links between play-based learning, curriculum and assessment
    - focused on providing child-driven experiences
    - recognise it's ok not to have all the answers
    - cover more outcomes in a single lesson
    - conscious of including real-world links into learning experiences

- **Professional Development**
  - **Teachers gained variety of skills from professional development model**
  - **reason**
    - PD was tailored to individual needs and interests
    - the hands-on
    - more supported by other participants and researcher
    - targeted my individual needs and interests
    - science and mathematics sessions helped build skills, knowledge and confidence
    - have more self-determination

- **21st Century Skills**

- **Teachers are conscious of importance of 21st century skills to learning**
- **Reason**
  - templates were flexible to meet individual teacher and child needs
  - researcher helped me find information, think with a play-based approach and link activities to the real world
  - feel more comfortable learning with children
  - enjoy using iPads and other technology to gather assessment data on children

Figure 5.8 Summary of thematic analysis of participant reflective journal entries written during Cycles Three and Four

5.7 Summary of Researcher Field Notes About the Implementation of Cycles Three and Four

Figure 5.9 details the thematic analysis of researcher field notes collected during Cycles Three and Four.

Analysis of Cycles Three and Four Researcher Reflective Journal

- **Play-based learning**
  - **play-based learning practice is achievable**
  - **Reason**
    - embracing play as a learning approach
    - sessions are running successfully independent of researcher
    - teachers sourcing own science and mathematics play-based activities
    - reports show evidence of assessment data collected through *Active Learning*
    - branching out into team-teaching during other sessions
    - running literacy and numeracy sessions with a play-based focus

- **Professional Development**
  - **Teachers are sharing knowledge**
  - **reason**
    - collaborative planning has evolved, teachers are bringing new knowledge and research to the table
    - increased transparency in planning, teaching and assessment
    - experimenting with team-teaching
    - developing units of work with more hands-on child-driven experiences, authentic tasks and links to real world contexts

- **21st Century Skills**
  - **Teacher were able to re-define their role in the classroom**
  - **Reason**
    - decrease in teacher-directed learning

- increase in open-ended questioning
- sharing knowledge with parents and other teachers through social media e.g. school Twitter and Facebook accounts
- greater choice in how children complete and present their learning
- opportunities for children to teach other children

Figure 5.9 Summary of thematic analysis of researcher field notes collected during Cycles Three and Four

5.8 Introduction to the Discussion of Transforming Thinking and Practice Through Professional Development

This Chapter addresses the subsidiary research question: can a play-based learning program targeting teacher science and mathematics professional learning, help improve teacher confidence in teaching these and other subject areas? To adequately answer this question it was important to provide a detailed explanation of the professional development process undertaken by participant teachers. The findings and discussion are presented in chronological order from pre- *Playing to Engage* through the action research cycles with the implementation of the professional development program (see 3.1.4.3 for a detailed timeline).

To achieve improved outcome results in numeracy, science and literacy, it was found that teachers would need tailored professional development if they were to fully commit to the program. In terms of the theoretical framework (see 2.6.1) teachers initially resisted change, as Fullan (2011) had predicted. Professional development and a supportive network gave them the foundations to implement play-based learning.

Both Dinham (2010) and Hattie (2008) argue that every child needs to have quality teaching and learning experiences. To achieve this, teachers need to be supported by effective leadership and ongoing, tailored professional development if they are to be successful in preparing children for the future (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008). It is also imperative, as identified by Gonzales and Lambert (2014), that in the evolving climate of education, teachers take on greater leadership roles and utilise the opportunity to develop new approaches to decision making in the school environment.

If changes are made in children's learning and achievement of curriculum learning outcomes, the key to success is engaging teachers in critiquing current practice and considering

alternatives (Robinson, 2011). Teachers need to build confidence in how learning and teaching can be conducted, in this case in the areas of play-based learning linked to science and mathematics.

5.8.1 Representation of an Effective Modus Operandi

This current study generated internal tensions for the researcher as a participant, because of the need to transverse between providing ongoing professional development for teachers and active participation as a teacher. From a teaching and learning perspective these tensions also traversed the adrogological and pedagogical continuum. For this program to be successful, the action research model needed to consist of a dual iterative cyclical process in which one cycle supported the implementation of the program and the other supported teacher participants. The cycle that included the teachers also included this teacher-researcher. Throughout the cyclical iterations there was constant feedback between the two cycles with each influencing the direction of the program (see Figure 5.10 below).

5.8.2 The Double Helix Action Research Model

The double helix action research model highlights the important relationship between the researcher and teacher participants in this study. Throughout the process there was a consistent, concurrent dual action research methodology utilised.

The blue spiral represents the action research journey of the researcher conducting the study, aligned with andragogical and heutagogical principles. The purple spiral indicates the journey of the teacher participants (including the researcher) implementing and refining the *Playing to Engage* program. The thin teal threads linking the two helixes represent the ongoing back-and-forth nature of the teacher-researcher transitioning between the two roles throughout the study.

Double Helix action research model
(see 3.1.4.3 for a detailed timeline of the cycles)
(Designed as a play-based teacher would see it.)

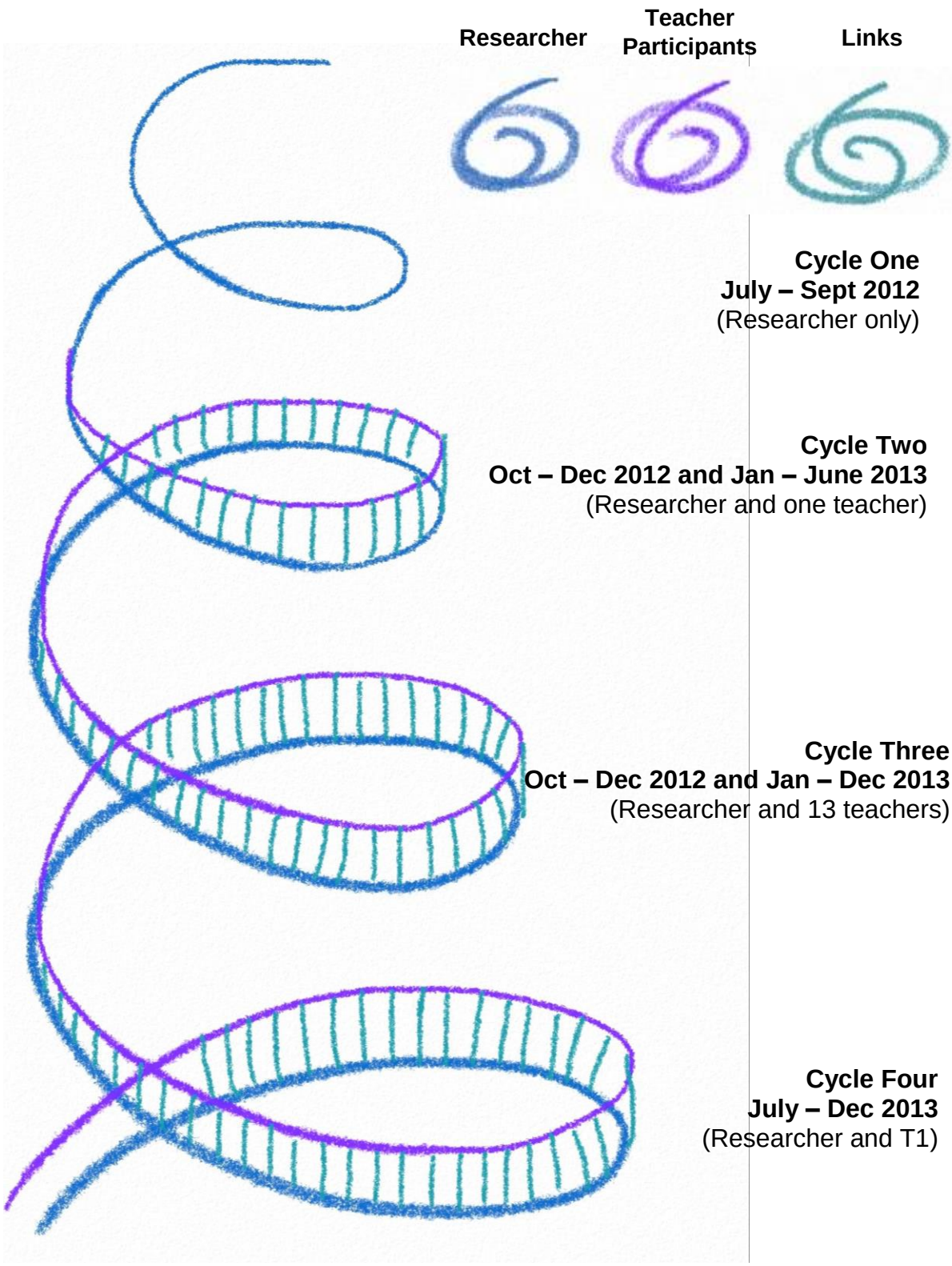


Figure 5.10 Double helix action research model

5.8.3 Ultimate Transformation in Cognitive Thought

Through a progressive journey, the participants were able to advance to a state of andragogy, and by the end of the study some participants demonstrated evidence of sophisticated heutagogical characteristics. By the final cycle, teachers had the ability to strategically choose activities and discuss their pedagogical appeal to children (see Appendix 4.15). A central aim of professional development is to move teachers beyond only teaching subject matter to creating learning environments built on inquiry. In this way, they are empowered to provide and model the tools children need to become effective learners (Keengwe, Onchwari & Onchwari, 2009). It must also be noted that children were similarly traversing between andragogy and heutagogy. This aspect of the study is addressed in chapter 6.

This conceptualisation of the dual role of the researcher as a participant is diagrammatically represented by the double helix in the action research cycle. It is a new conceptualisation, as it provides other teachers with a model to consider when conducting action research. Other teachers wishing to institute a novel program where they have to be participant, leader, director, driver, motivator and evaluator may find the model useful. It exemplifies reflection in action or reflexive action (Schon, 1987; Cohen, Manion, & Morrison, 2011), because the leader has to support teachers in their development of skills, knowledge and confidence without promoting learnt helplessness; that is, becoming reliant on the leader. If such reliance were to be an outcome, the program would in all likelihood not continue beyond the contribution of the leader. For any program to be sustainable it has to mature so it is no longer reliant on any one person or personality.

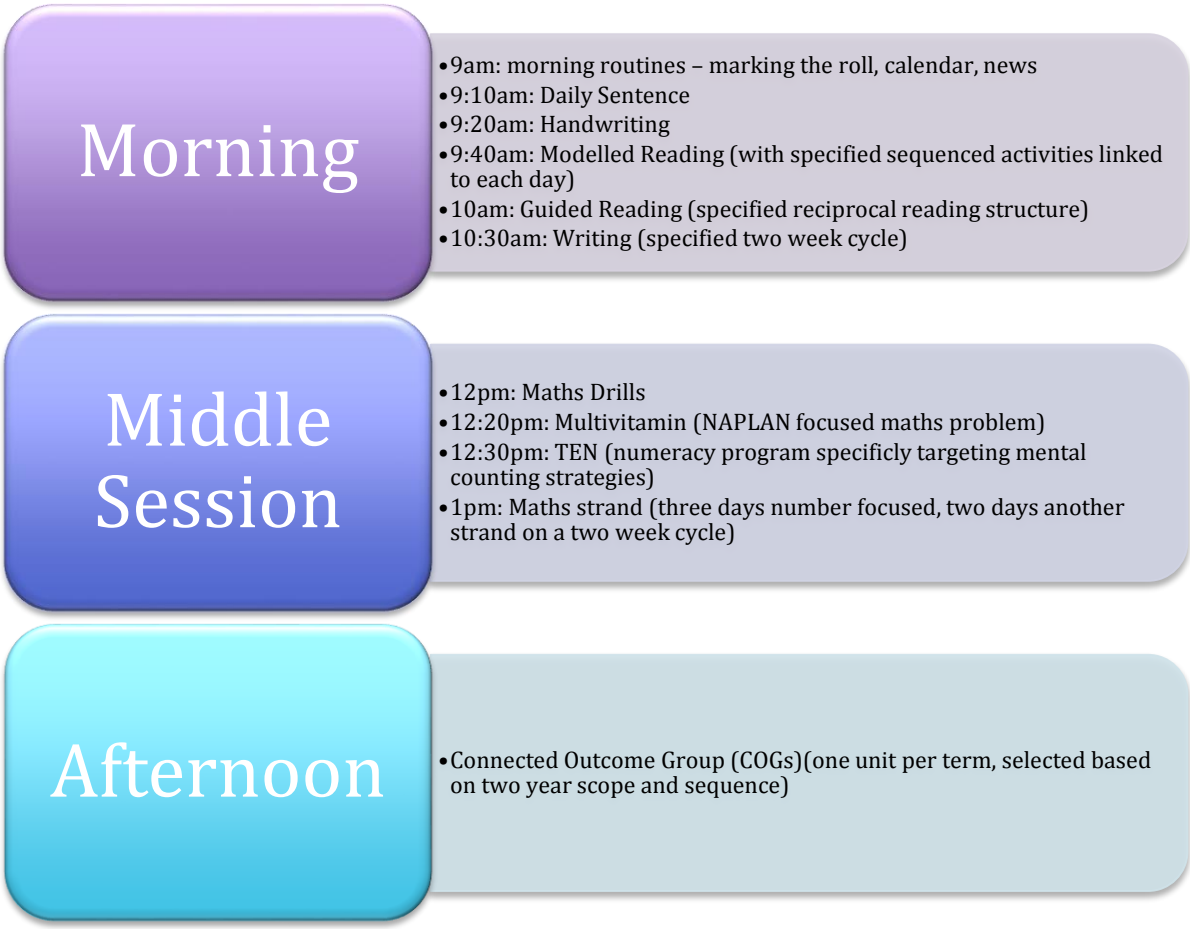
5.9 Challenging Mindsets

5.9.1 Challenging Imposed Invariable Structure

The structure and leadership within the case study school was overlaid with an atmosphere dominated by teacher-orientated philosophies (Weimer, 2013). Overarching policy documents dictated a formal structure for teaching in the classroom, leading to astringent focus on content delivery and data collection. This created an environment consumed with and driven by content (Prensky, 2011). Across the school, classrooms operated using a common structure, almost as if classroom teachers were being run through the same factory

process line (Whitby, 2013). There was a perception that content delivered in a predetermined way would improve learning outcomes for the children.

To illustrate this common core structure, a typical day in every lower primary class, as stipulated by the school policy, went as follows:



Not only did teachers and children run through the same lessons week in, week out, but this arguably ossified structure had been in effect for at least two years prior to the researcher arriving at the school. This meant the Year Two children in the researcher's class were on their third year of this regime. The purpose of the regime was to improve NAPLAN results. Strategies employed included the analysis of texts, broken down paragraph by paragraph, until they became meaningless, with the love of reading jeopardised, and then answering true / false and multiple choice questions, as practise for the next NAPLAN test. In the process of creating a cohesive whole school approach (Rowe, 2005), they were no longer drawing on teaching and learning techniques most relevant to individual children.

In trying to improve NAPLAN results, links to the real world and building a passion for learning risked being lost, these qualities arguably being quintessential qualities required in modern day classrooms (Fredricks, 2011). The lack of engagement of children was evident in the behavioural issues witnessed in class on a daily basis, as well as poor attendance and consistently low results, despite the common structure. These key factors are found in the Victorian Department of Education and Training (2013) low engagement list (see 2.2.3). The critical failing of this whole school approach to staff development and teaching and learning was that it sapped the creativity from teachers and fostered a climate of dependence and reliance on repeated activities. Everything they did on a daily basis was predetermined. Little thinking was required, including the order of letters and patterns to be taught during handwriting. In the final group interview, as teachers reflected on their two-year involvement in the study, they described themselves as so disengaged by the daily process that at the start of the study they felt unable to take new information and apply it in different ways in an attempt to make content interesting. The children, they said, were equally disengaged. This significantly impacted the quality of teaching taking place, which was a direct factor in negatively affecting the children's engagement, motivation and achievement (Hattie, 2008).

5.9.2 Creativity within Constraining Structures

During Cycle Two of the action research, T1 and the researcher used *Active Learning* to teach writing skills through free writing activities and procedure construction linked to practical activities. Reading was encouraged based on interest and passion to acquire new information which developed challenges supporting the application of mathematics concepts. Generally, this style of teaching was considered rebellious behaviour, and had a polarising effect (Prince, 2004). Teachers were fearful of stepping outside school policy and trialling new ways of teaching which were not consistent with the established teacher-directed model. After being programmed to teach in such a regimented way, the idea of teachers changing the way they offered learning experiences and re-defining their role in the classroom created palpable tension, a characteristic foreseen by Beetham and Sharpe (2013).

5.9.3 You Snooze, Children Lose

There was no way to sugar-coat the bleak outlook which faced the teachers and children in lower primary at the beginning of the study. At the point of intervention, from the perspective

of the researcher, it was evident that despite having an expensive ongoing literacy consultant in the school one day a week, student engagement levels were concerning (see 2.2.3). Despite all teachers undertaking lengthy professional development with a mathematics consultant, NAPLAN results were still well below average. Rather than including and approach recommended by Perry and Dockett (2007), this style of professional development relied heavily on a pedagogical model dominated by leadership authority and dictation (Taylor & Kroth, 2009). The model lacked the autonomy (Connor, 2006) necessary for a modern classroom teacher to evolve as an andragogical learner. It did not sufficiently create the elements described in Moon's (2004) model that were argued to be essential for successful professional development.

The context of the school at the start of the study impacted teacher willingness to consider, let alone embrace, play as an effective means of educating children. Any discussion about deviating from the structured mathematics schedule was initially met with apprehension, even derision. Besides the fact that teachers were locked in by school policy documents, teachers were tired of being lectured to, and seemingly deterred from developing a capacity for self-direction and self-determined learning (Merriam, 2001). During informal conversations and interviews, teachers often discussed their concerns about teaching to align with school policy. However, at the same time they were resistant to implementing anything outside policy documents. Due to teacher disengagement with the current system of professional development, it was imperative, if *Playing to Engage* were to be successful, that a new model of ongoing learning be introduced which promoted andragogical principles (Blaschke 2012). Specifically in science (see 2.3.4), following Haug's (2014) work, they would need to identify and understand the power of planned and unplanned teachable moments.

5.10 Building a Program from the Ground Up

5.10.1 Cycle One

The initial challenge for the researcher was to create interest in *Active Learning* among the other teachers. This process began during the preliminary Cycle of the program. Having the Principal come into the classroom and engage with the program quite early in its implementation was an important factor leading to its subsequent expansion. His interest

created opportunities for the children to showcase their work to someone outside the classroom, and because the principal was someone important it made it all the more special to them. On many occasions the children were insistent on inviting him into the classroom, especially when their work linked to his personal passions of science and technology. In turn, these positive interactions sparked staffroom conversations among teachers about what was happening in one junior classroom. It was this connection between the principal and the researcher, and his ongoing support for *Active Learning,* which ultimately led to an invitation for the researcher to present at the annual whole staff conference.

Cycle One of the action research process involved the four stages of plan, act, observe and reflect. Beginning the study in this way established the parameters of the program and facilitated the trialling of a number of activities and data collection methods. This process enabled initial problems with the *Active Learning* program to be resolved and in the process achieve greater legitimacy as it was implemented, and so provide evidence of its effectiveness.

At the same time, the professional relationship between the researcher and T1 was developing into a partnership. T1 initially provided an opportunity to discuss *Active Learning* but over time the discussion around the activities soon transformed into a collaborative partnership based on a shared philosophy of teaching and learning. The connection of T1 to the learning, process and practice made this a positive experience (Lave and Wenger, 1991).

5.10.2 Cycle Two

Cycle Two involved the researcher and T1 joining classes together for *Active Learning* sessions, and teaming up with the ESL teacher. Through this partnership the group was able to establish a community atmosphere built on trust and mutual appreciation (Beavers, 2009) for the underpinning philosophies of *Active Learning.* This in turn fuelled success, as the teachers were not only participants in the study but equal partners in the action research process, with a vested interest in the program (Denscombe, 2007).

This partnership changed the study to a collective initiative, and in turn altered the structure of the action research model. Having established a collaborative partnership with T1 and the ESL teacher, the researcher was able to engage with the group in the action research cycle as

an equal participant in implementing the pedagogy informing the *Active Learning* program. At the same time, the researcher bore the added responsibility of managing other andragogical aspects of the study including professional development, building collaborative partnerships with executive staff and parents, gathering and producing resources behind the scenes, and ultimately the final construction and evaluation of the program. This twofold responsibility required a double helix action research model, with the researcher, as teacher, assuming both roles throughout the study.

The partnership of three provided the researcher with an opportunity to evaluate and further develop *Active Learning* in consultation with its key implementers – the other teachers - an important factor in the success of the program (Brydon-Miller, Greenwood & Maguire, 2003) By creating an environment where professional development became an ongoing process, which was directly related to the nature of teaching in the context of this study (Adey, Hewitt, Hewitt, & Landau, 2004), all participants were able to benefit from the experience as a collective group and more specifically nurture individual needs. Each member of the team was able to bring something to the program. The ESL teacher provided a focus on language development. T1 provided a deep knowledge of curriculum and the teacher-researcher provided experience in play-based learning. Highlighting the skills of each individual teacher gave each of them a purpose within the group and developed teacher efficacy.

Cycle Two laid the groundwork for how each cycle of the action research model would work in the future as it expanded to include more teachers. The entire process was a truly collaborative and cyclic experience. The consistent, open communication between participants meant there was an ongoing process of planning, trialling, evaluating and reinventing (characteristics identified by Moon (2004) as necessary for highly effective professional development) in relation to each *Active Learning* session. This experience was multifaceted, as the action research cycle applied to the generation of new ideas for specific activities, the evolution of the activities themselves, effective methods of assessing the children's achievements, data collection and the overall reconceptualisation of the role of the teacher during sessions. A community of learners (Ollis, 2011) developed. Consequently, the group was able to streamline processes, including scaffolding activities such as the Mystery Box (see appendix 4.5.3) and the Challenges (see appendix 4.10) to help children build skills

over time, and essentially establish a base program ready for implementation in other classrooms.

5.10.3 From Pedagogy to Andragogy

Stepping from participant into the role of researcher involved designing templates to simplify the planning process and creating easy-to-use anecdotal recording sheets. Through planning sessions the researcher was able to take the ideas and comments of participants and help shape them into activities and refined practices. This approach involved identifying individual teacher needs, filling gaps in their knowledge and ultimately providing a foundation for teachers to become andragogical learners (McAuliffe et al., 2008). Working with such a small group meant the researcher could introduce new science concepts, guide teachers through workshop activities and prompt improvements to their *Active Learning* sessions by asking questions. The experience made for an intimate environment conducive to strengthening the skills and knowledge of each individual teacher, while at the same time providing the researcher with an opportunity to build solid foundations for the next stage of implementation.

5.10.4 From Small Beginnings Big Things Grow

The culminating success of Cycle Two was exemplified through the school reporting process. T1 and the researcher collaboratively wrote each child's bi-annual school report for parents. These were dominated by references to *Active Learning* experiences across all KLAs. What really stood out about this experience, and articulated by the Principal, was the detailed knowledge in relation to each child. These children's reports were unlike any he had read before, as they were all so different and specific to each child's individual achievements. Given the school's narrow focus on set programs and the limiting nature of COGs, reports usually included the same basic, somewhat generic, information. While this was consistent across the school, parents often complained that their child's report could really have been for any child, as it lacked specific detail. From a strategic point of view, report writing provided an opportunity for the researcher to establish positive connections between the program and parents. Here was a set of reports with an overwhelming number of real-world play-based learning examples of how children were meeting curriculum outcomes. Parents were able to see concrete evidence of how these experiences were being used to support their child's learning across mathematics, science, literacy and other KLAs. This type of communication

was important for the establishment of an effective partnership between home and school where a shared vision of perceptions and expectations could be created around play-based learning (Giovacco-Johnson, 2009).

The biannual school reporting process was also significant as a driver for influencing other teachers across the school to be more positively disposed to the *Active Learning* program. Through standard school editing procedures these reports were sighted by other executive staff, including the Stage Supervisor before reaching the Principal, fuelling even more interest in *Active Learning.* Other teachers wanted to know how so much content was being covered, and in such an interesting way. The recognition of the well-developed links being made between play-based experiences and the curriculum (Wood & Attfield, 2005) culminated in the Executive staff inviting the researcher to present *Active Learning* to the whole staff at the annual conference.

5.11 Winning Hearts and Minds

5.11.1 Get Active!

The whole school professional development session provided an opportunity for other teachers to be provided with an experience of the *Active Learning* program (see appendix 4.12). The aim was to deliver an experience which mirrored the 'hands on' nature of the program, show that it was fun and promoted independent reflection on how they were delivering learning experiences in their classrooms. To open the session, teachers formed groups and were given a box full of various items including recycled materials, chalk and play dough. Using these items, similar to the Mystery Box, they were asked to create an engaging activity, which linked to more than one curriculum area and could be incorporated into their upcoming unit of work. The idea was for teachers to play around with the items, engage with a play-based learning experience themselves and begin the process of blurring the lines between teacher and learner (Bandura, 2005).

The activity itself prompted a great deal of discussion, especially around the unusual items. One of the teachers described that it helped them to think outside the box and reflect on the way they taught. The key to this activity was linking it to their upcoming units of work, as it

provided a connection point (Buxton, Lee & Santau, 2008), ensuring the necessary meaningfulness of the exercise. The activity also showed them the power of collaboration as they spent time discussing the items amongst themselves and toying with ideas before reporting back to the whole group. This was another strategy to assist teachers in recognising the value in working together, as they were able to engage in more meaningful discussions (Leiberman, 2010).

When the groups were feeding back their thoughts and ideas it was interesting to note the number of suggestions that teachers thought were play-based but were still predominately teacher-orientated (Howard, 2010). This confusion evidenced that many teachers do not understand play or know how to provide play-based learning experiences for children (Martlew, Stephen & Ellis, 2010), for example, transforming egg cartons into mathematical dice games and bottle lids into sorting games (activities already offered through the lower primary Best Start Targeted Early Numeracy (TEN) Intervention Program – see 3.1.4.1).

5.11.2 Connecting to Passion

Another component of the professional development session was to influence teachers through storytelling and to motive them by connecting through their passion. I used the story of Leon and His Elephant (see appendix 4.2.2) to highlight how teaching outside traditional methods had a place in the classroom. It was through *Active Learning* that teacher and child were able to develop a strong relationship (Prensky, 2011), which was critical in finding the right approach to engage the child and provide authentic educational opportunities.

The presentation sparked an interest in *Active Learning* for a number of teachers including some from Stages Two and Three. Given the low SES dynamics of the school community, they expressed hope that this program would suit children in their classrooms. Others appreciated the work of the program but felt overwhelmed by the concept of re-defining their role within the classroom (Beetham & Sharpe, 2013) and resisted changing their practice (see 2.5.8).

5.12 Giving Professional Development a Much Needed Revamp

5.12.1 Getting into the Nitty Gritty

With the whole school development day came the opportunity to work with lower primary teachers in a more intimate and in-depth *Lesson Study* model. In total 13 teachers participated in the professional development and subsequent Cycle Three (there was only one change in the team across the timeframe of this cycle). This model of professional development occurred over three separate days, in consecutive weeks and allowed for:

- the exploration of current literature;
- setting the scene;
- a demonstration of the program in action;
- follow-up collaborative planning; and
- a participant-led *Active Learning* session.

By conducting the *Lesson Study* in this fashion teachers were given the opportunity to experience the program themselves, ask many questions, and build a collaborative partnership with other teachers in the group (Lieberman, 2010). This experience was designed to give teachers as much hands-on experience as possible, establish the quality of professional development, as discussed by Buxton, Lee and Santau (2008), and adequately prepare them to conduct *Active Learning* sessions in their own classrooms.

The *Lesson Study* experience provided an opportunity for the researcher to step out of the participant role into the outer strand of the double helix to reflect on participant actions and opinions. Through this critical reflective process the sessions could be altered accordingly, to fill gaps in participant knowledge by providing extra information or manipulating situations to counter concerns.

5.12.2 Gauging Participant Perceptions

During the initial session participants were asked to describe their individual thoughts on play, benefits, challenges, prior experiences and concerns. This discussion established where

each individual teacher stood in terms of their thinking about play-based learning in their classroom, and the issues / concerns needing to be address during professional development sessions. It quickly became apparent that although teachers were interested in the program, they seriously doubted its effectiveness for use as a legitimate teaching tool, mirroring the opinions found in Singh and Gupta's (2011) study. As discussed in Chapter 4, the teachers were significantly challenged by the word play. The only participants with experience in offering play-like activities were the Kindergarten teachers. Others, as described by Gronlund (2010), acknowledged it was really free time in the afternoon so they could catch up on other things or have a break. The only teacher with formal early childhood qualifications was in the preschool.

The discussion evoked some excellent points but nothing unexpected, and confirmed Broadhead, Howard and Wood's (2010) perception that teachers have mixed understandings of the term play. In this instance it was leading to misconceptions around expectations of children, teachers and schooling during play-based learning. Based on the discussion, they created a mind map (see Figure 5.11) which organised the teachers' thoughts into three main areas: the benefits of play, concerns about play, and experiences of play. Although the teachers could see the benefits of play-based learning, they expressed concerns about:

- not having the knowledge and experience to implement play-based experiences;
- the cost of buying resources;
- storage of equipment;
- planning and preparation for each session, which was quite different from their current practice; and
- the time commitment.

The teachers could see the effectiveness of play in the curriculum but, paralleling findings in other studies (Howard, 2010; Rowe, 2003), they still could not get beyond the psychological and structural barriers to find a place for *Active Learning* in their weekly timetable.

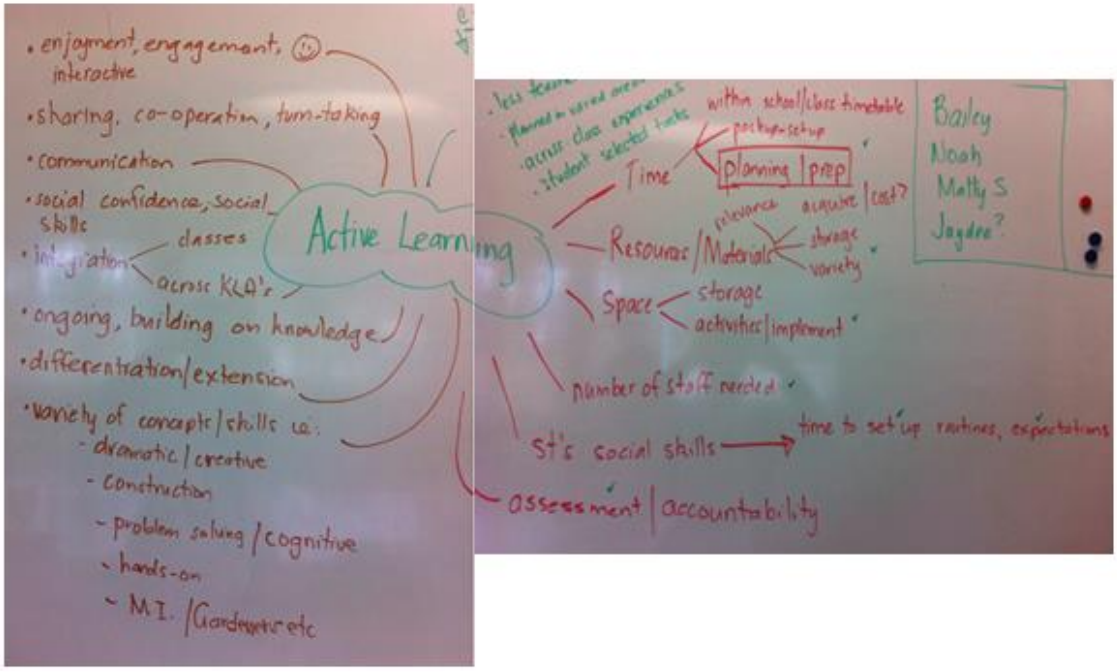


Figure 5.11 *Active Learning* Teacher Participant Mind map

5.12.3 Demonstrating *Active Learning*

Session Two of the *Lesson Study* consisted of teachers observing an *Active Learning* session in the researcher's class. Participants were able to select activities they were most interested in viewing. Before attending they were given a critique sheet (see appendix 11) with specific features to look for during the session such as introduction, range of activities, engagement, teacher interactions and pack up procedures. While T1 and the teacher-researcher ran the session with two classes, the *Lesson Study* participants circulated the classroom making notes. Some made an effort to interact with the children, whilst the majority were happy to simply observe; potentially an indication of their inability to define their role in that particular space (Howard, 2010).

T1 and the teacher-researcher had become comfortable with having different people in their classroom, and were open to constructive feedback (Schon, 1987). For the researcher, the process presented a strategic opportunity to develop an insight into teacher thinking, identify individual perspectives, and the strengths and weaknesses in the teachers' skills and knowledge base. In this way, as in Cycle Two, professional development could be tailored to meet individual teacher needs (Blaschke, 2012).

5.12.4 The Verdict

Following the *Active Learning* session an open discussion took place between participants. They discussed the criteria sheet and the program in general. Some important points to emerge from the conversation were:

- the high levels of engagement;
- the variety of activities;
- the excitement of the children;
- the quality of the resources; and
- the variety of discussion and quality of interactions between children and teachers.

It is also important to note some of the general comments made by participants in the post-session reflection:

> The role of the teacher is just so different during the sessions from what I'm used to doing. (T8)
>
> It's hard to not jump in and do things for the children or give them the answers. (T3)
>
> I felt the room had a buzz. I was surprised to not find more children off task or more behaviour management issues. (T6)
>
> I was amazed at the thought children put into their reflections. I thought it would all be like "that was fun, I had a good time", not specific, personal comments. (T5)
>
> I just do not know what I'm supposed to do while the children are playing. (T4)

5.12.5 Setting the Teachers up for Success

This session concluded with a collaborative planning session for the participant-lead *Active Learning* session the following week. This was important to adequately prepare the teachers (Howard, 2010) to be able to independently complete this process once the professional development was complete. To contextualise the session and provide participants with some

parameters, the teachers were able to select activities from a list the researcher had compiled. Once nine activities had been chosen, including two experiments, each participant took responsibility for an activity. Part of their preparation included sourcing or making any resources required and devising questions themselves.

5.12.6 Get in There and Give it a Go!

Prior to this experience some of the participants expressed nervousness about presenting their chosen activity, consistent with Hattie's (2008) notion of being comfortable within one's four walls but feeling confronted when required to teach in front of other professionals, and feeling judged. A number of meetings took place between individual teachers and the researcher prior to their sessions to examine the concepts to be presented and to design resources.

This example strongly suggested that today's teachers are not being sufficiently prepared to teach science and mathematics effectively and with confidence (Buxton, Lee & Santau, 2008). Whether it was teacher preparation, the inflexible school routine, or personal weakness in the curriculum areas of mathematics and science was not as important as the outcome – identified by participant teachers – which was ineffective learning by the children. On the positive side, these moments did afford an opportunity to deepen collaborative partnerships between individual teachers and the researcher. It also provided occasions to teach teachers how to find information, think with a play-based learning mindset, relate it to the learner through real-world experiences and promote problem-solving (McAuliffe, Hargreaves, Winter & Chadwick, 2008). These are key attributes of teacher progression towards andragogy.

The teachers were dealing with a host of emotions, including being out of their comfort zone, and therefore imperative for the researcher to promote a collaborative, supportive environment (Beavers, 2009), engendering a notion of trust and appreciation. It was vital that participants feel they had been successful and could implement this program with confidence in their own classrooms. The researcher needed to ensure the teachers developed a positive bond with other participants, forming a nurturing community so they could support one another in making improvements as appropriate (Ollis, 2011). If they could begin to build professional relationships they could collaborate and run sessions together, adding to each other's personal comfort. During *Active Learning*, teachers were able to move freely around

the room when they were not presenting. This helped take the focus from individuals and lessen the impact of feeling watched.

5.12.7 Positive Reflections

After the *Active Learning* session that followed the *Lesson Study* model, the participants discussed their experience. They were asked to identify elements of their own performance which they felt went well, and the teachers were encouraged to offer positive comments about each other's performance. The exercise was designed to build teacher confidence by focusing primarily on success as well as ways each lesson, with less focus on teaching, could be improved. Furthermore, this promoted the necessary skill of consistent critical self-reflection (Schon, 1987). A cross-section of comments from participants demonstrated this:

> I thought running the slime experiment would be hard as I didn't feel confident in the science behind it but with each new group of children I discovered they had so many ideas and thoughts themselves. They were more interested in engaging in conversation with each other and using their senses to explore the 'goop'. I felt a lot less pressure as I fell into the role of asking leading questions rather than giving answers. (T7)

> Children were so willing to discuss in detail what they were doing with each other rather than an adult. I was surprised at the complex language they were using. (T4)

5.12.8 That is a Wrap

At the end of the three sessions, one teacher still had difficulties with providing specific experiences for fine and gross motor skills. She wanted to write an activity card centred around dolls on a table, which children could dress and undress, as she wanted them to practice fastening and undoing buttons. This epitomised Weimer's (2013) comments regarding teachers continuing to make the decisions for children in the classroom. Despite repeated attempts to suggest integrating this activity into a home corner or role play setting, she could not move past having a specific fine motor station rather than incorporating the skill into a real world activity. Even after completing the *Lesson Study*, some teachers displayed an staunch reluctance to relinquish power and confirmed little understanding of play as pedagogy (Beetham & Sharpe, 2013).

Similar to this was T4, who felt the need to model every activity before allowing children the freedom to explore. She could not abandon her structured classroom practices and believed them to be the only way she could successfully implement the program in her Kindergarten room. This extended to the Mystery Box activity, where she provided each child with a specific animal to make instead of allowing the freedom to create an animal of choice. Once T4 modelled the activity in small groups, only then were the children allowed a turn by themselves. Many teachers feared that if they relinquished control and gave children the freedom to be creative and make self-directed choices, their classrooms would descend into chaos (Robinson, 2011).

5.13 Overcoming Ongoing Challenges

5.13.1 Tackling Teacher Implementation Dilemmas

During the study there were a number of recurring challenges which hindered the teachers' implementation of *Active Learning*. A major challenge was teachers redefining their roles during sessions (Beetham & Sharpe, 2013). Additionally, it took time to develop the ability to ask the right questions, to extend children's thinking and concept development. T3 had difficulty with open-ended questions as they were not her usual practice. She felt more comfortable asking questions like "are you having fun?" (T3).

Even though the teachers had enthusiastically undertaken this professional development, they were inclined to revert back to teacher-directed practices. For some, it poses a challenge to change practice and then sustain it (Heidemann and Hewitt, 2010). In the current study, this proved to be the case with some teachers who struggled to sustain a change from teacher-directed teaching. Working with a framework of adult education (Moon, 2004), that integrated teacher professional development, the professional development component was collaboratively decided and tailored to meet teacher needs. As such it incorporated a section to support teachers in scaffolding open-ended questions (see Appendix 5). Following Bodrova and Leong's (2007) suggestion, examples and scaffolds were incorporated to help teachers construct examples of open-ended questions before teaching. As with all skill development,

the process became more automatic over time for the teachers, as noted in their reflective diaries.

5.13.2 Teachers Inspired Through Children

The researcher needed to play a supportive role as the process of changing beliefs, and ultimately practices, required perseverance on the part of the participating teachers. Motivation to continue, however, was provided by the children and by the researcher explicitly pointing to:

- the children's engagement and enjoyment;
- the decline in behavioural issues;
- the noticeable improvement in English proficiency (see 7.2.6); and
- improved attendance (see 7.4.2).

These irrefutable positives proved important in sustaining the participant teachers on their journey from implementing pedagogy, to the andragogy-achieved deep reflection-in-action, which led to teachers embracing play-based learning, and at times fulfilling a leadership role in group planning. Ultimately the teachers traversed to a heutagogical state, where they were able to independently determine their own style of learning and independently fill gaps in their knowledge base.

5.13.3 Motivating the Toughest of Critics

The most significant challenge to overcome was motivating teachers to put in the required extra time and commitment to planning. For example, prior to the establishment of *Active Learning*, T3 would frequently recycle previously developed lessons and activities and rely on photocopied resources so she could be ready for class in as short a time as possible. She subsequently found herself challenged by her own commitment, by the children's enthusiasm, and by the energy within the group to spend time planning collaboratively, organising and sourcing new materials, and setting up for the next teaching session. Initially, she was not prepared to do this, and she was not the only one. From the perspective of the researcher, this was dispiriting and attributable to many factors. Perhaps the most crucial were the lack of investment in the program and the compounded toll of teachers having had other programs foisted upon them in the past. It was vital that these teachers not revert to presenting play experiences with minimal support or to simply keep the children entertained

while they completed other work. Implementing new programs can bring many potential problems (Gronlund, 2010), and so it was heartening by the end of the intervention to see T3 conscientiously adapting her planning and proffering ideas for sessions based on the children's interest, even when it would take a great deal of time to resource the materials needed.

5.13.4 Capturing a Spirit for Play-Based Learning

Over the course of the study teachers described a number of key factors which ultimately helped them to commit to the program. They valued the opportunity to manipulate and trial the program in their own classrooms and to develop their confidence, which was vital in altering their perceptions. T5 reported that the excitement and engagement of the children during *Active Learning* boosted her motivation to provide quality sessions. T4 was driven by the realisation that concepts could be introduced or applied to different situations, forming a basis for assessment. Also, she appreciated the idea of gathering data systematically through the use of technology (online iPad apps) to assist with reporting. On the other hand, T6, T7 and T9 were enjoying teaching together and sharing the planning and execution of teaching sessions as a team.

5.13.5 Keeping on Top of Resourcing

Having adequate resources can often be an issue (Howard, 2010). It is a scapegoat summoned by teachers in the initial stages of changing their behaviour, as a reason not to proceed. This provided an excuse at planning sessions to not consider an activity; it served to block many good ideas. Developing their creative thinking and ability to problem solve solutions was a progressive journey. This should have been the least of teacher problems. Consequently, as a result of discussions with participants the 'essentials and consumables' kits emerged (see appendix 4.14.3 and 4.14.4). The school also allocated a small fund to each Stage, which teachers could access at any time, for *ad hoc* items and stationery. At the beginning of each term participants met and discussed the central themes for teaching. These themes then formed the basis for collaboratively selecting materials and new resources for *Active Learning* sessions.

5.14 Let the Learning Begin

5.14.1 Big Kids at Heart Get a Chance to Play

Once the teachers became comfortable with offering basic play-based activities, planning collaboratively and gathering data to inform future planning, a follow-up professional development session was presented. The intention of this session was to help teachers connect with science and mathematics specifically, and build content knowledge (Buxton, Lee, & Santau, 2008) through hands-on experiments (see 3.1.4.3 for a timeline). A hands-on approach to play-based science and mathematics activities (Ainley, Kos & Nicholas, 2008) proved an effective way to deepen teacher expertise and develop their confidence.

Teachers trialled a range of play-based experiments and mathematics activities themselves (see appendix 4.12.5). Through this professional development experience they were able to think about the questions they would ask children. This, in turn, assisted their grasp of the concepts behind the learning experiences and built their confidence. It was important to present a complete professional development and resourcing package for teachers, where sound pedagogy was linked to quality subject knowledge (Bosse, 2007). Providing an opportunity for teachers to experiment with science and mathematics play-based activities, by putting them in the same position as children, helped further diminish the distinction between teachers and learners (Bandura, 2005).

A significant moment during this session was when one of the experiments did not work as well as anticipated. This provided an opportunity to talk about experimenting and not being frightened to trial different teaching strategies with children. The aim was to encourage teachers develop a comfort with following the lead of the children to create authentic moments (Wong, Wang, and Cheng, 2011) even if they included failure. It was a platform from which to investigate the question of 'why'. This experience also gave teachers the opportunity to talk through a variety of questioning techniques they could use, and especially how to build excitement before the experiment even started. This was a further example of how the leader of the study was able to facilitate the transition from a pedagogical approach to professional learning towards an andragogical approach that eventually led to improved classroom pedagogy. Improved classroom pedagogy, after the professional development

session, was evident when a participant teacher asked children questions such as, “what is detergent used for and what might happen if we add some to vinegar and bicarbonate soda to it?" (TX). Teachers needed to be nudged into tailoring questions so children could offer information themselves. This is viewed as a difficult task when teachers are used to a teacher-directed learning environment, but essential nonetheless, if they are to integrate children’s opinions and ideas (Fredricks, 2011).

5.14.2 Getting the Amount of Ongoing Support Just Right

In the early Cycles of the study the researcher provided the teachers with extra support in an attempt to combat their lack of confidence in the content of science and mathematics learning activities as well as in play-based learning (Howard, 2010). From the perspective of the researcher it was important to eliminate irrelevant factors that could ultimately hold teachers back both physically and cognitively from successful implementation of the program. Over time, it became necessary for the researcher to provide the participants with the space to determine if the program could continue, independent of the researcher. This is a key condition for the sustainable implementation of a program (Merriam, 2001). It needed to stand on its own and not be dependent on any personality or person.

The challenge for the researcher was finding a balance between supporting the teachers while at the same time giving them room to experiment and develop their own skills. Once the teachers had taken the important step to grow and practise skills (Lieberman, 2010), the teachers would be able to sustain changes in their practice. The participant teachers concluded that *Active Learning* worked for them as they did not feel they were locked into a brittle structure for the program. Rather, they had sufficient basic guidelines and freedom within its framework to make the experience their own and deliver it effectively (Adey, Hewitt, Hewitt, & Landau, 2004). The participants were provided with all the tools necessary to evolve to a state of andragogical practice where they were intrinsically motivated to source ideas and fill knowledge gaps themselves (Ashton and Newman, 2006)

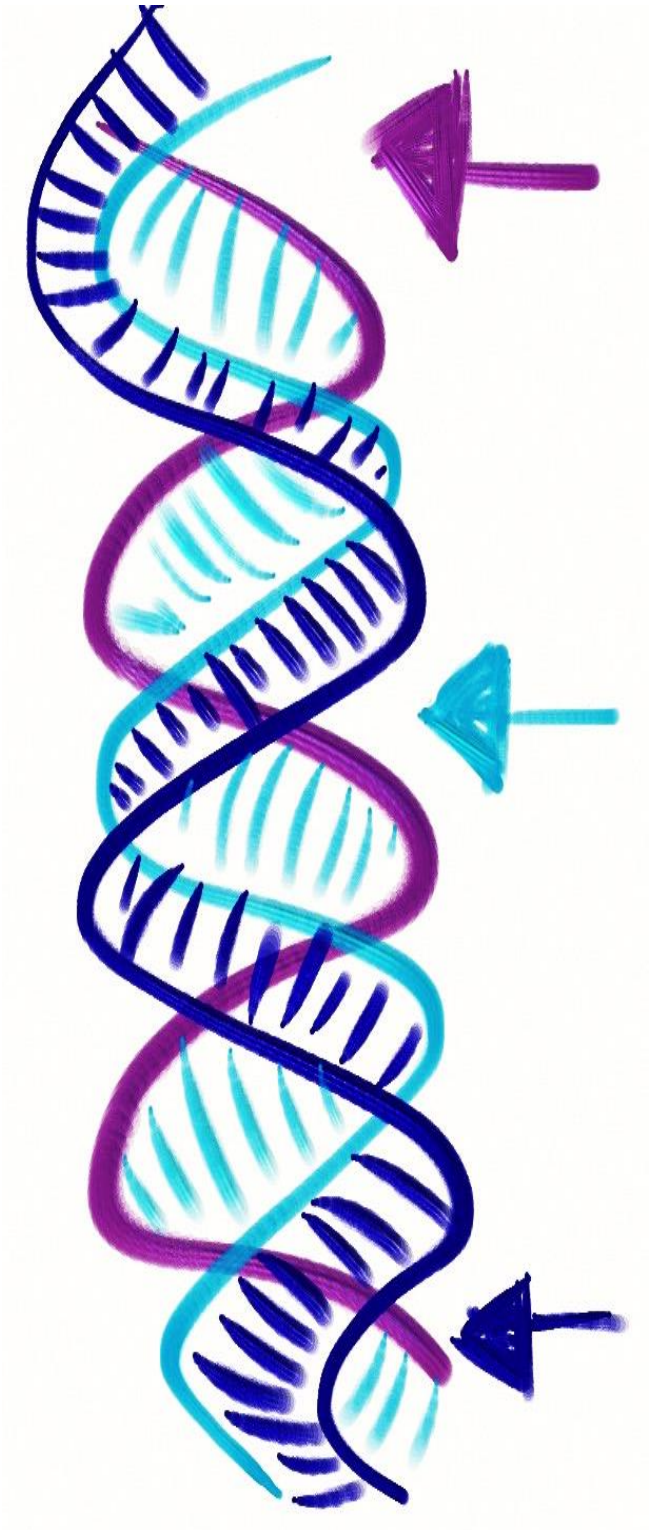
Although support was available when required, the vital development of a collaborative network of teachers (Moon, 2004) was achieved by providing space for them to take a more dominant role. By encouraging the teachers to take a leadership role from time to time, meant

they were able to provide their own expertise. By Cycle Four of the action research, the participants were independently sourcing activities and experiments relevant to the children in their classes. Relevance was determined by the children's interests and passions, which could then be shared with other children and mapped backwards to the curriculum. The classroom sessions in turn became more complex as the teachers became more creative in resourcing activities and building links to the curriculum. It also meant that because classroom experiences were better linked to real world situations, the teachers were covering more outcomes with a single activity. Children were eager to share their learning with other children (see appendix 4.15.6) which, with teacher guidance, meant opportunities could be linked back to the curriculum.

5.15 Evolution to Heutagogy

5.15.1 Teachers Embrace *Active Learning*

The evolution of *Active Learning* as an integral part of the program was a progressive, on-going and persistent journey (Buxton, Lee, & Santau, 2008). Teachers needed time to become comfortable and confident in delivering play-based activities. This process not only involved them transforming the way they taught children (Beetham & Sharpe, 2013) but also letting children have a greater say in their learning (see appendix 4.15), (Wong, Wang & Cheng, 2011). The experience gave the teachers new ways to present learning experiences and vital questioning techniques, with open minds towards different methods of teaching. Through this study, many of the teachers became reinvigorated and motivated (see appendix 4.14.9), self-determined (Kamenetz, 2010) to change the way they worked in the classroom. This was evidenced by their increasing willingness to research and source their own science and mathematics play-based activities. They were also bringing items from home and engaging in discussions with other teachers and parents, to create experiences based on the children's interests and passions. By Cycle Four, five Stage One classes had effectively collaborated to run joint sessions. Figure 6.12 outlines the development of teachers throughout *Playing to Engage,* based on pedagogical practices to facilitating their learning and the learning of other teachers based on heutagogy as the dominant form of learning.



Pedagogy
Pedagogy is the foundation upon which the study's learning is based and built.
Playing to Engage promoted the use of multiple strategies to help lead teachers to a place where they had the drive and motivation to learn for themselves in order to successfully develop play-based science and mathematics activities.

Andragogy
Andragogy is based on understanding how adults learn best to promote the establishment of life-long learning habits through internal motivation.
Playing to Engage helped teachers take the step from pedagogy into andragogical practices through the immediate relevance to their teaching, offering hands-on experiences in science and mathematics, and involvement in planning and evaluating their professional development and the program as a whole. Ultimately, through collaborative approaches and creating an environment conducive to the establishment of equal partnerships, teachers were able to become self-directed learners when it came to providing play-based science and mathematics experiences.

Heutagogy
Heutagogy is the complete transformation of adults to a state of understanding how they learn and being able to recognise and fill gaps in their knowledge base. In this study it was specific gaps in their knowledge of play-based learning strategies and creating engaging real-world science and mathematics experiences.
Playing to Engage propelled some teachers into a heutagogical dimension as they became autonomous with their professional development, choosing their own content, learning methods and incorporating self-reflective practices into their learning.

Figure 5.12 Three-dimensional model of the teachers' progressive journey from pedagocial principles to Heutagogical dimensions.

5.15.2 Making the Ultimate Transition from Andragogy to Heutagogy Paradigms

Cycle Four of the action research saw some teachers transition to an andragogical disposition while others were able to take the further step to heutagogical dispositions and apply play-based strategies to other areas of their teaching. They were independently researching current trends in education and sourcing leading educational teaching experts and academics. They were researching topics such as 21st century teaching, open-learning environments and child-centred learning using methods that suited their learning styles (Kamenetz, 2010). Some were able to see the gaps in their learning and sought means to develop their knowledge base, a key indicator of a heutagogical learner (Hase & Kenyon, 2007). T6 and T9 pursued an interest in curriculum development, and T4 became interested in alternative approaches to data and assessment, while T11 began to explore the integration of iPads into a special needs classroom to assist with language development.

5.16 Conclusion

The final Cycle saw the emergence of Inquiry Based Learning (IBL), open classrooms and collaborative teaching throughout the day. Teachers became more creative in how they met school policy requirements, and developed learning experiences interwoven around a central theme and linked this back to the curriculum. Their professional development became a consistent, ongoing part of the teachers' reflective practices, which they retained growing control over through their shift to andragogical and heutagogical paradigms of learning. Instead of the COGs units, teams of teachers were selecting topics in collaboration with children and each other. Topics were linked to the real world and made relevant to the everyday lives of the children. This transition coincided with the development of a range of foundational 21st century skills.

An equally significant factor leading to the suggestion that the *Active Learning* program was successful was not only children's improved academic results (see chapter 7) but also the development of key skills that would position children well for an unknown future as creative, self-determined learners. *Playing to Engage* took on the role of fostering collaboration, critical thinking, curiosity and questioning and many other 21st century skills in both the

teachers and the children. The importance of these skills and the progressive journey of participants is detailed in chapter 6.

Chapter Six

21st Century Learners

Chapter 6 – Findings and Discussion
Becoming 21st Century Learners: Skill Development

6.1 Introduction to Findings

This chapter focuses on the development of 21st century skills in both children and participant teachers throughout the study. The findings reported have been gathered from the post-study interviews conducted with participant teachers and reflective journal entries. They were then analysed thematically in a similar way to those presented in chapters 4 and 5.

6.2 Analysis of Teacher Interview Responses and Reflective Journals on the Development of 21st Century Skills in Children

6.2.1 Post-study Interview Question 1

During the post-study interviews the teachers were asked to describe any 21st century skills the children developed throughout the study and not covered by the curriculum (see Figure 6.1).

Question 1: Describe any 21st century skills children developed throughout the course of the study not covered in the curriculum.

- **21st Century Skill Development**
  - **Children were confident, autonomous learners**
  - **Reason**

  - **Collaboration, communication and social skills**
    - articulating answers with assertion
    - more open to different group configurations
    - demonstrating willingness to collaborate with an increasing range of children
    - strong interpersonal skills
    - less focused on friendship groups
    - greater interest in others' work
    - naturally engaging in conversations with a wider audience including children, parents and other teachers
    - relaxed environment helped EAL/D children build cultural capital
    - improved understanding and use of basic social conventions

- development of leadership skills through activities and challenges
- ran stations for other children by drawing on leadership skills and effective communication
- showing successful collaboration with children outside their friendship groups to solve challenge tasks

- **Problem solving, critical thinking and risk taking behaviours**
  - confident leaders supporting others during challenges and child-led stations
  - drawing on other children's knowledge and expertise to solve challenge problems
  - willingness to try new activities
  - taking more creative approaches to solving problems, including thinking outside the box
  - transferring skills to other lessons and activities outside of *Active Learning*
  - increasingly able to work on more complex problems for a sustained period of time
  - succinctly articulated solutions to problems and present reasoning

- **Creativity and technology**
  - presenting work based on their own personal style
  - showcasing personality and talents through creative arts
  - writing own songs and drama pieces to share with others
  - confident in using a wide range of technologies for different purposes
  - eager to share learning experiences using technology with parents and local community

- **Reflection**
  - independently conducted interviews with other children about their learning
  - greater focus on individual interests and passions
  - more thoughtful in how they used resources and interacted with others
  - higher quality of work being produced

Figure 6.1 Summary of thematic analysis for question 1 conducted during post-study group interview

6.2.2 Participant Teacher and Researcher Reflective Journal Entries on the Development of Skills in Children

Figure 6.2 presents a summary of the thematic analyses of participant teacher responses recorded in teacher journals post Cycle Four on the development of 21st century skills in the children.

Participant teacher and researcher reflective journal analyses on the development of 21st Century skills in children throughout the study

- **21st Century Skills**
  - **Children were developing an increasing range of skills which extended beyond *Active Learning***
  - **Reason**

  - **Collaboration, communication and social skills**
    - increased autonomy
    - willingness to ask questions of other children about their learning
    - negotiate with other children to solve a problem or complete a task
    - greater flexibility to group settings
    - ability to adapt to group dynamics
    - increase in positive interactions between children
    - more substantive conversations
    - heightened language skills
    - open to sharing knowledge and skills with other children
    - confident communicating with unfamiliar adults and community members

  - **Problem solving, critical thinking and risk-taking behaviours**
    - confident making decisions about their learning
    - self-select ways in which they would like to present information
    - more willing to explore talents and practise skills
    - identify own learning goals
    - sought assistance to complete tasks and challenges from other children
    - access tasks at ability level and build skills by working with other children
    - extend problem solving and critical thinking skills to other activities outside of *Active Learning*

  - **Creativity and technology**
    - selecting learning opportunities based on interest and passion
    - offering multiple options on how to present learning helped to build creativity
    - less teacher intervention
    - express creativity using technology
    - teach other children how to code and use specific Applications
    - suggest ways they can use technology to help them solve problems

  - **Reflection**
    - develop strong sense of self
    - intrinsically motivated
    - increased pride in work
    - willing to refine work
    - engage in self-reflective practices more frequently
    - give and receive constructive criticism from other children

Figure 6.2 Summary of thematic analysis of participant teachers and researcher reflective journal entries on the development of 21st Century skills in children

6.3 Analysis of Teacher Interview Responses and Reflective Journals on their Personal Development of 21st Century Skill

6.3.1 Post-study Interview Question 2

During the post interviews teachers were asked to describe any 21st century skills / professional qualities they had developed throughout the study (see Figure 6.3).

Question 2 Describe any 21st Century skills / professional qualities you as a teacher have developed throughout the study

- **21st Century Skills**
  - **Successfully identify how they have evolved as a classroom teacher through *Active Learning***
  - **Reason**

  - **Collaboration and communication**
    - share ideas and resources more freely between team members
    - productive collaborative planning sessions
    - exercised ownership over content and direction of program
    - positive and supportive environment
    - opportunities to trial team-teaching in a more relaxed setting
    - working together to increase creative capacity
    - sharing of assessment data

  - **Leadership**
    - took on small role in building confidence
    - opportunity to share personal interests and skills with other teachers and children
    - willingness to confront unfamiliar or challenging situations
    - took responsibility for managing activities
    - recognising they do not need to have all the answers
    - helping children develop their leadership skills
    - able to compromise with other teachers

  - **Critical thinking, problem solving and risk-taking behaviours**
    - willingness to trial new activities
    - increased ability to think of activity and experiment ideas outside of the box
    - critically analyse activities and incorporate real world, authentic child experiences
    - purposefully creating open-ended challenges
    - letting children be the experts and manage activities themselves
    - exploring backwards mapping during planning
    - stepping back from activity to allow children to solve problems themselves

- **Technology**
  - learning from children
  - trialling the use of online data collection methods
  - employment of portable devices as a learning tool instead of toy or reward
  - sharing learning experiences beyond the classroom through the newsletter and social media

- **Building relationships with children**
  - having more positive, less formal conversations with children
  - engaging in deep conversations with children about their passions
  - building quality relationships with children from different classes
  - showing they have confidence in children by letting them run stations
  - guiding children to discover answers themselves
  - participating in the play together with the children

- **Reflective practices**
  - ongoing, regular formal and informal feedback sessions
  - engage in conversations with children to get their feedback
  - identify changes needed and act of them
  - recognise gaps in knowledge base and sought to fix these

Figure 6.3 Summary of thematic analysis of question 2 conducted during post-study group interview

6.3.2 Participant Teachers and Researcher Reflective Journal Entries

Figure 6.4 presents a summary of the thematic analysis of participant teacher responses recorded in teacher journals post Cycle Four on their personal progression.

Participant teachers and researcher reflective journal analysis on development of 21st Century skills in themselves throughout the course of the study

- **21st Century Skills**
  - **Developed a range of key skills to help them reach andragogical / heutagogical paradigms**
  - **Reason**

  - **Collaboration and communication**
    - established open lines of communication
    - able to take on different roles during *Active Learning* sessions with the support of colleagues
    - encouraged collective responsibility for the success of sessions
    - consistent planning sessions conducted in Stage groups
    - workshopping ideas in a professional manner
    - confident with collaborative approach to data collection and sharing

- **Leadership**
  - benefit from other team members expertise
  - researching and sharing knowledge with others
  - independently identified skills they needed to develop or improve
  - recognised gaps in their understanding of curriculum documentation and sought to better equip themselves for gathering assessment data
  - being comfortable with letting children take the lead

- **Critical thinking, problem solving and risk-taking behaviours**
  - develop play-based activities linked to teaching themes running through their regular classroom practices
  - by Cycle Four increased thinking with a play-based mindset became second nature
  - taking children's ideas and interests and turning them into learning opportunities
  - stepping out of their comfort zone
  - personalising learning experiences for children
  - consciously working towards changing their role in the classroom to one of a facilitator of learning

- **Technology**
  - accepting that some children have a better understanding of how to use different types of technology
  - upskilling themselves on how to use an iPad and other digital devices
  - recognising Apps can be used for play-based learning purposes

- **Building relationships with children**
  - taking an indirect role during *Active Learning*
  - getting to know individual children from outside their class group
  - letting go and participating in drama and dance activities with children
  - collaborate with children to design activities and experiments
  - comfortable including children in planning process

- **Reflective practices**
  - open dialogue between teachers
  - critically assess activities and make changes frequently including scaffolding

Figure 6.4 Summary of thematic analysis of participant teacher and researcher reflective journal entries on the development of 21st Century skills in themselves.

6.4 Introduction to Discussion

6.4.1 Significance of developing 21st Century Skills for an Unknown Future

The program provided a broader range of skills outside of science and mathematics for both teachers and students. The Office of the High Commission for Human Rights (1990) said that

all children have the right to an education which will set them up for the rest of their lives and maximise their abilities; the significance of these statements was addressed by incorporating the necessary building blocks that enabled teachers to become independent and, hopefully, lifelong learners. A vital finding of this study was the role played by children's acquisition of 21st century skills. Additionally, this section explains how teachers progressed to actively engage in andragogical and heutagogical practices to where they understood their strengths and deficiencies, recognised how they, themselves, learn and were able to reconcile gaps in their learning (Blaschke, 2012).

6.5 Active Voice and Choice: Building 21st Century Children

6.5.1 Building Autonomy

The success of the program was inherently linked to children being able to self-direct their learning experiences and teachers moving into a facilitator role (Beetham & Sharpe, 2013); O'Connell, 2012). Achieving self-directed learning relied on the development of key 21st century skills and child autonomy during *Active Learning* sessions. The main challenge for children was 'unschooling' them and overcoming the automated 'guess what's in my head' responses they were inclined to reproduce as a result of previous learning experiences. In this case, it was about giving children the confidence to ask questions and challenge how they were learning (Whitby, 2013).

Early in the study it was evident the children were used to being told what to do, when to do it and where it was to be done, in a way similar to a factory conveyer belt or assembly line (Whitby, 2013). From observations and discussions with children, it was obvious that, at times, they were not clear about why they were undertaking specific activities. Changing the learning environment from one strongly directed by teachers was a steep learning curve for all, as much a challenge for the children as it was for teachers (Howard, 2010), while it was gradually and incrementally being achieved. A starting platform for change meant giving the children their voices back and building a collaborative learning environment.

6.5.2 Everyone as a Learner (Children and Adults Alike)

Playing to Engage created an atmosphere where, over the course of the study there became less distinction between teachers and children as learners (Bangura, 2005). Both needed the same skill set to meet the changing face of education and the unknown future of technology and the job market. Figure 6.5 outlines the key 21st century skills identified by the Ministerial Council on Education, Employment, Training and Youth Affairs (2008) and the EYLF (Australian Government Department of Education, Employment and Workplace Relations, 2009) as being important when preparing children for the unknown future of employment, and subsequently incorporated as part of the *Active Learning* program and teacher training. The children's and teachers' advances are discussed under each of these headings.

Figure 6.5 Key 21st Century skills identified as important when preparing children for the future

6.5.3 Collaboration, Communication and Leadership

The *Active Learning* sessions promoted a collaborative environment between the children. An open plan classroom design in its simplest form allowed the children the flexibility to move and adapt the space as needed (Hannafin, Hill, Land & Lee, 2014). They could work at tables, on the carpet, gather cushions together or move outside ,depending on their needs.

The more comfortable and confident the children became during *Active Learning* sessions the greater their motivation was to make choices about the activities they participated in and with

whom. These were important factors that promoted engagement and self-efficacy (Hannafin, Hill, Land & Lee, 2014). By Cycle Four, the children were less driven to follow others and able to take ownership of their interests and choices. This in turn led to an increase in collaboration between the children, with less inclination to make choices based on friendship groups. Instead, the choices they made were determined by interest, which helped them build new friendships based on mutual passions or a desire to solve problems, a critical element of the program's success (Henniger, 2014).

6.5.3.1 Building a Culture of Curiosity

As children are naturally curious (Mitra, 2005), they were eager to see what other children were doing, to find out how they created craft items and engage in different role-play scenarios. It took time to get them to open up and ask each other questions instead of relying on a teacher as the go-between in discussions. Over the course of the project their communication skills and level of positive interactions increased, which was evidenced through the many video clips recorded (see appendixes 1, 3 and 8 for examples). These clips demonstrated their confidence in having more substantive conversations and succinct articulation of key concepts. There was a constant buzz throughout the classroom.

In the case of EAL/D learners, the natural and authentic conversations occurring throughout the sessions helped these children explore language in a safe environment (Aliakbari & Jamalvand, 2010). The children's increased level of conversation help support the EAL/D learners and clearly contributed to their comparatively good NAPLAN literacy results (discussed in chapter 7). The project also allowed this group of children to share and contribute through their work, enhancing their sense of cultural capital in the classroom.

6.5.3.2 Celebrating Children's Individualism and Knowledge Bases

The children had the opportunity to explore their talents and practice skills, and discover new passions. By Cycle Four, they wanted to step up, ready to take the lead and run their own activity stations. *Active Learning* helped the children realise self-actualisation through the progressive exploration of who they were and what they knew (Broadhead, 2004). The development of their social and communication skills meant they were confidently interacting with others and could effectively express their interests. Through their own workshops and

peer exchanges with more competent children they were able to extend themselves and successfully obtain new information, as conceptualised by Vygotsky (1978).

Throughout the study the children were able to demonstrate their leadership skills in many different ways:

- some chose to express themselves by individually or collaboratively running workshops to share skills they possessed such as drawing, origami, gardening or Lego robotics;
- some naturally took on a leadership role through challenges and role-play activities; and
- others wanted to engage in discussions with other children and facilitate experiences through science experiments.

As the children developed their collaboration, communication and leadership skills these attributes began to extend into their everyday learning sessions. Their exploration of different interests and passions overall helped them to discover who they wanted to become (Broadhead, 2004). By Cycle Four, the children were collaborating in groups, on larger and more complex tasks. It became second nature for them to take on different roles and gather information from various sources themselves including from community members and senior teaching staff as part of daily activities.

6.5.4 Critical Thinking, Problem Solving and Risk Taking

The nature of the activities, especially the challenge-based activities, provided opportunities for the children to develop their critical thinking and problem-solving skills, a key element in preparing children for the future (Australian Curriculum Assessment and Reporting Authority, 2012). They were able to work individually and as a collective team explore questions that were initially asked by teachers. Early examples included the Mystery Box challenges where the children used recycled materials to create boats, animals and items of transport, or anything their imaginations desired (see Appendix 4 for more detailed examples).

As the children progressed they were able to work on more complex problems, such as creating a Lego crocodile robot or building rocket ships for the school's Book Week Parade. Children were able to sustain projects across multiple *Active Learning* sessions, prolonged engagement being a key characteristic of successful learners (Bodrova & Leong, 2007). When the children encountered problems, they sought assistance from other children, used their problem solving and critical-thinking skills to keep them going and achieve an outcome that pleased them. They were able to increasingly identify their learning goals and problem solve by different means to achieve them (Hannafin, Hill, Land & Lee, 2014). In cases such as the marshmallow towers (see Appendix 4.6.2) the children were given an opportunity to discuss their work, reflect, and then come back to the challenge during another session.

The nature of the open-ended mathematics problems, where there were often multiple answers, provided the children with the opportunity to engage with them at differing levels of complexity, to draw their own conclusions, and deepen their understanding (Hannifin, Hill, Land, & Lee, 2014). This in turn helped the children to become risk takers in their learning. They became were more willing to ask questions, give activities a go and offer their opinions freely. They were building the knowledge, skills and values to take advantage of opportunities and face challenges with confidence (outlined by the Ministerial Council on Education, Employment, Training and Youth Affairs, 2008). In the case of the greenhouses (see Appendix 4.5.1), the audio-visual presentation offered one simple process for completing the experiment but – exemplifying these characteristics – the children extended their learning by suggesting alternative options such as using different seeds, substituting the soil in the cups for other materials and changing the location required for it to grow, to see what would happen.

6.5.4.1 Communicating Through Questioning

Through the ongoing reflective practices established by the teachers' leading questions, and the consistent gathering of photographs and multimedia recordings, the children became comfortable talking to both adults and other children, to help them reason through their process or justify their conclusions. The interactions between Isabella and Jacob (Questioning MOV, Appendix 1), and Destiny (Safari Hunter MOV, Appendix 8) illustrate their confidence in questioning each other and probing for additional information. Asking questions of others

fuelled the children's passions and curiosity. This led to the children suggesting their own experiments, such as the multi-vinegar test. This included the children developing their own hypothesis and method to formally record findings, providing clear evidence they had rediscovered their voices, an important quality (Whitby, 2013).

The more the children drew on each other's knowledge and expertise to solve problems, the more confident they became in asking questions and thinking critically. They were effectively developing a range of key problem-solving, critical-thinking and collaborative skills (Crockett, Jukes & Churches, 2011). The children also applied skills gained through *Active Learning* to other situations, exemplified in specific examples (see Appendix 4). Due to the constant links being made by having cross-curricular activities, the children naturally became more creative in their problem solving and application of skills.

6.5.4.2 Creativity is the Key

The children's creative flair, an important component in a holistic learning experience (Australian Government Department of Education, Employment and Workplace Relations, 2009) manifested in many different ways before the study concluded. In the early Cycles, it was very important to offer many different options and limit the amount of teacher modelling, so the children could develop their own skills and style. Previously, the children had experienced standardised art activities where every picture, painting or drawing they created was exactly the same as the child's next to them. Through observation it become obvious that teachers had a clear picture of what an artwork should look like and the children were used to being told how to do it (O'Connell, 2012). Although this example relates to art, the same can be said of drama, dance and music. Each of these curriculum areas were given minimal time and attention, as the teachers allocated far more time to literacy and numeracy, mirroring Prensky's (2011) concerns about teachers becoming overly concerned with externally assessed curricular at the expense of creativity. This was rectified in *Active Learning.*

By offering role-play scenarios, Mystery Boxes, various painting activities with different mediums, drawing with a range of materials, playing and making musical instruments, and providing exposure to many genres of music (see Appendix 4), the children were given opportunities to explore their personal style of creativity. They were able to think

imaginatively and creatively to find an outcome which suited them (Whitby, 2013). Furthermore, this expanded their design and technology capabilities. Examples of this are the establishment of the acapella singing group, children writing their own songs to share with others, sketching and model making- workshops, and creating their own plays with props and sets. For the EAL/D children, sharing specific skills and talents from their cultural background with other children built strong interpersonal connections (Buxton, Lee & Santau, 2008).

6.5.4.3 Creativity as a Problem-Solving Tool

The children's creativity extended beyond the creative arts and into the way they solved problems. They were thinking outside the box. By Cycle Four they would ask for specific materials to use during Mystery Box, to build their creations. An excellent example of this was a child's choice to use sticky dots on her model rocket ship to hold the flaps down on a cardboard box. She also used rice to weigh down the legs of a model elephant so it was balanced (see Appendix 4.2.2).

Active Learning changed the way the children produced work. Nothing was stock standard anymore. Within the classroom, as promoted by the Australian Curriculum Assessment and Reporting Authority (2012), children were demonstrating their innovative thinking and creative approaches to learning. They were able to broaden their understanding of what creativity was and, for example, use Lego, models, Moviemaker and digital books to share their work with others. The broader focus on outcomes allowed them to think creatively and become more resourceful (Gonski, Boston, Greiner, Lawerence, Scales & Tannock, 2011).

6.5.5 Digitally Literate

Active Learning promoted the use of technology, a significant attribute for the rapidly changing needs of learners (Prensky, 2001), engaging their curiosities (Mitra, 2005) and promoting an active role in learning (Male & Burden, 2013). Initially, the children's work was captured in photographs and audio-visual clips but this was eventually extended to include ways the children expressed themselves. Using technology as a learning tool became second nature to them. Through *Active Learning* they also realised the full scope of what digital devices could offer – besides games – to enhance their experiences.

The children were confident using a wide range of Apple products including Mac Books, iPads and iPhones, as well as PCs, microscopes and robotics. Having access to the digital world gave them the opportunity to research and gather information that reflected their interests, to locate and create experiments, and to undertake 'how to' workshops with each other. In many cases it gave children a voice with which to express what they were interested in and wanted to explore. These examples typified the children's development of vital effective communication skills (Crockett, Jukes & Churches, 2011),.

6.5.5.1 Technology Opens Up Children's World

The integration of technology placed the children in an active role where they were able to inquire, create, collaborate and problem solve (Male & Burden, 2013). They could express their creativity by making movies and e-books, drawing, recording music and storyboarding puppet shows. Others used technology as a problem-solving and strategic tool to find answers or participate in challenges such as the Lego robot building. There were also the 'gamer children' who had a passion for coding, which they practised and refined using the Lego robots (see Appendix 4.15.7). These children also developed app knowledge through the use of Minecraft and Angry Birds. Some simply wanted to read interactive books and magazines.

The children could collaborate on projects inside and outside the classroom using technology. They were able to connect (O'Connell, 2012) and share their work with their families through Facebook, and connect with other children and educators through Twitter. The use of this medium brought the outside world into the classroom. It also served as a reflective tool through which the children were able to engage in conversations with each other, review their recording and get feedback from the outside world.

6.5.6 Reflective Practices

Throughout *Active Learning* and in the post wrap up, the children were constantly encouraged to reflect on their work through targeted questioning. It became second nature for them to converse with another child or adults about what they were doing. In many cases it became the children who would interview each other. This helped build their social skills and develop stronger relationships. The children were eager to ask each other questions and actively

engage in conversations to find out how others had achieved specific results. Overall, this process helped the children develop a strong sense of self, an important aspect of successful 21st century learners (Australian Government Department of Education, Employment and Workplace Relations, 2009).

A much bigger part of the process was the development of the children's inner reflective techniques, which was evidenced by the significant increase in the quality of work they produced. Initially, they were inclined to gather as many craft items as they could, irrespective of whether they needed them or not. They would use excessive amounts of ingredients when experimenting. By Cycle Four, the children were much more refined in their work (Gonski, Boston, Greiner, Lawrence, Scales, & Tannock, 2011). They were resourceful in their use of materials and systematic in gathering results. Teachers reflected that the process had become less of a competition and more about their individual interests and goals, something the children modified in themselves.

6.5.6.1 Stepping into the Future

The development of 21st century skills through *Active Learning* directly led to learning environments transitioning into flipped classrooms, where child-centred learning dominated. The children's mindsets were beginning to evolve, and in turn some were able to transition into andragogical or in some cases heutagogical learners in their own right. The skills developed extended beyond the program, into other areas of daily learning. The classroom became a space where the children had a greater say in their learning (Whitby, 2013), which was more personalised. This dramatic change would not have occurred without a significant alteration in the teachers' learning dispositions (Beetham & Sharpe, 2013).

6.6 Lifelong Learners: Building 21st Century Teachers

6.6.1 Teachers Need to Develop the Same Skills as Children

Playing to Engage highlighted the need for not only the children to change the way they were learning but also for the teachers to engage in the process as learners themselves. The importance of developing 21st century skills was not limited to the children. Teachers began to mirror the same skills themselves so they could efficiently facilitate the acquisition of

knowledge (Adey, Hewitt, Hewitt, & Landau, 2004). Teachers needed to learn to let go, become facilitators of learning in the classroom, and take risks in the experiences they were offering. As articulated by Beetham and Sharpe (2013), this was a significant progression from traditional teaching methods, but a necessity if children were to become 21st century learners – the ideal as described by Hattie (2008).

Interwoven with these skills was the teachers' developing confidence and skill in applying curricular knowledge and in understanding and applying authentic assessment. These remain key roles in an outcomes-driven school context.

6.6.2 Collaboration, Communication and Leadership

Ollis (2011) assists in understanding that collaboration and communication between the teachers is what made this program so successful. The consistent cyclic process opened the lines of communication between the teachers regarding all aspects of the program. Through this partnership the participants were able to share ideas, plan sessions, take on different roles, and reflect. The teachers' reflections indicate they felt a sense of ownership over and were invested in the program. This engendered a collective responsibility between the participants, a critical component in the process as articulated by Moon (2004).

By Cycle Three the expansion of *Active Learning* to other parts of lower primary meant whole teams of teachers were involved in collaborative planning sessions. Their desire to link activities to the curriculum – a key element (McTighe & Wiggins, 2011) – and support themes running through their classrooms, meant that discussing the planning of these sessions became a regular part of weekly preparation.

6.6.2.1 Creating Open Learning Environments

Active Learning encouraged the teachers to bring their classes together, which in turn made plain their vested interest in the program. Drawing on their collective responsibility – identified by the Ministerial Council on Education, Employment, Training and Youth Affairs (2008) – in a positive, supportive context, the teachers felt pressure to participate, contribute to discussions and offer ideas, which ultimately increased their levels of communication. Furthermore, given that teacher roles differed during sessions (Heidemann & Hewitt, 2010),

and because data were gathered by all, it was imperative the teachers share their findings and assemble information about the children for reporting. By the conclusion of the project the teachers were sharing ideas and resources across teams. This was a big change from the isolating experiences occurring at the commencement of the study.

6.6.2.2 Building Relationships with Children

Through positive interactions with the children, the teachers were able to develop strong relationships and insights into individual children's needs, a significant attribute identified by Prensky (2011). The teachers went from a role dominated by teacher-directed learning, to taking an indirect role in play-based experiences and providing support through questioning. In interviews, the teachers discussed how the positive, less formal interactions helped them to know the children on a deeper level. They truly grasped the children's specific passions and interests. The teachers also considered how significant the inclusion of other classes was in helping them build relationships outside the classroom.

Through the change in relationships and greater understanding of individual children's interests, the teachers were able to collaborate with children on their own projects and help them design sessions for presentation. The thinking behind each *Active Learning* session became how best to support what each child could achieve (Scoufis, 2013). Planning sessions became a collaborative experience with the children as they put forth their ideas, workshops and questions. This effectively promoted authentic child-centred and self-motivated learning experiences (Wong, Wang & Cheng, 2011).

6.6.2.3 Finding the Leader Within

Active Learning gave each teacher the opportunity to demonstrate leadership skills as they shared their passions and talents. Whether they were interested in the creative arts, literacy, science, EAL/D or mathematics, this program presented them with an opportunity to showcase their skills. This had a dual effect of not only allowing teachers to share passion amongst other professionals by drawing on their background knowledge, but more importantly it gave the children an insight into their teachers, helping to once again break down barriers. Through this experience the teachers were able to engage in an internal process of identifying personal attributes and skills they were lacking and in which they needed

further development (Blaschke, 2012). This was an important stepping stone in their becoming andragogical learners.

6.6.3 Critical Thinking, Problem Solving and Risk Taking

The teachers were able to think outside the box, and tackle the polarising attitudes associated with play-based learning (Prince, 2004). They needed to change the way they presented learning experiences to the children, and the way they connected, communicated and collaborated with them (O'Connell, 2012). The teachers needed to be constantly asking themselves: "how can I make these key concepts play-based and engaging, link them to the real world and promote the children's application skills, as well as look for specific activities with open-ended problems and multiple answers?" Although it took time for teachers to recognise opportunities and make curriculum links in their activities, their reflective journals indicate they were able to make this transition. The difficulty was to achieve this using a heutagogical framework; that is, to shift their thinking from providing the children with an experiment about changing the colour of a flower, to using questioning to entice the children to investigate how they could make flowers change colour, and to explore what colour actually was.

To make the children's ideas come to life and nurture the development of lifelong learners, (Office of the High Commission for Human Rights, 1990), there was a significant amount of problem solving which needed to take place behind the scenes. The teachers had to keep in mind the cost and availability of resources for activities, and in many cases look for alternative ways to achieve the same results.

6.6.3.1 Children Have Got This, They Have Been Playing Their Whole Life

As identified by the teachers during their interviews and noted through observations, one of the biggest challenges they faced in the implementation of the program was taking risks and handing over control to the children. One teacher stated, "after teaching in a classroom where you are used to running the show all the time, it is hard to back off and let go." Another teacher acknowledged the challenge of not giving the children all the answers, especially when conducting science experiments. Getting teachers involved as much as possible in sharing their personal talents, participating in drama, dance and dress-ups set them more at ease. Toward this end of 'letting go', one of the outcomes of Cycle Four was the transformation

of how learning spaces were run. The most significant change was the shift from teacher-directed to teacher-facilitated learning, an essential change to meet 21st century learner needs (Bartels, 2012). The teachers were more willing to dress-up, take on drama roles and enjoy being able to laugh at themselves.

6.6.3.2 Just Jump in

The notion of risk-taking goes hand-in-hand with the idea of 'letting go'. The teachers needed to recognise that if they expected children to put themselves 'out there' and try new things, even if feeling vulnerable, they needed to do the same. In the early Cycles a key objective was to change perceptions of teachers so they would go beyond their psychological barrier (Martlew, Stephen & Ellis, 2010) and take risks themselves. The Science Days, acting roles, rainbow lab coats and trialling new experiments (see Appendix 4) are examples where teachers pushed beyond their traditional comfort zones. The biggest risk for them was in the activities they selected. Understanding that it was alright if an activity or experiment did not work perfectly was one thing, but more importantly, helping teachers to see it as an opportunity to reflect and refine was another, especially if they are to be able to model this for children. An even greater challenge was developing a mindset in the teachers that they did not need to have all the answers. Making discoveries together with a child and celebrating the child's knowledge on a topic where the child was the expert was an amazing experience for the teachers, as described in their reflective journals. Cycle Four exemplified how far the participant teachers had come in acknowledging the children as experts, and celebrating both teacher and child as learners, an important means to growth (Saracho, 2011).

6.6.3.3 Creativity is the Key

Teacher have different strengths and weaknesses. The collaborative nature of *Active Learning* allowed them to come together and share elements of their individual expertise. An important element of the program was sharing specialised skills and knowledge, which helped to promote and foster a culture of personalised learning and create experiences linked to children's diverse interests, noted as important in the Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008). The collaborative nature of the program also helped to promote children as experts, and helped create learning environments where the teachers and children were indistinguishable (Bandura, 2005).

Confronting unfamiliar or challenging learning areas sometimes sternly tested teachers' abilities to step outside their traditional role, to think creatively and not rely on only tried and tested activities (Adey, Hewitt, Hewitt, & Landau, 2004). Early observations and conversations with them revealed that many of them were stuck in a rut. The teachers were used to presenting the same units of work year in and year out, and following the same structured routines laid out by school policy. This limited their creativity. The challenge was to help them to step into the 21st century, leave cardboard posters behind, and look for more creative ways of exploring the curriculum (Martlew, Ellis, Stephen, & Ellis, 2010). Wood and Attfield (2005) wrote that one measure of success was in marrying children's interests with curriculum content.

6.6.3.4 Thinking Outside the Box

Cycle Three saw a transformation in teacher thinking. Collaborative planning sessions and a congenial, collegial climate (Moon, 2004) facilitated an exploration of ideas and in-depth discussions. By providing teachers with generous quantities of books, electronic resources and a shared drive to upload their own ideas (see Appendix 10), they had access to a wealth of information to help make this process easier. During the post-study interview, T5 discussed how this helped her to feel more creative, a skill she had not thought she possessed. The teachers were initially provided with a series of resources, which made the implementation of *Active Learning* less daunting. With increased confidence the teachers began taking the lead in discussions and planning, which helped propel them into an andragogical state of learning. They were able to design multiple activities to explore the same concept or theme, consistent with the National Association for the Education of Young Children and National Council of Teachers of Mathematics' (2009) expectations of high-quality and accessible yet challenging activities. For example, in a case of focusing on procedure writing and measurement, a collaborative team of children and teachers selected milkshakes. The children were able to make them, write procedures, explore different types at a role-play café and design their own measuring cups.

By Cycle Four, being creative was about helping the children to achieve their self-determined visions. This was a collaborative process, with the children problem solving to find ways to

make their ideas and interests come to life and ultimately support the development of specific skills and knowledge (Wood & Attfield, 2005). Given the flipped nature of this Cycle and the emphasis on child-directed learning, the teachers needed to employ an element of backwards mapping and creativity to meet and assess curriculum outcomes. This was where the significance of digital technologies came into play as a tool for capturing 'wow' moments and achievements that occurred during *Active Learning* sessions.

6.6.4 Digitally Literate

Sitting on the cutting edge of technology is a tough place for a teacher to be, especially when, it is continuously evolving and affecting the way we communicate (White, 2013). Many teachers confessed to a lack of knowledge and skills in this area and displayed feelings of inadequacy, with the children having a greater understanding of iPads than they did. For T3, during the early Cycles of the project, incorporating or even discussing technology was a daunting experience. Many teachers had just transitioned from using a whiteboard to having an electronic Smartboard, but were still employing it as a projector. Most had no experience with iPads.

The introduction of technology opened up a new world for presenting work and recognising achievements. It was self-evident that teachers needed to take the challenge and up-skill with technology, thus causing pedagogy to evolve (Bartels, 2012). Instead of simply recording notes with pen and paper, as teachers did in the early Cycles, they were now able to take photographs and record videos. They also had access to the children's work on iPads, their e-books, recordings, Puppet Pal creations, and much more. By Cycle Four the teachers had progressed to using OneNote, a digital notebook for recording notes, hand written texts and images, and which could be accessed by multiple users.

6.6.4.1 Integrating Technology with Confidence

A vast difference between the early Cycles of the project and the final Cycle was the teachers' change in their attitudes towards technology. The importance of this was not only their acceptance that it was alright for the children to be experts, but their recognition of portable devices as learning tools and not toys. By Cycle Four the teachers had expanded their technology focus to include Facebook and Twitter, which extended the children's sense of

community (Australian Government Department of Education, Employment and Workplace Relations, 2009). For the teachers it was a new dimension, and a step towards heutagogical practices. This enabled them and the children to share their experiences and work with parents and likeminded educators outside the classroom to build intrinsic motivation (Lillemyr, Sobstad, Marder & Floweray, 2011). This provided the teachers with another avenue for feedback outside the school, including sharing images of learning in their classrooms on social media to gain feedback from other educators.

6.6.5 Reflective Practices

The structure of *Active Learning* encouraged the teachers to actively participate in ongoing reflective practices (Moon, 2004). The collaborative planning process and sharing of the children's achievements between the teachers naturally evolved into a cyclical evaluative process. As they stepped into an andragogical dimension, the teachers were able to critically assess the experiences they were providing and identify changes which needed to be made (Blaschke, 2012). Initially, this involved the modification of activities to help scaffold the children having choices and voices in the classroom. There was also discussion around the roles of teachers and how to move towards their becoming facilitators, a significant component of 21st century learning (Beetham & Sharpe, 2013).

By the evolution to Cycle Four, the teachers were able to independently identify skills and areas where they lacked information, and seek ways to fill these gaps themselves (Kamenetz, 2010). Real success came with the realisation that the teachers were equal partners with the children in the learning process (Bandura, 2005). Developing new skills and gaining knowledge was achieved through collaboration with the children, including learning coding, Lego robotics, Tweeting and blogging. This transformation added a new dimension to the *Active Learning* experience and helped transform the classroom into a space where teachers and children were learning together.

6.7 Conclusion

The acquisition of 21st century skills was significant in changing the way the teachers and children thought about learning and ultimately how they worked in the classroom. It gave

both groups a new skill set, which ultimately allowed them to think creatively and problem solve, helping to make the learning process easier. For the children the development of 21st century skills meant they had a reliable tool kit to choose from when completing tasks. This, in turn, helped transform academic results. The discussion in Chapter Seven explores the impact numerical data had on the study.

Chapter Seven

NAPLAN and Attendance Data

Chapter 7 – NAPLAN and Attendance Data Discussion: Impact on Teachers and Parents

7.1 Through the Looking Glass of Numbers providing data

7.1.1 Introduction

The findings and discussion in this chapter contribute to answering an aspect of the overarching research question: to what extent can play-based learning, specifically linked to science and mathematics, be used as an effective strategy to enhance student achievement? The influence of *Playing to Engage* on improving the literacy and numeracy results of the children in this study is explored first, using NAPLAN data, and then attendance data is analysed followed by a discussion of partnerships with parents.

It should be noted that the researcher did not undertake any independent analysis of NAPLAN data. The data provided by the government to the school was utilised by the school and teachers to identify areas of achievement that needed to be improved. Past and current data were compared as part of this process as well as the impact this had on teacher and parent views about *Active Learning*.

Different sets of NAPLAN data were explored to assess changes in achievement after participating in the *Active Learning* program:

- The 2013 NAPLAN results represent the achievement of children who had been in the *Active Learning* program for one year, having started in the program when they were in Year 2
- The 2014 NAPLAN results represent the achievement of children who had been in the *Active Learning* program for two years, having commenced the program when they were in Year 1;
- This discussion also took into account the NAPLAN results of Year 5 children who did not participate in the *Active Learning* intervention.

The 2015 Year 5 children were in Year 3 in 2013, so their NAPLAN results are derived from the same cohort of children as was involved in the *Active Learning* intervention. Other NAPLAN results compare Year 3 achievement with previous cohorts of Year 3 children where the school was, year on year, trending with many children achieving below the National Minimum Standard, and achieving below children in like schools; that is, with low SES and with high EAL/D enrolment (see 2.8.4).

A key question answered in this study was whether a play-based learning program could engage children in mathematics and science learning, build greater confidence, and impact achievement. A desirable outcome of this program was not so much for children to achieve higher bands in NAPLAN; it was more whether they were able to successfully acquire key foundational 21st century skills in mathematics and science. An extension of this was whether they could then successfully apply these skills to various problem-solving tasks in formal testing, general class-based activities and their everyday lives. Marsh and Dredge (2013) note these as the most important predictors of later success in learning. However, for teachers and parents improved NAPLAN results provided compelling data to validate the value of play-based learning.

This chapter specifically focuses on numerical results as a direct reflection of the NSW curriculum's KLAs and their outcomes and indicators through NAPLAN. The following discussion demonstrates how a child-centred play-based program, with appropriate professional development, positively increased the academic results of children from low SES backgrounds, a necessary aspiration articulated by Gonski et al. (2011). In considering the data it is important to bear in mind the demographics of the cohorts, including high percentages of children with additional learning needs and EAL/D children.

7.2 Foundations in Literacy

7.2.1 Underpinnings for Success

It was essential to meet the teachers' and parents' high expectations for literacy (Wong, Wang, & Cheng, 2011) if *Active Learning* was to become a standard part of the school's teaching

practices. The preoccupation with literacy was understandable given that over 85 per cent of the school's children did not have English as their first language. Although this study focused on improving the children's passion for and achievements in mathematics and science, it can be argued that any success was underpinned by a strong foundation in literacy. Being able to interpret information, articulate findings and produce written responses to questions required a sound basis in all areas on literacy: reading, writing, speaking and listening.

7.2.2 NAPLAN Literacy Results and the National Minimum Standard

The children's achievement in NAPLAN is reported in 'Bands' with Band One being the lowest and Band Eight being the highest for primary school children. The Bands are then divided so that a child can be seen to be achieving below the National Minimum Standard (NMS), at the NMS or above the NMS. A child achieving at Band Four in Year Three, for example, would be *above* the NMS, but another child achieving at Band Four in Year Five would only be *at* the NMS. Table 7.1 demonstrates the relationship between Band and Year levels.

Table 7.1 *Equivalent Bands Based on Children's Level of Proficiency*

Level of Proficiency	Equivalent band Year Three	Equivalent band Year Five
Below NMS	Band one	Band three
At the NMS	Band two	Band four
Above the NMS	Band three to six	Band five to eight

When these 2012 children reached Year 5 and the 2014 NAPLAN tests, they had had no previous exposure to the *Active Learning* intervention, even at the time of their sitting the Year 3 NAPLAN test in 2012. The NAPLAN results showed 41 per cent of the children achieving *below* NMS in literacy. The cohorts who had subsequently taken part in the intervention showed an encouraging decrease in the percentage achieving below NMS: 19 per cent in 2013 and 29 per cent in 2014 – a significant decrease of 10 to 20 per cent across the two years (see Table 7.2 below).

The Tables included in this chapter only relate to children whose achievement is cause for concern (below NMS), and high achievers at the top end of the scale in relation to their comparative bands. This discussion, therefore, does not represent all the children in the sample. To provide a comprehensive picture, data for three consecutive years of assessment are presented at any one time. For the purposes of this chapter, only key, relevant information has been included to make the interpretive process easier to follow. For a complete overview of the NAPLAN results consult Tables in Appendix 6.

Across all areas of literacy the comparison between the *Active Learning* cohort and previous groups showed a pleasing reduction in the number of children achieving below minimum standard. For example, the Year 3 reading results for children below the NMS declined significantly compared with the 2012 scores.

Table 7.2 *NAPLAN Reading Results below NMS for children in Year 3*

Academic Area – Literacy	Academic Year	Year 3 Results
Reading	2012	41%
	2013	19%
	2014	29%

In 2014, while 29 per cent of children below NMS is an improvement on the 2012 result of 41 per cent, it was higher than expected, given that only 19 per cent were below NMS in 2013 and that the cohort had only one year of the intervention. The participant teachers ascribed this anomaly to the slow uptake on the part of some teachers and their hesitancy in implementing *Active Learning* due to their lack of confidence.

Writing results showed a similar, but not as marked, trend as those for reading. In the case of Year 5 children there was a notable contrast between results when children were in Year 3 in 2012, compared with their results in 2014 when they were in Year 5. In writing, 44 per cent of results were in band one. The 2014 Year 3 results in reading and writing showed 10 to 20 per cent fewer children were below NMS compared with their Year 5 counterparts, who had never been exposed to *Active Learning*.

7.2.3 'Above NMS' – the Aim of the Case Study School

It is interesting that the achievement of children at the other end of the achievement scale, high achievers, were in the top two bands. These are described as 'above NMS'. For Year 3 in 2014 there was an increase in the number of children who were able to achieve above NMS in writing and most significantly, in spelling.

Table 7.3 NAPLAN *Writing and Spelling Results above NMS for children in Year 3*

Academic Area – Literacy	Academic Year	Year 3 Results
Writing	2012	11%
	2013	9%
	2014	16%
Spelling	2012	15%
	2013	21%
	2014	31%

The teachers attributed this fluctuation in writing results to the developing *Active Learning* program and the deliberate inclusion after the 2013 NAPLAN results of more challenges, themes and activities that required writing skills. The spelling results show that in 2012 only 15 per cent of children were above NMS. These students had had no exposure to *Active Learning*. By 2014, 31 per cent of the children were above NMS; they had taken part in the program for one or two years.

7.2.4 Taking a Closer Look at the Numbers for Reading and Writing

The most significant change in NAPLAN results between 2012 and 2014 was the dramatic reduction in the number of children who were achieving band one. These children had experienced two rounds of the *Active Learning* program. A flow-on effect of this was the increase in the number of children attaining results in band three or higher.

Table 7.4 *NAPLAN Reading Results as a Percentage of those achieving band 3 or higher between 2012-2014*

	2012	2013	2014
Band 3 or higher	35.5%	58.2%	54.6%

Overall, each year showed an increase in the overall number of children able to achieve higher bands. In 2012, only 34.5 per cent of the children were able to obtain scores equivalent to or higher than band three. The results for 2013 and 2014 showed an increase to 58.2 per cent and 54.6 per cent respectively, of students achieving band three or higher. This represents more than half the children achieving band three or higher.

The data also showed an increase in the percentage of children achieving band three or higher in 2013, followed by an increase to band four in 2014. In addition, there was an increase in the number of children who achieved band six – the highest achievement band reported for Year 3. In contrast, the 2012 cohort had no children in band six.

Table 7.5 *NAPLAN Reading and Writing percentages for Year 3 Children in Bands 3 to 6 for 2014*

	Band 6		
	2012	2013	2014
Reading	0%	1.8%	2.3%
Writing	0%	1.8%	2.2%

7.2.6 Drawing the Data Together

Over the time the *Playing to Engage* program was being implemented, the children's NAPLAN literacy results slowly but steadily began to improve across all areas. Arguably, the transition to play-based learning helped increase the children's motivation to learn because of the personalised approach to learning (Martin & Liem, 2010), described in Appendix 4. The strengthening of the children's writing skills through play-based activities such as the writing station and procedural work appears to have had a positive outcome with many children achieving band three and higher in writing. The targeted approach in *Active Learning* of developing the children's speaking and listening skills had provided them a sound

foundation for the progression of their spelling and grammar skills. This is especially significant given the high proportion of EAL/D children that composed the sample (Aliakbari & Jamalvandi, 2010). The data discussed so far included all the children, of which only a small number had English as their home or first language, while the majority had EAL/D. It was possible to isolate the results of the EAL/D children, which showed that within the cohort, 2.9 per cent were in band six for writing. Table 7.6 shows the substantial progression of EAL/D learners in 2014 to band three and higher in both reading and writing.

Table 7.6 *NAPLAN Writing percentages for Year 3 EAL/D Children who achieved Bands 3 to 6 in 2014*

	Band 3	Band 4	Band 5	Band 6
Reading	30.3%	21.2%	3%	3%
Writing	29.4%	26.5%	17.6%	2.9%

These numerical data also provided an opportunity for the researcher to step into an andragogical role and reflect on where children were not progressing as expected. Using data to inform continual assessment (Hattie, 2008) was an important factor in building effective teaching practices. Using this information the play-based learning experiences were refined to further support the children's development in specific areas. In considering the top performances, the data clearly assisted in determining what was working well, such as the writing opportunities. This knowledge provided a basis to extend children's experiences and entice them to the next level of achievement. The most significant benefit of the numerical data was to consider the children's results individually and use them to plan a much more tailored approach to meeting their needs (Hannafin, Hill, Land, & Lee, 2014).

In contrast, Year 5 data for the children who had not experienced *Active Learning* demonstrated a general lack of progress. In some instances, such as writing, they had actually regressed. It may be that the preoccupation with content (Prensky, 2011) contributed to the lack of progress of these children. Chapter 4 explores the culture of the school and lack of

engagement on the part of both children and teachers prior to the current study, which arguably had a significant impact on the Year 5 results. The discrepancies between the Year 3 and Year 5 cohorts highlights the importance of pedagogy as a way to meet individual needs and fuel passions. This is a clear indication that stepping away from more traditional approaches to learning and teaching and considering environments that acknowledge the unique personalities and interests of children, has positive outcomes for their learning (Prensky, 2001).

7.3 NAPLAN Mathematics Results

7.3.1 Mathematics National Minimum Standards Results

The numeracy NAPLAN data are presented in the same format as the literacy results. For the purposes of comparison the Year 5 results are again presented at times.

7.3.2 Children Achieving At or Below NMS in Numeracy

Table 7.7 shows that in 2012 (for children with no intervention) 60 per cent were either at NMS or below. In subsequent years, there is a slight improvement for children who had taken part in *Active Learning*.

Table 7.7 *Numeracy Results for, at, or below NMS for Year 3*

Academic Area – Numeracy	Academic Year	Year 3 Results
	2012	60%
	2013	53%
	2014	50%

In 2013, the children had been in the *Active Learning* program for one year, with the result that fewer students (53 per cent) were at or below NMS. In 2014, the children had been in the program for two years and the number at or below NMS had reduced even further to 50 per cent. Over the course of three years, the data showed a steady decline in those at or below NMS, meaning more children were achieving in higher bands.

7.3.5 Taking a Closer Look at the Numbers for Numeracy

When the children who had not participated in the intervention undertook NAPLAN testing in 2012, 39.9 per cent achieved band three or higher. By 2014 this increased to 50.1 per cent (Table 7.8), just over half the cohort. It was significant that there was an increase in the percentage of children in bands five and six.

Table 7.8 *2014 Band 3 NAPLAN Numeracy Results for Year 3 Children*

	Band 3	Band 4	Band 5	Band 6
Numeracy	26.2%	16.7%	4.8%	2.4%

7.3.6 Specific Areas of Numeracy – Number and Patterns and Algebra

In the specific areas of numbers, patterns and algebra, the 2014 cohort of Year 3 students showed an increase in band four and above. In 2012, of the non-intervention children, only 9 per cent were achieving band four or above in these specific areas of numeracy. By 2013 the children who had been exposed to *Active Learning* for one year, and achieved band four or above, increased to 23.6 per cent. In 2014, the children who had been taking part in the program for two years and achieved band four increased to 28.6 per cent, as noted in Table 7.9.

Table 7.9 *2014 Bands 3 to 6 NAPLAN Number, Patterns and Algebra Results for Year 3*

	Band 3	Band 4	Band 5	Band 6
Numeracy	26.2%	28.6%	7.1%	7.1%

7.3.7 Drawing the Data Together

The significance for teachers in this process and their growing insight into why the children's 2012 results were so low was discussed in Chapter 4. The nature of *Active Learning* gave

children the hands-on approach they needed to better understand concepts, discover which methods suited their individual learning style, and apply knowledge to real world tasks (Scottish Executive, 2007). As described by the National Association for the Education of Young Children and National Council of Teachers of Mathematics (2009), this style of learning made mathematics more accessible to the children in the study. This was in direct contradiction to the methods employed by the 2012 teachers for the Year 5 children included in this discussion. A key method in their approach was teaching to the test, a significant issue that tends to obstruct learning (O'Keefee, 2012). The success of the play-based approach was built on Notari-Syverson and Sadler's (2008) belief that important foundational mathematical knowledge could be constructed through everyday activities, and by providing frequent, specific opportunities for children to practice skills. The teachers claimed that these strategies had been effective in leading to the reduction of the number of children at or below NMS. It is also significant that over half the 2014 cohort achieved band three or higher (post-study interview). Consequently, a telling overall result of this study was the gains made in the areas of numbers, patterns and algebra.

7.4 The Roll-On Effect

7.4.1 Changing Teacher Perceptions Through Data

For many teachers, not only those involved in the study but also generally across the school, the NAPLAN results had a big influence on their perceptions about *Active Learning*. Given the nature of the school's consistent pressure to teach to the test through multiple-choice questions, NAPLAN style teaching and questioning, and a heavy focus on specific, isolated skills such as place value, it was difficult for the teachers to believe a play-based program could achieve results. This is consistent with the findings of Prince's (2004) study. Although NAPLAN was only one indicator of the success of *Active Learning*, for the teachers the validity of the program was significantly dependent on how well children performed in this National assessment.

Presenting positive NAPLAN data, as described by Buxton, Lee and Santau (2008) persuaded many teachers that higher achievement was possible for low SES children using the *Active Learning* program. The consistency of improved achievement across two years countered the

concern that it might simply be attributed to one cohort of children being stronger than others. The teachers were able to see the difference, as presented in the literacy and numeracy data above. One of the most confronting statistics was the difference between the results of children who had not experienced the intervention and those who had. This was obvious in the dispiriting lack of improvement, and in some cases regression, made by the Year 5 children (Weimer, 2013).

Within the participant group, the teachers' confidence in their ability to teach mathematics and science in a play-based manner significantly increased because of the NAPLAN results. These results confirm that children whose capacity to think creatively, and act flexibly and independently was cultivated, would be successful (Whitby, 2013). Children now had the ability to draw upon a sound knowledge base which had been developed through problem solving, collaboration and hands-on activities. Their dispositions for learning – engagement, perseverance and creative application (Claxon & Carr, 2003; Whitby, 2013) – had contributed to improved NAPLAN results.

These data provided the positive mindset needed for the teachers to cultivate their own development of 21st century skills, as well as the confidence to use play as a vehicle for learning, and ultimately their progression into andragogical paradigms. As expressed by T4 during a group interview: "*Active Learning* highlighted that there is more than one way to achieve higher NAPLAN results". T6 went on to discuss the importance of developing underlying skills for children to be able to effectively transfer information to various scenarios. The acknowledgement of the role *Active Learning* played in developing children in a holistic way was a big step forward. This changed the dynamic of learning and teaching in the classroom, a vital shift (Beetham & Sharpe, 2013). It also elevated the levels of engagement and motivation for both teachers and children, which in turn resulted in improved attendance.

7.4.2 Attendance Records Say It All

A direct influence on child achievement is engagement and motivation (Hattie, 2008). The low SES status of the case study school meant that, like many other similar schools, student achievement was challenged by lower attendance rates (Bradley & Corwyn, 2002). Subsequently, over the course of their schooling a significantly decreased amount of time

would be spent at school, compared with children in high SES schools. Disengagement is fuelled by a lack of interest and engagement in schooling stemming from poor literacy and numeracy attainment, which results in reduced, sporadic attendance (Victorian Department of Education and Training, 2013). For the teachers, the NAPLAN results provided a greater drive to produce worthwhile, interesting play-based learning experiences with stronger links to the curriculum, and a belief that the children could be successful. Furthermore, the teachers could see the value in partnering with children and building greater capacity through their personal interests (Fredricks, 2011), which in turn led to heightened levels of engagement and increased student attendance.

The children were genuinely excited to come to school because of *Active Learning*. They regularly asked when the play-based learning program would be run. This was a direct expression of the children's intrinsic motivation to learn (Lillemyr et al., 2011). They talked about their favourite activities and constantly made suggestions for the next session. Over the course of a year, 80 per cent of children had attendance levels over 90 per cent. This was a significant increase for this cohort, with previous attendance records showing that in Kindergarten 41 per cent of children had attendance levels below 90 per cent and in Year 1 the same group had a 39 per cent attendance level below 90 per cent. When these children started in the *Active Learning* program in Year 2, eight out of every 10 children had an attendance rate of over 90 per cent. The following year, post- *Active Learning*, when they were in Year 3, the children's attendance levels dropped, with only 64 per cent still maintaining an above 90 per cent record.

The parents of children in classes utilising the *Active Learning* program struggled to keep their children at home when they were sick as they worried about missing out (Researcher field notes). In the classroom, the children's opinions were considered and they were being given an opportunity to develop their own ideas (Fredricks, 2011). The teachers attributed the improved attendance to the *Active Learning* program. T5 said "The program's power lies in combatting poor attendance. I think it's the engaging learning that makes them want to come to school. It overcomes the risk factors of low engagement."
This teacher's view, supported by all others, aligns with those outlined by the Victorian Department of Education and Training (2013).

7.5 Partnerships with Parents

7.5.1 Three Way Partnership with Parents

Following a journey similar to that of the teachers, the parents were strongly influenced by the NAPLAN results and school reports (Wong, Wang & Cheng, 2011). For many families, NAPLAN results and the school reports had been the only contact parents had with their children's learning prior to *Active Learning*. As one parent stated, "all I care about is that my child gets good grades." The combination of *Active Learning* and improved NAPLAN results helped parents accept play-based learning as a viable method of educating their child, a key requirement expressed by Howard (2010). The impact of report writing on parent acceptance of the program was discussed in Chapter 4.

The parents' concern about *Active Learning* extended beyond the activities offered. They also had anxieties about team-teaching, child-centred approaches and collaborative group work. The NAPLAN results helped to alleviate some of the apprehension of the parents in the transition from traditional methods of teaching to modern methods. The parents incrementally became more involved in the classroom activities to the benefit of all. Creating and sharing a vision where there was common understanding between teacher and parents regarding children's strengths, perceptions and expectations enhanced the learning environment (Giovacco-Johnson, 2009). Additionally, the impact on parental engagement because of the richer and more personalised forms of reporting based on enhanced assessment data should be stressed.

7.5.2 Building Confidence and Understanding in Parents

It was important to create a learning environment that integrated home life and culture with daily classroom practices (Luke, Woods & Dooley, 2011). Through *Active Learning*, the children began to blur the lines between home and school by taking more of their work home, sharing their experiences with their families and bringing items into the classroom to work on. This has been identified as a key factor in countering Learning Frontier's (2014) finding that there was minimal discussion at home about school work. The improved home-school partnership ultimately led to the establishment of positive connections and greater parent understanding of what their children were learning (Berk, 2013). By highlighting the hands-

on nature of play-based learning, the parents were able to share their own knowledge and skills with the children and draw on their cultural background, passions and expert skills to assist children in their learning.

The reciprocal nature of parental culture sharing with the school was an important factor in enhancing outcomes for children. They became proud of their heritage and were viewed by other children as the expert in their culture. Such reciprocity is an ingredient of contemporary partnership, and represents a major step for many parents in the current study.

Bringing the classroom into the home through the children's work and stories, as well as improved communication through newsletters, homework matrixes and social media, facilitated the building of the parents' confidence. This occurred through:

- including simple science experiments and basic play-based activities in the fortnightly newsletter for all ages;
- designing homework tasks which highlighted real-world links to mathematics and science;
- uploading images of children in the classroom and describing their learning experiences on social media; and
- frequently bringing parents into the classroom to engage in experiences with their child.

This essential dimension of *Active Learning* was important in not only presenting strong and consistent messages to the parents regarding play-based learning, but also enhancing the children's overall opportunities for success. The promotion of *Active Learning* in the home helped to build parent confidence in the areas mathematics and science. By involving parents in the intervention process they could participate in activities shared through newsletters, homework tasks or within the classroom with greater confidence (Maher, 2007). This in turn meant they could see themselves contributing to their children's improved NAPLAN results.

7.6 Conclusion

The NAPLAN data over the course of two consecutive years shows the children's achievement improved in both literacy and numeracy during the time *Active Learning* was being implemented. This improvement was new at the case study school, where the trend had been negative for past cohorts of children. A significant reason for improved results was greater parent involvement and the increase in attendance rates over the course of the two years.

This chapter concludes the four meta-themes contributing to the findings and discussions. chapter 8 presents a summary of the study, and concluding remarks.

Chapter Eight

Concluding Comments

Chapter 8 – Drawing *Playing To Engage* Together

8.1 Meta Themes

8.1.1 Drawing the Research Together

Playing to Engage explored the impact of implementing a play-based program, primarily in the areas of science and mathematics, into lower primary classrooms through tailored professional development with teachers and a targeted exposure campaign with parents. Throughout the study it became clear there were four meta themes weaving together and shaping the study:

- perceptions of the term 'play' and restrictive generalisations imposed on it by teachers, parents and children;
- lack of confidence and knowledge from teachers and parents when offering mathematics and science play-based activities to children, resulting in the need for tailored professional development;
- the power of developing 21st century skills in both children and teachers; and
- the implications of mathematics and science play-based learning programs on academic results.

These aspects were discussed in the previous four chapters. This chapter will draw on those findings and discussion to answer the study's main and subsidiary research questions.

8.2 Answering the Research Questions

8.2.1 Research Question One:

The purpose of this study was to answer the fundamental question: to what extent can play-based learning, specifically linked to science and mathematics, be used as an effective strategy to enhance student achievement and strengthen the partnership between home and school for children from low SES backgrounds?

There were also three subsidiary questions shaping the direction of this study:

- Can a play-based learning program influence the overall holistic development of children? (Question Two)
- Can a play-based learning program, targeting science and mathematics, help improve teacher confidence in teaching these and other subject areas? (Question Three)
- Can parent perceptions of play in primary school settings be altered by a successful play program? (Question four)

8.2.1.1 Answering the Overarching Question

The findings of this study overwhelmingly support the implementation of a play-based learning program as an effective strategy for enhancing child achievement and strengthening the partnership between home and school. Consistently across the four meta themes, a range of arguments have been presented highlighting the benefits of and positive outcomes for play-based learning in a primary school setting for children from low SES backgrounds. The study must be viewed as an holistic endeavor, with *Playing to Engage* regarded as a complete package involving the implementation of *Active Learning*, delivered together with specific, tailored teacher professional development in play-based learning, predominantly in the areas of science and mathematics, as well as a perception campaign centered on the term *play*, targeting all key stakeholders. As such, the current study makes a number of contributions to new knowledge.

8.2.1.2 Contribution to New Knowledge: expecting and overcoming resistance to *play* for learning

The study showed it was possible to overcome issues and negative opinions of the term *play* in a primary setting. It must be acknowledged that the term had different meanings for each stakeholder. Consequently, there were different concerns to be addressed by each stakeholder. Collectively, early childhood educators need to be clear in their definition of play-based learning to ensure it is not confused with common social perceptions. For the teachers in the current study, it was initially about school being defined as a place of formal learning distinctly separate from early learning and preschool pedagogy. They also saw play as an add-on, something they did not have time for as they were too busy presenting teacher-

directed learning experiences. In addition, play was characterised as a method of delivery they could not control, anticipating that opening their classroom to an unstructured, unpredictable strategy for learning and teaching would ultimately lead to chaos. The parents were also tied to the notion of academic success and strongly influenced by education based on traditional models they experienced when they were at school. Questionnaire findings overwhelmingly articulated parent perceptions of play as physical activity linked to fitness, health, the outdoors and sport. The parents acknowledged the importance of play at recess and lunchtime but did not associate play with classroom learning, as parents believed its benefits were inherently in the development of social skills and friendships. For children, their previous experiences inside and outside the classroom created a perception of play as free time, a fun activity undertaken in spare time or at the end of the day when their regular class work had been completed.

Despite these differing perceptions of play, this study showed it is possible to overcome significant barriers and implement a play-based program as a legitimate method of teaching and learning in a primary school setting. A big part of the transformation in thinking was linked to the title of the program, *Active Learning*. It not only allowed key stakeholders to separate their thoughts on play with the program, but helped them to forge a new pathway for primary specific play-based learning pedagogy. Although the term *Active Learning* was not without its own issues and associated negative perceptions at the outset of the program, the teachers and parents were significantly more open to this wording. The teachers felt more comfortable with the concept of activity stations as *Active Learning* provided the parameters they needed to implement the program.

The study concludes that within a primary setting the strategic selection of a title for any play-based learning program can ultimately assist with breaking down the deep-seated barriers linked to the term *play*. It is important to note that, at its heart, the program should maintain the core values of play-based learning.

8.2.1.3 Contribution to New Knowledge: Clear comparison between play-based and traditional pedagogy

The key defining elements specific to play-based learning, as identified throughout the study, are outlined in Figure 8.1, which contrasts *Active Learning* play-based pedagogy with traditional teaching methods.

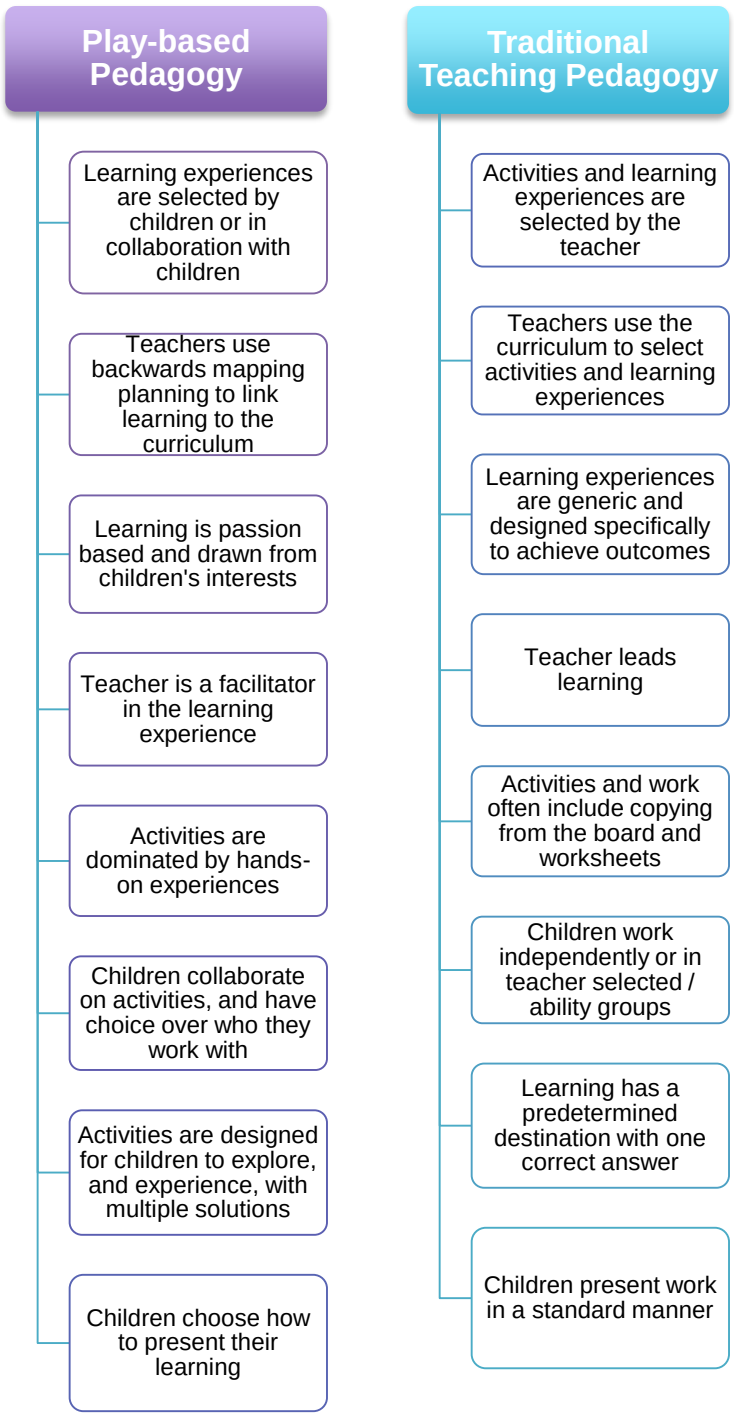


Figure 8.1 A comparison of *Active Learning* play-based pedagogy with traditional teaching methods

Figure 8.1 shows that *Active Learning* employed a child-centered approach to learning characterised by choice in what children learn and how they learn. In contrast, traditional methods are dominated by teacher control and structure over the learning experience, as evidenced by the teaching methods employed prior to the implementation of the program. Facilitating teachers implementation of play-based approaches to teaching and learning from what were predominantly traditional methods required a unique approach to action research.

8.2.1.4 Contribution to New Knowledge: Model for participant-researcher in design of an action research study

Throughout the study the role of the researcher constantly shifted between academic researcher and active participant within an action research model. Figure 8.2 shows the double helix action research model (discussed in 5.8.1) and highlights the need for a researcher to undertake two defined roles within one action research project. By taking this approach to the study the researcher was able to actively participate in the project, experience the learning process with other teachers, determine what was working and what needed changing, as well as gathering detailed records. From a research perspective, the researcher was able to attempt to step out of the study and critically evaluate teacher work, determine the direction of each professional development cycle and propel the momentum of the intervention towards achieving its goals. The children were not accustomed to this style of learning and as a result considerable scaffolding was needed. Consequently, the researcher had to create an intervention, which the teachers could implement in stages, and which would more likely lead to successful outcomes without the teachers going through a tedious trial-and-error process.

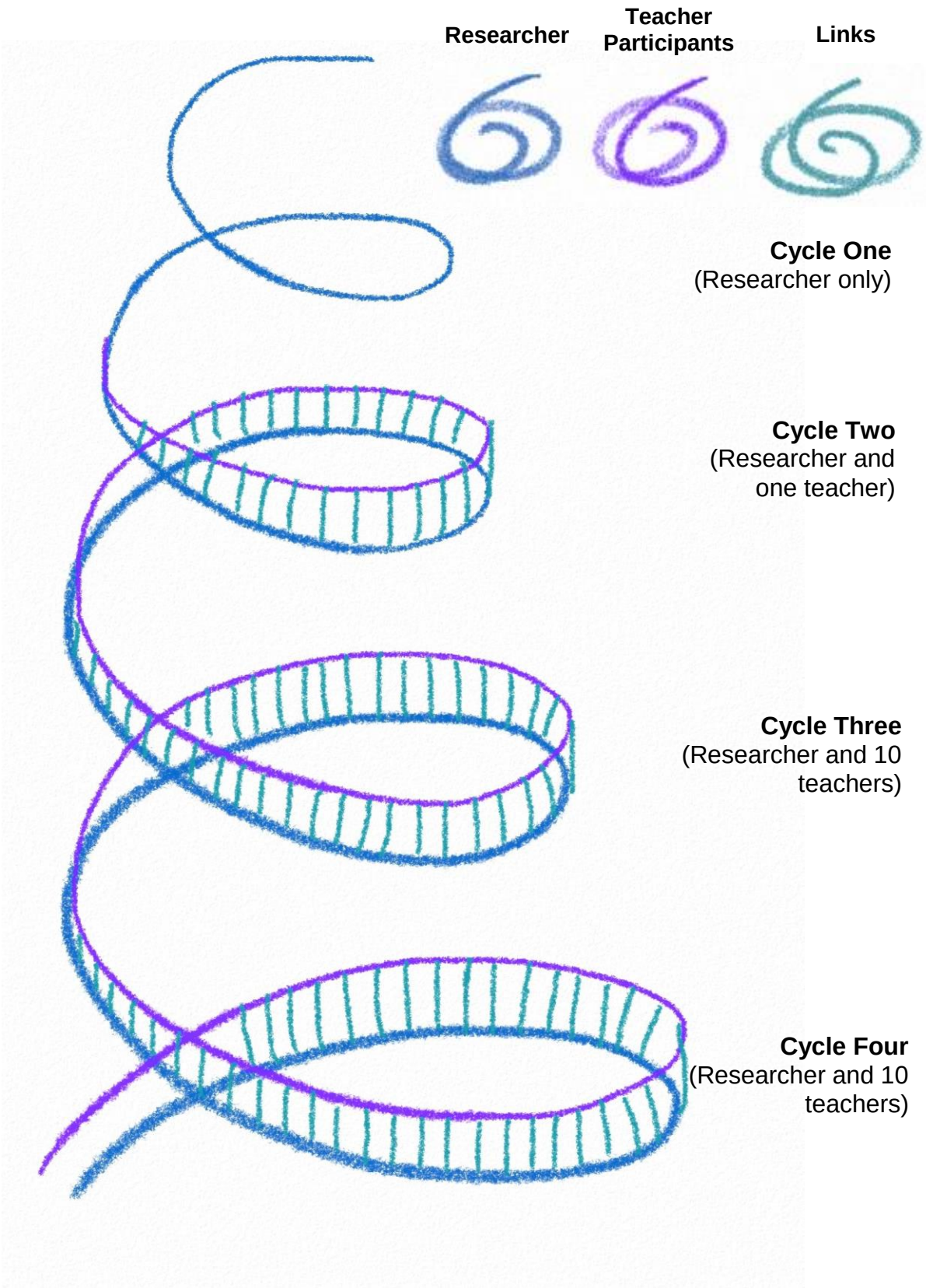


Figure 8.2 Double Helix action research model

8.2.1.5 Contribution to New Knowledge: Model for leading participants beyond the pedagogy paradigm

The success of the play-based *Active Learning* program was possible because of the work of the participant teachers and the researcher. This process involved positive, specifically designed hands-on professional development sessions, opportunities for the teachers to experiment with the program in a safe, collaborative environment, ongoing needs-based support from the researcher, resources provided and the movement of the participants into andragogical and heutagogical learning paradigms.

Playing to Engage gave the teachers freedom to draw on their own skills and talents as well as engage in a journey of discovery and learning in partnership with the children. The program had enough flexibility in its structure for the participants to tailor the learning experiences to meet the needs of the children and curriculum outcomes across all KLAs. Throughout the cycles of implementation the teachers became more aware of their individual strengths and weaknesses. The success of *Active Learning* was achieved because the teachers realised that deep, meaningful learning was possible through play-based experiences. This in turn led to the teachers embracing ownership of the program.

This transformation formed the basis of another of the study's contributions to new knowledge. It provided a different way of viewing the relationship between pedagogy, androgogy and heutagogy, as well as providing insights into the complex transition that learners make between them (see Figure 8.3 as discussed in 5.8.1). Such movements are not linear or unidirectional. Rather, they are complex and context responsive. The implication is that pedagogy, androgogy and heutagogy are not separate frameworks. The study shows there is just one framework and that is a complex learning framework. The three 'gogies' form a series of hierarchical layers of learning independence. A learner operating at the pedagogy level is dependent on others to facilitate their learning. A learner operating at the androgogical level can learn independently of external guidance, while a learner at the heutogogical level has learnt how to maximise their learning in a given context because they have learnt how they learn and can manage their learning accordingly.

The study also demonstrates that learners are not linear or unidirectional in their movement in and out of these different dimensions. It depends on context. A learner in one context may have enough experience and expertise to operate at an androgical level for instance, while in another learning context they may operate at the pedagogical level. This scenario is further transferable to other contexts. However, this is not necessarily the case.

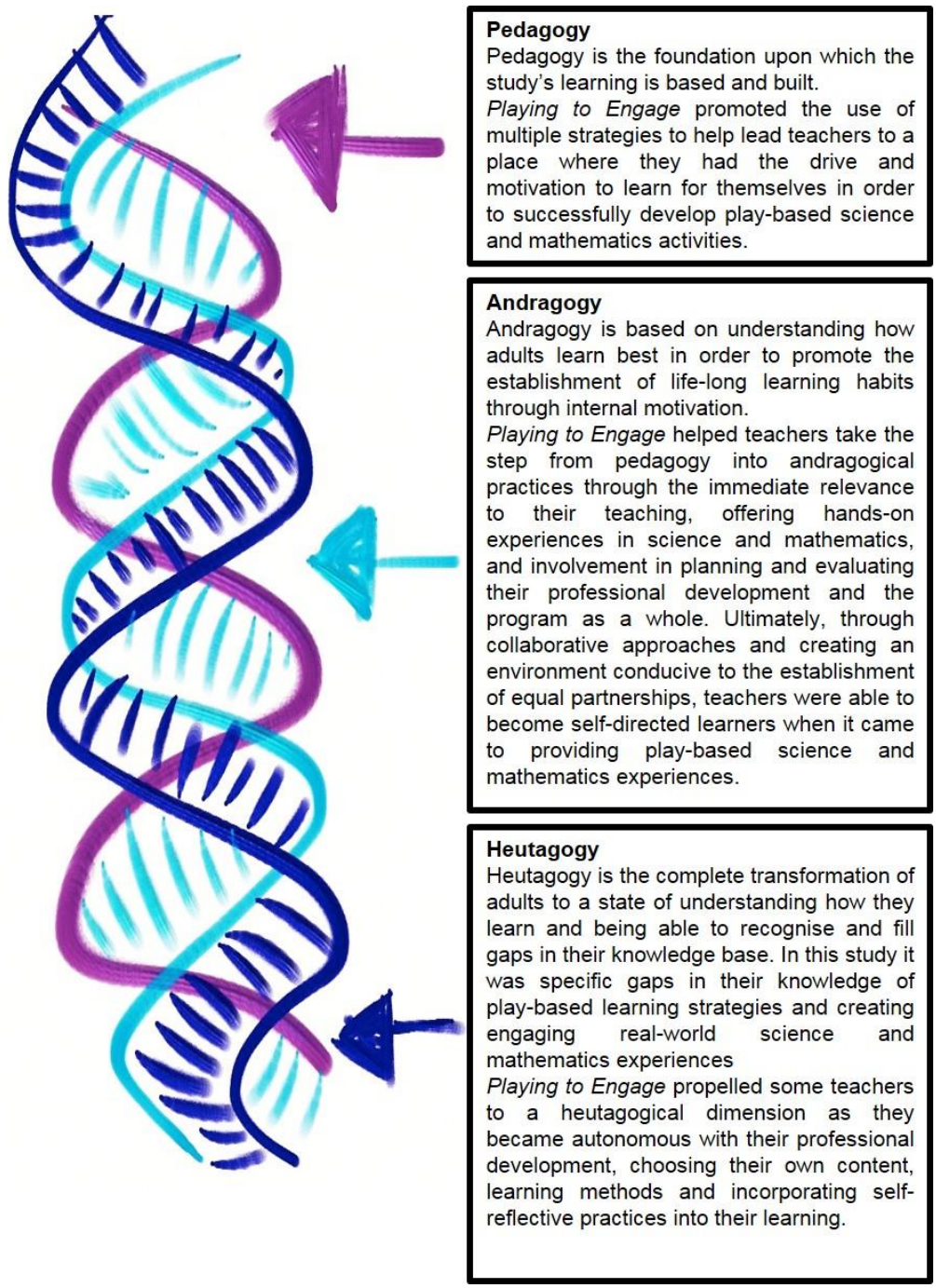


Figure 8.3 Three-dimensional model of teachers' progressive journey from pedagocial principles to heutagogical dimensions

The transformation of the teachers into andragogical and heutagogical learners helped them relate more with the needs and passions of the children. Throughout the study teachers became less concerned with knowing all the answers. Instead, they became eager to find information and build their background knowledge about topics which interested the children or to learn side by side with them in the classroom. This in turn influenced the children, creating a flow-on of positives to their schooling and learning experience. It took them from a passive role in the classroom to one of being actively involved in the learning process. By cycle four the children were completely in control of the activities and experiences made available during *Active Learning.* The learning space transformed into one dominated by child-led workshops, individualised experiences and greater engagement with significantly fewer behaviour management issues (discussed in detail in Appendix 4 and 5.1.2).

The children's heightened engagement achieved through *Active Learning* transferred to improved NAPLAN results across consecutive years in both literacy and numeracy. The children's attendance increased because they wanted to be at school and enjoyed the work. The nature of the program and its links to the development of 21st century skills made the process of transferring knowledge across situations easier for children.

8.2.2 Research Question Two

The second research question was: Can a play-based learning program influence the overall holistic development of children? Although the program set out with the aim of improving mathematics and science results in children from low SES backgrounds, it quickly became evident that *Active Learning* was also supporting the development of a many other skills.

8.2.2.1 Contribution to New Knowledge: 21st Century skills need to be a focus

Along with the development of knowledge across other KLAs in addition to mathematics and science, the program also gave the children the foundation needed to help them successfully transition to the future. This was an unanticipated finding of the study, but it became evident that for play-based learning to be effectively undertaken, it was necessary for both children

and teachers to develop 21st century skills. The key 21st century skills linked to *Active Learning* are presented in Figure 8.4.

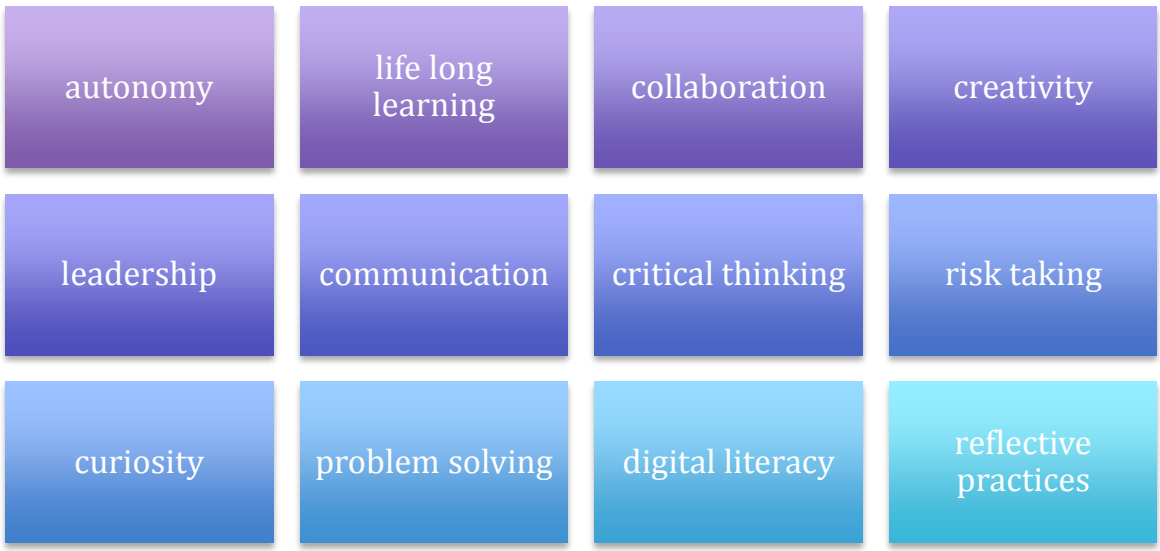


Figure 8.4 List of 21st century skills developed through *Active Learning* program

These abilities ultimately gave the children the grounding to transfer skills and knowledge across different learning experiences. *Active Learning* transformed the way the children tackled problems, interacted with other children and adults, and presented their work. They had a greater degree of confidence. The children celebrated their individual talents and understood how they could share and learn from those around them.

8.2.3 Research Question Three

The third research question was: Can a play-based learning program, targeted to science and mathematics, help improve teacher confidence in teaching these and other subjects areas?

8.2.3.1 Contribution to New Knowledge: Targeted professional development promotes improved outcomes for both teachers and children

Playing to Engage provided teachers with the support, structure and collaborative professional development network they needed to be able to gain an understanding of play-based learning pedagogy and enhance their pedagogical content knowledge in the KLAs of mathematics and science. Furthermore, in linking back to the theoretical framework of teacher professional

development, findings in the current study reinforce the notion that professional development is most successful when it is ongoing, where there is buy-in from teachers, and where teachers can determine the content of their professional development. On this basis they were then able to specifically develop skills in providing mathematics and science based activities. The teachers' heightened levels of confidence made them more comfortable delivering the program and taking a different role within the classroom. Throughout the study cycles their confidence promoted their progression to andragogical and heutagogical learning.

Active Learning was the bridge to help guide the teachers towards using more contemporary teaching methods. The key was starting out small with a one-hour program, which enabled the children to demonstrate how well they could work independently, with other children and with limited support from an adult. The teachers began to realise they could retain classroom control without the need to be in front of it, leading it. Over time the teachers transitioned to facilitators in the classes. This coincided with the development of their own 21st century skills (see Figure 8.4). The successes of *Active Learning* pushed the teachers, and more generally the school, to reconsider how children were taught, making the ultimate transition to child-centered learning.

8.2.4 Research Question Four

The fourth and last research question was: Can parent perceptions of play in primary school settings be altered by a successful play program?

At the outset of the program the parents had limited engagement with teachers and children's learning. The teachers were generally not enthusiastic about collaboration with parents and there were no parent helpers across the school.

8.2.4.1 Contribution to New Knowledge: A multidimensional approach can change parent perceptions

Active Learning took on a multidimensional approach to engage parents who not only appreciated the benefits of play but began to play an active role in their children's learning (see Figure 8.5).

Figure 8.5 Links made through *Playing to Engage* to engage parents

8.2.4.2 Contribution to New Knowledge: Home-school partnership can be improved through an action research study

The study was able to build connections with the parents in a variety of ways through newsletters, notes, social media (Facebook and Twitter) and face-to-face conversations about what was happening in the classroom. The teachers were so proud of the learning occurring, they would hold special events for the parents, and the parents came. Over the course of the study the parents showed their interest by the increased number of responses to the survey, comments on social media, helping out in the classroom and participation in *Active Learning* sessions.

8.3 Challenges

8.3.1 School Leadership Support

The school leadership team was reluctant initially to hear a new staff member promoting a new and, to them, implausible strategy. Without their support, the project would have foundered. It took a while for the principal and other members of the leadership team to see the merits of *Active Learning*. Possibly a turning point was when the principal appeared unannounced at the door of the researcher's classroom and stood observing the hive of

activity – no uniformity of activity amongst the groups of children, but all clearly engaged in activities that would lead to learning. His summation: "And there is not one mucking about". From then on he was supportive. Other members of the leadership team were won over with the reports that were so different from what other teachers we doing, yet so clearly describing children's learning.

8.3.2 Ownership of the Initiative

As researcher I had a double investment in *Playing to Engage.* I was passionate about providing the very best education for the children in my class within the framework of my own philosophy of the merits of play-based learning. Furthermore, I had the PhD study as a component of my thinking. This possibly made it more difficult for me to release the control of the activities, materials, and implementation of *Active Learning* than would otherwise have been the case. I did, in the end, relinquish complete control to the group, but in hindsight I could have done so earlier with no ill-effects. It was so important that the initiative should stand on its own, without my direction, yet I was hesitant to step back.

8.3.3 Funding for Materials

The school in question had additional funding because of the demographic of students. With the implementation of *Active Learning*, as an innovation in the lower primary classrooms, the school was generous in allocating funding for the purchase of materials as they became needed. After two years, it was becoming a little more difficult to access all the materials children were requesting and the school was reluctant to allocate a pre-determined budget to the initiative which would have provided staff with a better idea of what would be feasible. It was a case of children coming up with an idea, doing all the planning and itemising requirements and even doing the costing for them, and staff then having to go and request that from the central budget. This was not ideal as, if the request were denied, it would be left to teachers to break the news to the children which was deflating. By the end of the study, with staff speaking with a single voice, it was being discussed by senior leadership as to whether a set budget could be allocated in an ongoing way.

8.4 Limitations of the Study

8.4.1 Single Case Study School

Limiting the study to a single public school had the potential to restrict the transferability of the findings to Catholic and Independent schools. Also, the attention given to low SES children means the program will not necessarily work in middle and high SES schools to help improve academic results. The program could be transferable to similar low SES schools, especially the professional development model and resource kits.

Despite these limitations, at every stage of the study rigorous analysis of qualitative and numerical components ensured the findings were robust. The NAPLAN trends have shown over recent years that, generally across low SES groups, NAPLAN scores are slipping. In this study a play-based approach to learning and teaching reversed this trend. It can be argued, therefore, that a program such as *Playing to Engage* should be considered by other schools as a legitimate way to increase academic achievement. Specifically, the focus on and development of 21st century skills, could be appealing to other schools.

8.5 Further Areas for Research

8.5.1 Where to Next?

It is important to continue the analysis of NAPLAN results of future cohorts as the program continues. Additionally, it will be useful to track the progress of the children who were part of the initial *Active Learning* program, to see if the improved NAPLAN results persist. This information would further consolidate the effectiveness of the literacy and numeracy strategies used in this study.

Another area for further study would be to focus specifically on the development of 21st century skills and their impact on teaching and learning. In 2015, the program was extended to include Stage Two (Years 3 and 4). This initiative will provide an opportunity to explore a new dimension of the study, namely to see if the program can be adapted for upper primary children.

8.6 Concluding Statement

Playing to Engage bought together play-based learning strategies, tailored professional development and the acquisition of 21st century skills to achieve the aims of the study. Through a child-centered, play-based approach to teaching science and mathematics, *Active Learning* not only increased the children's academic achievement, but also empowered them to become partners in their learning experiences, and in the process develop key foundational skills, which were transferable across multiple disciplines. The program created an environment where the children wanted to come to school. They were passionate about learning and were able to engage in authentic, real-world tasks specifically designed to meet their needs and interests. The study demonstrated it was possible to overcome resistance towards the term *play* and implement a program valued by children, teachers and parents.

The implementation of the double helix action research model proved invaluable in providing the necessary link between researcher and participants. It enabled the establishment of targeted professional development sessions and the creation of a community of learners, an important component to the success of the study (Ollis, 2011). The teachers were able to effectively collaborate, and create a safe environment to take risks and share their experiences throughout the study. They developed an environment founded on trust and appreciation (Beavers, 2009), as they took on leadership roles and explored new methods of teaching and learning. The realisation of how beneficial *Active Learning* was for the children helped the teachers to transition between androgogical and heutagogical dimensions as they sought to develop their own skills and knowledge base.

The transformation from teacher-driven learning to child-centered play-based approaches was achievable due to the commitment of the participant teachers throughout the study to ongoing professional development. By the conclusion they could clearly differentiate between child-centered pedagogies and traditional teacher-directed modes of learning. In a similar fashion to the children, teachers were able to develop their own key foundational skills essential to providing a basis for innovative practice and flexibility in educating children for an unknown future.

Playing to Engage strengthened partnerships between home and school. The children were increasingly taking their learning home and engaging in conversations about their experiences. More parents were able to access the classroom and daily learning through social media, the school newsletter and physical participation in the *Active Learning* sessions. There was an enhanced feeling of collaboration between teachers and parents as they attended more school events and actively engaged in community projects.

8.7 Final Remark from a Participant Teacher

It is fitting that this thesis should conclude with a quote from the reflective journal of a participant teacher who was one of the most vocal skeptics at the start of the study:

> *There were a number of aspects, two years ago, that made me sigh. The person leading the study was so filled with energy and enthusiasm. I was tired and wanting to gently coast down to the green pastures of retirement.*
>
> *I was burdened by the daily frustration of poor attendance on the part of my children, their lack of engagement, their lack of progress in learning to speak English.*
>
> *I actively tried to obstruct the implementation of Active Learning – until I saw with my own eyes the enjoyment, the engagement, the real-world accomplishments of those children who had been trialled in the initial part of the study in other classes.*
>
> *It made me rethink. It made me question my own motives and motivation to teach and I, reluctantly, gave it a go.*
>
> *Now I am probably the most vehement protagonist of play-based, child-centred learning on the planet! I look forward to meetings to discuss challenges and opportunities. I LOVE the children's enjoyment, now, of learning. And, I love that they are able to transfer their knowledge and skills even to a NAPLAN assessment – with no teaching to the test.*

Reference List

Adams, L.D. & Shambleau, K.M. (2007). Teachers', children's and parents' perspectives on newly arrived children's adjustment to elementary school. In L.D. Adams & A. Kirova (Eds), *Global migration and education* (pp.87-101). London: Lawrence Erlbaum Publishers.

Adey, P., Hewitt, G., Hewitt, J., & Landau, N. (2004). *The professional development of teachers: Practice and theory.* Dordrecht: Kluwer Academic.

Ainsley, J., Kos, J., & Nicholas, M. (2008). *Participation in science, mathematics and technology in Australian education.* Australian Council for Educational Research, Department of Education, Employment and Workplace Relations. Canberra: Australian Government.

Alexandra, R. (2010). *Children, their world, their education. Final report and recommendations of the Cambridge Primary Review.* Abingdon: Routledge.

Aliakbari, M., & Jamalvandi, B. (2010). The impact of 'role play' on fostering EFL learners' speaking ability: A task-based approach. *Pan-Pacific Association of Applied Linguistics, 14*(1), 15-29.

Alise, M. A., & Teddlie, C. (2010). A continuatio of the paradigm wars? Prevalence rates of methodological approaches across the social/behavioural sciences. *Journal of Mixed Methods Research* (4), 103-126.

Ary, D., Jacobs, C. J., & Razavieh, A. (2002). *Introduction to research in education* (6th ed.). Belmont, CA: Wadsworth Thomson Learning.

Ary, D., Jacobs, L.C., Sorensen, C., & Walker, D.A. (2014). *Introduction to research in education* (9th ed.). Wadsworth, CA: Congage Learning.

Ashton, J., & Newman, L. (2006). An unfinished symphony: 21st century teacher education usinf knowledge creating heutagogies . *British Journal of Educational Technology, 37*(6), 825-840.

Australia Association of Mathematics Teachers and Early Childhood Australia. (2006). *Position paper on early childhood mathematics.* South Australia: Australian Association of Mathematics Teachers and Early Childhood Australia.

Australian Curriculum Assessment and Reporting Authority . (2011). *My School*. Retrieved July 7, 2012, from http://www.myschool.edu.au/.

Australian Curriculum Assessment and Reporting Authority. (2012). *The shape of the Australian curriculum .* Australian Curriculum Assessment and Reporting Authority. Canberra: Australian Government.

Australian Curriculum Assessment and Reporting Authority. (2013). *Why NAP*. Retrieved September 15, 2015, from Naplan Assessment Program: http://www.nap.edu.au

Australian Curriculum, Assessment and Reporting Authority. (2014). *National Assessment Program - Literacy and Numeracy (NAPLAN) 2013 Central analysis of data - Technical Report.* Sydney: Australian Curriculum, Assessment and Reporting Authority.

Australian Curriculum, Assessment and Reporting Authority. (nd). *NAPLAN.* Retrieved from http://www.nap.edu.au/naplan/naplan.html

Australian Early Development Census. (2012). *New 2012 AEDC Results.* Retrieved from https://www.aedc.gov.au/resources/aedc-userguide/understanding/comparing-aedc-results/new-2012-aedc-results

Australian Government Department of Education, Employment and Workplace Relations. (2009). *Australian Early Years Learning Framework.* Canberra: Commonwealth of Australia.

Australian Institute for Teaching and School Leadership . (2012). *Australian Professional Standards for Teachers*. Retrieved September 2, 2013, from Australian Institute for Teaching and School Leadership: www.teacherstandards.aitsl.edu.au

Australian Institute for Teaching and School Leadership. (2015, March 24). *School Leadership eCollection.* Retrieved March 24, 2015, from Australian Institute for Teaching and School Leadership: http://www.aitsl.edu.au/school-leadership-ecollection

Badger, E. (2013, December 17). *Low-income kids face a massive word gap. Here's one way to fix it.* Retrieved May 3, 2014, from National Journal: http://www.nationaljournal.com

Bandura, A. (2001). Social cognitive theory: An agentic perspective. *Annual Review of Psychology, 52*(1), 1-26.

Bandura, A.K. (2005). Ubuntugogy: An African educational paradigm that transends pedagogy, andragogy, ergonary and heutagogy. *Journal of Third World Studies* , 1-24.

Bandura, A., Barbaranelli, C., Caprara, G.V., & Pastorelli, C. (1996). Multifaceted impact of self-efficacy beliefs on academic functioning. *Child Development, 67*(3), 1206-1222.

Barblett, L. (2010). Play-Based Learning. *The Early Years Learning Framework Professional Learning Program* , 2. Canberra, ACT, Australia: Commonwealth of Australia.

Bartlett, T. (2011). The case for play: How a handful of researchers are trying to save childhood. *The Chronical for Higher Education* (57), 27-33.

Bartels, D. (2012). Agility in Mind, Technologies and Environment Supports Effective Change to Comtemporary Learning Models. *Quick* (121), 22-25.

Baxter, P., & Jack, S. (2008). Qualitative case study methodology: Study design and implementation for novice researchers. *The Qualitative Report, 13*(4), 544-559.

Beavers, A. (2009). Teachers as learners: Implications of adult education for professional development. *Journal of College Teaching and Learning, 6*(7), 25-30.

Beetham, H., & Sharpe, R. (2013). *Rethinking pedagogy for a digital age: Designing for 21st century learning* (2nd ed.). (H. Beetham, & R. Sharpe, Eds.) New York: Routledge.

Berk, L. (2013). *Child development* (9th ed.). Australia: Pearson.

Binkley, M., Erstad, O., Herman, J., Raizen, S., Ripley, M., & Rumble, M. (2012). Defining twenty-first century skills. In P. Griffin, B. McGraw, & E. Care, *Assessment and teaching of 21st century skills* (pp. 17-66). New York: Springer.

Birman, B.F., Desimone, L., Porter, C.A., & Garet, M.S. (2000). Designing professional development that works. *Educational Leadership*, 28-33.

Blaschke, L. (2012). Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. *The International Review of Research in Open and Distance Learning, 13* (1), 56-71.

Bodrova, E., & Leong, D.J. (2007). *Tools of the mind: The Vygotskian approach to early childhood education.* Upper Saddler River, NJ: Pearson Education.

Bordieu, P. (1992). Thinking about limits. *Theory, Culture and Society, 9*, 37-49.

Bosse, M. (2007, November 27). *Beautiful mathematics and beautiful instruction: Aesthetics within the NCTM standards.* Retrieved April 19, 2012, from International Journal for Mathematics Teaching and Learning: http://www.cimt.plymouth.ac.uk/journal/default.htm

Boyatzis, R. (1998). Transforming qualitative information: Thematic analysis and code development. Thousand Oaks, CA: Sage.

Boyle, T. & Petriwskyj, A. (2014). Transitions to school: Reframing professional relationships. *Early Years: An International Research Journal, 34*(4), 392-404.

Bradley, R.H., & Corwyn, R.F. (2002). Socioeconomic status and child development. *Annual Review of Psychology, 53*, 371-400.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology, 3*(2), 77-101.

Brydon-Miller, M., Greenwood, D., & Maguire, P. (2003). Why action research? *Action Research, 1*(9), 9-28.

Broadhead, P. (2004). *Early years play and learning: developing social skills and cooperation.* London: Routledge Falmer.

Broadhead, P., Howard, J., & Wood, E. (2010). *Play and learning in the early years: From research to practice.* London: sage.

Bronfenbrenner, U. (1994). The ecology of cognitive development: Research models and fugitive

findings. In R. H. Wozniak & K. W. Fischer (Eds.), *Development in context: Acting and thinking in specific environments* (pp. 3-44). Hillsdale, NJ: Erlbaum.

Brooker, L., Blaise, M., Edwards, S. (2014). *SAGE International Handbook on play and learning.* SAGE Publishers: London.

Brookfield, S.D., & Preskill, S. (2012). *Discussion as a way of teaching: Tools and techniques for democratic classrooms.* San Francisco: Jossey-Bass.

Brown, G. (2009). *Review of education in mathematics, data science and quantitative disciplines: Report to the group of eight universities.* Canberra: Australian Government.

Brown, K. (2010, May 7). *Dang you tricked me into learning: Chaos, current events, clickers and competition in the legal research classroom.* Retrieved October 18, 2013, from Social Science Research Network: http://ssrn.com/abstract+1602102

Brunsell, E., & Fleming, M.A. (2014). *Engaging minds in science and math classrooms: The surprising power of joy.* Alexandria, VA: ASCD.

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? *Qualitative Research Journal, 6*(1), 97-113.

Burton, R. (2011, May/June). It's time to stop defending play. *Play Exchange*, 68-71.

Buxton, C., Lee, O., & Santau, A. (2008). Promoting scince among English language learners: Professional development for today's culturally and linguistically diverse classrooms. *Journal Science Teacher Education, 19*, 495-511.

Cerbin, W., & Kopp, B. (2006). Lesson study as a model for building pedagogical knowledge and improving teaching. *International journal of teaching and learning in higher education*, *18*(3), 250-257.

Chichibu, T., & Kihara, T. (2013). How Japanese schools build a professional learning community by lesson study. *International Journal for Lesson and Learning Studies*, *2*(1), 12-25.

Claxton, G., & Carr, M. (2004). A framework for teaching learning: Learning dispositions. *Early Years International Journal of Research and Development, 24* 1), 87-97.

Clements, D.H., & Sarama, J. (2006). Maths all around the room! *Early Childhood Today , 21* (2), 24-30.

Coble, T.G., Selin, S.W., & Erickson, B.B. (2003). Hiking alone: Understanding fear, negotiation strategies and leisure experience. *Journal of Leisure Research*, *35*(1), 1-22.

Cohen, L., & Manion, L. (1994). *Research methods in education* (4th ed.). London: Routledge.

Cohen, L., Manion, L., & Morrison, K. (2011). Validity and reliability. *Research Methods in Education*, 179-216.

Collins, K., & O'Cathain, A. (2009). Ten points about mixed methods research to be considered by the novice researcher. *International Journal of Multiple Research Approaches, 3*, 2-7.

Connor, M. (2006). *Andragogy and Pedagogy*. Retrieved December 27, 2013, from Ageless Learner: www.agelesslearner.com/intros/andragogy.html

Connor, J. (2012). Foundations for learning: Relationsips between the Early Years Learning Framework and the Australian Curriculum. Retrieved from: http://www.acara.edu.au/verve/_resources/ECA_ACARA_Foundations_Paper_FINAL.pdf

Council of Australian Governments. (2008). *National Education Agreement.* Council of Australia Governments. Canberra: Federal Government.

Crockett, L., Jukes, I., & Churches, A. (2011). *Literacy is not Enough: 21st Century Fluencies for the Digital Age* . Australia: Corwin.

Curtis, K. (2012, January 20). *Breaking News*. Retrieved January 21, 2012, from News.com: http://www.news.com.au/technology/students-say-science-maths-courses-irrelevant/story-e6frfro0-1226249095546#ixzz1kA6dZxoh

Danielson, S., Tuler, S.P., Santos, S.L., Webler, T., & Chess, C. (2012). Three tools for evaluating participation: Focus groups, Q methods, and surveys. *Environmental Practice, 14*(2), 101-109.

Davies, B., Davis, E., Cook, K., & Waters, E. (2007). Getting the complete picture: combining parental and child data to identify the barriers to social inclusion for children living in low socio-economic areas. *Child:care, health and development, 34*(2), 214-222.

Denscombe, M. (2007). *The good research guide for small-scale social research projects* (3rd Edition ed.). England: Open University.

Denzin, N.K. (2012). Triangulation 2.0. *Journal of Mixed Methods Research, 6* (2), 80-88.

Derling, T.L., & Ebert-May, D. (2010). Learner- centered inquiry in undergraduate biology: Positive relationships with long-term student achievement. *CBE Life Sciences Education, 9*(4), 462-472.

Desimone, L.M. (2011). A primer on effective professional development. *Phi Delta Kappan, 92* (6), 68-71.

Dewey, J. (1938). *Experience and education.* Toronto: Collier-MacMillan Canada Ltd.

Dinham, S. (2010, June/July). Teachers Make the Difference. *Teacher: The National Education Magazine* .

Dockett, S. & Fleer, M. (1999). *Play and pedagogy: Bending the rules.* Marrickville: Harcourt Brace.

Donnelly, K., & Wiltshire, K. (2014). *Review of the Australian Curriculum: Final Report.* Australian Government Department of Education. Canberra: Australian Government.

Dooner, J.A. (2011, March 26). NAPLAN: It's a useful tool in your professional toolbox. *Teacher: The National Education Magazine*, 26-28.

Duncan, G.J., Dowsett, C.J., Claessens, A., Magnuson, K., Huston, A.C., Klebanov, P., et al. (2007). School readiness and later achievement. *Developmental Psycholog , 43* (6), 1428-1446.

Early Childhood Development Unit. (2006). *Programming experiences in early childhood development.* New York: Early Childhhod Development Unit.

Evers, C.W., & Wu, E.H. (2006). On generalising from single case studies: Epistemological reflections. *Journal of Philosophy of Education, 40*(4), 511-526.

Fontana, A., & Frey, J.H. (2005). The interview: From neutral stance to political involvement. In N.K. Denzin & Y.S. Lincoln (Eds), *The SAGE handbook of qualitative research* (pp. 695-728). Thousand Oaks, CA: Sage.

Fereday, J., & Muir-Cochrane, E. (2008). Demonstrating rigor using thematic analysis: A hybrid approach of inductive and deductive coding and theme development. *International journal of qualitative methods*, *5*(1), 80-92.

Finlayson, M. (2014). Addressing math anxiety in the classroom. *Improving School , 17*(1), 9-115.

Fleer, M. (1996). *Play through the profiles: Profiles throught play.* Canberra: Australian Early Childhood Association.

Fleer, M. (2009a). Supporting Scientific Conceptual Consciousness or Learning in 'a Roundabout way' in Play-based Contexts. *International Journal of Science Education, 31*(8), 1069 - 1089.

Fleer, M. (2009b). Understanding the dialectical relations between everyday concepts and scientific concepts within play-based programs. *Research Science Education , 39*, 281-306.

Fox, G. (2007). International perspectives on early years mathematics. *Mathematics: Essential Research, Essential Practice, 2*, 865-869.

Fredricks, J.A. (2011). Engagement in school and out-of-school contexts: A multidimensional view of engagement. *Theory into Practice,* (50), 327-335.

Frid, S., Goos, M., & Sparrow, L. (2008/2009). Editorial: What knowledge is needed for the effective teaching of mathematics? *Mathematics Teacher Education and Development , 10*, 1-3.

Fusco, E. (2012). *Effective questioning strategies in the classroom: A step-by-step approach to engage thinking and learning, K-8.* New York: Teachers College Press.

Garcia, E.E. (1991). *The education of linguistically and culturally diverse students: Effective instructional practices.* Center for Research on Education, Diversity and Excellence. NCRCDSLL Educational Practice Reports. Paper EPR01. Retrieved 8 August 2010, from http://escholarship.org/uc/item/2793n11s#page-1.

Gardner, H. (2011). *Frames of mind: The theory of multiple intelligences.* New York: Basic Books.

Gibson, W., & Brown, A. (2009). *Working with qualitative data*. India: Sage.

Gillard, J. (2009). Introduction to Education Chapter. *ALP National Conference* (pp. 1-5). Canberra: Australian Government.

Giovacco-Johnson, T. (2009). Portraits of partnerships: The hopes and dreams project. *Early Childhood Educational Journal 37*, 127-135.

Gonski, D., Boston, K., Greiner, K., Lawrence, C., Scales, B., & Tannock, P. (2011). *Review of Funding for Schools.* Deparment of Education, Employment and Workplace Relations. Canberra: Department of Education, Employment and Workplace Relations.

Gonzales, S., & Lambert, L. (2014). Teacher leadership in professional development schools: Emerging conceptions, identities, and practices. *Journal of School Leadership, 11*(1), 6-17.

Graham, T.A., Nash, C., & Paul, K. (1997). Young chrildren's exposure to mathematics: The child care context. *Early Childhood Education Journal, 25*(1), 31-38.

Grieshaber, S. (2008). Interrupting stereotypes: Teaching and education of young children. *Early Education and Development, 19*(3), 505-518.

Grieshaber, S. (2009). Equity and quality in the early years of schooling. *Curriculum Perspectives, 29*(1), 91-97.

Grieshaber, S. & McArdle, F. (2010). *The trouble with play.* Maidenhead: Open University Press.

Gronlund, G. (2010). *Developmentally appropriate play: Guiding young children to a higher level.* United States of America: Red Leaf Press.

Haak, D.C., HilleRisLambers, J., Pitre, E., & Freeman, S. (2011). Increasing structure and active learning reduce the achievement gap in introductory biology. *Science , 332* (6034), 1213-1216.

Hannafin, M.J., Hill, J.R., Land, S.M., & Lee, E. (2014). Student-centered, open learning environments: Research, theory and practice. *Handbook of Research on Educational Commuications and Technology*, 641-651.

Ham, V. (2010). Participant-directed evaluation: Using teachers' own inquiries to evaluate professional development in technology intergration. *Journal of Digital Learning in Teacher Education, 27*(1), 22-29.

Hase, S., & Kenyon, C. (2007). Heutagogy: A child of complexity theory. *Complicity: An International Journal of Complexity and Education, 4*(1), 111-118.

Hargreaves, A. (1994). *Changing teachers, changing times: Teachers' work and culture in the post-modern age.* London: Cassell.

Harris, J., Michnick Golinkoff, R., & Hirsh-Pasek, K. (2011). Lessons from the crib for the classroom: How children really learn language. In S. B. Neuman, & D. K. Dickinson, *Handbook of early literacy research* (pp. 49-65). New York: Guilford Press.

Hattie, J. (2008). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement.* London: Routledge.

Heidemann, S., & Hewitt, D. (2010). *Play: The pathway from theory to practice.* United States of America: Red Leaf Press.

Henniger, M.L. (2013). *Teaching young children: An introduction* (5th ed.). Upper Saddler River: Pearson.

Hetherington, L. (2013). Complexity thinking and methodology: The potential of 'complex case study' for educationl research. *Complicity: An International Journal of Complexity and Education, 10*, 71-85.

Hoddinott, D. (2006, September). *Cultural and linguistic diversity: Issues for schools.* Paper presented at the CHERI (Children's Hospital at Westmead Education Research Institute) conference, Sydney.

Holly, M.L., Arhar, J.M., & Kasten, W.C. (2009). *Action research for teachers: Traveling the yellow brick road.* Boston: Allyn and Bacon/Pearson.

Howard, J. (2010). Early years pracitioners' perceptions of play: An exploration of theoretical understanding, planning and involvement, confidence and barriers to practice. *Educational and Child Psychology, 27*(4), 91-102.

Fraenkel, J.R., Wallen, N.E., & Hyun, H.H. (2012). *How to design and evaluate research in education* (8th Ed.) New York: McGraw-Hill.

Ince, E., Kirbaslar, F.G., Yolcu, E., Aslan, A.E., Kayacan, Z.C., Alkan Olsson, J., et al. (2014). 3-Dimensional and interactive Istanbul University virtual laboratory based on active learning methods. *Turkish Online ournal of Educational Technology, 13*(1), 1-20.

Institute for Education University. (2009). *Teaching EAL: Strategy for the development of the English as an additional language (EAL) workforce in schools: for consultation: An independent report commissioned by the Training and Development Agency for Schools.* University of London, Training and Development Agency for Schools. London: University of London.

Kamenetz, A. (2010). *Edupunks, edupreneurs, and the coming transformation of higher education.* Canada: Chelsea Green Publishing Company.

Keengwe, J., Onchwari, G., & Onchwari, J. (2009). Technology and student learning: Towards a learner-centered teaching model. *Association for the Advancement of Computing in Education, 17*(1), 11-22.

Kim, K., Sharma, P., Land, S.M., & Furlong, K.P. (2013). Effects of active learning on enhancing student critical thinking in an undergraduate general science course. *Innovative Higher Education, 38*(3), 223-235.

Koralek, D. (2009, May). Mathematics in the early years. *Young Children*, 10-11.

Lather, P. (1992). Critical frames in educational research: Feminist and post-structural perspectives. *Theory into Practices, 31* (2), 87-99.

Lave, J., & Wenger, E. (1991). *Situated learning, legitimate peripheral participation.* Cambridge: Cambridge University Press.

Learning Frontiers. (2014). *Insights and Ideas.* Retrieved November 4, 2013, from Australian Institute for Teaching and School Leadership: http://www.aitsl.com.au

LeFevre, J.A., Skwarchuk, S.L., Smith-Chant, B.L., Fast, L., Kamawar, D., & Bisanz, J. (2009). Home numeracy experiences and children's math performance in the early years. *Canadian Journal of Behavioural Science/Revue canadienne des sciences du comportement, 41*(2), 55-66.

Leiberman, A. (2010). Making practice public: Teacher learning in the 21st century. *Journal of Teacher Education, 61*(1-2), 77-88.

Lillemyr, O.F., Sobstad, F., Marder, K., & Flowerday, T. (2011). A multicultural perspective on play and learning in primary school. *International Journal of Early Childhood, 43*, 43-65.

Little, M.E. (2009). Teaching mathematics: Issues and solutions. *TEACHING Exceptional Children Plus, 6*(1), 1-15.

Lopez, A., Correa-Chavez, M., Rogoff, B., & Gutierrez, K. (2010). Attention to instruction directed to another by US Mexican-heritage children of varying cultural backgrounds. *Developmental Psychology, 46*(3), 593-601.

Luke, A., Woods, A., & Dooley, K. (2011). Comprehension as social and intellectual practice: Rebuilding curriculum in low socioeconomic and cultural minority schools. *Theory Into Practice, 50*, 157-164.

Maher, M. (2007). Home-school partnerships within mathematics intervention. *Australian Journal of Early Childhood, 32*(3), 48-58.

Maher, M. & Buxton, L. (2015). Early childhood education at the cultural interface. *The Australian Journal of Indigenous Education, 44*(1), 1-10. doi 10.1017/jie.2015.5 Retrieved from: http://journals.cambridge.org/repo_A96AfOj7V4ye3c

Male, T., & Burden, K. (2013). Access denied? Twenty-first-century technology in schools. *Technology, Pedagogy and Education, 22*(1), 72-80 .

Marsh, S., & Dredge, L. (2013). Teaching for deep understanding in maths: Taking students from 'you haven't taught us this' to 'I get it'. *Professional Educator, 12*(3), 21-25.

Martin, A. J., & Liem, G. A. (2010). Academic personal bests (BPs), engagement, and achievement: A cross-lagged panel analysis. *Learning and Individual Differences, 20*(3), 265-270.

Martlew, J., Ellis, S., Stephen, C., & Ellis, J. (2010). Teacher and child talk in active learning and whole-class contexts: some implications for children from economically less advantaged home backgrounds. *Literacy, 44*(1), 12-19.

Martlew, J., Stephen, C., & Ellis, J. (2011). Play in the primary school classroom? The experience of teachers supporting children's learning through a new pedagogy. *Earlt Years, 31*(1), 71-83.

McAuliffe, M., Hargreaves, D., Winter, A., & Chadwick, G. (2008). Does pedagogy still rule? . *Proceedings of the 2008 AARE Conference December 7-10.* Queensland: Yeppoon.

McCulloch, V.B. (2001). A comparison of preservice teachers' mathematics enxiety before and after a methods class emphasizing manipulatives. *Early Childhood Educational Journal, 29*(2), 89-94.

McKinsey and Company. (2007). *How the beat-performing schools came out on top.* Sydney: McKinsey and Company.

McTighe, J., & Seif, E. (2010). An implementation framework to support 21st century skills. *21st century skills: Rethinking how students learn*, 149-172.

McTighe, J., & Wiggins, G. (2007). *Schooling by design: Mission, action, achievement.* Alexandria, VA: ASCD.

McTighe, J., & Wiggins, G. (2011). *Understanding by design framework.* Alexandria, VA: The Association for Supervision and Curriculum Development.

McTighe, J., & Wiggins, G. (2013). *Essential questions: Opening doors to student understandings.* Alexandria, VA: ASCD.

Meerah, T.M., Halim, L., Rahman, S.A., Harun, H., & Abdullah, R.T. (2011). Teaching marginalized children at primary school teachers' professional development through collaborative action research. *Cypriot Journal of Educational Sciences, 2*, 49-60.

Merriam, S. B. (2009). Qualitative research: A guide to design and implementation: Revised and expanded from qualitative research and case study applications in education. San Franscisco: Jossey-Bass.

Merriam, S.B. (2001). Andragogy and self-directed learning: Pillars of adult learning theory. *New Directions for Adult and Continuing Learning*, 3-13.

Merriam, S. B., & Brockett, R. G. (2007). *The profession and practice of adult education.* San Francisco: Jossey-Bass.

Mills, G. E. (2011). Action research: A guide for the teacher researcher (4th ed.). MA: Pearson.

Milne, A., & Plourde, L. A. (2010). Factors of a low-SES household: What aids academic achievement? *Journal of Instructional Psychology, 33*(3), 183-193.

Ming, K., & Powell, T. (2010). Emergent literacy: Ways to foster these skills in preschool children from low-socioeconomic backgrounds. *National Head Staff Association, 13*(2), 126-133.

Ministerial Council on Education, Employment, Training and Youth Affairs. (2008). *Melbourne Declaration on Educational Goals for Young Australians.* Canberra: Ministerial Council on Education, Employment, Training and Youth Affairs.

Mitra, S. (2005). Self organising systems for mass computer literacy: Findings from the 'the hole in the wall' experiments. *International Journal of Development Issues, 4*(1), 71-81.

Moon, J. (2004). *A handbook of reflective and experiential learning.* London: RoutledgeFalmer Press.

Morse, J.M., & Niehaus, L. (2009). *Mixed method design: Principles and procedures.* Walnut Creek, CA: Left Coast Press.

Nakata, M. (2007). The cultural interface. *The Australian Journal of Indigenous Education, 36,* Supplement, 7-14.

National Advisory Committee on Creative Arts and Culture. (1999). *All our futures: Creativity, Culture and Education.* London: Department of Education and Employment.

National Assessment Program. (2013). *NAPLAN - results reports performance*. Retrieved March 29, 2015, from National Assessment Program: http://www.nap/information.faqs/naplan--results-reports-performance-htm

National Association for the Education of Young Children and National Council of Teachers of Mathematics. (2009). *Position Statements.* Retrieved May 10, 2012, from NAEYC: http://www.naeyc.org/positionstatements/

National Association for the Education of Young Children. (1995). *Principles of child development and learning that inform developmentally appropriate practice*. Retrieved September 21, 2013, from

National Association for the Education of Young Children: http://www.naeyc.org/about/positions/dap3.asp

National Council of Teachers of Mathematics. (2000). *Principles and standards for school mathematics.* Reaston, VA: The National Council of Teachers of Mathematics.

New South Wales Department of Education and Communities. (2014). *Early Action for Success: Information for Principals - Implementing the Literacy and Numeracy Action Plan.* Sydney: New South Wales Department of Education.

Notari-Syverson, A., & Sadler, F. (2008). Math is for everyone: Strategies for supporting early mathematical competences in young children. *Young Exceptional Children, 11*(3), 2-16.

Northern Territory Department of Education and Training. (2009). *Northern Territory Curriculum Framework.* Darwin: Northern Territory Department of Education and Training.

Nye, B., Konstantopoulos, S., & Hedges, L.V. (2004). How large are teacher effects? *Educational Evaluation and Policy Analysis, 26*, 237-257.

O'Connell, J. (2012). So you think they can learn? *Scan , 31*(2), 6-12.

Office of the Chief Scientist. (2014). *Science, technology, engineering and mathematics: Australia's future.* Commonwelth Government, Office of the Chief Scientist. Canberra: Commonwelth Government.

Office of the Chief Scientist. (2012). *Mathematics, engineering and science in the national interest.* Department of Industry, Innovation, Science, Research and Tertiary Education. Canberra: Australian Government.

Office of the High Commissioner for Human Rights. (1990, September 2). Retrieved August 25, 2013, from United Nations Human Rights: Office of the High Commissioner for Human Rights: http://www.ohchr.org

O'Keefee, D. (2012). NAPLAN 'An expensive mistake'. *Education Review* .

Ollis, T. (2011). Learning in social action: The informal and social learning dimensions of circumstantial and lifelong activists. *Australian Journal of Adult Learning, 51*(2), 248-268.

Organisation for Economic Co-operation and Development. (2002). *Starting strong: Early childhood education and care.* Paris: OECD Publications.

Ortlieb, E.T. (2010). The pursuit of play within the curriculum. *Journal of Instructional Psychology, 37*(3), 241-246.

Ottmar, E.R., Decker, L.E., Cameron, C.E., Curby, T.W., & Rimm-Kaufman, S.E. (2014). Classroom instructional quality, exposure to mathematics instruction and mathematics achievement in fifth grade. *Learning Environments Research, 17*(2), 243-262.

Pagliaro, M.M. (2011). *Exemplary classroom questioning: Practices to promote hinking and learning.* United Kingdom: R&L Education.

Paradise, R., & Rogoff, B. (2009). Side by side: Learning by observing and pitching in. *Journal of the Society for Psychological Anthropolog , 37*(1), 102-138.

Perry, B. & Dockett, S. (2002). Young children's access to powerful mathematical ideas. In L. English (Ed.), *Handbook of international research in mathematics education: Directions for the 21st century* (pp. 81-111). Marwah: Lawson Erlbaum.

Piaget, J. (1962). *Play, dreams and imagination in childhood.* New York: Norton.

Piaget, J. (1971). The Theory of the stages of cognitive development. In P. Mussen, *Carmichael's manual of child psychology* (Vol. 1, pp. 703-732). New York: Wiley.

Pine, G.J. (2009). *Teacher action research: Building knowledge democracies*.

Thousand Oaks, California: SAGE.

Prensky, M. (2001). Digital Natives, Digital Immigrants. *On the Horizon , 9* (5).

Prensky, M. (2011). *The Reformers Are Leaving Our Schools in the 20th Century.* SNS Newsletter.

Prince, M. (2004). Does active learning work? A review of the research. *Journal of Engineering Education, 93*(3), 223-231.

Richards, L. & Morse, J. M. (2013). Qualitative research design. *Readme first for a user's guide to qualitative methods. 3rd ed.* Los Angeles: Sage 87-116.

Robinson, K. (2010). *Changing education paradigms.* Retrieved from The Royal Society of the Arts: http://www.youtube.com/watch

Robinson, K. (2011). *Out of Our Minds: Learning to be Creative.* UK: Capstone Publishing.

Robinson, K., & Aronica, L. (2015). *Creative schools: The grassroots revolution that's transforming education.* New York: Penguin Publishing Group.

Rowe, K. (2005). *National inquiry into the teaching of literacy (Australia), Teaching reading.* Canberra: Australian Government.

Rowe, K. (2003). The importance of teacher quality as a key determinant of student experiences and outcomes of schooling. *Building teacher quality: What does the research tell us?* (pp. 15-23). Canberra: Australian Council for Education Research.

Rowe, M. (2012). A longitudinal investigation of the role of quantity and quality of child-directed speech in vocabulary development. *Child Development, 83*(5), 1762-1774.

Rubie-Davies, C., Hattie, J., & Hamilton, R. (2006). Expecting the best for students: Teacher expectations and student achievement. *British Journal of Educational Psycology, 76*, 429-444.

Sanagavarapu, P. (2010). Children's transition to school: Voices of Bangladeshi parents in Sydney, Australia. *Australasian Journal of Early Childhood, 35*(4), 21-24.

Sanagavarapu, P. & Wong, M. (2004). An exploratory study of early childhood educators' views on culture and play. *Journal of Early Chldhood Teacher Education, 24*(4), 303-309.

Saracho, O.N. (2011). *An integrated play-based curriculum for young children.* New York: Routledge, Taylor and Francis group.

Sargeant, M.A., Burton, L D., & Bailey, A. (2010). Higher education in Sint Maarten: Fostering growth of teacher knowledge in mathematics and science. *Journal of Research on Christian Education, 19*, 172-196.

Schensul, J. J. (2012). Methodology, methods, and tools in qualitative research. In S. D. Lapan, M. T. Quartaroli, & F. J. Riemer (Eds.), *Qualitative research: An introduction to methods and design* (pp. 69-103). Retrieved from http://www.eblib.com

Schmidt, H. G., Coden-Schotanus, J., & Arends, L. R. (2009). Impact of problem-based, active learning on graduation rates for 10 generations of Dutch medical students. *Medical Education, 43*(3), 211-218.

Schon, D. (1995). *Frame reflection: Towards the resolution of intractable policy controversies.* San Francisco: Jossey-Bass.

Schon, D. (1987). *Educating the reflective practitioner: Towards a new design for teachng and learning in the professions.* San Francisco: Jossey-Bass.

Schon, D. (1984). *The reflective practitioner: How professionals think in action.* US: Basic Books

Scottish Executive. (2007). *A curriculum for excellence, Building the curriculum 2) Active learning in the early years.* Scottish Executive. Edinburgh: Scottish Executive.

Scottish Executive. (2013). *About active learning*. Retrieved November 23, 2013, from Education Scotland:http://www.educationscotland.gov.au/learningteachingandssessment/approaches/activelearning/about/what.asp

Scoufis, M. (2013). Have We Lost Focus on Our Students' Learning? *International Journal for the Scholarship of Teaching and Learning, 7*(1), 3.

Singh, A., & Gupta, D. (2011). Contexts of childhood and play: Exploring parental perceptions. *Childhood, 19*(2), 235-250.

Smith, S., & Maher, M. (2016 in press). The power of play-based learning: A pedagogy of hope for potentially at-risk children. In S. Lynch, D. Pike, & C. a'Beckett, *Multidisciplinary perspectives on play from early childhood and beyond.* Springer.

Statistics Unit, Centre for Education Statistics and Evaluation and Multicultural Programs Unit. (2013). *NSW Trail of the reliability and validity of the EAL/D (English as an Additional Language/Dialect)*

learning progression. NSW Department of Education and Communities. Sydney: NSW Department of Education and Communities.

Stephen, C., Ellis, J., & Martlew, J. (2010). Taking active learning into primary school: a matter of new practices? *International Journal of Early Years Education, 18*(4), 315-329.

Stephen, C., Ellis, J., & Martlew, J. (2009). *Turned on to learning 2: Active Learning in Primary One.* University of Edinburgh. Edinburgh: AERS Research Briefing Paper No.8.

Synodi, E. (2010). Play in the kindergarten: the case of Norway, Sweden, New Zealand and Japan. *International Journal of Early Childhood Education, 18*(3), 185-200.

Taylor, B., & Kroth, M. (2009). A single conversation with a wise man is better than ten years of study: A model for testing methodologies for pedagogy or andragogy. *Journal of Scholarship of Teaching and learning, 9*(2), 42-56.

Tesse, R. (2012, April 07). *Breaking News*. Retrieved April 08, 2012, from News.com: http://www.news.com.au/national/rich-childrer-perform-better-at-school/story-e6frfkvr-1226320881931#ixzz1rQwZy04v

Timperley, H. (2009). Using assessment data for improving teaching practices. *ACER Research Conference 2009*, (pp. 21-25).

Torff, B., & Sessions, D. (2009). Teachers' attitudes about professional development in high-SES and low-SES communities. *Learn Inquiry, 3*, 67-77.

Trawick-Smith, J. (2010). Drawing back the lens on play: A frame analysis of young children's play in Puerto Rico. *Early Education and Development, 21*, 1-32.

Tuckman, B.W. & Harper, B.E. (2012). *Conducting educational research.6th Ed.* New York: Rowman & Littlefield.

UNICEF. (2002). *The state of the world's children.* Retrieved from http://www.unicef.org/sowc02/fullreport.htm

United Nations International Children's Emergency Fund. (2006). *The state of the world's children.* New York: UNICEF.

Univerisities Australia. (2015). *Submission to the 'Vision for Acicence Nation' consultation paper.* Canberra: Universites Australia. Retrieved from https://www.universitiesaustralia.edu.au/news/submissions-and-reports/-Vision-for-a-Science-Nation--consultation-paper/-Vision-for-a-Science-Nation--consultation-paper#.Vp2qdJ24Zzk.

Vail, K. (2004). Grasping what kids need to reach performance. *The Education Digest, 69*, 12-25.

Van Oers, B. (2010). Emergent mathematical thinking in the context of play. *Educational Stidies in Mathematics, 74*(1), 23-37.

Varol, F., & Farran, C. (2006). Early mathematical growth: How to support young children's mathematical development. *Early Childhood Education Journal, 33*(6), 381-387.

Victorian Department of Education and Training. (2015). Victorian Early Years Developmen Framework. Retrieved from http://www.vcaa.vic.edu.au/Pages/earlyyears/index.aspx?Redirect=1

Victorian Department of Education and Training. (2013). *State Government Victoria.* Retrieved September 24, 2014, from Department of Education and Training: http://www.education.vic.gov.au/school/principals/participation/papers/disengagedrisk.aspx

Vygotsky, L. (1987). *Mind and society: the developmentof higher mental processes.* Cambridge, MA: Harvard University Press.

Vygotsky, L.S. (1962). *Thought and Language.* New York: Wiley.

Warren, E., & Young, J. (2002). Parent and school partnerships in supporting literacy and numberacy. *Asia-Pacific Journal of Teacher Education, 30*(3), 217-228.

Watson, K., Handal, B. Waters, E. & Maher, M. (2013). The influence of class size upon NAPLAN performance: a study of Catholic schools in the Sydney Archdiocese. Report prepared for the Sydney Catholic Office of Education. Sydney: The University of Notre Dame Australia.

Weimer, M. (2013). *Learner- Centered Teaching: Five Key Changes to Practice* (2nd ed.). San Francisco, CA: Jossey-Bass.

Whitby, G. (2013). *Educating Gen Wi-Fi: How to make schools relevant for 21st-centry learners.* Australia: Harper Collins Publishers.

White, G.K. (2013). *Digital fluency: Skills necessary for learning in the digital age.* Australian Council of Educational Research. Melbourne: Australian Council of Educational Research.

Willingham, D.T. (2012). Ask the cognitive scientists: Why does family wealth affect learning. *American Educator, Spring*, 33-39.

Wilson, M., & Sapsford, R. (2006). Comparison of methods. *Data Collection and Analysis*, 93.

Wong, S.-m., Wang, Z., & Cheng, D. (2011). A Play-based Curriculum: Hong Kong Children's Perceptions of play and non-play. *The International Journal of Learning, 17*(10), 165-180.

Wood, E., & Attfield, J. (2005). *Play, learning and the early childhood curriculum* (2nd ed.). London: Paul Chapman.

Wu, M. (2009). Measurement, sampling, and equating errors in Large-Scale assessments. *Educational Measurement: Issues and Practice*, *29*(4), 15-27.

Wu, M. (2010). The inappropriate use of NAPLAN data. *Professional Voice*, *8*(1), 21-25.

Xu, Y. (2010). Children's social play sequence: Parten's classic theory revisited. *Early Child Development and Care, 180* (4), 489-498.

Yelland, N. (2011). Reconceptualising play and learning in the lives of young children. *Australasian Journal of Early Childhood, 36*(2), 4-12.

Yelland, N. & Neal, G. (2012). Aligning digital and social inclusion: A study of disadvantaged students and computer access. *Education and Information Technologies, 18*(2), 133-149.

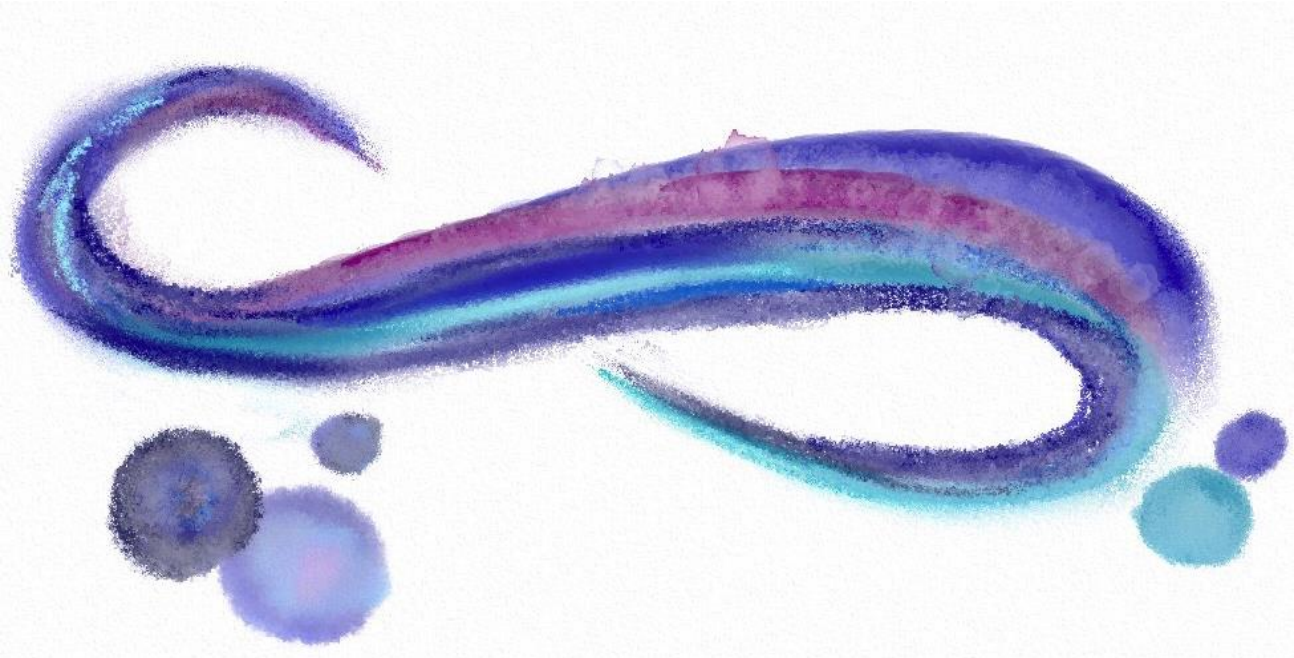
Yin, R. K. (2013). *Case study research: Design and methods* (5th ed.). Thousand Oaks, CA: Sage.

Zevenbergen, R. & Logan, H. (2008). Compute use by preschool children: Rethinking practice as digital natives come to preschool. *Australian Journal of Early Childhood, 33*(1), 37-44.

Zhao, M., & Ji, Y. (2014). Challenges of introducting participant observation to community health research. *ISRN Nursing*, 2014, 1-7.

Zill, N., & Resnick, G. (2006). Emergent literacy of low-income children in Head Start, chapter 25. In D. K. Dickinson, & S. B. Neuman, *Handbook of early literacy research* (Vol. 2, pp. 347-374). New York: Guildford Press.

Appendices



Appendix 1 –
Questioning Transcript

Interviewer – I (six year old child, EAL/D only speaks Spanish at home)

Interviewee – J (six year old child, EAL/D refugee, lived in Australia for one year)

I – Hello Jacob

J – Hey

I – What did… are you doing?

J – um, I'm collecting butterflies

I – and what else?

J – um, and dragonflies

I – so did you find any?

J – um, yep

I – How many?

J – Three butterflies, three um dragonflies

I – What else have you found?

J – um, lizards

I – What colour are the butterflies?

J – um, different colours

I – What colours? So, what else are you finding?

J – um, I'm going to find ladybugs

I – um, how many have you found?

J – um, three

I – so far?

J – yep

I - So slow. Three ladybugs, four butterflies, three moths and two lizards. How, now what are you going to do with these?

J – Put them in the pile

I – How are you going to put them in the pile?

J – mmm, by numbers… maybe

I - show us. (Jacob starts moving the bugs around) Are you going to put them in lines?

J – Yep, I'm putting them in lines but they are different numbers

I – So Jacob, how far are you going to go to find different animals?

J – the forest

I – how far? Say very, very far

J – hmm, very, very far. Far away.

I – So what are you going to find?

J – um, I'm finding…

I – What are you finding?

J – caterpillar, I think

I – What sort of caterpillars?

J – Uuummm green ones

I – Green caterpillars. Cool. How many have you found?

J – um, one

I – so far? So slow. Are you going to find turtles and crocodiles?

J – yes, I'm going to find crocodiles in the river

I – so where is this river?

J – um

I – Behind you?

J – yeah. Green river, blue water.

I – so, can you see any crocodiles?

J – Yes, over here.

I – did you find any more?

J – yes

I – look there is some green grass over there. There's one, brown.

J – yeah

I – Let's find some more! Do you see any more? Ooo this one's a grey one, somehow. Ooo scaly. What else are you finding, Sarafi Hunters? Ooo a turtle, very hard shell. It's a turtle?

J – yep

I – Ooo another turtles with spots on its shell, very interesting. I wonder where its going? Where is Mister turtle going? Do you know?

J – Yeah

I – To get his shell cleaned?

J – Yeah

I – Let's find some more.

J – yeah

I - Let's go back to your autograph. Let's see… let's see what's in the grass. Can you find anything? A lizard! Ooo look at that. What happened to mister lizard? Ooo that's a crocodile.

Let's go back to your autograph and see how many you've found. One, two, three, four, five and six. One, two, three, four five, six. Are you goes to find some spiders?

J – Yes.

I – Where are you going to find some spiders?

J – hmm, in the garden.

I – Which garden? Let's go find some snakes and frogs.

J – Here's some snakes and frogs.

I – Excellent! Lots and lots of snakes and frogs. And over here, all different. Ooo look at this one! Look at these.

J - Ooo look at this one, very interesting.

I – Ooo look at these ones, scary. Ooo look at this, pink ones

Appendix 2 –
List of Activities

Although the majority of the activities cross over multiple KLAs, they have been organised into their main KLA.

Literacy		
Milkshakes	Felt boards	Audio books
Sushi	Guess Who	Magazines
Crazy faces	Writing station	Story Kit (writing ebooks)
Paddle pop stick frames	Crazy chef game	Recording interviews
Spider webs	Story making magnets	
Pin wheels	Letter writing	

Mathematics		
Fruit and vegie painting shapes	Bus stop game	iPads
Play dough	Snakes and ladders game	Treasure maps
Geo shapes	Incy wincy spider game	bingo
Pasta beads	Spotty dogs game	Marshmallows and pasta
Water play	Pirate hats	Making Snowflakes
Design studio	Marshmallow bank	Angry Bird Towers
Minecraft		

Science		
Colour mixing	Mystery Box	Marble run
Slime	Lego	Dinosaur puzzle
Floating and sinking	Duplo	Train set
Paper bugs and flotation	Toy cars	Cooking
Smelly balloon	Large animals	Build a car (Recycled materials)
Growing plants	Lego coding (WeDo)	Mini Greenhouses

Exploding monsters	iPads	Paper Planes
Sustainable living (designing water dwellings)	Lava Lamps	Density column
Dancing sultanas	Scientific drawings	Clucking cups
Designing and testing rockets		

Creative and Performing Arts		
Shop	Paper pictures	Finger puppets
Bugs galore	Chalk drawings	Music box (playing)
Witches and wizards	Painting	Musical instruments (designing)
News station	Spoon people	Making masks
Doctors	Modelling clay	Making finger puppets
Vet	Crayon rubbings	Fancy feathers
Café	Bubble pictures	Lightbox and X-Rays
Home corner	Drawing box	Icing sugar painting
Hat box	Cool creatures	Photography
Celebrations box	Pet rocks	Step-by-step drawing

HSIE		
Building blocks	Natural environment pictures	Tree house
Exploring Wetlands		

Challenges		
Build a clay boat	Design a toy	Mystery Box
Build a bridge	Cup and carrot bridges	
Marshmallows and pasta	Testing vinegars	

Appendix 3 –
Red Back Spider Transcript

Camera person – H

H – Look at that, man

R – What are you doing? He's going to move up and down. Trahdyn! Look at it…

H – What?

R – Trahdyn! They're having a fight. The Red Back spider… it's having a fight

T – The Red Back spider and who?

R – look it's dead. Film it

T – What's he doing?

H – I am filming it

R – He's gone. Another one. He's ready to kill.

H – He's taking him away. It's pulling it

R – Trahdyn! He's pulling the Red Back spider

H – Look, he's tying the legs around and he pulls it up

R – It was so cool. Look at it.

H – Look it's hanging. I want to stop it

R – No, I want to watch what he going to do

H – let's see if he sucks its blood

R – No, What he's doing?

H – now it's sucking its blood. No it's not.

R – When it gonna finish it?

T – It's so freaky, isn't it?

H – Can I stop it now?

R – I wonder what's happened

H – The Red Back spider got it

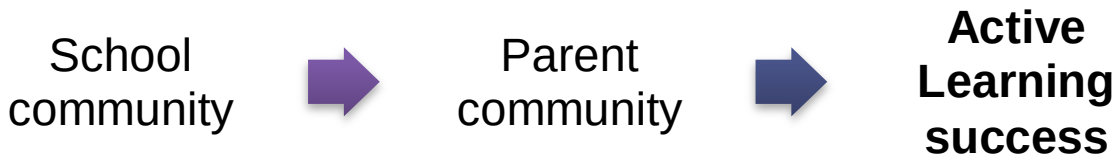
Appendix 4 –
Detailed Description of *Playing to Engage*

4.1 *Active Learning* in Action: Let's Play to Engage

4.1.1 *Playing to Engage*

Playing to Engage was a multidimensional project involving the collaboration of school executive, classroom teachers, parents and children across one South-West Sydney school community. Throughout the project, concurrent to the *Active Learning* program, the school community participated in a range of activities and professional development sessions in order to promote the importance and long-term benefits linked to science and mathematics play-based learning experiences.

To adequately present the wide breadth of the *Playing to Engage* project, the following information has been organised into distinct cycles. Each cycle represents a new facet in the implementation of the project. The central, overarching component to this research was the *Active Learning* developmental play program. In order to successfully implement the program within the school, it was essential to have the buy in from the school and parent communities.



To achieve this, demonstrations, whole school events, professional development and information sessions were held for both staff and parents throughout the project.

4.2 In the Beginning (Cycle One of the Action Research)

4.2.1 The Context

The innovative play-based learning program began with a single Year Two class, in a big school, as Friday afternoon activity. Over the course of a term the program evolved and developed as the researcher and twenty-two children participated in a range of curriculum based play activities. Although the activities covered all elements of the curriculum, there was a heavier focus on mathematics and science. This was in direct response to evidence from the researcher's initial data collection on the lack of quality teaching experiences being offered in these areas of the curriculum. In the case of mathematics daily teaching practices and school policy were based on teaching drills and NAPLAN style questioning, with a lack of attention on children being able to transfer skills and knowledge to hands-on problem solving scenarios. Science on the other hand was predominantly only being taught as part of the NSW Education Department's theme based integrated units called Connected Outcomes Group (COGs), which in the classroom was not a central focus of teaching and learning, but generally only covered during afternoon lessons which ultimately meant often it was left out altogether.

4.2.2 Let the Children Play!

During play sessions the children engaged with a variety of activities including play dough, Lego, jigsaw puzzles, a café and a supermarket role-play kit. In order to give a snapshot into the world of play created by these children and the researcher, little vignettes have been provided to showcase the deep learning and experiences had throughout the course of the project. Each vignette has been presented in a purple box with detailed photos.

Below is an example of how the children were able to take the simplest of materials and create an engaging learning opportunity linked to a real life mathematics scenario.

Shopping in Style

During one session the children were presented with a variety of consumables boxes i.e. cereal, cat food, frozen vegetables and milk, a shopping trolley and a cardboard container filled with play money and credit cards. Without any prompting, a group of children began

moving tables around to form a U shape, they set up the consumables including pricing labels. Before declaring the supermarket open for business, a couple of children made signs on a small whiteboard naming the shop and welcoming customers. Some children stood behind the counter while others moved around selecting items to purchase. Items were scanned, placed in bags and money exchanged. One child even used the side of the imagined cardboard box cash register to swipe the customer's credit card. Once the exchange was complete the items were placed back on the tables ready for someone else to buy.

The shop role play not only links children's interests, real world experiences but at the same time meets NSW curriculum outcome requirements across various KLAs. The table below was created early in the program's development to demonstrate to staff the diversity of curriculum outcomes and indicators which could be incorporated into the shop experience.

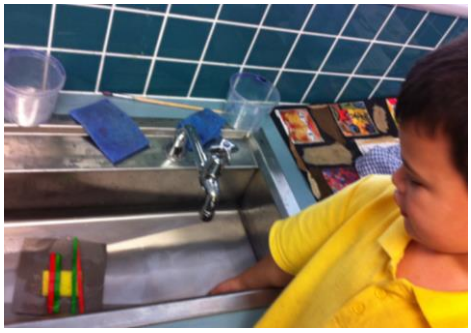
Active Learning Experience	Key Learning Area	Strand	Outcome and Indicators
Writing a shopping list and signed for display	English	Writing	WS1.13 Identifies how own texts differ according to their purpose, audience and subject matter. Purpose Discusses some of the different purposes for which people write Discusses some of the advantages of writing to record information or events Discusses how familiar examples of writing (including electronic texts) give information in different ways Discusses some of the different purposes for visual texts such as charts, maps, diagrams, illustrations
Interactions between shop workers and customers	English	Talking and Listening	TS1.1 Communicates with an increasing range of people for a variety of purposes on familiar and introduced topics in spontaneous and structured classroom activities Purpose recounts real or imagined events in logical sequence listens to and follows a brief set of instructions Audience talks with parent helpers in the classroom talks comfortably with peers on a range of topics interacts in informal conversations with peers and adults listens attentively and converses with others to share ideas or give information

Setting up the shop and purchasing of items by customers	English	Talking and Listening	TS1.2 Interacts in more extended ways with less teacher, makes increasingly confident oral presentations and generally listens to others Listening Skills as a listener, usually maintains eye contact, if culturally appropriate, with speaker Interaction Skills listens and contributes frequently to small group discussions attempts of involve others in group discussions
Reading a shopping list and then selecting the right items at the shop	English	Reading	RS1.7 Understands that texts are constructed by people and identifies ways in which texts differ according to their purpose, audience and subject matter.
Calculates different amounts of money and gives change	Mathematics	Working Mathematically Number	Working Mathematically Applying Strategies Uses objects, diagrams, imagery and technology to explore mathematical problems solves problems that relate to their environment uses a variety of strategies to solve addition and subtraction problems Number Whole Number Counts, orders, reads and represents two- and three- digit numbers orders a collection of notes or coins according to face value Addition and Subtraction Uses a range of metal strategies and informal recording methods for addition and subtraction involving one- and two- digit numbers performs simple calculations with money

Participates in a role play scenario	Creative Arts	Drama	Making Takes on roles in drama to explore familiar and imagined situations creates a range of roles and situations adapted from their imagination, literature and everyday experiences expresses an understanding of the shared fiction of the drama by stepping-into-role to enact a situation and stepping out-of-role to reflect on the action Conveys story, depicts events and expresses feelings by using the elements of drama and the expressive skills of movement and voice creates and adapts stories for enactment responds to elements of drama to create shared meaning Performing Interacts collaboratively to communicate the action of the drama with others shares their drama making with others incorporates props and costumes to communicate role, situation and place
Buying and selling of food goods	HSIE	Social systems and structures	Explains how people and technologies in systems link to provide goods and services to satisfy needs and wants identifies different goods and services that fulfil their needs identifies the differences between goods and services Identifies the difference forms of monetary exchange, e.g. cash, credit card, cheque
Selecting healthy foods	PD/Health/PE		Recognises that positive health choices can promote wellbeing Recognises that a variety of food is needed for good health Identifies different foods that can keep them healthy

The initial play sessions demonstrated the children's ability to share, positively interact with each other, mix with a variety of children outside their friendship groups, create role play scenarios and play collaboratively. They were able to show their skill, share prior knowledge and have the ability to direct their play and learning experiences. For example, from the shop role-play some children adapted their understandings and independently established a bakery by making food out of play dough. The food items were organised into groups based on type, presented for customers to purchase and sold by exchanging play money. Overall, the children thoroughly enjoyed and looked forward to play sessions each week.

Most of the activities were selected based on the children's interests or stemmed from the direction in which play naturally led them. For example, the play dough bakery experience led to a new role-play café box, an interest in dinosaurs turned into making wooden dinosaur models, and a desire to explore if a handmade boat could float transformed into floating paper bugs.



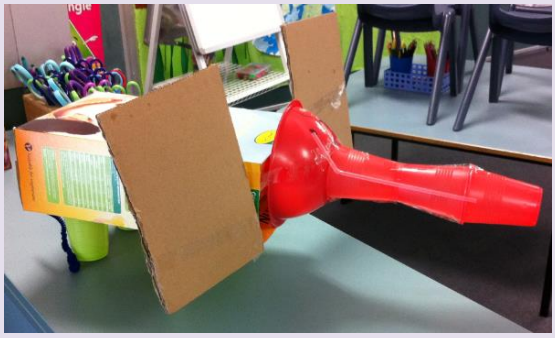
One of the most popular activities with the children was the Mystery Box. This activity involved children being presented with a range of recycled materials including empty boxes, milk cartons, tubes, paddle pop sticks, bottle tops and plastic cups etc. Children also had access to sticky tape, glue and staplers. From these materials they were able to create anything they could imagine from robots to cupcake making machines, dragons to submarines.

Elephant Dreams (see Elephant.MOV for audio-visual)

For one child, this experience provided the means to express his creativity and wealth of knowledge on a range of animals. This child struggled to communicate socially with other children, and he found everyday classroom tasks like writing a challenge. Play and the Mystery Box allowed him opportunities to interact with other children and express his passion for science and technology. Two examples of his work are as follows:

Using two green cups he cut the bottoms out and then drilled holes in the sides for the green pipe cleaners to feed through. Then he twisted the pipe cleaners together to make a band in which fitted around his head, fashioning the cups into a pair of goggles. While wearing the goggles around the classroom it happened to start raining outside. The child came to me and said “it’s raining outside and I don’t want my eyes to get wet. I need something to cover the openings so the water doesn’t get in”. Together we explored a range of materials before he settled on some glad wrap and used sticky tape to attach it to the apertures of the cups.

On another occasion he decided to make an elephant using coloured plastic cups, a plastic bowl, sheets of cardboard and a large cereal box (see attached video *Elephant*). He started by sticking four cups to the bottom of the cereal box with sticky tape, one in each corner for the feet. Next he attached sheets of rectangular cardboard to either side of the box for ears. He then added a plastic bowl to the side of the box for the head. Onto the front of the bowl he attached two cups by sticking the open ends together. When he went to attach a third cup to the trunk, the whole body of the elephant tipped forward, he described it as being 'trunk heavy'. When asked what could be done to fix it, he discussed the need to weigh down the back half of the body so the whole elephant would stand up. He then disassembled a couple of the legs and poured in some rice and re-joined them to the body. Finally he applied some last minute touches including a little pipe cleaner tail, bendable straw tusks and eyes. A little mishap with the permanent marker turned the creation into a pirate elephant.



The detailed description of this child's achievement serves to highlight not only his creativity, but exemplify the importance of working from a child's strengths, assuming each child is capable and to hold high expectations. His engagement, motivation, and improved social and communication skills embody the higher level aims of play.

4.2.3 Two Minds are Better than One!

In the early days, my class would occasionally be joined by T1 and her children. We found there were many benefits to combining the classes including,

the opportunity for collaborative planning and teaching;

the sharing of ideas and teaching perspectives between the teachers;

an outsider's interpretation on the actions and needs of the children;

a tailored environment where children could be extended based on their interests and learning needs;

the occasion to run special activities which required close teacher supervisor such as art or science experiences, while the second teacher roamed the classroom;

extension of social interactions for children outside the classroom; and

an opportunity for more children to influence the direction of activities and bring new perspectives and knowledge to the shared learning environment.

4.2.4 The Change from Play to *Active Learning*

The success of the initial sessions prompted discussions with other staff, including the Principal about the positive learning opportunities which were emerging. During the first informal conversation with the Principal the word "play" was used to describe the sessions in which the children were participating in. The next day during my morning literacy session the Principal appeared in my classroom. He expressed an interest in seeing the play program in action as he was concerned it would be like other programs he had already seen where children were given a bunch of toys with few educational benefits and left to their own devices.

When discussing the encounter with other teachers on staff, in an attempt to assist, they provided me a copy of a list of play activities they used when once upon a time teaching kindergarten. They also suggested I put it in my teaching program in order to make the developmental play program look "educational". The teacher went on to describe their play sessions as being an opportunity to catch up on marking or read one-on-one with children, but suggested that if the Principal was coming I might need to make it look more legitimate. Misconceptions about the correct way of implementing play-based learning abounded.

The term *Active Learning* was adopted due to the reaction of the Principal to the word play, and the general common perception many primary educators (especially the staff at the case study school) have that play is something children do independently while teachers get other work done, as the T1bove demonstrated. The use of the title *Active Learning* throughout the course of the project would prove to make executive staff, teachers and parents across the school feel more comfortable with this type of program running in a primary school setting.

Although T1 and I specifically selected a range of activities to showcase the Year Two developmental play program for the Principal, these were from our bank of activities already in existence and in no way "special". The children designed, made and painted a car out of a cardboard box, made clucking cups, expressed their creatively through the Mystery Box and bought items at the shop. The Principal interacted with children, even making a clucking cup, and spent time exploring the learning environment. Following the session the Principal expressed his appreciation for the learning and "total engagement" occurring through these sessions. He was delighted to see the extensive variety of curriculum links being made especially in the area of science and technology. The Principal would make many more visits during *Active Learning* sessions over the course of the project, and frequently comment on the fact that every child was completely engrossed in learning.

The perceived success of the program attracted the interest of a number of key executive staff within the school including the Deputy Principal and Assistant Principal's for Early Stage One and Stage One. The Dean of Education and Assistant Dean from Notre Dame University also visited on separate occasions. Each visitor provided a unique insight into *Active Learning* and they were able to offer constructive feedback to help streamline the program. School executive staff were amazed at the cornucopia of

higher-order learning which was occurring, broad levels of engagement by all children, the tailored experiences and the distinct lack of behavioural problems. Both university guests reflected on the abundance of on task conversation happening between children and the variety of interesting activities presented.

4.2.5 Creating a Collaborative Partnership

Throughout, the collaboration between the researcher and T1 embodied a constant open line of communication. It was extremely refreshing to work with someone who shared a similar teaching philosophy and appreciation for play in a primary school setting. Following each *Active Learning* session there was always a lot of discussion and reflection between us about the program. Throughout the initial cycle there was a lot of tweaking and modifications made to help the program run smoothly and ensure children had successful learning experiences. One of the adjustments involved the management of the number of children per activity, for example the role play resources only catered for six children at a time but often at least ten would rush to the space. Initially before play started we trialled reminding the children of the number which were allowed at each station. This generally worked, as the children were good at self-monitoring. Over time though different role plays and table activities had varying numbers, so we created large laminated signed with numbers of them to place next to the activity therefore providing children with a visual reminder.

In order for the café role play activity to work successfully, children needed to take on a variety of roles such as customer, chef / cook or server. The children were so excited to be the chef that unless T1 or I sat down as a customer they often had no one to whom to serve their food. To help overcome this we introduced role cards on lanyards. Each child at the activity needed to wear a lanyard with a particular role which they needed to fulfil. Although the children were taking on more roles, they struggled to listen to each other and embody a particular character. It was at this point we decided to workshop the cafe as a whole class and use it as a teaching moment for *Our Families* unit of work.

Building a Café

One recess while the students were outside playing, T1 and I turned our classrooms into a giant café. We had different sized tables with checked table cloths, plates and cutlery. When the children came back in we modelled what the café experience would look like with just one group. At the table sat a mum and

dad with their two children. We discussed who would do the ordering for the family and how each character would behave. Next a server was introduced who handed out menus and took the family's order to a chef in the kitchen. The chef cooked the order and handed it back to server.

Once all the children had seen how the café experience worked each of the 40 children were allocated different roles. To mix things up, customers found a post-it at their seat which gave them a role to play – such as grandad, Aunty Mary, child under 5 or Cousin Joe. We intentionally created tables with different family dynamics to match the real-life family dynamics of children in our classes. It was an amazing experience. Watching the children embody a role and interacting with each other was great. Each purposeful verbal interaction was a gain for these children for whom English was an additional language. The serving staff wrote down orders on little memo pads and the chefs in aprons cooked up some delicious food. Overall, the experience helped to scaffold the learning needs of our children and changed the way they engaged with the café during *Active Learning*. In the weeks following we had families visiting the café, babies and animals crawling along the ground, and mums pushing strollers.

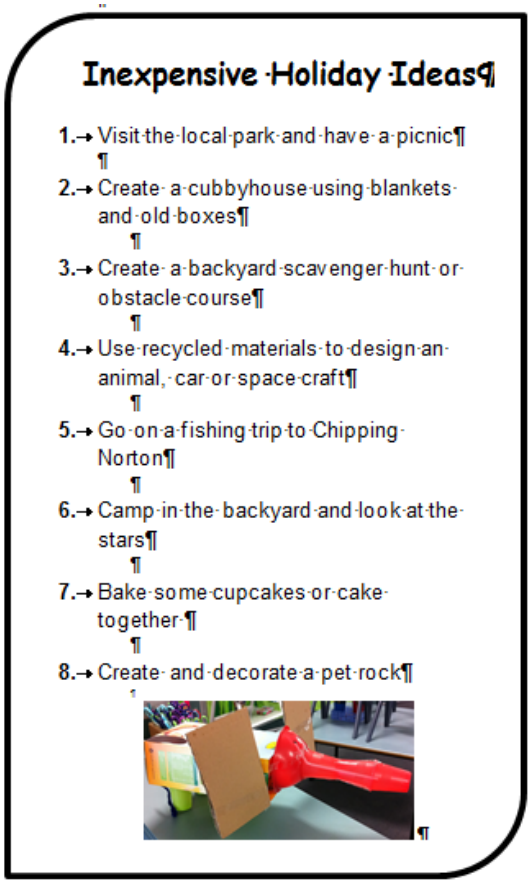


Another activity in which required modification was the Mystery Box. In the early weeks we found children were going to the table collecting as many things as they could and sticking them together. When asked what they had made on occasion they had no idea. Although T1 and I always offered them the opportunity to let their creativity guide them and the freedom the experiment with the materials, we introduced a challenge to help focus some of the children. The challenge changed frequently and was linked to a theme for example transport, animals or people. This helped some children enhance their creativity and reduce the amount of wastage.


4.3 The Parent Factor

4.3.1 Extending *Active Learning* into the Home

The initial cycle of implementation also involved the inclusion of ideas and tips for parents in the school newsletter. The articles were designed to help parents to see the benefits of incorporating play into their home lives and recognise that play has a legitimate place in children's learning experiences in a primary school setting. The piece below was designed to provide parents with inexpensive but fun activities to engage the children with during the school holidays. Again this was in response to the cohort with many parents being unemployed. Not all articles were targeted at lower primary often the newsletter would include experiences or challenges aimed at middle and upper primary children.



Inexpensive Holiday Ideas

1. Visit the local park and have a picnic
2. Create a cubbyhouse using blankets and old boxes
3. Create a backyard scavenger hunt or obstacle course
4. Use recycled materials to design an animal, car or space craft
5. Go on a fishing trip to Chipping Norton
6. Camp in the backyard and look at the stars
7. Bake some cupcakes or cake together
8. Create and decorate a pet rock

4.4 The Buy In (Cycle Two of the Action Research)

4.4.1 Get On Board!

The completion of Cycle One culminated in the establishment of the *Active Learning* program as a demonstrably quality curriculum-linked learning experience. The trial had been an overwhelming success with both the children from an engagement and enjoyment perspective and with executive staff as they observed and evaluated the documentation related to quality learning in the KLAs. The support of T1 as a collaborative partner and sounding-board meant the majority of potential problems had been resolved. The next cycle was the program's expansion into all three Year Two classes. It was at this point T2 joined the team and bought the total number of children participating up to 65.

All three classes engaged in an *Active Learning* session once a week for an hour. As well as this, T1 and the researcher also ran a longer session with just the two classes on another day.

Children came into *Active Learning* with a range of prior play-based learning experiences. Due to this, as children spent more time engaging in the sessions, the program had to evolve as the children progressed. This was predominantly due to children's ongoing social development; cognitive development; increased ability to participate in play based experience; and development of their creativity.

In order to capture the extensive range of activities (see Appendix Two for complete list of activities provided) and rich learning which occurred throughout the project a very small selection of vignettes have been selected. The majority of activities crossed over into a variety of KLAs, so they have been categorised based on the main curriculum area they meet or into a special features section.

4.5 Science

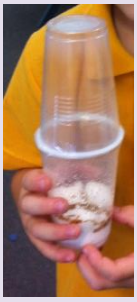
4.5.1 Mini Greenhouses

This activity provided children with the opportunity to create their own mini greenhouse using plastic cups, cotton wool, sticky tape, seeds and a water spray bottle. Prior to this experience the children had

been focusing on procedures as a text type. We had also recently built a greenhouse outside and based on one of the children asking how a greenhouse worked, this was the perfect chance for an investigation.

Going Greenhouse

Four children sat at tables in a row with their lab coats on waiting for the short clip to start on the Smartboard. It was the first time we had trialled a visual procedure with the children. As the clip started they listened and gathered the required amount of materials from the table in front of them. The clip ran again and again, running for approximately three minutes, so if they missed something they could pick it up second time around and check they were on track up to that point. On completion of the greenhouse one of the little girls asked if she could make another one, but this time try using a different type of seed to see what would happen. Another child commented on their excitement in making a greenhouse but couldn't understand why it wasn't green. The children were able to select where in the classroom they set up their greenhouse. Many chose a sunny spot on the windowsill and talked about the plants' need for sunlight to help them grow. One child chose a dark spot on a table, as he wanted to see if there would be a difference between those in the sun and his.



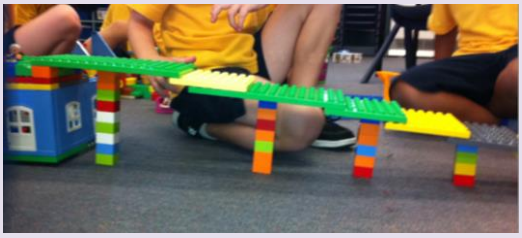
4.5.2 The Duplo ramp

The children alter between learning through play with Lego and Duplo which provides opportunities to experiment with construction enhancing creativity. Some children like to play by themselves but often they join together to create towns, robots, flying craft and theme parks. Sometimes when we felt some children are not exploring other activities and just using the blocks, we took a break from making them available.

Ramp it up

On one occasion there were five children working together at the Duplo station. When they called me over they had built a house with a very long ramp going all the way to the ground. We talked about

how they had made the ramp and how it worked. The blocks were supported to give the ramp a gradual slope. Using the ramp a child pushed a toy car down. Just before reaching the end of the ramp the car fell off the side. The child tried again but with the same result. After some discussion by the group and rejigging of the structure, one of the children put the car on the top of the ramp but this time he banked it all the way over to the left side. As the car rolled down he talked about how this helped as in rolled to the right but this way it could make it all the way to the bottom.




4.5.3 Mystery box - build a boat challenge

Children were given a challenge to make a boat which would float when placed in a small tub of water. They could use any of the items found in the Mystery Box including egg cartons, plastic tubs, cups, tins, straws, paddle pop sticks and cardboard boxes. Once they had made a boat and were ready to try it in the baby pool.

Float your Boat

As the children brought their boat up to the pool I asked them "How did you make it? Do you think it will float? Why?" All the children were insistent that their boat could stand the water test regardless of what it was made out of. Many had used plastic cups and containers for the base of their boat and could explain why it was a good material for water.

One little boy made his boat out of a cardboard Oreo container. After he placed it in the water I asked him if he thought it was the best material to use for his boat. He could see how strong the plastic boats were but wanted to see how long his boat could stay afloat, so we timed it.

Another child used half of an egg carton for the base of his boat with some plastic cups stuck inside and a clothes peg for a mast. When he put the boat in the water it not only started to fill up with water but it tipped over from the weight of the peg. He quickly scooped the boat up out of the water before it got too wet. When I asked what had gone wrong he said it had a hole in the bottom and the top made it tip over. He took the boat back to the Mystery Box table reworked it and then brought it back for a second go. I enquired about what changes he has made. He talked about covering the holes in the base with sticky tape and moving the clothes peg to inside the bottom of the boat. This time it was a success and the boat was able to stay buoyant.

Instead of bringing a boat to the tub, one child designed a submarine by transforming a cordial bottle. He wanted the bottle to stay under the water, like a real submarine, but with the lid on it kept rising to the surface. He tried pushing it down, putting other objects on top but he couldn't make it stay. Other children became interested and offered advice. Eventually one of the children suggested taking the lid off so some water could go in the sub and help it sink.

A number of children began to express an interest in how the boats worked. I found some plasticine and

suggested a challenge – create something that can float. The children started off rolling the plasticine into a ball, when that didn't work they tore little pieces off but they still sank to the bottom. Then they began discussing the problem with each other about what a real boat looked like, and the curved shape of the bottom. Eventually one child began to hollow the plasticine out into a bowl shape, then it was all about altering the design so little drips of water didn't come in the sides.



4.6 Mathematics

4.6.1 Mystery Box - Toy Sale

The items in the Mystery Box changed weekly depending on the recycled materials we had and sometimes what the children brought from home. Originally it was just one big tub which then progressed into different coloured recycled bags for plastic, glass and paper so the children could sort and easily locate items they wanted. Most of the time they had sticky tape and craft glue but occasionally, to challenge them, we would take one of these away.

Building Toys

The children's interest in making toys, robots, musical instruments and pieces of transport evolved into a special challenge. Over the course of five weeks children designed and created a range of toys in preparation for a grand toy sale. During this time, as part of the class reward system, the children earned pretend money to spend at the toy sale. This also gave children experience with exchanging money. As they earned more coins they were able to add them up and trade for five and ten dollar notes. Children were able to make as many toys as they liked or none at all if they so preferred. We talked to the children about the quality of their creations and who they were making the items for. Some children expressed a desire to paint their toys which resulted in a second station being opened during *Active*

Learning for paint work.

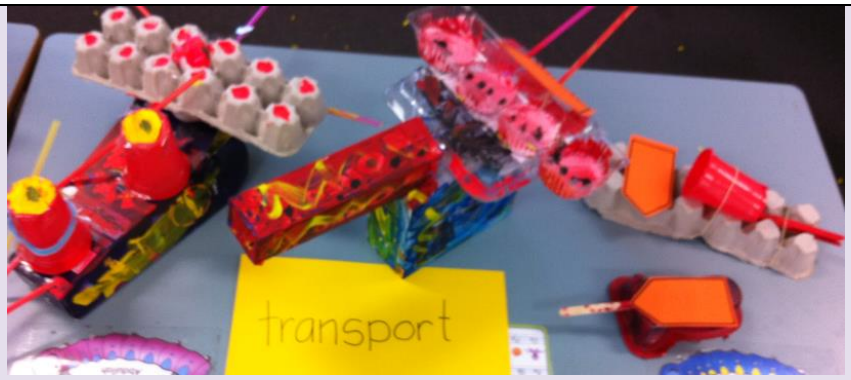
It was interesting to watch the children at the painting station as they discussed each other's work. Some offered painting tips such as letting parts dry before continuing to prevent the colours from mixing. Others suggested specific colours or painting techniques to help make a toy stand out.

On the day of the toy sale, as a whole group, the children discussed how best to display the toys for optimum customer viewing. It was decided table aisles were needed like in the supermarket. Over the course of the five weeks some children had already began eyeing off which toy they wanted to purchase. It was determined by the children, to help customers find the toys they were interested in quickly they needed to be grouped together based on a common theme.

Once the tables were set up and signs made for each group, the children selling toys began the process of setting them up. This included writing price tags and positioning their toy so it would appeal to customers. The sellers had to consider what would be a reasonable price for their toy. Children pitched their toy to waiting customers explaining why they need it and how it worked.

When the toy sale began all of the children collected their money and perused the tables. Once they had selected a toy, there was a cash register with a child ready to serve them. Each child exchanged money and took their new purchase home with them.

If this challenge were to be run again, the next step would be to give the children who made the toys back their earnings. They would then be able to use this at the next toy sale or to purchase highly desirable materials from the storeroom. Other children would also be able to participate through the regular class reward system.

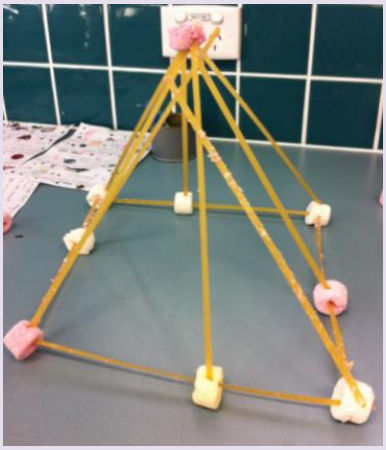
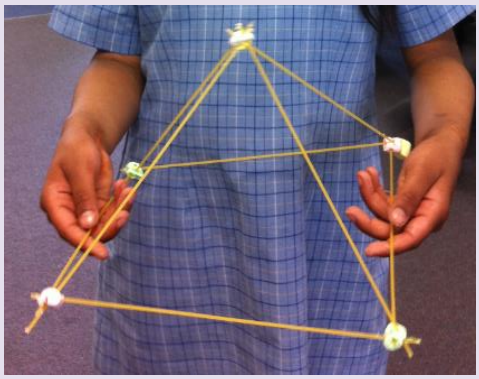


4.6.2 Marshmallow and Pasta Towers

Children were given marshmallows and long spaghetti pasta with which to make towers. This activity progressed in stages over the course of a number of *Active Learning* sessions.

Pyramids and Pillars

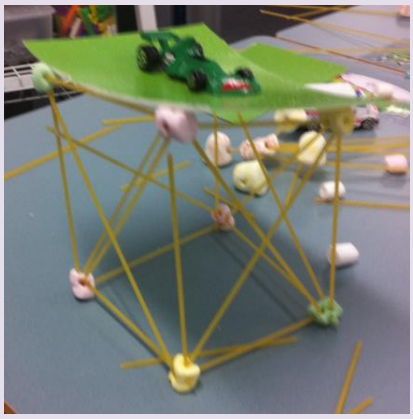
Stage One – children were given minimal instruction except to design a tower in which would stay up. Based on the work of other children the majority made pyramids which surprised me as it was not the four sided rectangular shape I had in my head. The children talked a lot about the difficulty in using the large marshmallows an asked for small marshmallows.

Stage Two – this time around the children were given different types of marshmallows and two varieties of spaghetti. They also had a children's science book with some structural ideas for their towers. Although the towers started to get bigger and children began working in pairs, they still resembled pyramids. Some could see that the triangle was a strong shape but they were trying to use four pieces of spaghetti to get the same shape as crossing two pieces over in an x.

Stage Three – before *Active Learning* started we talked a lot about strong shapes and looked through some pictures in which showed the use of triangles in their construction. There were also two stations, one with marshmallows and spaghetti and the other with plasticine and spaghetti. A couple of the girls clicked in to crossing the pasta over to help support the sides of their tower and so the building began. The children discussed the differences between the building materials and how much easier the plasticine was to work with because they could mould it into different shapes.

Stage Four – now the children had the knowledge and skills to build a simple tower, we set the challenge of building the tallest tower which could hold the weight of a toy car. The children used triangles to help build strong supports for the cardboard and toy car to sit on.



4.6.3 Fruit and Vegetable Shapes

This activity involved the children using a variety of fruit and vegetables as stamps with different coloured paints. Some of the ingredients were left whole while others were cut into halves and quarters.

Juicy Paintings

This activity promoted a lot of language as the children had to ask for the shapes they wanted, e.g. can I have half an apple and a whole squash. The children also had the opportunity to talk about two and three dimensional shapes. At first they mostly just dipped the stamps into the paint and stamped them straight onto the page. One child was interested to see what sort of pattern she would get if she rolled the orange across the page, while another child talked about the segments inside the orange.

There was a little girl who enjoyed painting the paint onto the fruit and vegetables and then stamping them onto the page. Once she had the hang of it she tried putting two colours on the one piece of fruit to see what effect this produced. Following her experimentation she started using the shapes to make a picture, including flowers and a sun. Other children soon began to follow her lead.

4.7 English

4.7.1 Procedures - Milkshakes

Children were given a list of ingredients including honey, milk, banana, strawberries and ice cream from which they could design their own smoothie. This activity involved two steps, 1) writing up the

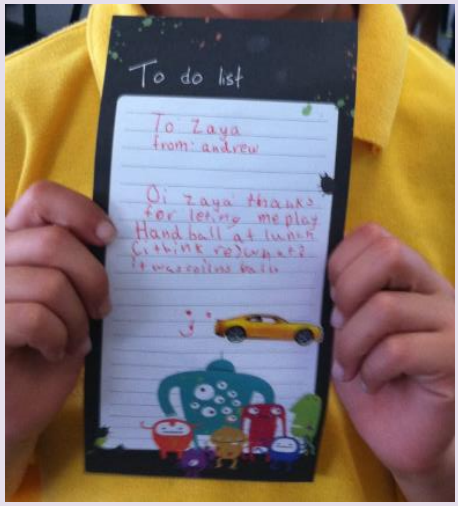
procedure and 2) following their own procedure to make the smoothie. Under the supervision of a teacher the children clopped, sliced and diced their own ingredients, as well as measured and poured milk into the blender.

It was fascinating to see how keen the children were to write in order to create their recipe in the kitchen. As we were focusing on procedures in writing, this activity really helped the children develop the command language structure and sequencing specific to the text type. When making the smoothie the children donned little aprons to chop and slice the fruit while they enthusiastically talked through exactly what they were doing.

4.7.2 Writing Table

The writing station consisted of a variety of implements including coloured gel pens, scented textas, rainbow pencils and mini stampers. Children also had access to a range of stationery and envelopes. Children were not given any direction just to write anything their hearts desired.

Children often write letters to their families or each other at the writing station. We set up a post box for children to put their letters in and then the postman would sort them and deliver them to the recipient. A little boy wanted to get his letter delivered faster so he designed a paper aeroplane to fly it to the recipient.



4.8 Creative Arts

4.8.1 The Kids' Surgery (vet)

This role play box contained a variety of resources including white lab coats, prescription pads, bandages, a stethoscope, gloves and a range of labels to describe typical things you would find in a doctor's surgery.

Children entered the Doctor's Surgery with a range of illnesses and injuries. On this occasion I was pretending to have a bad cough. The Doctor checked my breathing and took my temperature before pulling out the prescription pad and writing me a prescription for Dimetapp.

During another session a group of children turned the surgery into a Veterinarian clinic. Children dropped off their pets including dogs, cats and cockatoos for the vet to help.

During one session the school Information Technology consultant happened to be in the room assisting with a technical issue. When he saw the children role-playing in the doctor's surgery he said "It's so great to see that you're teaching children not to be afraid of going to the doctor, that its ok and they will help them get better".

4.8.2 Celebrations Box

The Celebrations box was designed to fit in with one of the COGs we were teaching. The box contained themed outfits including a salsa dress, glittery vests, party dresses and capes, as well as lots of different types of brightly coloured material and accessories. They also had access to party hats, plates, cups and napkins with Halloween, birthday and generic rainbow patterns on them. Depending on the day sometimes the children would create a role-play or participate in a disco.

This moment occurred towards the end of the year and sums up just how far the children had come. A group of five children sifted through the costume box and each found themselves an outfit. Inspiration struck one of the children and he began outlining a scenario to the others. They got to work setting up a Halloween picnic on the classroom floor complete with plates and cups. One of the children asked if he could film the picnic as they had come up with a story. The child took on the role of director calling out action and cut where appropriate for the other children. They had also broken up their story into different takes.

4.8.3 Chalk Drawings

This activity came from an Usborne science book and an excess of chalk around the school. It involved dipping chalk into water and then applying it to the paper.

The children took this activity to a whole new and unexpected level. Without any guidance they started to experiment with the chalk and create some very interesting pictures. Some children painted their hands to use as a stamp, others drew on the page and then used their fingers to mix the colours.

To step up this activity, we introduced sugar water which makes the chalk colour pop on the white paper. Children expressed an interest in trying darker coloured paper to see what would happen. The use of sugar created interesting discussion with the children about how it worked and which method they preferred.

4.9 HSIE

4.9.1 Wooden Tree house

The children were keen for a dolls house but all the ones I looked at were pink and I was after something in which was gender neutral. The tree house was perfect. It came with a pulley system; crane and the children could pull it apart and reimagine the design into anything they liked. To go with the tree house we bought a couple of different Sylvannian families including the meerkats and hedgehogs.

A group of children and I were talking about the scenario they were acting out with the animals in the tree house. The family included some hedgehogs and meerkats, which a child described as being step children and although they were different looking they were still part of the same family.

A discussion about how the pulley system worked led to an outdoor experiment in which we setup a challenge. The children needed to design a pulley system which could lift a weight to the top of a children's playground. They were able to work as a team, with minimal teacher interaction, to design and implement a working pulley system. The children modelled theirs on the example from the tree house and discussed the benefits of having more pulleys in order to more easily raise the weight.

4.9.2 Natural Environments Pictures

The children used a range of twigs and leaves to create interesting natural artworks.

In preparation for this activity some of the children collected natural materials from outside the classroom. The instruction was anything natural so they gathered soil, bark, rocks, a range of different

leaves and twigs. A couple of the children were happy to create a collage look by simply sticking the items onto the page to make a natural looking picture. Other children made requests for paint and crayons. They painted the leaves using a paintbrush and stamped the patterns onto the page. Some children used the crayons to create rubbing pictures.

Throughout the activity, children talked about the differences between natural and man-made materials. With two girls it also sparked a discussion about how we care of the environment. Therefore, we looked at Jeannie Baker's book *Where the Forest Meets the Sea* for inspiration.

4.10 Special Features – the Challenges

4.10.1 Build a Bridge (see Bridge.MOV audio visual)

For this activity children were given the challenge of building a bridge using only cardboard boxes, newspaper, masking tape and a ruler.

Stage One – along with the information above the bridge needed to be at least 30 centimetres off the ground.

There was only one bridge. A group of about six children gathered as a team for the challenge. One particular child took a lead role which suited the group. Along the way they constantly measured and communicated with each other as they progressed with their construction. The bridge was a success.

Stage Two – this time around the children needed to design a bridge in which was at least 30 centimetres off the ground and could hold the weight of a tape dispenser in the middle.

Before they began the challenge I pulled out the bridge from last time and we talked about how they had

made it and how it couldn't hold any weight in the middle because of its design.

The challenge attracted some of the same children but also some new competitors and a new leader. When it came to the finished product it easily held the weight of the sticky tape dispenser. The children were so excited and wanted to try out other objects. We found a large tub and placed it on top of the bridge. The children roared with laughter and delight. As the leader picked up the tub his brow furrowed. He picked up the tape dispenser in his other hand and with a little hefting said, "it's much bigger but the sticky tape dispenser is still heavier". The children searched around the classroom for something else which was heavier, in the end they settled for one of the smallest children in the class. When he sat on the bridge it miraculously stayed up!

4.10.2 The EAL/D Effect

The *Active Learning* program was fortunate to attract the attention of the school Learning Support team, in particular the lower primary ESL Teacher. She acknowledged the significant learning benefits of the program but more importantly, from her perspective, the talking and listening occurring. Within my class alone 19 out of 21 children were from families with English as an additional language. The ESL Teacher recognised the value of the activities in promoting discussion and interactions between the children. She quickly became another member of our team even giving up her release time to work in the classroom with us. Having her support added a new dimension to the learning experience as some of the activities and the way we presented them became more heavily linked to our regular teaching program. For example, during the term when we taught the text type procedures we offered more experiments and craft activities where children needed to work with a partner to read the procedure in order to help them quickly recognise the structure during writing activities. We also offered a number of cooking opportunities such as making sushi, crazy face sandwiches and milkshakes to promote the use of commands and action verbs.

Perfect Snowflakes

What you need

- ✔ Paper
- ✔ Scissors
- ✔ Ruler
- ✔ Pencil
- ✔ Plate or cereal bowl
- ✔ Glitter and glue - *optional*
- ✔ Crayons or markers - *optional*

What you do

1. Fold the circle in half.

2. Fold the outsides in as shown in diagram.

3. Fold the paper in half.

4. You are now ready to begin cutting out the design of your snowflake. Do not cut away all folds or the snowflake will fall apart.

5. Gently unfold the snowflake and see what kind of design you have created.
6. *Optional:* put dabs of glue on the snowflake and sprinkle with glitter or colour them.

On the days where *Active Learning* only involved the researcher and T1, having the support of the ESL Teacher made all the difference. We were able to have one teacher supervised activity running while the other two teachers roamed the room, or have two supervised activities running at the same time. It also gave us the opportunity to invite other lower primary classes to join in the sessions. We alternated between a kindergarten and year one class over a number of weeks.

4.10.3 Scaled Activities to Meet Diverse Needs

The T2 and T1 found the evolution of the program revolved around the skills and previous play experiences of the children. For example, the introduction of new classes to the year two mix, meant taking the program back to a variety of basic activities such as the shop, Lego, play dough etc. Throughout the year as the children became more confident and their skill set expanded they were able to participant in more complex activities with greater independence. By the end of the year the children were able to follow a relatively simple set of instructions from an audiovisual presentation to complete a craft activity. They were able to independently collect the necessary equipment without support and had the self-control to only gather the craft materials required to complete the activity. At one point we had four separate craft activities rolling on the Smartboard for children to select from. They had become so patient, and not only could acknowledge some activities took longer or had more processes than others, but they were able to wait until their presentation appeared on the screen, whilst offering advice and support to other children completing different activities.

4.11 Planning, Programming and Assessment

4.11.1 Establishing Routines and Systems

The initial planning was quite a lengthy process predominantly undertaken by the researcher. Although T1 and the researcher decided on the activities together, to save time and limit the amount of extra work for T1 most of the curriculum links and paperwork was completed by the researcher. Over the course of the programs development a variety of styles and formats were used to present information to teachers.

4.11.2 Cycle One

The early documents, numbering many pages, outlined each activity, resources needed and curriculum outcomes and indicators. It was useful in helping T1 and the researcher become familiar with the curriculum links, so when interacting with the children it became an automatic process in linking the types of questions we were asking with outcomes. Although this was a very useful process it was a lengthy task on a weekly basis and could not be sustained long term by other teachers.

4.11.3 Cycle Two

The introduction of T2 to *Active Learning* bought new challenges. Despite having the planning documentation each week they could not get her head around the curriculum links and how best to interact with children. Initially she asked questions like are you having fun? Due to this a new section was added to the planning documents, suggested questioning.

As the curriculum links became more apparent to the teachers, the document transformed into a master list with all the activities used during *Active Learning* outlined on it. Then each week T1 and 2 were only given a brief summary sheet. It was their responsibility to review the Master list as needs be. It was also electronically updated as new activities were introduced. This provided sufficient scaffolded support for T1 and 2, but also became manageable for the researcher.

4.11.4 Cycle Three

Although the Master list was useful and contained detailed information, it was not practical for teachers due to the ongoing maintenance required and the appearance of too much preparation work involved. In order to make it more accessible and user friendly the resource transformed into activity cards. Each activity came with its own card, still detailing the same general information about resources and curriculum links but in a much less cluttered format. The cards were also colour coded based on main curriculum area and allowed for teachers to add in additional activities and information as required.

4.11.5 Getting the Data

Designing an assessment approach that took into account a number of formats to cater for different activities and teacher preference. At the beginning of each session coloured pieces of paper were distributed around the room. On the sheet was a table containing each child's name and a column for comments. Each class had their own colour. During the session T1, T2 and the researcher were able to write down comments about any child relating to what they were doing or had made, with particular reference to the curriculum areas.

In addition we also took many photos using Smart phones. This allowed teachers an opportunity to collect another form of anecdotal record as we conference with children to ascertain the depth of their understanding of the concept at the heart of what they had been doing. The children also really enjoyed

this as they felt special that a record of their achievements was being kept. The data was then able to be transferred into the written table at a later time after the session had finished. All of the participants found this very useful as the images helped jog their memory and it allowed them to focus more on the learning experience as opposed to assessment data gathering.

4.11.6 Bring on the Kids

Once the program had been well established across the whole of year two, we began to extend invitations to specific children in the Support Unit, who could cope with the large number of children in a play setting. Each Friday a group of between four to eight children, in year one and two, would join our classes for *Active Learning*. It was a really rewarding experience for everyone involved. The support unit children were able to interact with mainstream children in a stress-free environment. Parents were excited at the opportunity for their child to integrate into a regular classroom setting. Teachers had the opportunity to work with a variety of learners and build meaningful relationships with children from the Support Unit.

It has been almost six months since Joseph and Keola participated in an *Active Learning* session but every time I see them on the playground it's the first thing they ask me, "when can we come and play in your classroom".

One of the most amazing parts of this experience was how inclusive our children were. The Support Unit children blended in with the mainstream children once play commended. Our children understood, they assisted these children when needed and made an effort to include them in activities.

By chance we also started to gather another group of children during *Active Learning* sessions, those with high-level behaviour problems. At times we had up to four children from grades three to six participating. Many of them were able to slip into a mentor role and assist our students in completing activities. At times, though, they were also right in there making things at the mystery box, running the cash register at the shop or making pasta necklaces. Towards the second half of the year, *Active Learning* in our rooms was built into children's behaviour plans.

In one case, there was a year six boy who frequently visited us. He had been diagnosed with serious mental health issues and displayed major behaviour problems inside and outside the classroom. The school Well Being Officer described his extreme anxiety in even entering his own classroom, to the point that he would often soil himself. During *Active Learning* he would frequently have the opportunity to mentor children, if he wasn't playing himself. The relaxed atmosphere allowed T1 and the researcher to get to know the boy and over time our classrooms became the only place he felt comfortable in. Even when the Well Being Officer was working one-on-one with him, she would bring him down to our withdrawal room.

The older children's interest in science lead to the purchasing of new resources specifically targeted at them. On other days when *Active Learning* wasn't running they would participate in mini science inquiry sessions with the Well Being Officer.

4.12 Professional Development (PD) on Play

4.12.1 Exposure to *Active Learning*

The first opportunity to present an *Active Learning* Professional Development workshop was as part of the whole school mid-year teaching conference. For many of the teachers it was their first formal introduction to the program. The presentation consisted of three parts: information on the importance and benefits of play for all children, a small group activity exploring resources and how to use them for play based learning experiences and an overview of *Active Learning* in the Year Two classrooms. This

optimised andragogy and provided me with the opportunity to step between andragogy to allow them to access the pedagogy they would need to implement *Active Learning*.

During the small group component of the session teachers were given a group of resources from which they needed to come up with as many play based activities as they could. A second part of the challenge was to make sure they were also linked to the NSW curriculum outcomes. The resources included chalk and water, play dough with a variety of cutters, a mini mystery box and balloons. Conveniently, the majority of staff were already seated in Stage groups with support and executive staff scattered throughout.

The second Professional Development lesson study sessions were much more intimate and included a select group of seven teachers from the Preschool, the support unit, Early Stage One and Stage One classes. The sessions ran once a week over three weeks and was designed with a lesson study format in mind.

4.12.2 Second PD Lesson Study Session One: the research behind play

This session exposed participants to current research around play-based learning, other projects out there, linking play to the curriculum, different types of activities and the teacher's role during play. Throughout this lesson study teachers were active participants in the learning process. They were asked to reflect on their understandings of play, specifically to give the research an opportunity to gauge their perceptions and level of knowledge. This information was then used to inform the direction of the following sessions.

4.12.3 Lesson Study Session Two: the *Active Learning* demonstration and preparation for the participants running a session

This portion of the lesson study gave teachers the opportunity to experience *Active Learning* first hand. Prior to the experience occurring teachers were walked through the structure of the program and given a comprehensive critiquing sheet. The *Active Learning* session was run as a collaborative partnership between T1 and myself, and all the children from our classes. It was important for teachers to not only be able to view the children's work and experience the atmosphere without the added pressure of

having to run a session themselves, but also witness the interactions between teachers and children, and also the collaborative partnership in action.

Following the session the teachers were given the opportunity to express their thoughts and critique. This activity served a dual purpose of i) evaluating teachers perceptions of the program once they had experienced it, and ii) provide direction for myself as to where to take the professional development. The teachers expressed a genuine sense of excitement about the program and where surprised at how engaged the children were. They also were intrigued by how few children struggled to make choices by themselves and the lack of behaviour issues. Despite these positives though they were hesitant to implement the program themselves and worried about assessment strategies.

In an effort to distil these fears and help build a collaborative atmosphere among the participant group it was imperative they run their own session together. Session Two concluded with a planning workshop so teachers had time to research and gather resources for their contribution to the *Active Learning*. By undertaking this process they were given an opportunity to engage first-hand in the planning process under the guidance of myself, an important component to adequately supporting these teachers if they were to be successful in the long run.

4.12.4 Lesson Study Session Three: the participants run an *Active Learning* session

This session was set up with the same children from the demonstration, as they were familiar with the learning experience and structure. All components of the session were run by the participants while I reflected on their learning, the quality of the experience and identified future directions for their professional development.

Throughout the *Active Learning* session each of the participants took turns delivering information or activities to the children from beginning to end including the introduction and conclusion. The Preschool teacher introduced the children to a new challenge activity where they had baskets full of cardboard rolls, from which they needed to build a castle. She had bought pictures of real European castles for the children to use as inspiration.

Overall it ran like one of our regular sessions. When they were not presenting, the participants were critiquing the other members of their group, looking at the same criteria as has been used in the demonstration the week before. It was interesting to see more of a diverse range of teachers interacting with the children.

At the conclusion of *Active Learning* participants engaged in a reflective session where they analysed their experience with a focus on the positives. Each of the teachers took turns outlining what they did well, followed by thoughts from others in the group. This process helped teachers to build confidence in themselves and contribute to the development of a supportive atmosphere.

4.12.5 Third time's a charm

Given the interest from staff in the program following the first lesson study process, it was decided that the remaining Early Stage One, Stage One and lower primary Support Unit would complete the training. They expressed the same concerns regarding implementation as the previous group had.

It ran in exactly the same format as the previous sessions with a couple of slight changes. During the second session, I conducted a mini experiment activity. I felt if they had a number of simple experiments under their belt, with suggested questioning techniques this would build their confidence in offering this type of activity during *Active Learning*. Teachers were able to make,

- lava lamp using oil and water
- Dancing sultanas with soda water and sultanas
- A mini greenhouse
- Bicarbonate and vinegar monster

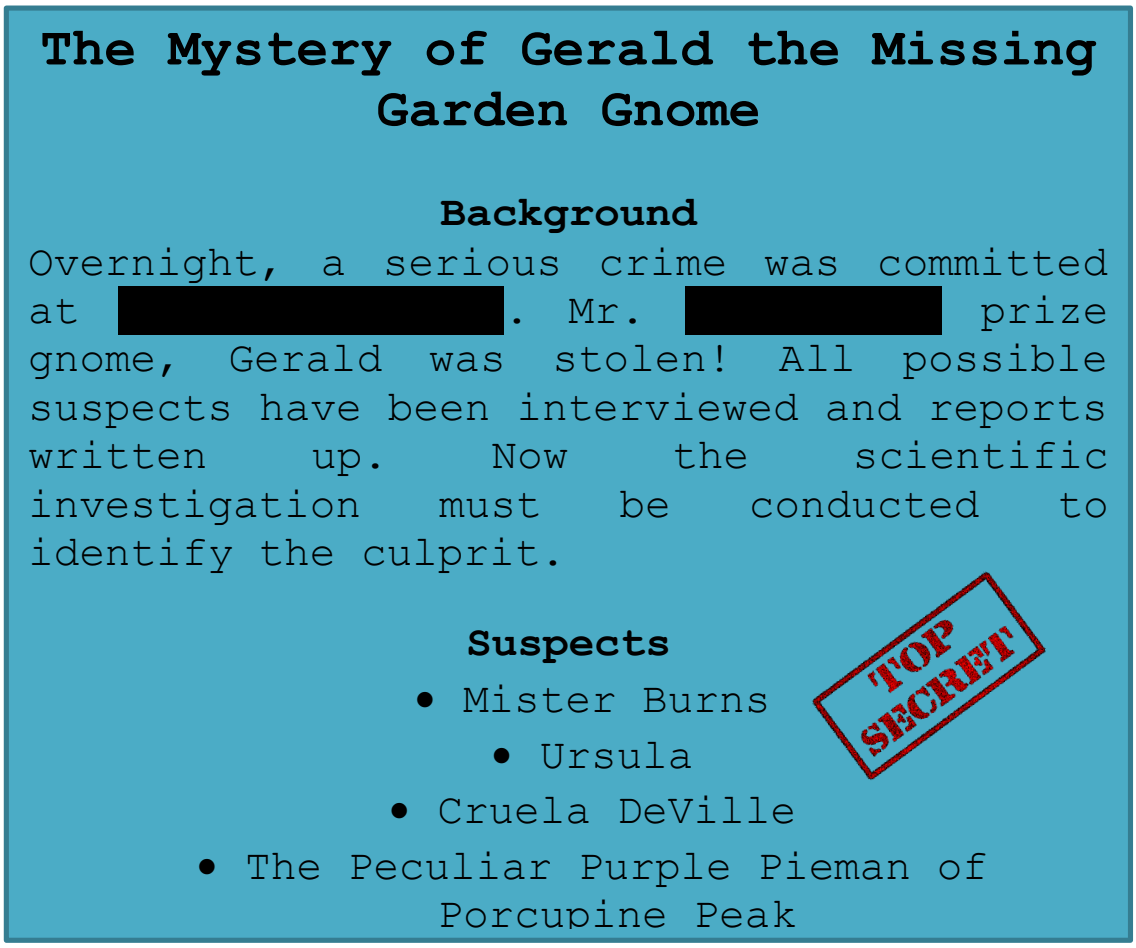
The other change was an opportunity for the teachers to complete a programming sheet at the end of the third session. This provided an opportunity for them to look closely at one activity and link it with the curriculum documents. This also helped them with collaborative planning.

4.13 Whole School Science Adventures

4.13.1 The Mystery of Gerald the Garden Gnome

The Mystery of Gerald the Garden Gnome developed out of an idea to host a whole school science day, involving all 412 children. Although the main focus of the day was to expose children to science based activities, it also provided the perfect opportunity for me to promote science activities on a more consistent basis in the classroom and some crucial professional development across the school. This was a daylong initiative. Children attended a Questacon incursion science show and completed a series of experiments designed to help them solve the Mystery of Gerald the Missing Garden Gnome.

The day culminated in a K-6 assembly where the mystery was solved, children had a chance to discuss their experiences and awards were presented for science related achievements.



4.13.2 Steering Committee for Science Day

Preparations began by determining a number of key aims for both teachers and children, which were decided on by a small committee including the researcher, Principal, T1 and the ESL Teacher. This was done in order to achieve the main outcome of providing an exciting science experience for all.

Teachers

- Demonstrate a range of basic science experiments which can be conducted in the classroom with minimal resources
- Make science multi-purposeful and link across key curriculum areas
- Build confidence

Children

- Engagement
- Excitement about learning through science

- Challenging learning experience for K-6

4.13.3 Teachers' Roles in Science Day

There was a significant amount of work undertaken by the researcher prior to Science Day in order to make it run as smoothly as possible, and to limit the amount of extra work placed on teachers. The underlying intention was to help motivate teachers by making the whole process look simple and easy. Behind the scenes the researcher was heavily involved in selecting appropriate experiments for a variety of ages, linking the experiments to the overarching case study (Gerald the Garden Gnome), designing the back story for the case study, buying the resources, taking photos and creating case files for children to record their observations in.

Leading up to the day, teachers were allocated one experiment each and emailed detailed information describing the experiment, which included links to footage stepping out the process and the science behind it. The Stages were divided into four groups, which allowed for three experiments and one session to complete the case file. The experiments not only had to work with the case study but also provide a variety of sensory learning experiences and cater for kindergarten to upper primary children.

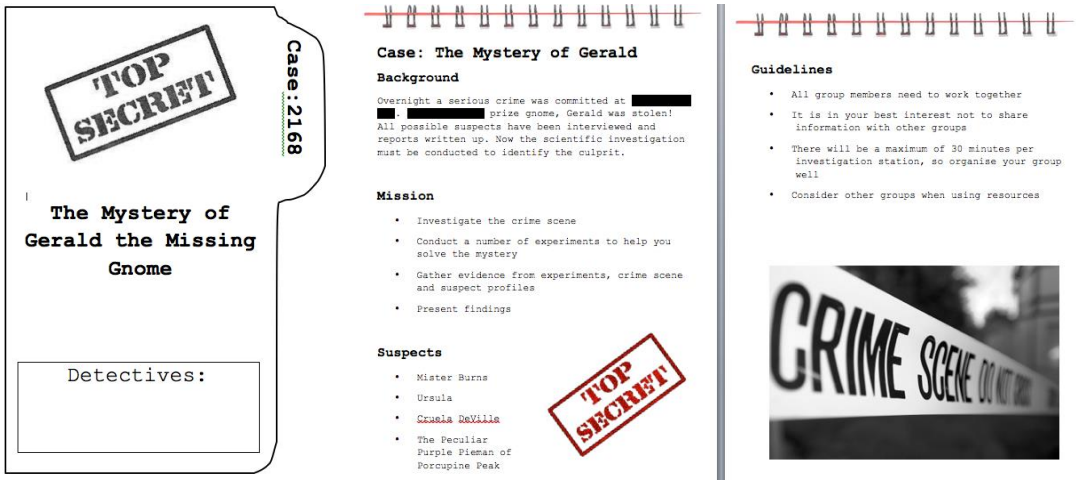
- Experiment 1: pop top rocket
- Experiment 2: cornflour slime
- Experiment 3: scented bubble picture prints
- Case Study file

On Science Day, all staff attended a briefing session in the morning. Each teacher was given a package containing,

- all the equipment and materials needed to conduct their particular experiment,
- a copy of the experiment and key science information behind it,
- a timetable for Questacon sessions and experiment rotations, and
- suggested questions.

4.13.4 Children's Role in Science Day

For the children the day began with them hearing of the sad disappearance of Gerald the Garden Gnome, beloved school mascot. In fact, it was the first time they had ever heard of Gerald, but a series of pictures from previous whole school events with Gerald in them made a few believers. Children looked through a series of crime scene pictures on the Smartboard, which had been linked to each experiment. They were then placed in triads and given a case file containing suspects and witness statements.



Children were given 40 minutes to complete each experiment and review the suspects in their case file over the course of the day. They moved around the school and worked with a variety of teachers including regular classroom teachers, as well as the librarian and physical education teacher. To successfully solve the mystery children needed to analyses the experiments, suspect statements and witness reports.

The Sydney based Questacon Science Squad team also presented shows throughout the day on liquid nitrogen and Slime. The shows ran for an hour and children were grouped based on stage level. We also had the Questacon science Play team visit and present sessions for the preschool children and kindergarten. Although the case study activities were free, Questacon charged $5 per child for the shows. The Principal was so keen for all children to participate in the day that he subsidised many payments and offered family discounted to make the event accessible to everyone.

4.13.5 The Mystery of Gerald and the Missing Birthday Present

The inaugural whole school science day was such a big success that we decided to run a second one. This time around we made a few modifications based on the recommendations from teachers and amped up the mystery. The biggest was to focus solely on the mystery and allow the children more time to complete experiments and the case study file.

Since the first science day Gerald had become such a big part of the school community. He attended all official school events, it seemed only fitting that the new mystery centre around him. This time around Gerald was the unfortunate victim of a horrible crime where his balloons were taken as he arrived at school for the big birthday party. The same small committee put together a series of experiments, and developed the links to bring the mystery to life. The experiments included,

- invisible ink experimentation (lemon juice, grape juice, salt and white wax crayon)
- static charge
- slimy snot

We stepped up the drama by including short clips to accompany each experiment from witnesses to the crime and an introductory clip introducing the mystery.

The Mystery of Gerald and the Missing Birthday Balloons

Background
While parking his Cozy Coupe in the school car park Gerald was knocked to the ground by an unknown person. His balloons were stolen right out of his hand. When he got up the culprits had vanished into the school and left a scrunched up piece of paper.

Suspects

- Madagascar Penguins
- The Chipmunks
- Bowser (Mario Brothers)
- Merida (Movie: Brave)

4.13.6 Welcome to the Mystery

The opening clip, setting the scene for the mystery, was made by a small group of year five and six children using stop start animation software. The children were given a short script from which they designed and coordinated all the props, setup the shots and took over 200 photos. Along the way children provided new ideas, including adding music and sound effects to the clip. This not only improved the quality of the clip but gave the children an opportunity to stamp their ownership on it.

4.13.7 Calling All Teachers! Lights, Camera, Action

The clips included a number of well-known teaching staff from all over the school. They were designed to be shown before children completed each experiment and to provide additional clues to help them solve the mystery.



4.13.8 Putting it all Together

The day started with the each classroom Teacher briefing the children on the mystery and then viewing the opening clip. From here, they were organised into triads and began rotations among their Stage classes. At the end of the day we held a whole school assembly. Children got up on stage and talked through their conclusions to the mystery and favourite parts of the day. Children in each class were presented with science day awards, which rounded out the day perfectly.

4.14 All In (Cycle Three)

4.14.1 Play for All

The Professional Development sessions and Science Day activities largely contributed to the increased confidence and push towards other teachers providing *Active Learning* experiences in their own classrooms. Once all kindergarten to year two teachers, including support, had completed the official training package the Principal approved the *Active Learning* program as a compulsory teaching component. Now came the challenge of packaging the program for individual teachers, including the main issue of supplying good quality resources. This was predominantly due to differing needs of teachers, such as the divide between collaborative teaching and working independently. Also, the sustainability of the program was also a major consideration when planning out resource allocations.

4.14.2 The Resource Kits

The Cycle Two participants and I designed the kits and categorised them based on content. The original outlay catered for all Early Stage One (three classes), Stage One (five classes) and Lower primary Support (two classes). They were sequentially introduced to teachers over a period of time, as not to

overwhelm. Throughout the process teachers were given the opportunity to reflect and contribute to the contents of the kits. Initially, each teacher was given an essentials kit and consumables kits.

4.14.3 Essentials Kit

6 piece dining set

play food set

special scissors

cash register

pretent play money notes

prentent play money coins

play dough tool set

sticky tape dispenser

When selecting items for the kits, only the best quality was sought within reasonable price constraints. The articles in the essentials kits were determined by their ability to be used in multiple scenarios including role-play settings and craft. For example, the cash register and play money could be used as part of a shop or café, the plastic food and dining set as part of the café or home corner.

4.14.4 Consumables Kit

variety of perminent markers

variety of coloured pens

variety of coloured textas

small straws

craft glue

mixed coloured origami paper

sequins

paddle pop sticks

plastic cups

patty pans

rice

pasta

play dough

plastic bowls

goggly eyes

4.14.5 Additional Resources

Each teacher was also given a USB with a variety of resources gathered by the researcher including suggested activities, further reading material on play-based teaching methods and a collection of templates (guides only) for them to utilise when planning or assessing.

4.14.7 Sharing Resources and Building Collaborative Partnerships

As hoped, teachers grouped together to undertake *Active Learning* sessions. All of the Kindergarten teachers ran sessions together, the Year one classes played together and the original 1/2 composite and Year Two classes were still in business. Through this teachers were able to pool together their resources, share ideas for activities and work as a collaborative team. It also meant, as we have seen before, that children were able to mix with other teachers and children outside their own class.

Following a term of teachers having access to the basics and consumables kits, they were given an opportunity to reflect on the contents and make suggestions. Based on their feedback specific resources were purchased to replenish the consumables kits based on the themes being taught in Early Stage One and Stage One (each had different requests). The Support Unit kits did not require any additional resources as they had substantially smaller numbers of children.

4.14.8 Specialised Themed Kits

In addition to the basics and consumables kits being re-distributed to classes, as Stages, Kindergarten and Year 1/2 were given new themed kits. The kits were decided by the researcher and teacher participants based on the units of work being taught in the classroom and children's interest. A detailed description of the themed boxes has been given below.

Early Stage One	
Theme	**Resources in kit**

Farm	• wide variety of plastic farm animals
	• themed books
	  ○ animals
	  ○ produce
	  ○ jobs
	• animal masks
	• coloured labels
	• trays
	• dirt and sand (to create farm environment on trays)

Shop	• shopping trolley • plastic food • pad for writing shopping list

	• shopping related labels • price tags
Doctor Surgery	• bandages, band aides and gloves • doctor's kit • related labels and laminated resources including prescription pad and appointment sheet • white coats

Stage One	
Theme	**Resources in kit**
Shop / Cafe	• shopping trolley / baskets • plastic food • pad for writing shopping list • shopping related labels • price tags • table cloths
Doctor / Vet Surgery	• bandages, band aides and gloves • doctor's kit • related labels and laminated resources including prescription pad and appointment sheet • white coats • stuffed animals • animal carry case

The importance of *Active Learning* in the eyes of the teacher participants was especially evident when they collectively shifted the time from 2pm – 3pm Friday to 12pm – 1:40pm Friday.

4.14.9 Putting it all Together

Once the participant teachers had access to resources (the initial consumables kit, essentials kit and UBS) it became evident they were enthusiastic to experiment with activities and collaborative with each other. During the early days, they would frequently ask the researcher for specific ingredients to conduct the experiments demonstrated during the professional development sessions. Through feedback sessions they showed willingness to trial various activity suggestions related to their overarching theme for the term.

4.14.10 Early Stage One

Farming

In the case of Kindergarten, their theme for the term was farm animals and farm related produce. The researcher was able to offer a range of suggestions, all linked to the curriculum, which covered a wide range of KLAs. Based on the strong links to the curriculum and the researcher's recommendations they created a list of equipment and craft materials required, and away they went. Throughout the term the children participated in farm themed activities such as creating fruit and vegetable paintings, designing farms in a sandbox with plastic animals or using building blocks to create pens for animals, crafting animals and transport at the mystery box such as tractors, trucks, sheep and cows, and they recorded plays using Puppet Pals on iPads.

Road Maps

The teachers designed and trialled a range of activities such as a free styled car mat. Using chalk they drew the outline of roads and streets on the carpet. As the activity evolved within the chalk drawing they scattered laminated images of shops, community services and other important buildings for the local school area. The children were able to freely move these around as they had Velcro spots on the

back. The children were also given a number of sight words to add to the map. Once *Active Learning* began the children were not only able to discuss specific buildings but also practise sight words.

Making Music

During *Active Learning* sessions the children were able to experience new art and craft activities including playing a range of culturally diverse musical instruments. Based on their experiences with the instruments they were then given the opportunity to create their own. In the image below they have made shakers using clear plastic cups, sticky tape, glitter and various shaped sequins.

Although Early Stage One were very much themed based in their approach to *Active Learning*, in contrast Stage One were more driven by experiences and creating learning opportunities which varied from their daily practise, meaning more science and creative arts activities.

4.14.11 Stage One

Backyard Creatures

Active Learning bought new animals into the classroom including stick insects, silk worms and pygmy breaded dragons. Children were given the opportunity to become mini scientists and study these creatures. They had access to note pads, laminated categorising sheets, magnifying glass, factual texts and iPads.

Technicolour Flowers

The teachers began to explore science experiments beyond those offered in the professional development sessions. They borrowed books and got children to research simple experiments. They discovered one experiment in which changed the colour of a plants flower when you placed it in coloured water.

The children were so excited when the flowers began to develop shades of pink and blue that they wondered if other plants could transformation also. The teachers bought in some celery for the children to experiment with.

Marshmallow Towers

During this challenge the children were given the freedom to create anything they wanted with the marshmallows. Many of them worked together to craft cubes, sculptures and towers. They were able to discuss how they crafted their creation, what they would do differently next time and challenges they had, such as the size of the marshmallows.

The importance of *Active Learning* in the eyes of the teacher participants was especially evident when they collectively shifted the time from 2pm – 3pm Friday to between 12pm – 1:40pm Friday.

4.15 Back to the Future (Cycle Four of the Action Research)

4.15.1 The Evolution and Success of *Playing to Engage*

In the final Cycle of the program we go back to an earlier stage with the collaborative team including the researcher, T1 and ESL Teacher. By the time the rest of lower primary had come on board with the program, the original two classes have elevated to a completely new platform of *Active Learning*. The children and parents had evaluated the program as so successful that the teachers decided to run two sessions a week. The major change however was in the way *Active Learning* was presented; but more important was the fact that children took over control of the *Active Learning* sessions making them completely child driven.

4.15.2 Incorporating *Active Learning* Principles into Everyday Teaching -Mathematics

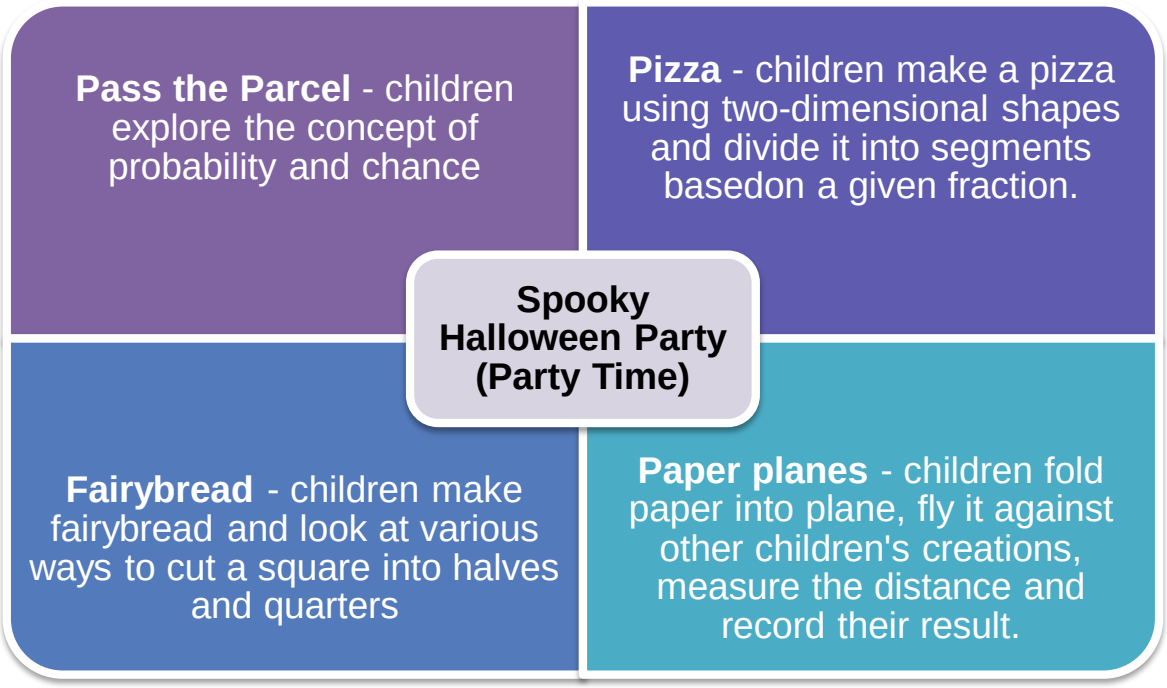
During mathematics lessons children were given a significant amount of choice in the activities they participated in. Throughout a week sessions would vary between themed (linked to a specific strand), holistic (combination of strands covering real world scenarios) and challenged based (children creating mathematical problems to share with other children).

While teaching a compulsory school wide unit on place value (prompted by poor NAPLAN results in this area) T1 and the researcher devised a range of activities (see description below) from which children could self-select. They were given the same parameters as *Active Learning*. All of the activities were play-based and linked to children's interests.

Fantasy masks

Children were given the challenge of organising a Spooky Halloween Party for some of their ghost friends, and then they participated in the party. In pairs children were able to self-select from a range of problem solving activities one would need to complete in order to organise a

party. Following this they engaged with a range of mathematical challenge games as part of the party experience.



4.15.3 Unit – MasterChef Challenge

In collaboration with the ESL Teacher, the researcher and T1 created a healthy eating unit based around the popularity of MasterChef. Children worked in groups to investigate, design and create an interesting sandwich. The sandwich could be any shape but needed to be healthy and contain at least one vegetable from the school garden. As part of this process the children participated in a range of hands-on learning experiences.

As part of the MasterChef challenge the classes needed to design, select vegetables and establish a vegetable garden. This process involved children being presented with a range of vegetables to taste test and seed packets. There challenge was to select vegetables in which they were interested in eating, would make their sandwich interesting and would grow during spring. Children worked in groups to make their selections and then presented their preferences to the whole group. Based on the classes suggestions everyone voted and the winning vegetables were planted.

As part of the research Cycle children were able to select from various recipes to make as prototypes. The main idea was for them to be able to evaluate flavour combinations and design options. Through this experience children were able to follow recipes, accurately measure ingredients and critique their creations.

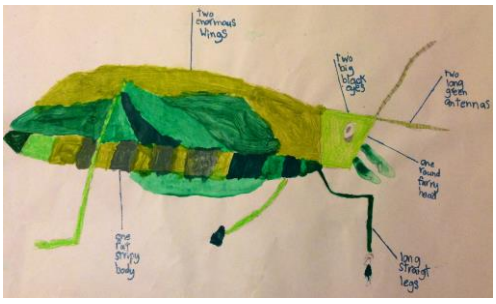
For the culminating challenge, children presented their sandwiches including an explanation of the process in which the selected garden vegetable went through to get in their sandwich and a procedure of how to make it, to a panel of judges and parents. All of the published recipes from the children's work were compiled into a recipe book.

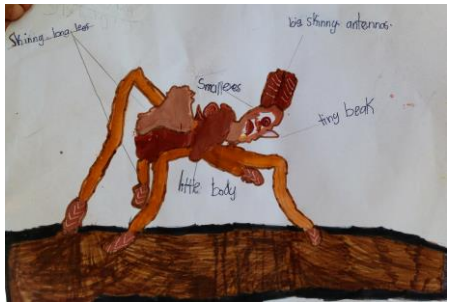


4.15.4 Unit – Backyard Safari

The researcher and T1 designed the Backyard Safari unit, in collaboration with the ESL Teacher. At the beginning of this unit children were presented with a short film created by the teachers outlining a range of inaccurate information linked to the local environment. The overarching challenge was for the children to research a backyard creature of their choice and produce a detailed information report for progressive publication on a secure website. Within set time frames the children explored and created a description, life cycle, habitat, diet and interesting features. Apart from the sub-topic children were given a significant amount of freedom in the way they presented their information, see table below for examples. To assist children with specific skills such as photography, drawing, recording, and using iPad apps mini lessons were offered which they could choose to attend, see Red back and Safari Hunter MOV audio visuals (for transcripts see Appendix 3 and 4).

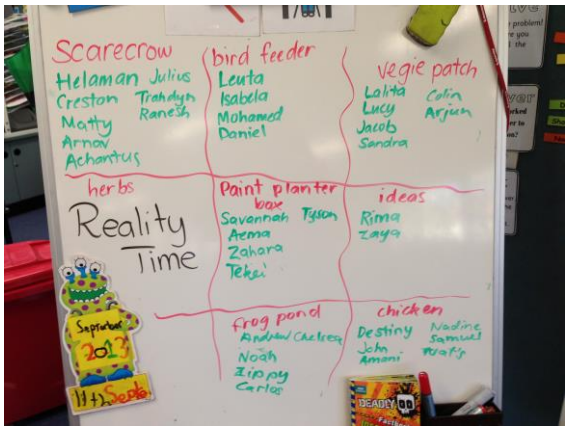
In order to help improve children's drawing skills and ultimately help them create quality artworks for publication on the website, T1 and the researcher ran drawing workshops. Children were able to select from a range of mediums including watching YouTube clips, step-by-step drawing books, completed illustrations, light box and experts within the class to practise their selected backyard creature. Once they had a finished a sketch they were able to experiment with a variety of materials to determine which medium would best suit their style of art and the features of their animal. Children were given access to paint, felt tip pens, oil pastels, wax crayons, watercolours, pencils, textas and charcoals.

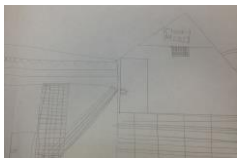




4.15.5 Reality Time

Active Learning sparked a secondary program called Reality Time. In actuality it was just a modified version of *Active Learning* with one central variant, a focus on sustainability with activities based around interacting with the local environment. Through these sessions children were still able to self-select activities, change of their own accord and suggest ventures of their specifications. Projects they chose to undertake had variant timeframes but this wasn't significant as their questions and interests would create new ventures. Below is a sample of some of the projects suggested and undertaken by the children.



Activity	Description	Image / Anecdote
Building a Birdfeeder	A group of children researched the local birdlife and various birdfeeders. Based on their findings they created sketches for their design. Following this they built a birdfeeder. Another group researched the type of bird feed and which paint colours were needed to attract Rainbow Lorikeets. Following this they designed a colour scheme and painted the birdfeeder, then selected a location in the school garden for it to live.	    The little girl standing with the birdfeeder was responsibly for painting. Before starting she initiated a discussion about adding glue to the paint so it would be more durable out in the elements. She chose to mix equal parts superglue with paint.
Building a Chicken Coop	Through another activity the children hatched and raised baby chickens. They successfully drafted an email to the Deputy Principal outlining why the school should keep the chickens. As part of this project a group of children researched chicken coops, argued for the one they believed best suited the animals and purchased it online. When the flat pack coop arrived the children followed the instructions and built the house.	   

Bridge Redesign

A group of children were interested in looking at alternative options for the bridge in the wetland. As part of this process they explored various materials such a metal, wood and plastic. They discussed the need for a fence to keep small children out and a railing so people didn't fall into the water.

While one child was sketching his design for the new bridge he came and asked for the metre ruler. When questioned he stated I need to add some length to my bridge as I've created an arch which will be longer than a straight line. I also want to make the bridge wider so people have more space to walk.

Vegie Patch

A group of children were eager to plant a vegetable garden. They researcher various vegetables to plant, purchased seedlings from Bunnings and established a garden. As part of the gardening process they read labels, measured spacing and determined the level of shade needed.

One of the children involved showed a keen interest in the garden project exploring various which fruits such as watermelon and rockmelon she could grow and how much space they required. She wanted to plant pumpkins to use for Halloween. It became clear the fruits and vegetables she had selected would not fit in the already established patches. She then independently researched, designed and selected a location within the school for new garden beds.

Sensory Garden

A group of children designed a sensory garden to plant with children from the Support Unit. They researched, (including tasting, smelling and feeling) and selected plants such as Aloe Vera, thyme, parsley, mint, sage and basil among many others. Some they planted as seeds and others seedlings.

In reality for the researcher, T1 and ESL Teacher, *Active Learning* transformed every aspects of our daily teaching practices.

4.15.6 Achieving the Ultimate: Child-centred *Active Learning*

During Cycle Four the researcher, T1, and the ESL Teacher stepped back substantially, releasing control to the children. It was an opportunity for the children to have a say in how we were meeting Stage One curriculum requirements. Discussions would frequently take place between teachers and children as to how an idea could become a learning experience for others. Over the course of the study the children became more familiar with the structure of *Active Learning*. The more exposure they had to various science and mathematics related activities, the more confident they became in asking for particular items or activities to be made available during sessions.

Given the fact that the children had the freedom to access resources around the classroom at any time and peruse a wide range of art / craft, science and activity books, they increasingly wanted to expand their experiences. Also the children began to more frequently ask a variety of questions which would often lead to investigations and the development of activities. The less formalised style of learning experience provided the children with an opportunity to offer constructive feedback and make suggestions without fear of judgement.

When children were given an opportunity to run their own station, especially when exploring a science or mathematical concept, it was under the proviso that they completed the activity first with the support of a teacher. This process allowed for the exploration and in-depth discussions to prepare the children to work with others. During *Active Learning* one of the teachers would be close by to make sure the integrity of the activity and the curriculum links were maintained.

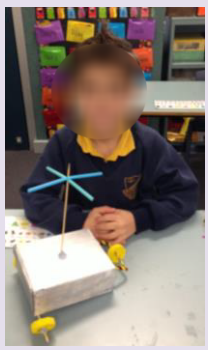
The excitement children exhibited towards *Active Learning* was evident in the constant requests for sessions to be run. Even when the classroom had been emptied out on the second last day of Term 4, they still asked for *Active Learning*! Children began to design their own activities to run for other children and would bring in resources from home. One little girl even bough in a science experience kit to show other children, it included a microscope, slides, magnifying glass and beakers. It also worked in

reverse: children would often take ideas from *Active Learning* and complete projects of their own at home.

The Carcopter

On one occasion a little boy designed and created a carcopter (combination of a car and helicopter) at the mystery box. It required significant problem solving skills, as he was insistent all three wheels be able to turn around so it could be pulled along the floor. The front wheel was the most challenging, as it needed to be away from the body of the car so it would rotate.

The second wooden design showed a similar model to the version from the mystery box but clearly showed evidence of adult support. When asked he discussed the process he went through to design and make the tricycle with his dad.



Children began using their own time to research ideas in classroom books or on iPads. They would then make shopping lists for resources they needed so it was ready to go during the next *Active Learning* session, or if the items were readily available they would take them home. T1 and I would photocopy any instructions they needed or templates to assist with their endeavours. Often the children would return to school with their completed projects.

We would see things such as dioramas, origami animals, a model turtle and frog, songs, a giant cardboard Despicable Me Minion (with a specific page from the Big W catalogue highlighting all the Minion toys, my favourite), an Angry Birds moneybox and cupcakes.

The relationship between the teachers and children had evolved by this phase and were founded on a heightened level of trust and respect. *Active Learning* exploded from the classroom into the school grounds as children's curiosities took over.

The attached clip, *Safari Hunter*, showcases a group of six children (not all are seen on camera) independently creating a documentary as Safari Hunters. As they explore the local wetland dressed in khaki clothing, armed with a magnifying glass and plastic insects. It is interesting to note not only the science content they draw upon but also the mathematical skills of categorising, shapes and counting. There is the additional benefit of them practising English and the clip evidences their vastly improved social skills.

Over the course of the study children were able to participate in activities for increasingly sustained periods of time. In some cases their projects would extend over the course of a couple of weeks.

Rockets Away

One session a little girl asked if she could build a rocket for the school Book Week space competition. She started at the mystery box by designing a simple rocket out of cardboard with a paper plate wrapped around to make a cone. Once it had all come together with a little sticky tape and glue she asked if it was possible to paint and decorate the craft piece.

The following session she selected a silver colour to paint the rocket. After applying one coat she could still see the cardboard so she left the project to dry and came back to it later during the session to apply another coat. In her down time from painting she searched the classroom high and low for a cardboard box to hang her rocket from.

Once she had selected a box big enough to house her rocket it was all about selecting the right shade of blue. Throughout this whole process it was mostly a solo effort but children would stop and chat with her about what she was doing. Her original rocket at the mystery box started a trend of rockets, especially ones with paper plate cones. With the box painting it was all about children popping by, helping out with a little painting and then going back to their own activities.

After the box was fully painted she ran into a problem, the base of the box would not stay flat, the lids kept popping up. She experimented with blue-tac and sticky tape rolled over but the cardboard would not stay down. Finally she came and asked the researcher if she could have some of the Velcro we use to stick objects to the wall. She was able to line the edges of the flaps with sticky Velcro so it would stay down.

During the final session, she worked on decorating the box with silver stars and hanging the rocket inside. Using blue wool she carefully attached it to the top of the rocket with a tiny amount of sticky tape and to the box.

At the Book Week she was awarded first place in the junior rocket design competition, by a panel of impartial judges.

The activities and projects became progressively more creative over the course of the study as children gained experience and were influenced by other children and the resources around them. Below is a minute window into the *Active Learning* world these children shaped, the vignettes have been organised into the categories of science / mathematics and other.

4.15.7 Science / Mathematics

Density Column

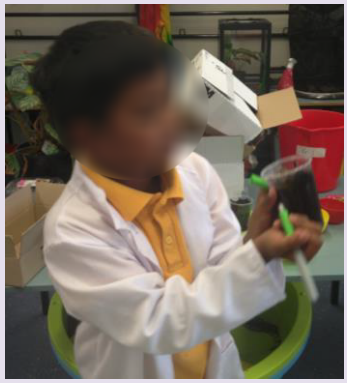
Two children (a boy and a girl) found an experiment in a kitchen science book on density columns. First they wrote a shopping list of all the ingredients they needed including honey, vinegar, dishwashing liquid and glycogen. They then conducted the experiment together. Upon completion they came and asked the researcher if they could run the activity for other children. The following week the boy and girl organised their station including all equipment, liquids and lab coats. As children approached the stations the pair were able to support them in conducting the experiment. The first step before any liquid entered the cup was to mark the side in one-centimetre intervals so they didn't over use the liquids.

The pair used an iPad to show other children what order the liquids needed to be placed into the plastic cup, and what the density column would look like once completed. They were even able to discuss with other children what was happening with the layering of liquids. Surprisingly the boy and girl worked extremely closely with children from the Support Unit when they became interested in the experience, helping them to find and pour the correct liquids.

The Gardening Centre

The gardening centre was a favourite with many of the Year 2 children and the Support Unit. In one session a little girl asked if we could plant real vegetable and fruit seeds as she was not only interested in seeing them grow but wanted to look at the different seeds. She suggested a range of seeds she wanted such as watermelon, pumpkin, zucchini, corn and tomato, and the researcher purchased them.

A little boy took over running of the station during *Active Learning*, as he was excited about the growing process. He wanted to house the plants in the school greenhouse, before transplanting them into the garden. During the session the boy organised children, talked them through the process of selecting a seed they would like to plant, writing their name and the plant name on the side of the cup, as well as the actual planting. It was interesting to listen to the conversations between children as they discussed the differences between the seeds. Children read the back of the packet to check they were planting them correctly.


Which Vinegar?

One day one of the children asked, "which vinegar do I need to make a lava lamp? My mum only has Balsamic vinegar. Will that work?" These questions began an *Active Learning* investigation. The boy and a friend looked up different vinegars they sold at Coles, then created a shopping list for T1 and the researcher to use. They had specified white, brown and red vinegar, apple cider and balsamic vinegar.

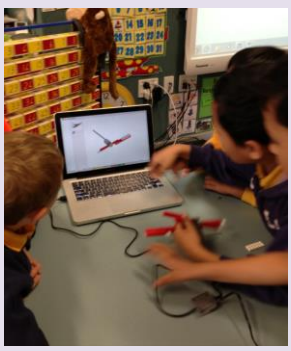
During *Active Learning*, the boy, along with a group of children, made predictions about what would happen, and which vinegar would work best with the bi-carbonate of soda. This experiment was different from others as they worked as a team testing each type of vinegar methodically. During this time they shared observations with each other and offered suggestions about what to try next. They experimented with mixing various vinegars together and adding bi-carbonate of soda to see if this would change the reaction.

Snappy, Snappy Lego Crocodiles

After the researcher participated in an external series of professional development sessions run by a NSW University on how to incorporate Lego robotics into the classroom, a WeDo Lego package was purchased for the children. The set allowed children to build a variety of simple machines using a step-by-step computer program, Lego pieces, a motor attached to a USB device and beginners guide to computer coding.

During an *Active Learning* session a group of four children set themselves up at a computer with the WeDo set. The only instructions they were given were how to select different projects. Over the course of four one-hour sessions they worked together to build a crocodile. During this time they came across challenges such as how to attach the motor and make it go, how to create a computer code with sound; they worked together to solve their problems.

Once the crocodile was completed, it moved and made noises. The boys were so keen to show off their hard work they presented it to the greater class, their parents and the Principal.



4.15.8 Other Student Generated Activities

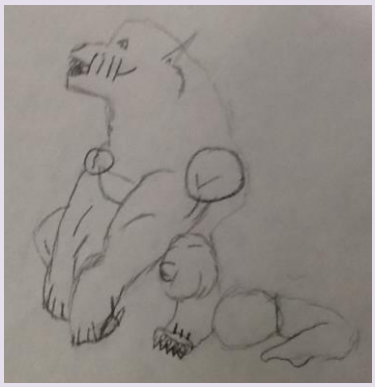
The children brought to the classroom a wide range of prior skills and experiences and through *Active Learning* promoted and encouraged them to share their proficiencies with other children. They also discovered new passions during *Active Learning* such as origami, magic tricks, singing and song writing. Children shared their experiences and craft with others in which in turn sparked interest, they ran workshops and even recorded their endeavours.

To the Drawing Station

A group of four boys had been practicing their drawing skills, specifically how to sketch a werewolf, over the course of a couple of weeks. This process for them was not just about being able to draw the beast but more importantly how to sketch properly. They spent time experimenting with different pencils and charcoals getting the shading right before even starting

Once they felt they had mastered the werewolf they were keen to share their experience with other children in the class. During *Active Learning* they set up a station for six children, with various pencils and drawing paper. It was so popular they ran three separate sessions. Children would sit down and the boys would talk through sketching, specific techniques and how to create a werewolf.

They used a specific step-by-step book which the participants could view while they were drawing. At one point it became evident that not all of the children could see the book at once, so one of the boys collected a couple of iPads and took pictures of the pages so each child had his or her own reference material.



Origami

During one session a little boy was running an origami station on how to make ninja stars (see Ninja Star.MOV audio visual). At one point he became frustrated as it was challenging to verbally describe the process to others, so he took over and began making the ninja stars for other children. It was in this moment the researcher found an opportunity to assist the little boy in providing instructions to others and stepping them through the process all the while utilising his expanding linguistic skills.

The little boy, with the assistance of a few friends, decided to make a short informational video clip outlining the steps to make a ninja star. This format worked really well as one child was able to make the star while the others talked through the process.

When it was said the children took over *Active Learning*, this happened in every respect, unless the proposed activity did not further thinking or learning. Not only were the activities theirs and run by them, but they also took all the photographs and footage. During a session children had access to iPads, and iPhones to record all of their special moments. They independently conducted interviews with other children and took photos of pieces of work.

To anyone standing nearby the clip (Questioning.MOV, for transcript see one) of a boy and girl playing with plastic animals does not look like anything out of the ordinary, but upon closer inspection it was quite extraordinary. Throughout the excerpt she questions the Safari Hunter (boy) as he searches for and categorises insects. She prompts him when he doesn't give enough information and is able to rephrase questions when he does not answer. It should be noted for both children English an additional language

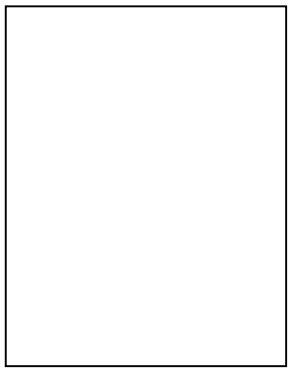
4.16 Opening Doors

4.16.1 A Community of Learners

As *Active Learning* progressed the children became more and more keen to share their experiences with family members. Both teachers and children would frequently invite parents and older siblings into the classroom to see particular pieces of work, but also more generally see what the children were doing. It was especially great when children had projects running outside like teaching soccer skills, kite building and paper plane competitions as parents could see them in action and interact with them. Often we would have younger siblings join in during sessions, they instinctively became part of the greater *Active Learning* community. Children, regardless of their relationship to the infant, were eager to help them find activities, sibling wanted to show them projects they were working on and participate I activities with them.

As another avenue to help build interest in the program, and reach those parents and local community members who could not visit the school as frequently, we used Facebook, Twitter and YouTube. Parents were given access to a wide variety of images and short clips showing the children participating in various activities.

YouTube



Facebook

Twitter

Appendix 5 –
Planning Documents

	Activity	Resources	Outcome	Indicators	Questioning
1	**Mystery Box** **Challenge: A vehicle**	Mystery box Sticky tape Super glue Scissors	**Science** Students will develop their knowledge and understanding of the process of investigation that people use to develop reliable insights into the natural and made environments. Students will be able to design and make products, systems and environments to meet specific needs.	• state the purpose of an investigation. • recognise that discoveries can be made through play, exploring and experimenting. • combine a variety of materials and images to make simple models, drawings and structures. • describe to others the strengths and limitations of a design.	Vehicle • How does it work? • How could you make it go? • Who would use it? General • How did you make that? • What materials have you used? • What is the best part of your creation? How could you make it better?
2	**Toy cars**	Toy car box	**Science** Students will develop their knowledge and understanding of physical phenomena Students will be able to investigate natural and made environments. **Maths** DS1.1 Gathers and organises data, displays data using column and picture graphs, and interprets the results	• pushes and pulls can make things move and stop. • explore how things work and engage in guided play. • Display the data using concrete materials and pictorial representations • Use objects or pictures as symbols to represent other objects, using one-to-one correspondence	• What would happen if the cars only had three wheels? • Can you build a bridge for the cars to cross? • What happens when you push the car along the mat? What would happen if you pushed it along the floor in the wet area? Why is it different? Families • Which car would be best for a family? Why? Data • Can you group like cars?

3	**Building blocks**	Building blocks Car mat	**CUS1.3** Identifies customs, practices, symbols, languages and traditions of their family and other families. **Maths** SGS1.1 Sorts, describes and represents three dimensional objects including cones, cubes, cylinders, spheres and prisms, and recognises them in pictures and the environment	• identifies characteristics that make another family different or similar to their own • Name, describe, sort and model cones, cubes, cylinders, spheres and prisms • Recognise three-dimensional objects in pictures and the environment, and presented in different orientations • Recognise that three-dimensional objects look different from different views	• Where can families go to shop/play and live? • What activities do you do with your family? Maths • What shape is this? • Which shapes are best for building with?
4	**Large animals**	Farm / jungle / insects	Students will develop their knowledge and understanding of: Living Things	• all living things are different	• Where would you find these animals? • How is this animal different from this one? • How are they the same? •
5	**Finger Puppets**	Finger Puppets	**TS1.3** Recognises a range of purposes and audiences for spoken language and considers how own talking and listening are adjusted in different situations.	• retells a narrative, showing emerging awareness of structure.	• Can you tell me a story? • Who is in your story? • Where are they? • What are they doing?
6	**Duplo**	Duplo tub	**Science** Students will be able to investigate natural and made environments.	• explore how things work and engage in guided play.	• What have you made? • How does it work?
7	**Shop**	Shop box Money Cash register	**DRAS1.3** Interacts collaboratively to communicate the action of the drama with others. **Maths**	• shares their drama making with others • Incorporates props and costumes to communicate role, situation and place. • Sort, order and count money	• How much does…… cost? • How much money do you have? • What can I buy with….?

			Whole Number Use the language of money	using face value	
8	**Vet / Doctor's Box**	**Vet / Doctor box**	**DRAS1.1** Takes on roles in drama to explore familiar and imagined situations. **DRAS1.2** Conveys story, depicts events and expresses feelings by using the elements of drama and the expressive skills of movement and voice.	• creates a range of roles and situations adapted from their imagination, literature (including poetry) and everyday experiences • expresses an understanding of the shared fiction of the drama by stepping-into-role to enact a situation and stepping out-of-role to reflect on the action • responds to the action of the drama through individual and group roles, eg superheroes, protesters • interprets a dramatic context by responding in a drama form, eg improvisation, movement, mime, storytelling, readers theatre and puppetry. • creates and adapts stories for enactment • responds to the elements of drama, (eg tension, contrast, symbol, time, space, focus and mood) to create shared meaning • expresses dramatic meaning through movement and voice.	• Who are you? • How does your equipment work? • Where do you live? • What do you do?

9	**Smelly Balloons**	**Balloons Incense Weigh to hold balloon down**	Science Students will be able to investigate natural and made environments.	• observe, using all the senses. • explore how things work and engage in guided play. • undertake an investigation as a result of individual curiosity or as a means of solving problems. • interpret data and explain their observations.	• How does it work? • What can you smell? • What else do you know that smells the same?
10	**Play dough**	**Play dough tools**	**VAS1.2** Uses the forms to make artworks according to varying requirements. **Maths** SGS1.1 Sorts, describes and represents three dimensional objects including cones, cubes, cylinders, spheres and prisms, and recognises them in pictures and the environment	• investigates techniques of cutting, carving, incising and modelling in clay and other sculptural materials and investigates qualities including spatial relationships, volume, mass, solids, voids and decorative effects in three-dimensional activities • Name, describe, sort and model cones, cubes, cylinders, spheres and prisms • Recognise three-dimensional objects in pictures and the environment, and presented in different orientations • Recognise that three-dimensional objects look different from different views	• What have you made? • How did you make it? • How does it work? • Is there anything you would change? • Can you make some 3D shapes? • What shape is it? • Does it look the same for this side?

11	**Tree House**		CUS1.3 Identifies customs, practices, symbols, languages and Traditions of their family and other families. CUS1.4 Describes the cultural, linguistic and religious practices of their family, their community and other communities.	• identifies characteristics that make another family different or similar to their own • examines what contributes to positive relationships within families and identifies what can cause conflicts	• What makes these people / animals a family? • Do they all need to look the same to be a family? • How are they like your family? • How can families get along?
12	**Bus Stop Game**	Board game	**Maths** Whole Number	• Count forwards and backwards by ones, twos and fives	• How many more? • How many do you need to take away? • How many people are on your bus? • Can you group them so they are easier to count?
13	**Dinosaur puzzle**	Dinosaur puzzle	**Science** Students will be able to investigate natural and made environments. **Talking and Listening**	• observe, using all the senses. • explore how things work and engage in guided play. • undertake an investigation as a result of individual curiosity or as a means of solving problems. • interpret data and explain their observations.	• How do you know where the pieces go? • What do you think it will look like when it is finished?

14	**Geo Shapes**	Shape box Paper Pencils	Maths SGS1.2 Manipulates, sorts, represents, describes and explores various two-dimensional shapes VAS1.1 Makes artworks in a particular way about experiences of real and imaginary things	• Make tessellating designs using flips, slides and turns • Identify a line of symmetry • talks about significant features and relationships within their artworks. • explore how things work and engage in guided play. •	• How did you create your picture? • What shapes can you see? • Is there something special about your picture? • How does the geo slide work?

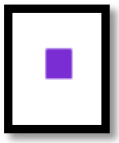
Appendix 6 –
Raw NAPLAN Data

The data presented below provides a snapshot of how children from the focus school are performing against established standards before the study commenced. Results are presented in bands with band one being at the bottom (lowest scores) and band six (highest scores) at the top. Band two is the benchmark for minimum standard for Year Three.

Focus school's Achievements in Comparision to Other Children Across the Nation

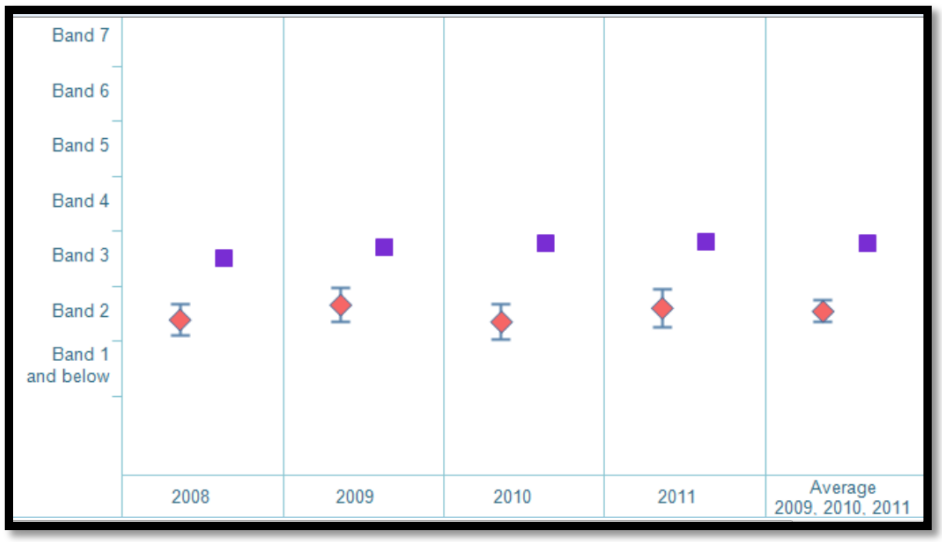
Key to interpreting data

Focus school (red diamond represents average and blue lines represent extremes)



National average

Reading results for Year 3



Numeracy results for Year 3

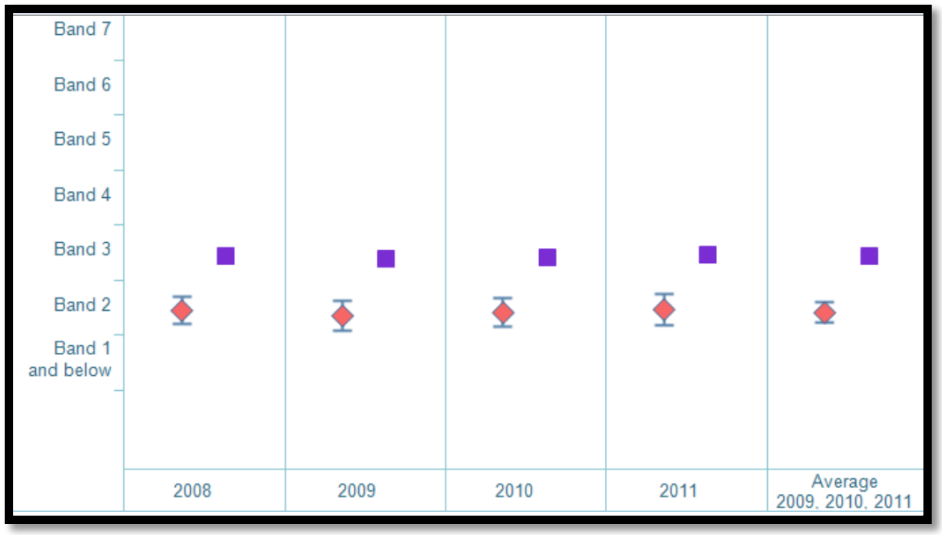
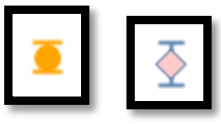


Figure 6.1 Focus school compared with national results

Clearly the results from Figure 2.5 show the true reality of the situation at the focus school where these children were achieving, and it provided a starting point for the project. The Year 3 reading and numeracy results indicated the majority of children have been consistently static around the Band 2 mark for the past four years. In all areas presented the National average is at least one Band higher than the focus school.

It is clear from these results that children from the focus school were lagging well behind the rest of the nation. These results stressed the significant educational gap in all areas of literacy and numeracy between children from the focus school and those throughout the rest of Australia.

Focus school Results Compared with Similar Demographics



Key to interpreting data

Focus school (pink diamond represents average and blue lines represent extremes)

Children of similar demographic (orange circle represents average and lines represent extremes)

Reading Year 3 Focus school compared with schools of similar demographic

Numeracy Year 3 Focus school compared with schools of similar demographic

Figure 6.2 The reading and numeracy results of the focus school compared with schools of similar demographics across the country

Certainly, if one looks at the Focus school's results between 2008 and 2011, the results of low achievement are consistency across all areas tested. Since 2008 ACARA has made a conscious commitment to design questions that can be linked across sequential NAPLAN tests. Therefore this study is able to compare the data throughout the study.

Even within the same low SES demographic of migrant, aboriginal and welfare dominate groups the focus school still significantly lagged behind other schools. In all cases these children are performing well below the national averages in all areas.

Literacy Results within Study Period

Academic Area – Literacy	Academic Year	Year Three Results	Year Five Results
Reading	2012	41%	42%
	2013	19%	23%
	2014	29%	39%
Writing	2012	19%	23%
	2013	15%	30%
	2014	17%	44%
Spelling	2012	24%	27%
	2013	20%	31%
	2014	23%	26%
Grammar & Punctuation	2012	44%	42%
	2013	28%	31%
	2014	33%	35%

Figure 6.3 Literacy NAPLAN Results children in Years Three and Five below NMS for the Case Study School

Academic Area – Literacy	Academic Year	Year Three Results	Year Five Results
Reading	2012	65%	46%
	2013	42%	35%
	2014	45%	64%
Writing	2012	22%	19%
	2013	36%	31%
	2014	18%	57%
Spelling	2012	49%	35%
	2013	29%	34%
	2014	40%	38%
Grammar & Punctuation	2012	62%	54%
	2013	43%	42%
	2014	49%	53%

Figure 6.4 Literacy NAPLAN Results for children in Years Three and Five at or below NMS for the Case Study School

Academic Area – Literacy	Academic Year	Year Three Results	Year Five Results
Reading	2012	9%	4%
	2013	11%	2%
	2014	5%	5%
Writing	2012	11%	13%
	2013	9%	10%
	2014	16%	0%
Spelling	2012	15%	24%
	2013	21%	19%
	2014	31%	17%
Grammar & Punctuation	2012	5%	9%
	2013	11%	12%
	2014	7%	12%

Figure 6.5 Literacy NAPLAN Results of children in Years Three and Five at Proficiency for the Case Study School

L	Band Three			Band Four			Band Five			Band Six		
	2012	2014	2014	2012	2014	2014	2012	2014	2014	2012	2014	2014
Reading	12.7%	29.1%	27.3%	12.7%	18.2%	22.7%	9.1%	9.1%	2.3%	0%	1.8%	2.3%
Writing	41.8%	33.9%	40%	25.5%	21.4%	26.7%	10.9%	7.1%	13.3%	0%	1.8%	2.2%

Figure 6.6 NAPLAN Reading and Writing percentages for Year Three Children in Bands Three to Six for 2012-2014 for the Case Study School

	Band Three			Band Four			Band Five			Band Six		
	2012	2014	2014	2012	2014	2014	2012	2014	2014	2012	2014	2014
Reading	12.5%	30.6%	30.3%	14.6%	19.4%	21.2%	8.3%	5.6%	3%	0%	0%	3%
Writing	45.8%	35.1%	29.4%	22.9%	18.9%	26.5%	12.5%	5.4%	17.6%	0%	0%	2.9%

Figure 6.7 NAPLAN Reading and Writing percentages for Year Three Children EAL/D Learners Bands Three to Six for 2012-2014 for the Case Study School

Numeracy Results within the Study Period

Academic Area – Numeracy	Academic Year	Year Three Results	Year Five Results
	2012	30%	33%
	2013	27%	29%
	2014	29%	33%

Figure 6.8 Numeracy Results for Below NMS for Year Three and Five Children in Percentages for the Case Study School

Academic Area – Numeracy	Academic Year	Year Three Results	Year Five Results
	2012	60%	51%
	2013	53%	59%
	2014	50%	64%

Figure 6.9 Numeracy Results for At or Below NMS for Year Three and Five Children in Percentages for the Case Study School

Academic Area – Numeracy	Academic Year	Year Three Results	Year Five Results
	2012	4%	5%
	2013	2%	8%
	2014	7%	3%

Figure 6.10 Numeracy Results for At Proficiency for Year Three and Five Children in Percentages for the Case Study School

	Band Three			Band Four			Band Five			Band Six		
	2012	2014	2014	2012	2014	2014	2012	2014	2014	2012	2014	2014
Numeracy	45.5%	18.2%	26.2%	1.8%	20%	14.3%	3.6%	3.6%	7.1%	3.6%	0%	7.1%

Figure 6.11 NAPLAN Number and Patterns and Algebra Results for Year Three Children in percentages for Bands Three - Six 2012-2014 for the Case Study School

Appendix 7 –
Parent Pre and Post *Active Learning* Survey Responses

Comments from Parent Surveys (Pre Active Learning)
Survey given to parents Kindergarten to year Two
88 out of 152 Completed

The following is a snap shot of the survey responses.

General comments

- 1 out of 88 (1%) described learning used the word learning when describing play
- 16 out of 88 (18%) listed play-based activities other than physical that they do at home with children
- 67 out of 88 (76%) use words such as physical activity, fitness, energy, active, to describe play
- 51 out of 88 (58%) expressed strong feelings about play being highly important to and predominantly about building social skills. Using words such as play nice, communication and social skills
- 24 out of 88 (27%) believe play to be a form of entertainment or to relax
- 58 out of 88 (66%) used the word fun to describe play
- 62 out of 88 (70%) listed only physical activities which they play at home with children

Question One: What does play mean to you?

- Engaging in activities to keep entertained
- Learn simple things through play
- Having fun with friends like tips and hide and seek
- Someone need to be entertainment and relaxing
- Play means to engage with exciting and fun activity and happily expressing yourself
- Being entertained
- Children being active, using their imagination, dressing up, having fun
- Play is stimulating the mind in a fun way
- "play" means interesting to me
- I feel playful
- Active, sports
- Fun, fresh air
- Children play nice together
- They will get to do exercise
- Teaching my child its not all about winning

Question Two: What do you see as the benefits of play for children?

- Sharing, being active, stimulating brain / mind
- For happiness and enjoyment
- Active, fit, exciting, joyful
- Limited
- Play makes children happy and relaxed
- Learning how to share

- Self-confidence
- Play is ok
- Developing social skills and having fun
- Classroom. No. No play
- They get to do exercise
- Not enough space for the students to play

Question Three: What is your understanding of play in the classroom?

- There would be time that children will have free time in the classroom to play as a reward
- Develop children's skills in drawing and computer
- Rewarding the child
- No play in the classroom that's was my understanding. I always tell my kids play is for home
- Smart learning
- Educational
- To keep them healthy
- In the classroom play need to be small
- Fun
- When they need to have but need to limit
- Board games
- Friendship configuration
- Interacting with each other in a fun time
- When there are games like heads down thumbs up, play hangman etc. so they can new words especially in hangman

Question Four: To what extent do you think playing helps your child to learn in the classroom?

- being kind and respecting others
- limited
- they learn how to share, also to socialize with others, learn how to be friendly
- makes them smarter
- playing helps children unwind from having to think
- to a certain extent only
- Playing helps children in the class to be creative and interact with other children builds self esteem
- leisure time, mingle with other kids in the classroom or doing something that kids like or whatever the teacher tells them
- play time helps children unwind from having to think of everyday structure

Question Five: How often do you play with your child at home? What activities do you do?

- help with homework, counting
- daily – soccer, volleyball, catch games and many more
- Often watch TV together
- We practice writing
- Good when bored
- Only on weekends at the park, kicking balls
- Everyday – draw, read, write, origami
- Colouring, drawing and loom bands
- Hardly

- Yes of course. Game console
- Hardly
- My kid likes using the interest to find stuff
- Only on weekends at the park, kicking balls
- Weekends during footy training

Analysis of Data

The initial parent responses to the play-based learning survey overwhelmingly demonstrate their perception of play as a physical activity. This response was replicated across multiple questions as they describe play to be about fitness, energy and exercise, followed up with the overwhelming number of responses to home activities predominantly centered on sports and the outdoors. A significant number also talk about play as a means to developing social skills, confidence and co-operation. These were the only skills the majority of the parents articulated could be taught within the classroom.

It was surprising how few parents mentioned play as a legitimate learning method or described activities is a classroom setting which included a literacy or numeracy focus. From the responses it is clear parents believe play to be a relaxing activities that provides a break from teaching. Many used words such as fun and entertaining to describe play reiterating their perceptions that it is simply a casual, relief from real teaching.

Comments from Parent Surveys (Post Active Learning)
Survey given to parents Kindergarten to year Two
106 out of 147 Completed

General comments

- 86 out of 106 (%) used the word learning when describing play
- 42 out of 106 (%) listed play-based activities other than physical that they do at home with children
- 67 out of 106 (%) expressed strong feelings about play being highly important to and predominantly about building social skills. Using words such as play nice, communication and social skills
- 24 out of 106 (%) believe play to be a form of entertainment or to relax
- 20 out of 106 (%) used the word fun to describe play
- 35 out of 106 (%) listed only physical activities which they play at home with children
- 39 out of 106 (%) use words such as physical activity, fitness, energy, active, to describe play

Question One: What does play mean to you?

- Having fun
- Finding somefing fun to do
- When you participate in a sport or some sort of game it is called play
- Play means you are doing something you like
- Play means that children are able to learn from other kids, interact and make friends
- It helps to develop their fine motor skills which they need to grow and learn
- playing help children to learn about stuff in a fun way
- Learn and see things that develop child's mind so that helps with the thinking
- As children play they learn. Solve problem. Share. Play well with others
- Play means interaction between students which gives enjoyment and learning skills for them
- Playing to grow and learn thru playing experiences
- Enjoy childhood
- Activities for kids to use their imagination freely
- Allowing the child to use their imagination and develop creativity

Question Two: What do you see as the benefits of play for children?

- Sharing, being active, stimulating brain / mind
- Another way of learning which is fun
- Boosts self confidence
- Exercise, broadening their imagination, expressing themselves
- Makes them think for themselves and encourages interactions with others around them
- Help their mood and keep them occupy instead of boring
- Learn simple things through play
- Benefits of play for children combines their curiosity to made them more clever
- Learn new things
- They are not bored the whole day
- Helps them grow
- To help them think for themselves
- Play builds the imagination. Play promotes social skills. Play advances physical development. Play helps kids work through emotions.
- Bonding with other ppl in groups or one on one situations
- Children need to be active coz it not only requires them to use their brains but it is physically good

Question Three: What is your understanding of play in the classroom?

- Play in the classroom can be just about anything reading, playing cards, singing etc.
- Developing fine and gross motor skills, learning while playing and solving problems while developing mental strategies
- It makes learning exciting, makes kids what to be involved in the activity. Play can also be a relaxed and pressure free method of learning
- School is about learning. Kids play at lunch and recess not too much have free time in the classroom to play
- Group activities. Encouraging to develop interacting abilities
- Fun way of learning
- "…developing fine and gross motor skills. Also learning while playing and solving problems while developing mental strategies
- Play in the classroom stimulates mental and physical skills of the students

- Relaxed atmosphere, fun. To express their feelings and ideas and to foster independence
- Fun time – dress up, puzzles, watchin tellie
- Play in the classroom helps children seek out new information, experiences and challenges. Play is a valuable learning experience

Question Four: To what extent do you think playing helps your child to learn in the classroom?

- When you make things fun, they want to learn you play a maths game or spelling game, so really they are learning and social skills which is important
- Play help my child study better
- It sticks in head. its ezyer to remember
- A lot of mental and physical development
- Help kids to exercise. Get better imagination. Talk betterer
- Few hours everyday out on the playground
- I understand it is important
- Having fun in the classroom makes the learning experience more enjoyable
- Improve self confidence
- I think it's invaluable. Any activity that gets a child interested and thinking is healthy for their minds
- They will participate more, interests them easier
- Provides a break from structured learning. Children can play maths games for example which will help them learn without them realizing
- Play in the classroom would be good coz if the children played while they learn they would enjoy it more and enjoy learning more
- Engaging in classroom activities through play will be beneficial and enriching for my child
- It allows my child to maintain his focus on class activities because he is enjoying learning

Question Five: How often do you play with your child at home? What activities do you do?

- Very often! Puzzles, memory games, cooking, soccer and books etc.
- I always play with my children in the backyard, so they don't have to do that at school
- Hard with 7 children
- we played 3 times a week including tennis, football, soccer and boxing. Active sport it help with hand eye coordination
- As much as possible. We sing, dance, go for walks, go to parks, we make up our own stories at bedtime, read, draw, write, do craft and lots more
- I played with my children often at home. We do stuff like craft, board games, footy and we like to cook together
- Every day. Memory cards, reading, going to the park, tickling, talking and laughing
- On the weekend during footy training – running, kicking football and tackling
- We play at home everyday. We play Wii, play soccer, read stories, do paintings and walks

The second round of surveys shows a significant change in the perceptions of the majority of parents. There were still the standard responses linked to physical activities

Appendix 8 –
Safari Hunter Transcript

Safari Hunter – D
Camera Person, Questioner and Sarafi Hunter – Z
Camera Person and Questioner - S

D – Hi, my name's Destiny and I'm the backyard Safari Hunter. Let's go find some bugs. Look at these interesting frogs. This is one, its body's orange and it has black spots. Look at this poisonous frog, its blue and it has blue spots. Better not touch it with your fingers! Look at this interesting snake.

Z – I want to ask a question. Why are we not allowed to touch frogs?

D – Because frogs they might get hurt, so you must look at them.

Z – What… are they poison some of them with the different colours or no?

D – Yes

D- And look at this red frog. It has red… black legs and a black, and a black bum… bottom. Look at that frog, it's another one like the one at the bottom. Let's go look for some other frogs.

Look at this bug. Far down there. Ooo look at this bull ant. Its red..

Z – It's so big that bull ant! Do you know how bull ants get bited?

D - …And it has six legs. What's your question?

Z - My question um, how does bull ants, um how can they bite your hand?

D – They can bite it with their pincers, just right there. So you must be careful with bull ants. Now let's look for some ladybugs at the tree. No look at the ladybugs. No the ladybugs are dead. So let's go look at… it has pink stripes with a yellow body. Look at this frog. It's the same frog as the other orange frogs. Opps.

S – I think there is one animal, could be right up here.

D – There's a bug. Look up there, it's a ladybug. Look an ant. Look at the scorpion in the tree, it's very yellow its body. Look at this centipede, it has lots of legs, I can't count them.

S – can I ask questions?

D – Yep.

S – Why does a frog live on the land, and pond and water?

D – Because it needs drink and it needs fresh air.

S – But why?

D – Because the frogs

S - Whispers it's an amphibian, because they are amphibians

D – because they have amphibians

S – because they ARE amphibians

D – because they are amphibians. Look at this interesting frog, it's green and it has a yellow body. Come. Look, and this is a red bug and it has red ears. We must go give it a drink.

Z – Um, I have a question. Did you see any animals around here?

D – Yeah

Z – Oh good thinking of animals. Um I think there is a jug there. Let's dig through and see if we can see something silver. Look here, look here, it's hard to find things. Ooo look here, where is it? I think its not here anymore. Right under

D – I think it's here

Z – I want to find it. I think we lost it.

S – But I marked it

Z – oh here, here I found it! Lucky. Let's see if we have some ants in here, or no.

D – Pretend I put some…

Z – Here's some ants. Come see all these ants in here, and they're so… here look at this. You'll see an ant there, can you? Can you see an ant in there?

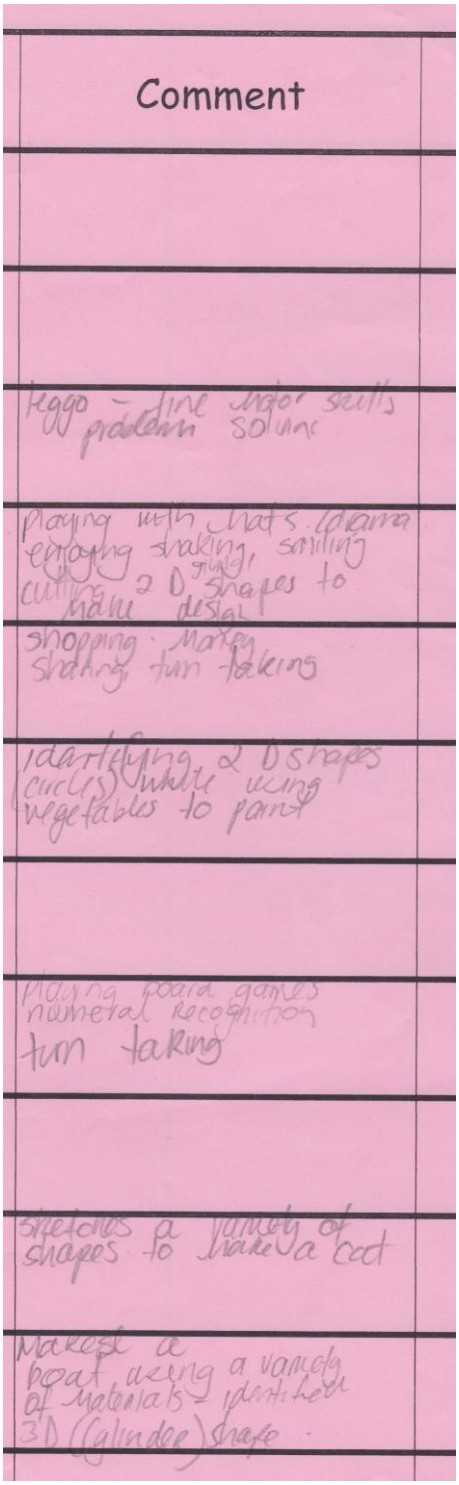
…some animals that we can see. Some… let's go pick up some animals we can see

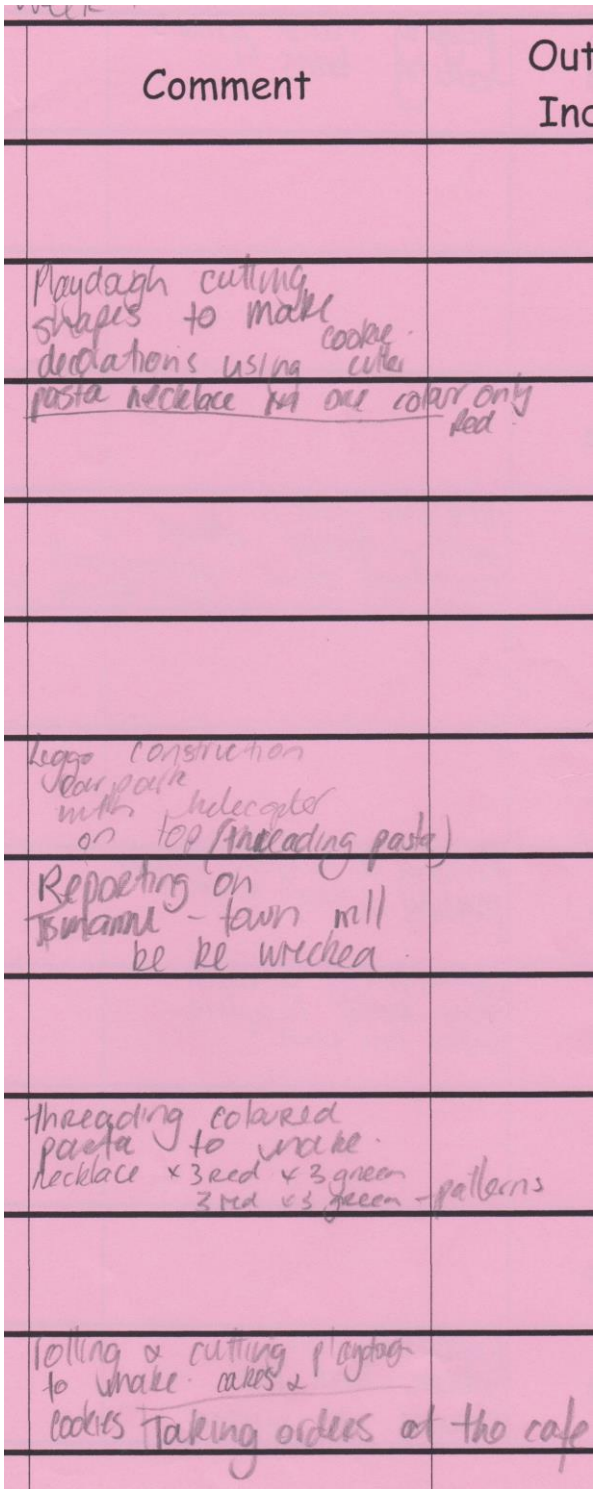
D – Look at me, look at me. Sandra look at me. Let's go look for some animals. I found some. Look at this green snake, that's the right one that was just at the pond. Look at this scorpion. How can it be down there when it was just over there? Another red bug with blue ears and another trapped bug.

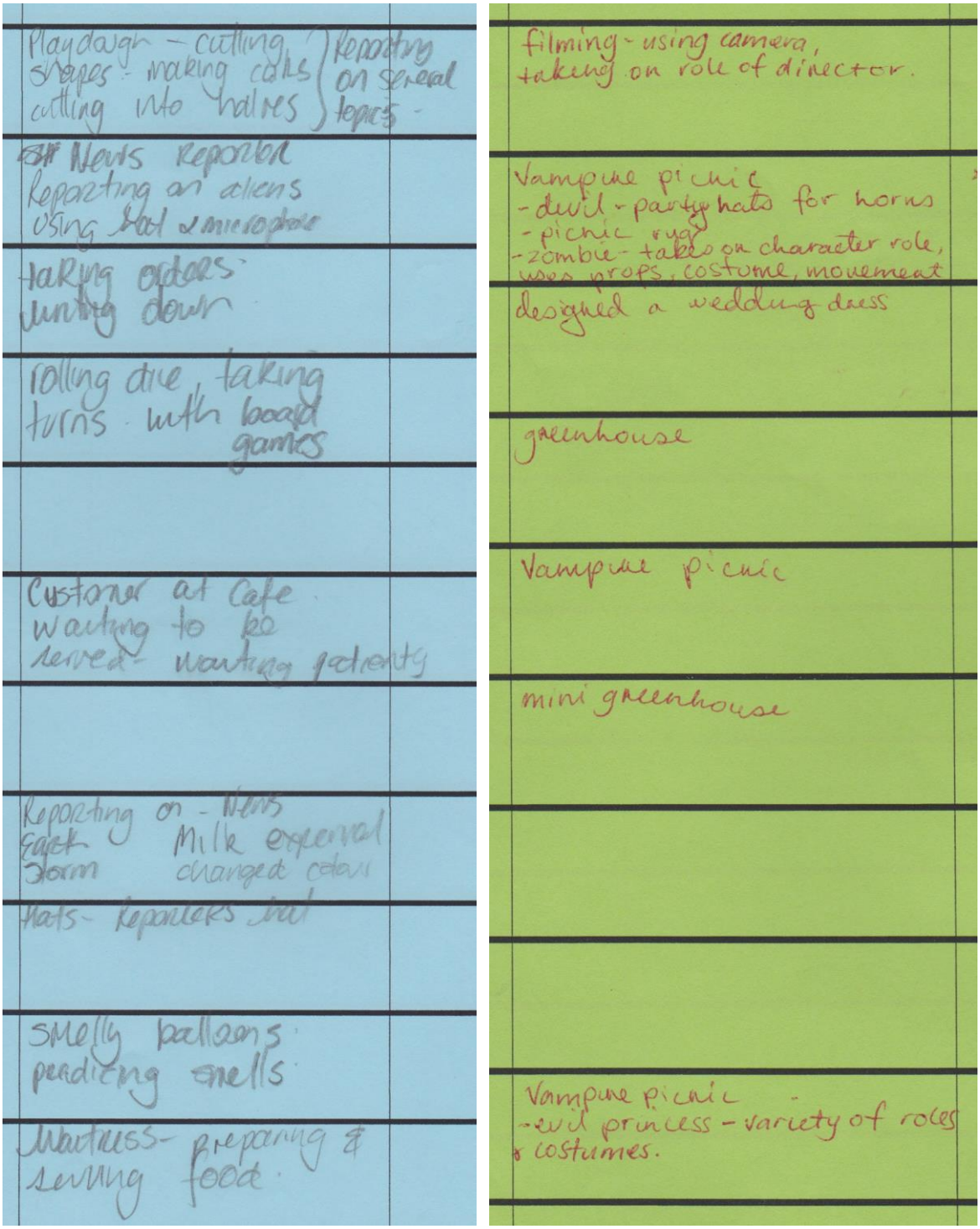
S – It's a bee! Why does a bee sting you? And when it stings you why does it die?

Appendix 9 –
Examples of Assessment Sheets

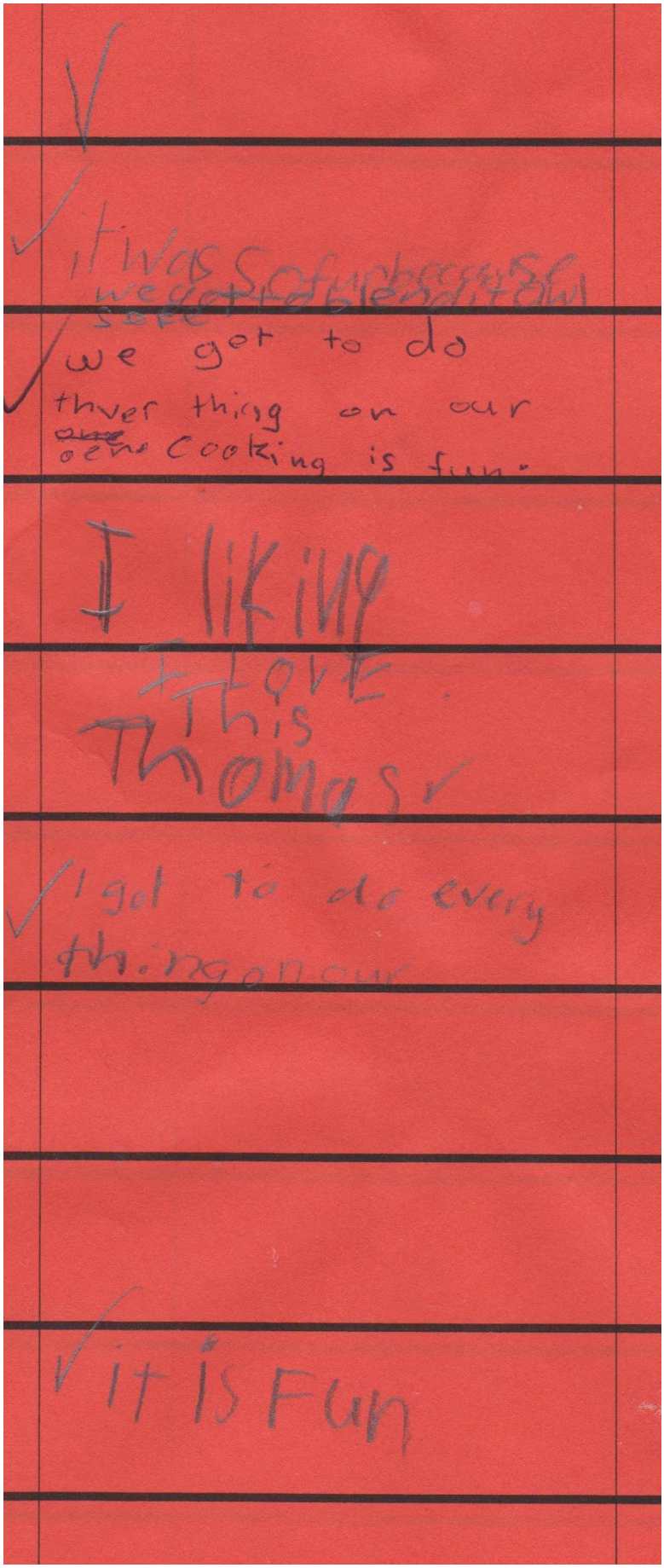
Raw assessment sheets completed by participant teachers during *Active Learning* sessions.






Playdough – cutting shapes - making cakes cutting into halves
Reporting on several topics -
News Reporter Reporting on aliens using Hat & microphone
taking orders writing down
rolling dice, taking turns with board games
Customer at Cafe waiting to be served - waiting patiently
Reporting on - News Cafe Milk expired Storm changed colour
Hats - Reporters Hat
smelly balloons pending smells
Waitress - preparing & serving food.
filming - using camera, taking on role of director.
Vampire picnic - devil - party hats for horns - picnic rug - zombie - taken on character role, uses props, costume, movement
designed a wedding dress
greenhouse
Vampire picnic
mini greenhouse
Vampire picnic - evil princess - variety of roles & costumes.

Raw assessment sheets completed by children during *Active Learning* sessions.



Accumulation of data from a single week of *Active Learning*

Comment week 7	Outcome / Indicator
Role play – African animals Building blocks – stacked up building blocks and compared which tower was taller.	• shares their drama making with others • Incorporates props and costumes to communicate role, situation and place.
Fruit and veg shapes – created interesting pictures and shapes	• experiments with the properties of different drawing and paint media and tools such as graphite ('lead') and colour pencils, fibre tip pens, crayons, paint, brushes, rollers, scrapers, sticks and computer applications in drawing to create particular effects in an attempt to capture likenesses of things depicted
Role play – tiger and lion chasing a gazelle	• shares their drama making with others • Incorporates props and costumes to communicate role, situation and place. • creates a range of roles and situations adapted from their imagination, literature (including poetry) and everyday experiences • expresses an understanding of the shared fiction of the drama by stepping-into-role to enact a situation and stepping out-of-role to reflect on the action
Role play – doctor Incy wincy spider game	• shares their drama making with others • Incorporates props and costumes to communicate role, situation and

Fruit and veg shapes	• experiments with the properties of different drawing and paint media and tools such as graphite ('lead') and colour pencils, fibre tip pens, crayons, paint, brushes, rollers, scrapers, sticks and computer applications in drawing to create particular effects in an attempt to capture likenesses of things depicted
Role play - frog	• shares their drama making with others • Incorporates props and costumes to communicate role, situation and place.
Role play - pirate	• shares their drama making with others • Incorporates props and costumes to communicate role, situation and place.
Fruit and veg shapes	• experiments with the properties of different drawing and paint media and tools such as graphite ('lead') and colour pencils, fibre tip pens, crayons, paint, brushes, rollers, scrapers, sticks and computer applications in drawing to create particular effects in an attempt to capture likenesses of things depicted
Mystery box – made a four legged animal (elephant???) and a robot	• combine a variety of materials and images to make simple models, drawings and structures.

Appendix 10 –
Teacher Professional Development Pack

As part of the *Lesson Study* professional development each participant teacher was given a collection of digital resources to support the implementation of *Playing to Engage.* Along with an overview of *Playing to Engage* the resource included reading material, suggested books, printable material, websites and templates. Table 10.1 below outlines a summary of the reading material.

Table 10.1 Summary of digital resources given to teachers during *Lesson Study*

Government Documents	Australian Government Department of Education. (2009). *Australian Early Years Learning Framework.* Canberra: Australian Government Department of Education.
	Ministerial Council on Education, Employment, Training and Youth Affairs. (2008). Melbourne Declaration on Educational Goals for Young Australians. Canberra: Ministerial Council on Education, Employment, Training and Youth Affairs.
Journal Articles	Broadhead, P. (2004). Early years play and learning: developing social skills and cooperation. London: Routledge Falmer.
	Fusco, E. (2012). Effective questioning strategies in the classroom: A step-by-step approach to engage thinking and learning, K-8. New York: Teachers College Press.
	Gronlund, G. (2010). Developmentally appropriate play: Guiding young children to a higher level. United States of America: Red Leaf Press
	Howard, J. (2010). Early years pracitioners' perceptions of play: An exploration of theoretical understanding, planning and involvement, confidence and barriers to practice. Educational and Child Psychology, 27 (4), 91-102.
	Martlew, J., Stephen, C., & Ellis, J. (2011). Play in the primary school classroom? The experience of teachers supporting children's learning through a new pedagogy. *Earlt Years , 31* (1), 71-83.
Case Studies	Bartlett, T. (2011). The case for play: How a handful of researchers are trying to save childhood. The Chronical for Higher Education (57), 27-33.
	NSW Department of Education and Training and University of Western Sydney. (2006). Fair Go Project. School is the place for me: Pathways to student engagement. NSW Department of Education and Training.
Suggested Books	Crockett, L., Jukes, I., & Churches, A. (2011). Literacy is not Enough: 21st Century Fluencies for the Digital Age . Australia:

	Corwin.
	Robinson, K. (2011). Out of Our Minds: Learning to be Creative. UK: Capstone Publishing.
	Whitby, G. (2013). Educating Gen Wi-Fi: How to make schools relevant for 21st-centry learners. Australia: Harper Collins Publishers.

Table 10.2 below lists the digital templates participant teachers were given to assist them with planning and assessment.

Table 10.2 List of digital templates

Template
Class List
Individual child assessment
Task specific assessment
Consumables and essentials kit list
Resource list ordering form
Master list of activities
Active Learning term overview proforma

Table 10.3 lists the printable resources made available to teachers to assist with the implementation of basic *Active Learning* during Cycle Three of the program.

Table 10.3 Printable material

Printables	
Scaffolded drawing templates	Butterfly
	Car
	Dog
	fish
	Frog
	neckalace
	dress
	Gingerbread man

Basic Procedures	Growing a cress head
	How to make a pirate hat
	Painted rock pets
	Perfect snowflakes
	Popsicle stick picture frames
	Rain maker
	Wool and popsicle spider webs
Role Play Kits	Crazy placemats
	School
	Shop
	Vet
	New reporter
	Family
	Doctors surgery

Table 10.4 details the suggested websites given to teachers to help them find activities and resources to use during *Active Learning* sessions.

Table 10.4 List of websites

Title	Use	Web link
Questacon	Science experiments	http://sciencesquad.questacon.edu.au/activities/
SparkleBox	Printable resources	http://www.sparklebox.co.uk
Professor Bunsen	Science ideas and resources	http://www.profbunsen.com.au
CSIRO	Science experiments	http://www.csiro.au/en/Portals/Education/Programs/Do-it-yourself-science.aspx
DLTK	Craft ideas	http://www.dltk-kids.com

Appendix 11 –
***Lesson Study* Critique Sheet**

Structure / Organisation
Introduction, Activities, wrap up

Assessment

Photos / assessment sheets

Questioning / Interactions

Types of questions / conversations

Activities

Engagement / Curriculum links

Appendix 12 –
Asylum-seeker and refugee children belonging, being and becoming: The early childhood educator's role

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Keywords: refugee children; asylum-seekers; action research; play-based learning

Abstract

The personal experience of educators from one Australian university in relation to boat people, comprising mothers and children in detention, is discussed within a Foucauldian theoretical framework. Media and political portrayal of refugees at times leads to 'us-and-them' conceptions of asylum-seekers. This paper foregrounds the challenges of their lived experience whilst in detention, with specific focus on children. The corollary highlights the pivotal role early childhood educators play when these children are granted visas and arrive in early childhood settings after years of incarceration. What belonging, being and becoming, as envisaged in the Australian *Early years learning framework,* might mean for these children specifically as they become citizens of Australia, is examined through the findings of an action research study in a preschool and lower primary school with high refugee enrolment. Key to children's development is utilising play as the preferred pedagogy in the early years of formal schooling.

Keywords: refugee children; asylum-seekers; action research; play-based learning

Introduction

A theoretical framework based on the work of Michel Foucault is used to discuss one example of the lived experiences of one group of women and children asylum-seekers in a detention centre in

a city in Australia as they awaited the outcome of their application for refugee status to be decided. The United Nations Refugee Agency (2012) defines asylum-seekers as follows:

> An asylum-seeker is an individual who has sought international protection and whose claim for refugee status has not yet been determined. As part of internationally recognized obligations to protect refugees on their territories, countries are responsible for determining whether an asylum-seeker is a refugee or not. This responsibility is derived from the 1951 Convention relating to the Status of Refugees and relevant regional instruments, and is often incorporated into national legislation. (United Nations Refugee Agency, 2012, p.5)

The discussion in this article critiques the portrayal of asylum-seekers and refugees in the media and in political debate. This discourse influences the perceptions and attitudes of Australian citizens. Then an initiative is described that was undertaken by early childhood education lecturers and their students from one university to provide an early childhood program for a group of children incarcerated on mainland Australia. The individual struggles and stresses within asylum-seeker families as they experience incarceration, sometimes for a number of years, are foregrounded.

With this as background, an action research study in a school with high refugee enrolment investigated effective pedagogy and strategies to engage these children and their families. Outcomes for refugee children were considered in terms of belonging, being and becoming as expounded in the *Early years learning framework* (Australian Government Department of Education, Employment and Workplace Relations[DEEWR], 2009). Findings are discussed, highlighting the pivotally important role that educators in the early years can play in settings where these children will be enrolled when they are granted visas to stay in Australia.

Theoretical Perspectives

Foucauldian theory proposes that discourse constructs a certain version of events which creates subjects who are then possibly subjugated by others or dependent on others (Foucault, 1979; 1983). According to Foucault, another layer of this conception of the subject is the subject's experience of subjectivity, of "being defined as an intentional being by one's self-knowledge, by one's awareness or image of who and what one is" (Prado, 1995, p. 53). Interpreting Foucault's view, Willig explains that discourse can be conceptualised as "constitutive of experience rather than representational or reflective" (Willig, 1999, p. 2) determining how people view others labelled in a

specific way and how those so labelled view themselves. In her extrapolation of Foucault's understanding of power relationships, Mills (2012) emphasises that he focused on the analysis of the effects of various institutions on groups of people and that this "mode of objectification... has concerned those ways in which human beings achieve a sense of themselves" (p.104).

Foucault (1979) maintains that "judges of normality are present everywhere." There are "the teacher-judge, the doctor-judge, the educator-judge, the 'social worker'-judge" and these decide what is normal and desirable, always being guided by their beliefs, which they have adopted because of their own perceptions of self.

These normalising judgements often include "negative assessments of individuals or groups that turn not on outright criticism or condemnation, but on invidious comparisons with a favored paradigm real or imagined" (Prado, 1995, p. 61). This again links to the Foucauldian notion of the subjects who, as individuals, might be subjugated and, furthermore, manipulated to define themselves in terms of these judgements, conceptions, and descriptions (Prado, 1995).

It is clear that if the dominant discourse is one lauding Australians who are of European descent and who speak Australian English, then those who have little English and are portrayed in the press as interlopers into Australia, are likely to be negatively compared with Australian citizens, creating an *us* and *them* scenario. Equally, if the discourse espoused considers refugees to be part of the norm, then refugees are more likely to be considered a part of *us* and to be included more readily. This "communicative framing" provides both the refugees, and Australians who interact with them, with a way to understand what it is to be a refugee, and also mediates how we respond to and conceive of refugees. The prevailing discourse might promote or limit their own and society's perception of the worth and capabilities of refugees.

Derrida (1982) presents the idea that the language used for communication shapes the meaning of the object it is describing, whether this object be a feeling, a thought, or a social phenomenon. He highlights that describing an object or phenomenon is often clearer if it is contrasted with what it is not, provoking a duality. Examples might be wealth versus poverty, educated versus uneducated, health versus disease, literate versus illiterate, normal versus abnormal, Australian versus immigrant or refugee who does not speak English. In each of these not only is the contrast

emphasised but the second is conceptualised as the negative, less acceptable, and undesirable. "The immutable trace of the difference of an Other thoroughly permeates the historicity of Western knowledge" (commentary by Trifonas in Derrida, 2002). Lather (1993) agrees that discourses around any topic are important as they are instrumental in shaping it. She maintains that discourse "worlds the world" giving that topic perspective and parameters, defining attitudes and social assumptions regarding it. Harrison, Edwards and Brown (2001) concur, describing discourse as "the forms of language used in thinking, feeling, speaking or writing which produce meanings, or constitute ways of understanding the world". Agreeing with Derrida (1982), Harrison et al. (2001) demonstrate that discourses can be powerful determinants of what is socially acceptable, what is considered good and viewed as correct.

The significance of the preceding discussion for this paper lies in the fact that society has constructed perceptions and beliefs, evidenced in discourse, around asylum-seekers and refugees in Australia. So what discourse does surround boat people asylum-seekers in Australia at present? For these people are indeed subject to society's discourse regarding them. The discourse in relation to them constructs their experiences and may, to a certain degree, also construct their identities since they do not live in a vacuum, nor are they able to live solely in society with people experiencing the same realities. On being granted visas, they share society with Australians who function within a framework of certain assumptions, which are determined by discourses of this particular time and place and culture. While it may not be entirely the way refugees see themselves (Gill, 1999), society sees them and interprets them and their reality in terms of current discourse.

When discourse results in an 'us-and-them' portrayal of people, it is easy to blame, to think asylum-seekers deserve no better, that they are queue-jumpers and should be locked up (Refugee Council of Australia, 2013). Some myths overturned by the Refugee Council of Australia (2013), but still prevalent in discourse and media-portrayals, include beliefs that asylum-seekers who arrive by boat present a security threat to Australia, that they take away places from genuine refugees in overseas camps, and that refugees do not contribute to Australian society in any meaningful way. The conception of them as a negative, single entity rather than as individual mothers and children, seems to have allowed or even promoted this discourse about asylum-seekers and refugees.

The reality is that to be considered legitimate refugees, asylum-seekers must demonstrate that they are fleeing persecution (Refugee Council of Australia, 2013). Political debate and media reports suggest that Australia is being inundated with asylum-seekers with dubious claims. They are portrayed as being people seeking to improve their lives economically and that they are not fleeing persecution in their home countries. Government statistical figures counter this portrayal. Of those asylum-seekers processed in 2012, for example, 91 per cent were found to be genuine refugees and in the March 2013 quarter, following a similar trend, 90.3 per cent of those processed were awarded refugee status (Hall, 2013).

Foucault did not, however, see subjects, in this case refugees, limited completely to the particular conceptualisation or construction of them by others and themselves. Dreyfus and Rainbow (1983) explain that Foucault saw this subjectivity as only one of the possibilities of organising one's consciousness of self even though Foucault sees the way that beliefs develop as being "always related to social power/knowledge structures" (Forbes, 2003, p. 151). This supports the argument that while subjects, in this case refugees, might be manipulated by the discourse of society, they ultimately have some say in determining to what extent they will allow this manipulation. This presents an important starting point for early childhood educators who can tap into the potential positive frames within which women and children such as those described later in this paper, operate, and build on positives to promote the belonging that children and families ideally should experience as members of the early childhood setting's community.

An initiative in a detention centre

Background to the current example

As more and more boats carrying asylum-seekers have arrived in Australian waters the preferred processing centre, Christmas Island, has become too crowded and in 2010 the government, in honouring its promise to limit the number children who would be kept behind barbed wire, found suitable accommodation on the mainland. Whole motels in a number of cities have been commandeered for this purpose. These are termed 'alternative places of detention' of which there are facilities currently in Perth, Leonora, Darwin, Brisbane and Inverbrackie. Conditions and restrictions on the asylum seekers differ from place to place (Australian Human Rights

Commission, 2013). The women and children described in this current initiative were housed in motel rooms while their claims for refugee status was processed – which takes an indeterminate amount of time, from a few months to several years at times. The motel in question was a so-called 'closed facility' meaning that the women and children were not permitted to leave the premises. It also meant that families became split up as the men remained on Christmas Island or were taken to male-only detention centres in Western Australia.

The initiative

Lecturers in early childhood programs at a university and students in those programs, became concerned as rumours regarding the living conditions for the asylum-seekers began to circulate the city. The women and children were housed and fed; their basic and medical needs were attended to, but they were not permitted to leave the premises. Everyday activities that young Australian children experience as a matter of course were not accessible to these mothers and children. The park down the road where children could have played on the adventure playground was out of bounds. A visit to the local supermarket was not permitted. The beach, not far down the road, was unattainable. No education was provided for the children. Terrified of contravening some law or rule of which they were unaware, thus jeopardising their chances of being granted refugee status, the mothers hustled their children from the eating area back to their motel room – where there was nothing positive and productive or stimulating for the children to do: no books, no writing materials, no interactions with children their own age, only their siblings. No contact for the mother with the local community. No barbed wire, it is true, but incarceration nevertheless.

The lecturers and students found that while the dining room was used to feed the mothers and children, the large reception area and lounge were not utilised for anything. They sought and in 2011 gained permission to create an early learning centre in that space; they set about raising funds and gathering materials suitable for enhancing the development and learning of young children. The students and university staff worked with authorities to get permission for the students to visit the "centre" daily on a rotational basis and to run a program for the children in detention. The intention was to provide the mothers the opportunity to socialise with other mothers and to learn what an early childhood setting would look like for their children when they were allowed into the community and to let the older children experience what school would be like. Most importantly, the aim was to provide a stimulating environment for the children to promote their cognitive as

well as social development and to expose them to English, to put them on the front foot for when they were allowed out.

The local community had been generous and the early childhood equipment and materials were new, appealing, and well set out in the reception area of the detention centre. Mothers and their children were summonsed and with delight and goodwill beaming forth, the university students explained what they were proposing. The children were eagerly straining at their mothers' hands, yearning to be able to approach the table where play-dough was set out, to build with the blocks and Lego, to pick up the books, to investigate the dressing up clothes, to cuddle a doll, to paint, to write. The reaction of the mothers to this invitation was surprising to the point of being shocking.

Mothers grasped their children more firmly by the hand, tucked them away behind their skirts, and in desperate whispers cautioned their children not to dare to touch *anything*! They clearly thought this might be some sort of a test and their levels of anxiety were patently obvious. What if their child broke a toy? What if their child inadvertently behaved in a way that would be considered inappropriate in this foreign culture? What if their child took a toy away to play with and brighten the long, dull hours cooped up in a single room? Would this jeopardise the family's chances of being granted refugee status? Would she then ever see her husband again?

A revealing reaction indeed. This is a clear example of the creation of "subjects" who are dependent on others and therefore potentially subjugated (Foucault, 1979; 1983).

Discussion on the detention centre experience

As Australians it is difficult, perhaps, for us to walk a mile in the moccasins of asylum-seekers, to conceptualise them as 'us' and not consider these people, with different looks, dress, culture, religion, as 'them' as described by Prado (1995). From our safe and cosy existence it is well nigh impossible to imagine the terror that can drive a family to flee their homeland, leaving their heritage and everything familiar to them. It stretches our imagination to consider their boat voyage fraught with danger, to empathise with them praying for calm weather. And then on arriving at their destination in a place where they do not understand the language, it is confronting for us to imagine a mother's fear as she is separated from her husband, leaving her with full and sole responsibility for their children; to consider her interminable days of waiting and wondering and

not knowing how long this reality is to be hers, her feeling of powerlessness and the anxiety of not knowing what the final outcome of her application will be. Her stress at being judged, as described by Foucault (1979), but not knowing whether she will be found suitable or wanting in this foreign land, we can only imagine. These people experience incarceration with no barbed wire but with no finite end, no stimulation and minimal support.

Nine of every 10 families who have experienced such incarceration will be granted refugee status, and become part of Australian society. It begs the question why we, as a society, would place people who will sooner or later become part of 'us' in conditions that will likely promote mental illness amongst both adults and children, and stagnate the development of children during the crucial early years? The purpose of this paper is simply to raise awareness, however, not to incite political action. Rather, it is to move forward and consider what early childhood educators can do when these children arrive at our centres and in our schools. In the example described above, it took many weeks for the children and mothers to trust the university students and staff involved and to begin to make use of the early childhood facility.

Action research

One of the people involved in the initiative described above found her second teaching post to be in the first year of formal schooling in a school with a high enrolment of refugee children. This led to an action research study investigating strategies and pedagogy that would facilitate refugee children's belonging, being and becoming and foster their engagement with the Australian curriculum in formal schooling. Action research has a long history and there are a wide variety of interpretations of it. In the current study, action research was seen as practitioner-oriented inquiry into the work of teachers and their students' learning (Feldman & Minstrel, 2000).

The site

School X is located in a low SES region of greater Sydney. Housed within the site are a primary school, large support unit and preschool for children aged up to four. The school demographic comprises a significant number of migrant families and high refugee enrolments, predominantly from Middle Eastern countries including Afghanistan and Iraq. Overall, more than 85% of students have English as an additional language. Within this number there is not one dominant cultural group, instead an even mix of Polynesian, Asian and Middle Eastern families. School X

has found it challenging to engage with the local community, to manage poor attendance and to improve extremely low NAPLAN results.

Action research cycles

Phase 1

Initially the action research project began as just the researcher in one lower primary classroom. It stemmed from having 90% of children with English as an additional language, the children's desire to play, the need to expand their experiences and extend their talking and listening skills. Throughout the semester the children participated in play-based learning sessions at least once a week. This experience allowed them to experiment and explore a range of activities of their own choosing. It started out very small with the children building a supermarket, creating a dough café, and designing cars and animals out of recycled materials. It was overwhelming to see the diversity in the children's creations, the skills and prior knowledge they brought to the sessions. Throughout the establishment period the number and quality of activities increased as children shared their ideas and experiences. A significant supporter during this initial stage was the school's preschool teacher. A strong advocate for play-based learning, this professional partnership provided an opportunity to share ideas and collaborate across settings.

Phase 2

The program was a success with the children and quickly became their favourite learning experience. It soon gained the attention of the Principal and the classroom teacher next door. The interest provided an opportunity to expand the learning experience by combining two classes together. The range of activities began to increase significantly through teacher-sharing, with a specific focus on providing quality science and mathematics based experiences. Also, having a second person in the room meant a teacher-led experiment could be run while the other teacher managed the rest of the room. As well as the benefits for the children, having a second teacher provided an opening for deep reflection on the program. This period of the program's evolution had a strong emphasis on refining, including how many children were permitted at a station at the same time, how to equitably allocate roles during role-play scenarios, and how to effectively manage resources. Also, more importantly, it crystallised how to appropriately scaffold activities and to accurately record children's experiences and learning.

Phase 3

On moving into the next stage of the action research cycle, the researcher was able to showcase the program to the whole school at its annual conference. Thereafter a professional development program around play-based learning, led by the researcher, was established for lower primary teachers to participate in. At this point the teacher responsible for the program offered to children who have English as an additional language, became a key partner. She contributed key knowledge on vocabulary, placed a spotlight on drawing out children's talking and listening skills and providing experiences which supported the themes being studied in our classrooms. For example, during procedure writing we offered milkshake and sushi making as stations.

Phase 4

The next stage involved incorporating all three of the Year Two classes into one session. Fortunately the open learning plan classroom provided an adequate platform for 75 children to interact effectively and engage in the program. The children were able to mix with others across the grade and build relationships outside their own classroom walls. Due to the significant period of refining during the preliminary stages, by this point the children had become so familiar with the program they were more comfortable asking for particular activities and suggesting new ones – such as a musical instrument-making station and setting up a toy shop. The teachers had also become more confident in relinquishing whole-class didactic instruction and providing the children with opportunities to explore and create whilst meeting the outcomes required.

The partnership with preschool staff meant access to a greater selection of resources and they proved a vital sounding board for new ideas. Through many informal discussions, activity ideas evolved and were reflected upon. Since the implementation of the program the relationship between the greater school community and preschool has strengthened. The researcher and primary preschool teachers now have a shared belief in the importance of play for children aged zero to eight as espoused in the *Early years learning framework* (DEEWR, 2009) and creating activities and learning spaces in which children also meet the outcomes as required by the NSW curriculum.

Phase 5

The final stage of the action research project involved expanding the program across all Kindergarten to Year Two classes, including two support unit classes, making 10 in total. The challenge with this new venture was allocating resources and making the program work with different teaching styles. The program relies heavily on children having the freedom of choice and a high level of questioning skills on the part of staff to draw out information from children and effectively utilise teaching moments. All teachers were given a basic resource kit including cash register, play money and dinner set. They were also given a broad range of consumables to help create a variety of craft activities and basic experiments. To accompany the resources each teacher received a USB including suggestions to help establish the sessions, possible activities and printable resources. From this, each grade combined to create whole group sessions at least once a week where all the children came together.

Findings

Playing to engage

From the very beginning the strategy was always the same: to provide quality play-based learning experiences which de rived from the children's interests and encouraged deep conversations between children, and between teacher and child. Play is a global concept as outlined in the United Nations (1959) Declaration on the Rights of the Child and is a right of all children. Regardless of how a child came to School X, play was the common ground from which these predominantly refugee and migrant children could build so many skills including social, academic and cultural.

Accountability

Regular meetings with all participants and individual reflections in particpants' reflective diaries evidenced a concern that credibility might be an issue when it came to reporting. Therefore, all of the learning experiences were linked to the NSW curriculum in the planning phase.

Response to children's interests

Although there was a greater emphasis on science, technology and mathematics, experiences were in no way limited to these areas. Participants report that as they became more familiar with the implementation of a play-based program, so their capacity to respond to children's interests improved as well. Each session comprised a variety of activities including experiments, role-play

stations, games, drawing and writing, after consultation with all participants. A snapshot of one session might include:

- Doctor / veterinarian clinic
- News station
- Writing station with post box for children to deliver mail
- iPads
- Guess Who game
- Exploding monsters experiment
- Build a bridge challenge
- Play dough
- Sketching station with charcoal pencils
- Marble run
- Lego
- Vegetable and fruit paint stamping

Below is a more in-depth look at two of the activities.

Build a Bridge Challenge (Mathematics)

This was a scaffolded activity across two sessions.

During the first session children were given some masking tape, newspaper and cardboard boxes. They also received a set of basic guidelines, 1) the bridge needed to be free standing, 2) be at least 30 centimetres off the ground, and 3) hold a small weight. Without any more direction, a group of six children came together; they communicated about the design and as a team created a bridge.

The second time around, the children were given the same materials but this time asked to design a bridge which could support the weight of a sticky tape dispenser. Before the challenge started they gathered together and we examined the previous bridge. Particular attention was paid to the structure and creating a more robust final product, which could support the required weight. The end creation could not only hold the sticky tape dispenser but also a small child!

Exploding Monsters (science)

This was a staged experiment with a child directed follow-up activity.

During the first session children were given plastic cups, markers, super glue and a variety of small craft materials to make a monster. The idea was for the cup opening to be the mouth with the monster looking up. Children designed a variety of interesting monsters, some with pompoms, six eyes, and others with earrings and big teeth.

At the beginning of the next session children collected their monster cups and gathered at the experiment station. Each child was presented with white vinegar, bi-carbonate soda, food colouring, water, dishwashing liquid and a plastic spoon. They were able to individually choose and self create their own vinegar and bi-carbonate of soda chemical reaction. Throughout this process the children discussed different elements and their effect on the explosion – such as adding detergent and how it changed the reaction; they mixed in colours to create purple and orange foam.

Following this experiment, one child had gone home and asked his mum if they could make an exploding monster but his mother only had red vinegar. The next day the child asked if the experiment would work using any type of vinegar. This question prompted another investigation involving white, brown, red, apple cider and balsamic vinegar, and mixing each with bi-carbonate of soda.

Improved ability to capitalise on teachable moments

Participants report that their skill and identifying and utilising teachable moments improved with practice. Children felt comfortable moving around, self-selecting play-based learning activities and mixing with a variety of other children outside their friendship groups. The experience encouraged teachers to find the teachable moments, asking meaningful questions and simultaneously building quality relationships with each child in the room regardless of which home-class they came from.

Play-based learning infused into other curriculum areas

Children were guided by three over-arching rules: share, look after our belongings and move safely around the room. Behaviour issues were not a problem at any stage due to the fact that every child was so highly engaged in the play-based learning experience. This factor encouraged participant teachers to extend the opportunity for children to engage in this way and these play-based learning strategies have begun filtering into Preschool to Year Two everyday teaching practices. Play-based learning experiences are no longer confined to the designated session once a week; the benefits are being applied across the curriculum to everyday teaching practices.

Collaboration leading to language development

Participant reflective diaries highlight that the overwhelming success of the program was achieved by promoting collaboration between children and the increased levels of talking and listening among them. In terms of the *Early years learning framework*, for refugee and migrant children, having an authentic learning environment with the freedom of choice and the lack of pressure from traditional schooling, provided a relaxed atmosphere to develop new language skills. Their sense of belonging and being a valuable participant in their learning was fostered. In the case of procedure writing, having informal opportunities for these children to practise specific language structures, such as action verbs, allowed them to more confidently and successfully complete writing activities during regular lessons.

Contributing and growing

This method of learning provided an opportunity to support the Refugee Council of Australia (2013) in refuting the notion that refugees do not contribute in a meaningful way to society. It is a challenging experience for children who are competent in their first language to be placed in a learning environment where they suddenly become the vulnerable one. The foundations of play draw on hands-on experiences, trial and error and exploration which means anyone regardless of background can become an expert. By allowing children to self-select from a wide variety of activities promoted the opportunity for them to be able to find something which showcased their skills and gave them confidence with other children. Through the open-ended challenges these children could share their prior knowledge and experiences with other children in a safe and supportive learning environment. The informal play-based learning setting has helped to encourage an equitable learning environment, and helped children to feel that they belong and are valued as learners. From Preschool to Year Two we are creating a space where all children are

valued; they have a sense of being, becoming and belonging (DEEWR, 2009) and regardless of where they have come from, their achievements are celebrated. Within the structure of play-based learning all five of the *Early years learning framework* outcomes are being successfully addressed for all children.

Embracing their new culture

Through the play-based learning experiences, refugee and migrant children were able to test boundaries and ascertain appropriate social skills. The *Early years learning framework* states: "From before birth children are connected to family, community, culture and place" (DEEWR, 2009, p.7) but for refugee children this statement has become contested. The educators had a responsibility to make the centre and the school their safe place, since "knowing where and with whom [they] belong – is integral to human existence". In acknowledging their "interdependence with others" we fostered "the basis of relationships in defining identities" (DEEWR, 2009, p.7). The play-based learning activities promoted interactions with their peers at all times.

Parent efficacy

Additionally, we needed to play a part in helping parents overcome the powerlessness (Foucault, 1979) they had experienced in detention. In doing so we would be challenging their cultural mores as in their home countries parents were frequently not encouraged to be involved in the school and teachers were remote personages. In the current study, we did this by sending home a survey about play-based learning, including information and examples of children's work in the fortnightly newsletter and frequently inviting parents into the classroom to share the children's learning journey. We also worked hard to build relationships with the siblings of our children from the Preschool to Year Six. This helped strengthen relationships with families, make siblings feel comfortable interacting with us in the playground and being part of our greater classroom and school community.

English building bridges

Taking into account Foucault's perception that beliefs, as quoted by Forbes (2003), always develop in relation to social power and knowledge structures, the program drew on the diverse skills and abilities of all children to build bridges between our refugee, migrant, Aboriginal and English speaking children. This style of learning provided the holistic basis children need as outlined in

the *Early years learning framework* where children are described as "social beings who are intrinsically motivated to exchange ideas, thoughts, questions and feelings..." (p.38). Increased proficiency in English helped them become confident and active learners inside and outside the classroom.

Improved attendance

The success of the program from Preschool to Year Two has resulted in better attendance, improved social skills, academic results and increased confidence levels of children in regular teaching sessions. In a comparison of children's attendance records from Kindergarten to Year Two, over 80 per cent have improved figures. In a couple of cases where children had extremely poor attendance there has been a 10 – 20 per cent rise in the number of days they have been at school. It has also led to increased engagement due to the greater freedom in choice of activities children have and the greater positive connections being built between child and classroom teacher.

Conclusion

Even as the Australian Government considers alternative processing options, such as sending boat arrivals to Papua New Guinea which was profiled strongly in July 2013, this is unlikely to affect the processing of women and children in the short to medium term. The children will continue to arrive in our early childhood settings and schools. Early childhood educators stand in a uniquely powerful position in relation to children who have been incarcerated for a number of months or a number of years. We have the *Early years learning framework* (DEEWR, 2009) to guide and inform our practice. We have the education to critique even that document as it pertains to the specific needs of individual children. As practitioners we have the skills to meet the needs of all children whom we meet in our centres and classrooms if we sensitively and thoughtfully consider where they are and to where we would like them to progress. The current study alerts early childhood educators to the specific high needs of refugee children as they step from incarceration into our communities and the important role they can play in the development of these children. Furthermore, it highlights the vital importance of pedagogic continuity particularly for these children. Play-based learning fosters the transition from an early childhood centre into formal schooling and this study provides examples of how this might be achieved. Finally, this paper emphasises the importance of having high expectations for these children and not to imagine that

they are cognitively limited simply because their development might have been delayed by their experiences in detention.

References

Australian Government Department of Education, Employment and Workplace Relations (2009). *Belonging, being and becoming - The early years learning framework for Australia.* Canberra, Australia: Author.

Australian Human Rights Commission. (2013). *Immigration detention and human rights*. Retrieved 30 June 2013 from www.humanrights.gov.au/publications/immigration-detention-and-human-rights.

Derrida, J. (1982). *Margins of philosophy* (A. Bass, Trans.). Chicago: The University of Chicago Press.

Derrida, J. (2002). *Ethics, institutions, and the right to philosophy* (P. P. Trifonas, Trans.). Lanham, MD: Rowman and Littlefield.

Dreyfus, H., & Rainbow, P. (1983). *Michel Foucault: Beyond structuralism and hermeneutics*. Brighton, England: Harvester Press.

Feldman, A. & Minstrel, J. (2000). Action research as a research methodology for study of teaching and learning science. In A. E. Kelly & R. A. Lesh (Eds.), Handbook of research design in mathematics and science education (pp. 429–455). Mahwah, NJ: Lawrence Erlbaum.

Forbes, J. (2003). Grappling with collaboration: Would opening up the research 'base' help? *British Journal of Special Education, 30*(3), 150-155.

Foucault, M. (1979). *Discipline and punish* (A. Sheridan, Trans.). New York: Pantheon.

Foucault, M. (1983). The subject and power. Afterword to H. Dreyfus & P. Rainbow. In *Michel Foucault: Beyond structuralism and hermeneutics* (pp. 208-226). Brighton, England: Harvester Press.

Gill, C. J. (1999). Invisible ubiquity: The surprising relevance of disability issues in evaluation. *American Journal of Evaluation, 20*(2), 279-288.

Hall, B. (2013). Boat people genuine refugees, *Sydney Morning Herald*. Retrieved from http://www.smh.com.au/opinion/political-news/boat-people-genuine-refugees-20130519-2juvg.html

Harrison, R., Edwards, R., & Brown, J. (2001). Crash test dummies or knowledgeable practitioners? Evaluating the impact of professional development. *British Journal of Guidance and Counselling, 29*(2), 199-211.

Lather, P. (1993). Fertile obsession: Validity after poststructuralism. *The Sociological Quarterly, 34*(4), 673-693.

Mills, S. (2012). *Michel Foucault* (2nd ed.). Retrieved 20 May 2013 from http://reader.eblib.com.au.

Prado, C. G. (1995). *Starting with Foucault: An introduction to genealogy*. Boulder, CO: Westview Press.

Refugee Council of Australia. (2013). *Myths about refugees and asylum seekers.* Retrieved 25 June 2013 from http://www.refugeecouncil.org.au/f/myth-long.php#illegals

United Nations (1959) *United Nations Declaration on the Rights of the Child*. Retrieved 8 June 2013 from http://www.un.org/cyberschoolbus/humanrights/resources/child.asp

United Nations Refugee Agency (UNHCR). (2012). *UNHCR asylum trends 2012: Levels and Trends in Industrialized Countries.* Retrieved 20 May 2013 from http://www.unhcr.org/cgi-bin/texis/vtx/home/opendocPDFViewer.html?docid=5149b81e9&query=UNHCR asylum trends 2012

Willig, C. (1999). Introduction: Making a difference. In C. Willig (Ed.), *Applied discourse analysis: Social and psychological interventions* (pp. 1-21). Buckingham, England: Open University Press.

Appendix 13 –
The Power of Play-based Learning: a pedagogy of hope for potentially at-risk children

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Abstract
In this chapter, the authors explore the preliminary findings of a qualitative action research study into the effects of a play-based program in a primary school, which focused on improving knowledge and skills in the key areas of science and mathematics for a cohort of potentially at-risk children. The findings of the study suggest the need to counter teacher prejudice against the notion of play as a vehicle for learning for school-aged children; the need for parents to be encouraged in a different way to be partners in their children's education; and highlight the pivotal role of professional development for participant teachers. The authors use the work of Freire on the pedagogy of hope and its interaction with literature on play to illustrate a number of advantages of this play-based program. First, it had cross-curricular advantages given its correlation with improved literacy and numeracy scores obtained through the National Assessment Program for Literacy and Numeracy; second children demonstrated an increased ability to drive learning content; third, it had positive impacts on student confidence and engagement; fourth they developed a complement of 21st Century life skills; and finally the acquisition of cultural capital and social skills proved a powerful tool to student engagement. This chapter seeks to explain those impacts in terms of the playful nature of the program.

Introduction

The two authors of this chapter have contributed significantly in a number of initiatives in remote Aboriginal communities in the Northern Territory, Australia, where starting with Aborignal people's knowledges was vital and where it was found that having their ways of knowing, being and doing as a key pillar for learning was pivotal to success (cf. Maher 2013a; 2013b; 2012; 2010a; 2010b). Also, these authors had been part of an initiative involving providing play opportunities for the children of boat-people whilst they were incarcerated (cf Maher & Smith, 2014). In the current study, these experiences, together with a synergy with the principles underpinning Paulo Freire's work in *Pedagogy of the oppressed* written in 1970 and then his reflection on that work in *Pedagogy of hope* written in 1992, informed the thinking and approach within the current study. To explain: while Freire wrote in the context of political oppression of the working class, nevertheless, the sentiments are applicable to marginalised groups within Australia. He provided a framework for a 'progressive educator' (Freire, 1992, p. 3), which allowed us to identify key elements for success within the current study. It should be noted that these elements such as parental involvement and children retaining power within their learning, for which Freire (1992) coined the term *pedagogy of hope*, we put into action. This was achieved through a play-based program, but the examples and findings are provided tentatively. We seek further scrutiny and debate as we follow Freire (1992) who holds that '… the educational practice of a progressive option will never be anything but an adventure into unveiling. It will always be an experiment in bringing out the truth' (Freire, 1992, p.1).

Context of the current study

The current study took place in School X in a low socio-economic region of Western Sydney. Approximately 10 per cent of the students at the school were Aboriginal and around 80 per cent were refugees from a variety of countries and cultures, bringing with them a multiplicity of languages. Of the students in the current study, ultimately including Preschool children (aged 4), and Kindergarten to Year Two children (aged 5 to 7), 95 per cent had English as an additional language or dialect.

School X comprised 500 students in 16 regular classes. Those with behavioural or severe learning difficulties were segregated and taught in "Support Classes" which became an integral part of the current study. Student attendance at the start of the study, in 2012, was poor with some students in the junior years attending less than 50 per cent of the time. Student achievement on National Assessment Program for Literacy and Numeracy (NAPLAN) was extremely low. As noted by the Australian Mathematical Sciences institute in 2014, "More worrying still is the fact that there is significant inequality in performance among Australian students" (Wienk, 2014) and that this correlates with socio-economic status (SES). Demonstrating this correlation, the achievements of students across New South Wales (NSW) in 2011 (Australian Curriculum Assessment and Reporting Authority , 2011) are shown in the table below together with those of students in like, low SES schools. These also show the achievement of School X students as lower than the low socio-economic status (SES) achievement across NSW – and declining.

Table One: A comparison of NAPLAN results broken down to show school X, similar low SES demographics and average results across Australia

	Reading		Persuasive Writing		Spelling		Grammar & Punctuation		Numeracy	
Year 3	353 335 - 371		356 341 - 371		343 326 - 360		321 302 - 340		346 331 - 361	
	SIM 381 372 - 390	ALL 416	SIM 388 380 - 396	ALL 416	SIM 376 367 - 385	ALL 406	SIM 384 374 - 394	ALL 421	SIM 373 365 - 381	ALL 398
Year 5	436 421 - 451		470 455 - 485		469 454 - 484		468 451 - 485		451 437 - 465	
	SIM 459 450 - 468	ALL 488	SIM 453 445 - 461	ALL 483	SIM 457 449 - 465	ALL 484	SIM 465 456 - 474	ALL 499	SIM 462 454 - 470	ALL 488

SIM Schools serving students from statistically similar backgrounds
ALL Australian schools' average
- Student population below reporting threshold
Year level not tested

Selected school's average is
substantially above
above
close to
below
substantially below
these schools' average

In 2012 one of the authors was appointed to teach Year Two (7 year old children) and she brought with her a strong belief in the power of play as a vehicle for learning.

Play-based pedagogy

The Secret Is Out!

Some have argued that play is children's work but we would say that it is far more than this. Play is their 'self-actualisation, a holistic exploration of who and what they are and know and of who and what they might become' (Broadhead, 2004, p. 89).

Play-based learning is an integral part of children's development and its positive implications for young children have been the focus of many major research papers over recent decades. Henniger (2002) describes play as a crucial way for children to learn about language, develop intellectual concepts, build social relationships and understanding, strengthen physical skills and deal with stress. Overall, play is a key element in enhancing children's all-around development (O'Connor, McCormack, MacLaughlin, Angus, & O'Rourke, 2014; OECD, 2002).

A key individual who has significantly influenced the way we view play is Piaget (1962). His constructivist analysis of play-based learning has laid a solid foundation for authentic experiences which incorporate interactions with other children and adults, and hands-on manipulatives. The purpose of hands-on objects and materials in play are to provide children with opportunities to assimilate new knowledge within existing schemes. Heidemann and Hewitt (2010) believe Piaget intended for adults to fulfil an indirect role in play-based experiences and only introduce new information as needed. This proved an important aspect in the play-based program in the junior primary classes in the current study.

Another strong advocate and visionary in the realm of play was Vygotsky. He believed play to be a vehicle that would help children to reach their potential level from their actual current level of development, which he referred to as the zone of proximal development (ZPD) (Vygotsky, 1987). The ZPD shifts as children learn and understand information. Through interactions with a more competent peer or adult, children can extend themselves and achieve and love the experience. Bodrova and Leong (2007) co-authors of *Tools of the Mind: The Vygotskian Approach to Early Childhood Education,* adds that when young children pretend, they often use bigger words than they normally would and extend themselves to attain more advanced skills of self-control, language use, memory, attention, cognitive skills and cooperation with others. Claxon and Carr (2004), offer a dynamic interpretation of learning dispositions by suggesting a series of adverbs which broaden the term's universal interpretation by advocating robustness, richness and breadth which are promoted through developmental play. These terms refer to children's ability to respond to learning in a positive manner despite the challenges, explore a wide variety of activities and spread the application of skills across different tasks.

A central component to the Vygotskian theory, and which was pivotal in the planning for learning in the current study, is the link between children's social and cultural upbringing to their development (Henniger, 2013). Interactions with adults and other children directly shape the way a child learns about the world around them. Agreeing with Piaget, Vygotsky relates children's development of cognitive concepts to interactions with peers and adults. Bodrova and Leong (2007) describe the adult role as consisting of scaffolded support in the form of questions, demonstrations and modelling. A significant element to a successful Vygotskian play program is a conscious promotion, through the provision of engaging experiences, towards language development. Scaffolding and questioning also has a strong emphasis on fostering in children the ability to communicate and express their thoughts and feelings with others.

In the case of children with English as an Additional Language or Dialects (EAL/D), the vast majority of students in the current study, the acquisition of language is vitally important to their social inclusion and overall learning. This is critical in order for them to "belong" (Australian Government Department of Education, 2009) and to see themselves as an integral part of this progressive community of learners. This aligns with Freire's view that:

> The reading and writing of the word would always imply a more critical rereading of the world as a "route" to the "rewriting" – the transformation – of that world. … Hence, also, the need in literacy projects conducted in a progressive perspective, for a comprehension of language and its role … in the achievement of citizenship. (1992, p.32-33)

A major component to second language speakers' acquisition of a new dialect is providing authentic opportunities for talking and listening to occur between both peers and teachers. According to Aliakbari and Jamalvandi (2010) speaking is considered one of the central elements of everyday communication, and thus mastering speaking ability should be an ultimate goal within the classroom. In the case of EAL/D leaners, play provides an opportunity for children to interact in real world situations with other children, to practice sentence structure and grammatical features. It also places them on a level playing field where they have a platform to evidence their cultural capital with other children.

Play, Play, Play!

In the past decade a number of countries including Norway, Sweden, New Zealand, Britain and Japan have emphasised the significance of play by embracing its place in formal curricula. Although this may also be true in Australia with the introduction of The Early Years Learning Framework for early childhood settings, the conundrum for classroom teachers in formal schooling is how to fit this sort of play program into a set curriculum.

As the Wong, Wang and Cheng (2011) study evidenced, the assumptions that play is beneficial to children's learning remains in the realm of research, academia and some educators' belief systems. There has not been the necessary acceptance across society in general, nor, importantly, amongst parents that play is a legitimate vehicle for learning in the formal school setting. Parents present a common view of society towards play:

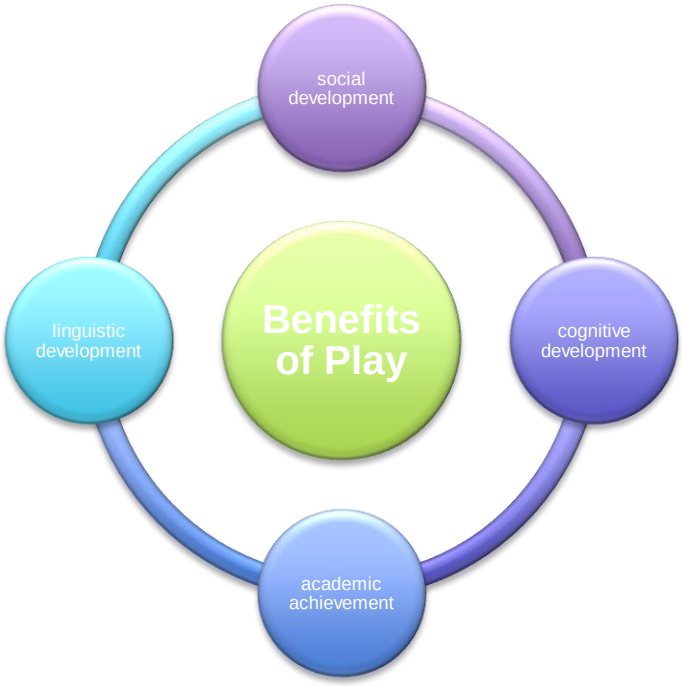
> In a society where academic achievement is highly valued teachers and parents hesitate to think of play as essential to child development; they are more likely to see it as an obstacle to children's academic success and future career prosperity. (Wong, Wong, & Chang, 2011, p.166)

The challenge for early childhood professionals and advocates of play is how to alter the perceptions of society. As suggested by a recent British study we should capitalise on children's inherent desire for learning and practical experiences when they enter formal schooling, and not dent their enthusiasm and confidence (Stephen, Ellis, & Martlew, 2010) by "schooling them" in a factory-like setting (Whitby, 2013). But surprisingly, theory is not enough; people need to see appropriate, well executed play-based programs in action if they are to believe in the value of play as a vehicle for learning

Play as a learning tool has been an academic focus for well over a hundred years now. Throughout this time it has moved in and out of favour with teaching professionals. Saracho (2011) describes play as a means through which young children are provided with an opportunity to express their own ideas, symbolise and test their knowledge of the world around them with others. Figure One outlines the diverse range of benefits associated with play-based learning for children. Although this diagram looks simple, it shows how play influences every aspect of a child's development

which Synodi (2010) explains is linked to social, personal, linguistic, physical, cognitive, moral, creative and artistic growth.

Figure One: Benefits of play



In the classroom, play-based programs have the potential, as Saracho (2011) discusses, to provide children with an entry into basic inquiry in literacy, science, social sciences, mathematics, art, music and movement. Play-based programs have the ability to promote and foster the personalised learning and create experiences for the diverse capacities of each young Australian as stated in the Melbourne Declaration (Ministerial Council on Education, Employment, Training and Youth Affairs, 2008). Expanding on this, Lillemyr, Sobstad, Marder and Flowerday (2011) declare children are able to engage in experiences in which have a strong sense of relatedness and therefore contribute strongly to intrinsic motivations for learning. For all learners, young and old,

> [t]he act of studying, teaching, learning, knowing, is difficult, and especially, it is demanding, but it is pleasant … It is crucial, then, that educands discover and sense the joy that steeps it, that is part of it, and that is ever ready to fill the hearts of all who surrender to it (Freire, 1992, p.69)

For lower primary, Wood and Attfield (2005) believe a well-developed play program has the capacity to enhance children's content knowledge across the curriculum. They delve further, stating that success means creating an approach which is based on both curriculum-generated play to support the development of specific skills and knowledge and a play generated curriculum based on teachers responding to the interests of the children is the best approach to curriculum planning.

Recent studies (O'Connor et al., 2014) illustrate that play promotes problem solving, inventiveness, innovation, creativity, coping skills, processing skills, emotional intelligence, personal happiness, belonging, identity, confidence, political ideology, ethical formation, and interpersonal communication. These dispositions for learning are imperative for all children but specifically those of low SES and it possible that a developmental play program will foster these skills.

Play-based learning allows children to take control of their learning and the direction in which they want to drive it. At the end of the day, as Freire (1992, p. 57-58) highlights,

> … teaching is not the pure mechanical transfer of the contour of a content from the teacher to passive, docile students. Nor can I resist repeating that starting out with the educands' knowledge does not mean circling around this knowledge ad infinitum. *Starting out* means setting off down the road, getting going, shifting from one point to another, not *sticking,* or *staying.*

So, we needed to get going. We believed that play-based learning creates a dimension through which all children and teachers can be learners. It creates an environment where every person in the room is able to contribute to the learning through knowledge, skills, prior experiences and/or risk-taking. Given that student engagement and attendance was extremely poor and therefore concerning at the start of the study, the impetus for promoting so strongly a play-based approach to learning and teaching was derived from Vygotsky (1986) who holds:

> "Thought is engendered by motivation, i.e., by our desires and needs, our interests and emotions. Behind every thought there is an affective-volitional tendency, which holds that answer to the last 'why' the analysis of thinking" (p.252)

It was vital that children first be engaged and eager and, second, have every opportunity to improve their English. We therefore use a definition of play-based learning that is founded predominantly on Vygotsky's (1986) definition of play-based learning where "the interaction between the adult and the child is like a dance – the child leads and the adult follows, always closely in tune with the child's actions" (Berk & Winsler, 1995, cited in Davis & Tu, 2008). However, it also includes elements of mediated learning which emphasises the importance of teacher-child interactions, without the reliance on every aspect being teacher directed. A study undertaken by Fleer (2009) supported findings of previous studies (cf. Karpov, 2003; Kozulin, 2003; Tzuriel, 1996) demonstrating the vital importance of teacher-child interactions for when "teacher-child interactions were not focussed on scientific concepts within these playful contexts, that

children drew upon their prior experiences and created imaginary narratives from their use of materials"(p.1085). This meant that children were not necessarily making connections to arrive at scientific concept understanding. In the current study we took cognisance of this and professional development for teachers provided them with the skills and questioning techniques that would further children's understanding and concept development. With practice they became increasingly confident and skilled at doing this.

In the current study there were a number of aspects that needed to be considered and obstacles to be overcome. The main one of these were the views of teachers in the primary school and the parents that play was something children in the prior-to-school setting engaged in and used for learning before they came to formal schooling where *real* learning would take place. They did not consider play as a legitimate vehicle for learning in their primary school. Undaunted, the current study was undertaken.

The current study

The play-based program evolved over the course of two years in four distinct phases.

Phase One

The innovative play-based learning program began with a single Year Two class, in a big school, as Friday afternoon activity. Over the course of a term the program evolved and developed as the researcher and twenty-two children participated in a range of curriculum based play activities. Although the activities covered all elements of the curriculum, there was a heavier focus on mathematics and science. This was in direct response to the lack of quality hands-on teaching experiences being offered in these areas of the curriculum and the disengagement of the children towards learning. Children lacked the ability of being able to transfer skills and knowledge to hands-on problem solving scenarios. Science on the other hand was predominantly an after thought only covered intermittently as an isolated activity.

Phase Two

The completion of Phase One culminated in the formal establishment of a play-based learning program as a demonstrably quality curriculum-linked learning experience. The trial had been an overwhelming success with both the children, from an engagement and enjoyment perspective, and with executive staff as they observed and evaluated the documentation related to quality learning in the Key Learning Areas (KLAs). The support of Teacher A as a collaborative partner and sounding board meant the majority of potential problems had been resolved. The next cycle was the program's expansion into all three Year Two classes. It was at this point Teacher B joined the team and bought the total number of children participating up to 55. It was also during this Phase the teacher participants teamed up with the English as a Second Language (ESL) teacher. The play-based program involved a range of activities linked to various KLA curriculum outcomes and indicators. Anecdotal notes, footage and photographs of the children were used to provide assessment information for formal reporting, as well as feedback for the teachers and the establishment of reflective practises.

In this Phase the knowledge gained by the participant teachers fuelled the expansion of the program into other learning areas. In literacy and numeracy sessions children were given greater choice in their activities, more opinions were made available which linked to the real world and children's interests, and the number of practical experiences increased.

Phase Three

In this Phase the program expanded to incorporate all of Lower Primary and two Support Unit classes from Kindergarten (age five) to Year Two, ten classes in total. The growth of the program created the requirement for formal teacher professional development sessions, which were conducted in a lesson study format across three days. The Lesson Study involved a research presentation, demonstration, collaborative planning session and culminated in the running of a session by the participants with feedback. Once all teachers had completed the official training package the Principal approved the Active Learning program as a compulsory teaching component. Then came the challenge of packaging the program for individual teachers, including the main issue of supplying good quality resources. This was predominantly due to differing needs of teachers, such as the divide between collaborative teaching and those preferring to work independently. Also, the sustainability of the program was a major consideration when planning resource allocations.

Phase Four

In the final phase of the program we go back to an earlier stage with the collaborative team including the researcher, Teacher A and ESL teacher. By the time the rest of Lower Primary had come on board with the program, the original three classes have elevated to a completely new platform of play-based learning. The children and parents had evaluated the program as so successful that the teachers decided to run two sessions a week. The major change however was in the way program was presented; but more important was the fact that children took over control of the play-based learning sessions making them completely child driven. Children suggested stations they were interested in running themselves; in preparation they participated in trial runs to make sure they had a sound understanding of the concepts behind the activity before leading other children.

Findings

The play-based learning program exceeded the expectations of the researchers. Not only were the children engaged and motivated, and learning through choice and interest, but also there was a resounding commitment from other teachers who became interested and inspired by the program. Some of the key outcomes have been improved attendance on the part of the children, increased engagement with the school on the part of the parents, and improvement in NAPLAN results.

Children's Engagement

Given the low SES backgrounds and high migrant status of children participating in the program, the majority had experienced at least one or more of the following setbacks, which influenced their schooling experience,

- parents with low level education and negative attitudes towards formal schooling;

- parents who didn't verbally interact frequently or buy educational toys in the early years;
- lack of preschool or early childhood learning experiences;
- English as an additional language;
- "schooled" by teacher directed learning, worksheets and irrelevant activities; and
- lack of teacher confidence in the specific areas of play-based learning, science and mathematics.

Throughout the study children displayed in many ways heightened levels of engagement and motivation towards learning. From the simplest form their smiles and the constant references they made to experiences they had had in the program to children asking interesting open-ended questions and displaying a sophisticated thirst for new knowledge. They began researching topics of their choice and suggesting stations they could run to showcase experiments, origami skills, drawing, drama workshops, computer knowledge and so much more. Children were reading because they wanted to access information on dinosaurs, frogs, African animals, soccer skills; they wanted to know how to complete activities such as making craft items or executing a specific experiment. They began writing more to record how they made their milkshakes, to send hand-written letters to each other filled with kind words and drafting scripts so that they could record plays using digital technology. Children would even request items to help them complete activities they had researched at home but couldn't complete without resources, or they would bring in projects constructed in their own time of which they were proud.

From children's increased engagement came a flow-on effect of other significant successes such as their attendance levels.

Improved attendance levels

Children were genuinely excited to come to school. They asked when the play-based learning program would be run every other day. They talked about their favourite activities and constantly made suggestions for the next session. Over the course of a year out of 55 children, 39 had attendance levels over 90 per cent. Parents struggled to keep children at home when they were sick as they worried about missing out. As an example, one little boy's attendance in Kindergarten where there was focus on play ran at 85 per cent, by Year One it had plummeted to below 80 per cent. Most mornings this child would sit outside the classroom on a little wooden bench, after the bell had gone, because he was disengaged with learning and had no interest in being inside the classroom. When the play-based learning was introduced to his class in Year Two, this same boy had an attendance level of 93 per cent. He was engaged in learning, building strong relationships with other children in the class and had an increased level of confidence.

Heightened social skills

This is an important place to reiterate some of the disadvantages these children face as they enter formal schooling such as English as an additional language, little or no pre-schooling and a lack of quality verbal interactions with other children and adults. Within the classroom, despite having already completed two years of formal schooling, we found these children struggled to think independently, work cooperatively, value skill other children offered and generally communicate effectively with each other.

The play-based learning program allowed children to interact on an even playing field. It promoted an atmosphere where children needed to communicate to complete activities and gain information required. Those who were not so confident in one area were able to shine in other areas. The program built pride in their cultural heritage and promoted positive interactions between children, and children and teachers, as everyone wanted to ask questions and hear about the learning-taking place. The children moved freely throughout the space during sessions often interacting with children outside their social circle. This process helped to build an inclusive learning environment where children were eager to work with each other and called on and valued specific skillsets offered.

Acquisition of 21st Century skills

Although the acquisition of increasingly appropriate social skills was a significant development throughout the program, there were also a number of other key 21st Century skills children established along the way. Activities, included a range of challenges, promoted both collaboration and problem solving. Children built bridges, to hold a specific weight, made using only cardboard, sticky tape and newspaper, they created boats to float on a small body of water using only recycled materials, and they designed tall, stable towers using spaghetti and marshmallows.

These activities and experiences may seem like good, sound pedagogy which educators would expect to find in the early years of schooling, but the reality of this case study was that broad perceptions of teachers towards developmental play in formal schooling meant traditional teacher orientated learning would have over-ruled without this initiative. Also, the ongoing struggle amplified in the literature of teacher attitudes and often poor grounding curriculum specifically in mathematics and science curriculum areas were exemplified through this case study.

We know this because teacher's lack of confidence, knowledge and poor outcome results in National and State testing, specifically in the area of numeracy, prompted the Department of Education to designate an Instructional Leader, at Deputy Principal level specifically to the location to assist in professional development of Kindergarten to Year Two teachers to improve results. This case study is not the only New South Wales Department school to have an Instructional Leader introduced; 50 were appointed in 2012 and an additional 26 in 2013 to work with teachers and school leadership to improve numeracy and literacy results. Thus, School X is not an unusual example. Within the school, data gathered from teachers highlighted the fact that science had previously been taught in isolation of other subject areas and often conducted in a mad panic around report time. In addition to this, a significant proportion of the experiments undertaken were so structured they came with a pre-determined output, thus missing a meaningful steps in the process.

Previously, at this school, the teaching of mathematics or science meant teachers stuck close to traditional methods of explicit teaching practices, gave instruction in isolation of other Key Learning Areas, conducted whole class teacher led session and utilised worksheets without providing opportunities for the 'hands-on' application of skills. Active Learning sessions gave children deep-learning experiences, real-world context and allowed them to apply a variety of mathematical concepts to a single task.

The program included a wide range of activities which provided children with an opportunity to explore and expand their creativity including themed drama stations such as a doctors surgery

and jungle safari, playing and crafting a range of musical instruments, exploring mediums such as chalk, acrylics, oil pastels, charcoal, lead pencil and watercolours, and dance workshops.

The sessions took the learning out of the hands of the teachers and placed it in the control of the children. They were able to independently suggest and design their own activities, explore specific child-designed questions and recognise there can be a variety of solutions to real-world problems. They were also able to employ a range of strategies and self-select tools to help them solve problems, and draw on the knowledge of experts be it child, teacher, parent or community member to help them.

As children completed activities or during the wrap-up at the end of the play-based learning sessions they were given the chance to talk about what they had done and critically reflect on their work. Children vocalised to each other and/or a teacher in many different formats, including iPad recordings and photography, how they felt about their pieces of work, how they could improve and what they loved about the session. Children became so familiar with this process that it led to them interviewing other children independently and also putting more effort into their projects, often to the point where they would complete them over a number of weeks.

Children became very comfortable using PC and Apple technology to record drama, musical and dance pieces, and taking photographs of their own and other children's work. They used programming software to build moveable Lego robots and explored a diverse range of apps to create ebooks, puppet shows and digital art. They were invariably keen to have access to technology so that they might capture their own moments, show their work or create documentaries, for example news reports or a footy show commentary, and present using a Smartboard.

The reality of this case study showed that prior to the Active Learning program being implemented children were not able to apply explicitly taught skills across tasks, which was evident in their Best Start, NAPLAN and general assessment results. They were disengaged with learning and they could not think for themselves, because they were so used to playing *guess what's in my teachers' head*. Active Learning had the dual role of increasing children's independence, ability to think for themselves, positively engage with learning and collaborate with children across the class, it also had the same effect on teachers.

Child-driven content

The more comfortable children became with the program the greater involvement they were able to have in the design of activities. Ideas came in many forms: some were conceived through questions children asked, others were experiences they had had at home and wanted to share, many were from craft and experiment resources children read in the classroom or skills they wanted to teach others. If it were possible, the station was created for them. Often children then ran the activity themselves with the backup support of a teacher, especially if it was an experiment, to make sure they had accurate terminology, understood key concepts and that they were facilitating the experience for others rather than doing it all themselves.

Improved literacy and numeracy results

Children were encouraged to write letters to each other, create procedures and use them to make items, they also independently designed surveys to question others and wrote descriptions about animals. Some children built Angry Bird towers using place value blocks to knock down, while others added up money at the supermarket or café. The program allowed children greater freedom to express themselves. They were increasingly able to transfer skills from everyday classroom activities into the play-based learning sessions and vice versa. This transferability was reflected in the increased scores achieved in both numeracy and literacy NAPLAN results. In many cases children moved at least one band higher than children at the same level in previous years.

These outcomes for children became infused into everyday classroom activities making for an intensely purposeful learning environment. Children were more inclusive of others in the completion of tasks, choosing to work with others. They showed greater awareness of quality work with substance and could manage their own time and learning. They demonstrated superior independence and could locate resources, reference materials and access technology by using their own background knowledge or that of another child's. In this classroom the teachers became true facilitators in these children's learning journey as the program evolved and they released control.

Discussion

The findings noted in the previous section relate to children, however, the impact on teachers and parents was as positive within their contexts.

Teachers

Knowledge and the content of the curriculum are generally in Australia delivered in a top-down model. School leadership usually ensure planning from the curriculum prior to the learning and teaching taking place. Friere holds that educators and curriculum developers 'claim to be progressive, and they regard themselves as proprietors of knowledge, whey then need only *extend* to the ignorant educands' (Freire, 1992, p. 112). At School X this approach to learning and teaching was evidenced on two levels. The curriculum has been written by subject experts with students in mind who would have Australian English as their home language. Often the New South Wales (NSW) curriculum, and teachers' interpretation of this curriculum, did not take into account children such as those in School X. At the local level, teachers, who had studied through traditional teacher education courses, were inclined to teach these children as they would children of Australian heritage of middle or high SES. This had had disastrous results evidenced in poor attendance, behaviour problems in class, devastatingly low achievement by children on NAPLAN tests and extremely limited liaison between school and parents.

Despite data showing poor achievement, attendance and engagement by the children, teachers were so entrenched in their pedagogy that they were extremely and vociferously reluctant to attempt another model at first. As noted by Freire:

> The task of educator would be all too easy if it were to be reducible to the imparting of content that would not even need to be treated aseptically, and aseptically "transmitted," since, as the content of a neutral science it would be aseptic. … The subject or agent of a neutral practice would have nothing to do but "transfer knowledge," a knowledge that would be itself neutral'. (Freire, 1992, p.64-65)

Teachers in the current study considered themselves, at the outset, competent and progressive in their teaching; they therefore found it confronting when a new approach was mooted as another

option to be tried. Indeed, they were reluctant even to consider the questions Freire notes as fundamental to effective content:

> what content to teach, in behalf of what is this content to be taught, in behalf of whom, against what and against whom? Who selects the content, how is it taught? What is teaching? What is learning? What manner of relationship obtains between teaching and learning?...If being a teacher means being superior to the student in some way, does this mean that the teacher must be authoritarian? Is it possible to be democratic and dialogical without ceasing to be a teacher, which is different from being a student? (Freire, 1992, p. 116-117).

It took weeks of discussing with other junior primary teachers at School X the challenges to their approach, weeks of letting them observe the children engaged and retaining the power over their learning in the play-based program and how children then undertook the concomitant responsibility for their on-task behaviour and for their learning. As the study progressed and the teachers, falteringly at first, increasingly incorporated play-based learning into their classrooms, so in the professional development sessions, teachers began to ask the same questions as Freire, noted above, and to answer them for themselves. A conversation during one session shows this clearly:

T 5: It's not just the skill of being able to put play-based learning into practice, it's also the thinking that goes on behind it, like, who says we have to start with planning from the curriculum? Why can't we start from children's interests and map back to the LOs (learning outcomes) in the curriculum?

T2: I mean, the results (NAPLAN) speak for themselves now.

The above excerpt, from one of the professional development sessions, demonstrates the change in attitude as teachers increasingly found it possible to relinquish control to the children. The Principal's comment as he viewed the play-based learning in action in early 2013 summed it up: "It's so scary to see you teachers let go and give the children free reign to follow their interests. It is just so amazing, really, that there is nobody mucking about. Not one. They are actually engrossed and clearly learning."

Essentially what had happened over the implementation of the program, and as it developed, was that teachers used children, their cultural mores and specific interests as the starting point for planning and providing learning experiences. The practice of using children's interests as the starting point resonates with Freire's (1992, p.166) response to a poster he saw in Chile which stated that "those who know must teach those who know not". He added the following:

> But for the one who knows to be able to teach the one who knows not, ... first the one who knows must know that he or she does not know all things; second, the one who knows not must know that he or she is not ignorant of everything. Without this dialectical understanding of knowledge and ignorance, it is impossible, in a progressive, democratic outlook, for the one who knows to teach one who knows not (Freire, 1992, p. 166).

This thinking, that teachers have the humility to know the limits of their knowledge, and to hold high expectations of the children, was evidenced in the current study where there was truly a child-centred approach and as the children increasingly became partners with the teachers and drivers of content. Having the children as partners and directing the learning, reflects the adjusted framing and underpinning beliefs of teachers. They had to come to believe that play-based learning is a legitimate pedagogy. Also, they had to come to conceive of the children as efficacious

and capable learners – and not limit them by a discourse framing them as having limited potential because of their historico-social and cultural background. It became foundational to the way the teachers interacted with the children and, importantly, their parents.

Parents

The vast majority of parents of the children in School X saw themselves as almost completely powerless in relation to the education of their children and, indeed, determining their own futures, which was evident in their responses to survey questions, non-existence of a school Parent and Community organisation or volunteer program and extremely poor general attendance at school events and classroom activities. The legacy of the ex-refugees having been incarcerated for a length of time, the fear that they would by word or deed somehow jeopardise the acceptance of their children, was discernible in their interactions with the school and the staff. Freire emphasised '[i]n line after line of *Pedagogy of the Oppressed*, I discussed this phenomenon … the fear that fills the oppressed, as individuals and as a class, and prevents them from struggling' (Freire, 1992, p. 107-108). At the start of the program, parents almost never came to school, never responded to newsletters or attended parent-teacher conferences. In no way did they see themselves as partners with the school in the education of their children, nor as important to their development. They were all by then Australian permanent residents or citizens but their sense of powerlessness was palpable. Participant teachers in the current study came to understand what Freire notes: 'No one leaves his or her world without having been transfixed by its roots, or with a vacuum for a soul. We carry with us the memory of many fabrics, a self soaked in our history, our culture…' (Freire, 1992, p.23). The challenge was how to assure parents of this understanding and that the school truly valued their knowledges. Parents seemed to want to hope for better things for their children and themselves, but felt so burdened and disempowered in a new land and culture, an unfamiliar language, that they appeared paralysed in the context of their children's schooling.

With the implementation of the play-based learning program, children became excited about school; they wanted to participate as evidenced in improved attendance. They would take partially completed projects or experiments home and complete them there, their enthusiasm contagious. Children were so proud, for example, of the wetlands they seen develop, the vegetable garden they had dug and planted, the chicken coop they had sourced, ordered, paid for, built and tenanted with five chickens and four ducks that they insisted their parents come to school to see. This allowed teachers to start to build relationships and garner parent input, support and advice on the activities to offer to children. Gradually parents came and ran traditional dance sessions, baked traditional recipes with the children, taught everyone snippets of their home languages where, of course, their own children were the experts. They brought artefacts from their culture to school and their children explained their significance to everyone for, by then, the children's English was way in advance of their parents'

Play-based learning compared and contrasted with traditional teaching

Although the experiences described above may mirror sound classroom pedagogy there is one significant difference, student choice and direction. For example, a group of students decided they wanted to design and build a bird feeder. When the lower primary teachers were asked what they would have done next, the majority responded, that they would have chosen a location in the garden and put birdseed in it, project done. Instead our children separated themselves into different groups and other children floated in and out based on their interest as they guided the

learning experience to look at specific colours birds are attracted to, which paint was the best to use and durable in the elements, which birds were native to our location, bird sounds to attract them and selecting appropriate birdseed, managing the long term costs and sourcing it locally.

Below is a table outlining the key differences between this play-based learning strategy and traditional pedagogical practice.

Traditional Teaching	Play-based Learning
Role of teacher = instruct, direct, explain, control and assess	Role of teacher = facilitator of learning, to question, extend thinking with challenges, scaffold as children plan and execute experiments
Teacher dominated/directed	Child dominated
Predetermined Learning Outcomes from Curriculum decided by teacher prior to undertaking activity	Power of learning lies with children
Activities provided by teacher to children in a structured manner	Activities provided on children's request and according to their interests
Children move from station to station on teacher instruction	Children choose what they do, when they do it and how they do it
Frequent use of worksheets to keep children on task and for evaluation	Children are the experts and teach each other scaffolded by teacher
Independent work or teacher selected groups based on ability levels, mixed or focus	Children select groups, modify them and make collaborative choices based on interest and expertise
Assessment by teacher	Children decided on mode of learning, recording and evaluating their work, often using 21st century skills

It is difficult to single out the most important positive to emanate from the play-based program, but parental engagement with the school, and through that with each other, was certainly, even if tangentially, highly significant for their own ability to fit into the community. It saw them begin to form a group with a common understanding of the new society in which they found themselves and of the way their children were engaging in learning in their new environment. It saw them form networks of support for one another, saw them socialise and connect with each other through the children. They began to see the real desire of the school and the Australian educational system to include them as valued participants in their children's education. This dawning awareness provided for them what Freire so aptly describes:

> An understanding of the world which, conditioned by the concrete reality that in part explains that understanding, can begin to change through a change in that concrete reality. In fact, that understanding of the world can begin to change the moment the unmasking of concrete reality begins to lay bare the "whys" of what the actual understanding has been up until then (Freire, 1992, p.19).

Parents previously had some little hope for better things, but that hope 'demands an anchoring in practice' (Freire, 1992, p. 2) and this is what the play-based program offered them – a concrete way forward. The parents, through this program, were given the means, the 'permission' they called it,

to relinquish their 'attitude of "adhesion to the oppressor"' (Freire, 1996, p. 27) in order to play their part effectively in this new society of theirs.

> It was as if the "culture of silence" was suddenly shattered, and they had discovered not only that they could speak but that their critical discourse upon the world, their world, was a way of remaking that world. (Freire, 1992, p.30)

What the play-based learning program offered parents was the means to engage, to speak, to critique, to come to a better understanding of the educational system their children were engaged in and to play a significant and positive role. 'It was as if they had begun to perceive that the development of their language which occurred in the course of their analysis of their reality, finally showed them that the lovelier world to which they aspired was being announced ...' (Freire, 1992, p.30).

The play-based learning program had seen their children develop from burdened, quiet, reluctant attendees at school to keen, bright-eyed, confident equal participants in the learning endeavour with the teachers. Little by little the parents were drawn into this. Their own engagement, tentatively offered at first, became increasingly important in the development of the program. Their suggested content, their donated items, their treasured stories, when recorded, were utilised not only by their own child, but by others who then asked questions of that child, placing her in role of expert.

Conclusion

We, as authors, have used a lens of some elements of Freire's *Pedagogy of hope* to think about and explain the findings of our study. We could have written this purely from the perspective of advantages of play-based learning for improving children's outcomes. It seemed to us, however, that the effects on parents and teachers would then be diluted and we wanted those to hold equal prominence.

Certainly, for the children the findings section of this chapter provides evidence of enormous growth and achievement on the part of the children, effectively demonstrating that '[t]eaching someone to learn is only valid … when educands *learn to learn*' (Freire, 1992, p. 68, italics in original). Children took the initiative and drove the content of their learning; it was the teachers who had to adjust their pedagogy and, to a point, their belief systems around effective pedagogy for this specific cohort of children. Teachers' buy-in to the play-based program has flowed into 2014 to the point where they have been able to continue it in the junior primary without the researcher any longer leading the process. She has now moved to the middle primary and is beginning to introduce this pedagogy with older children (aged 8-10) and a new learning community of sceptical teachers.

For us, the authors, it was most specifically in relation to parents that elements of Freire's *Pedagogy of hope* were applicable. Their initial disempowerment that changed over time, through 'anchoring in practice', to positive, purposeful interactions with the School, their children, other parents and the wider community was potentially the most significant positive outcome of the initiative. As noted by Freire, hope is not enough, it needs to be channelled, leading to action:

> … my hope is necessary, but it is not enough. Alone, it does not win. But without it, my struggle will be weak and wobbly. We need critical hope the way a fish needs unpolluted water... The essential thing … is this: hope, as an ontological need, demands an anchoring in practice. As an ontological need, hope needs practice in order to become historical

concreteness. That is why there is no hope in sheer hopefulness. The hoped-for is not attained by dint of raw hoping. Just to hope is to hope in vain.' (Freire, 1992, p.2)

It would be arrogant to suppose that the play-based program alone was responsible for the positive outcomes for children, teachers and, importantly, the parents. We believe, however, that it played a central and important role. Consequently, we have the intense hope that the positives evident in this play-based program and reported in this chapter, will be a catalyst for others with similarly at-risk students to have the confidence to try this pedagogy of hope.

References

Aliakbari, M., & Jamalvandi, B. (2010). The impact of 'role play' on fostering EFL learners' speaking ability: A task-based approach. *Pan-Pacific Association of Applied Linguistics , 14* (1), 15-29.

Australian Curriculum Assessment and Reporting Authority . (2011). *My School*. Retrieved July 7, 2012, from http://www.myschool.edu.au/.

Australian Government Department of Education. (2009). *Australian Early Years Learning Framework.* Canberra: Australian Government Department of Education.

Bodrova, E., & Leong, D. J. (2007). *Tools of the mind: The Vygotskian approach to early childhood education.* Upper Saddler River, NJ: Pearson Education.

Broadhead, P. (2004). *Early years play and learning: developing social skills and cooperation.* London: Routledge Falmer.

Claxon, G., & Carr, M. (2004). A framework for teaching learning: The dynamics of disposition. *Early Years, 24*(1), 87-97.

Davis, G. A., & Tu, T. (2008). Mathematics and science in the early years. In P. G. Grotewell & Y. R. Burton (Eds.), *Early childhood education: Issues and development* (pp. 23-45). New York: Nova Science.

Fleer, M. (2009). Supporting scientific conceptual consciousness or learning in 'a roundabout way' in play-based contexts. *International journal of science education, 31*(8), 1069-1089.

Freire, P. (1996). *Pedagogy of the oppressed (New revised edition).* New York: Continuum.

Freire, P. (1992). *Pedagogy of hope.* London: Continuum.

Heidemann, S., & Hewitt, D. (2010). *Play: The pathway from theory to practice.* United States of America: Red Leaf Press.

Henniger, M. L. (2013). *Teaching young children: An introduction* (5th ed.). Upper Saddler River: Pearson.

Henniger, M. L. (2002). *Teaching young children.* Upper Saddle River, NJ: Pearson.

Karpov, Y.V. (2003). Vygotsky's doctrine of scientific concepts. Its role for contemporary education. In A. Kozulin, B. Gindis, V.S. Ageyev, & S.M.Miller(Eds.), *Vygotsky's educational theory in cultural contexts.*(pp.65-82). New York: Cambridge University Press.

Kozulin, A. (2003). Psychological tools for mediated learning. In A. Kozulin, B. Gindis, V.S. Ageyev, & S.M.Miller(Eds.), *Vygotsky's educational theory in cultural contexts.*(pp.65-82). New York: Cambridge University Press.

Lillemyr, O. F., Sobstad, F., Marder, K., & Flowerday, T. (2011). A multicultural perspective on play and learning in primary school. *International Journal of Early Childhood , 43*, 43-65.

Maher, M. (2013a). Making inclusive education happen: The impact of Initial Teacher Education in remote Aboriginal communities. *International Journal of Inclusive Education, 17*(8), 839-853. *doi:10.1080/13603116.2011.602532.*

Maher, M. (2013b). Early childhood project analysed within a model enhancing the self-efficacy of Indigenous people. *International Journal of Equity and Innovation in Early Childhood, 11*(1), 17-33.

Maher, M. (2012). Teacher education with Indigenous ways of knowing, being and doing as a key pillar. *AlterNative: an international journal of Indigenous scholarship, 8*(3), 343-356.

Maher, M. (2010a). Indigenous teacher education initiative: Shared conceptualisation leading to social justice and social capital in remote Australian Aboriginal communities. *International Journal of Interdisciplinary Social Sciences, 5*(1), 357-366.

Maher, M. (2010b). Culturally responsive evaluation enhancing outcomes for Indigenous children. *Studies in Learning Evaluation Innovation and Development, 7*(2), 42-54.

Maher, M., & Smith, S. (2014). Asylum-seeker and refugee children belonging, being and becoming: The early childhood educator's role. *Australasian Journal of Early Childhood, 39*(1), 22-29.

Ministerial Council on Education, Employment, Training and Youth Affairs. (2008). *Melbourne Declaration on Educational Goals for Young Australians.* Canberra: Ministerial Council on Education, Employment, Training and Youth Affairs.

O'Connor, D.. McCormack, M., MacLaughlin, P., Angus, J. & O'Rourke, V. (2014) Playing for High Stakes; Findings from the Irish Neighbourhood Play Research Project and their Implications for Development. EduLearn: Barcelona ISBN 978-84-617-0557-3

Organization for Economic Co-operation and Development. (2002). *Starting strong: Early childhood education and care.* Paris: OECD Publications.

Piaget, J. (1962). *Play, dreams and imagination in childhood.* New York: Norton.

Saracho, O. N. (2011). *An integrated play-based curriculum for young children.* Routledge, Taylor and Francis group.

Stephen, C., Ellis, J., & Martlew, J. (2010). Taking active learning into primary school: a matter of new practices? *International Journal of Early Years Education , 18* (4), 315-329.

Synodi, E. (2010). Play in the kindergarten: the case of Norway, Sweden, New Zealand and Japan. *International Journal of Early Childhood Education, 18* (3), 185-200.

Tzuriel, D. (1996). Mediated learning experiences in free-play versus structured situations among pre-school children of low-, medium-, and ligh-SES. *Child Development and Care, 126,* 57-82.

Vygotsky, L. (1987). *Mind and society: the development of higher mental processes.* Cambridge, MA: Harvard University Press.

Vygotsky, L. (1986). *Thought and language.* Cambridge, MA: MIT Press.

Whitby, G. (2013). *Educating Gen Wi-Fi: How to make schools relevant for 21st-centry learners.* Australia: Harper Collins Publishers.

Wienk, M. (Ed.) (2014). *Discipline profile of the mathematical sciences 2014.* The University of Melbourne on behalf of the Australian mathematical Sciences Institute 2014, Vic: Australia.

Wong, S.-m., Wang, Z., & Cheng, D. (2011). A Play-based Curriculum: Hong Kong Children's Perceptions of play and non-play. *The International Journal of Learning , 17* (10), 165-180.

Wood, E., & Attfield, J. (2005). *Play, learning and the early childhood curriculum* (2nd ed.). London: Paul Chapman.