

Exploring the role of schemas within the Welsh Foundation Phase curriculum

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Abstract:

This study explores children's schemas in the play-based Foundation Phase (FP) curriculum in Wales between 2012 and 2015. It uses detailed narrative observations, interviews, questionnaires and photographs to represent how children, aged between three to five years in the FP, used their schemas to develop their knowledge and understanding. An important focus of the research was to establish the developmental needs of practitioners working in the FP in terms of their knowledge of schemas.

The literature review critiques the constructivist theories of Piaget (1953, 1969, 1972) and Vygotsky (1978), previous key studies into schemas and how schemas can be supported in play-based curricula. The findings are presented as written narratives of the children's lived experiences using their schemas over two terms in one FP setting in South Wales. Drawing on the work of Piaget (1953, 1969, 1972); Athey (1990, 2007); Meade and Cubey (2008); Arnold *et al.* (2010); Nutbrown (2011) and Atherton and Nutbrown (2013) the observations and photographs are interpreted and analysed schematically and links are made to FP curriculum areas of learning and FP outcomes. It explores FP stakeholders' perceptions of schemas through the analysis of questionnaires and semi-structured interviews. Ethical considerations were taken into account. Consent and assent was sought from the setting, and all stakeholders involved in the research.

Findings indicate that there is a lack of knowledge and understanding of how schemas can support learning and development by FP stakeholders across South East Wales. Therefore this research, as well as highlighting how schemas can support children's knowledge and development within the FP curriculum, argues for the inclusion of schemas within FP training, policy and practice. This thesis contributes new and original knowledge by revealing how children's particular schemas can be supported across areas of learning and provision within the Welsh FP curriculum. A further contribution for FP practitioners has been the development of a working suite of tools to support the informed use of schemas in early years settings.

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Chapter 1: Introduction

1:1 My personal interest in the topic- the rationale:

My own interest in schemas has stemmed from ten years working as an early years practitioner and a lecturer in both further and higher education in Wales. As a practitioner, I was always interested in the unique ways young children made sense of the world and constructed their knowledge through their interactions with adults and resources within the classroom. Even prior to the Foundation Phase (FP) teaching in early years was topic based, with an active hands-on learning approach (ACCAC, 1996). There were always opportunities for children to follow their own interests and ways of learning. Child initiated activities were actively encouraged and the different ways children used to construct their knowledge and understanding were keenly observed. I was careful to always plan activities and provide resources that followed a child's interests. Therefore, although I had never heard of, or intentionally used, schemas in my practice, I had noted the different ways children seemed to prefer to learn and tried to support this.

My first formal knowledge of schemas came from supporting a student with her dissertation project where she was exploring how to provide learning opportunities based on children's schemas in a Flying Start setting for children aged two to three years. This led me to read Athey's (1990) book, 'Extending Thought in Young Children'. From this I was able to make connections through children's repeated patterns of behaviours, which I had previously witnessed in the classroom, and schemas. This previous experience as a classroom practitioner and a growing interest in schemas, led me to my choice of research questions and the design of this study.

In Wales, the FP curriculum (WAG, 2008c, 2015a) is based on a child's interests, should start where the child is and be child-centred and holistic. These are all principles, which should support children's schemas, as schemas help children to construct meaning in what they are doing and are intrinsic to that child (Louis *et al.*, 2008). However, to date there is no formal training in South Wales available for FP practitioners on supporting children's schemas and little guidance provided in FP policy and practice documentation and this could be deemed a missed learning opportunity.

In using an action research methodology in this research, I was able to explore children's schemas in depth and include practitioners in the research. This developed both my and the practitioners' knowledge and understanding of schemas. Openness and a sense of mutual discovery underpinned the action research through conversations over the photographs and observations

made with the children throughout the research. This led to mutual discoveries and an enriched understanding of the children's lived experiences within the setting. Through understanding schemas, children's behaviours can be viewed from an alternative perspective. If children's actions, their talk and meaning making are viewed schematically then new and different understandings can emerge. The challenge for adults is to be able to hear and see what is shown through actions and to attune their thinking to the child's *form of thinking* (Athey, 1990; 2007). Therefore, the research aims of this thesis are to explore children's schemas in the FP and how adults can be supported to nurture and nourish schemas once identified. This has contributed to the originality of this research in exploring schemas within the Welsh FP curriculum framework.

1:2 Setting the research into context: The Foundation Phase:

This thesis has set out to explore children's schemas in the Welsh play-based Foundation Phase curriculum. This research is timely as to date there has not been any other research into children's schemas within the context of the Foundation Phase curriculum. This study also explores FP stakeholders' knowledge and understanding of schemas. Again, this is timely as the Welsh education system is continually evolving, with practitioners constantly needing to develop their own understanding and pedagogy of the many ways children construct knowledge and understanding and *come to know*.

The Foundation Phase (FP) curriculum was introduced into all nursery settings in September 2008, and continued on a rolling programme of implementation until 2011. This new curriculum incorporated the Early Years curriculum and Key Stage One into one learning continuum for children aged three to seven years (Thomas and Lewis, 2016). The background to the development of the FP started with a report by Margaret Hanney in April 2000 (Hanney, 2000). She explored current provision for three year olds, and reported that the best provision was having a balance of adult-led and child-led tasks, a curriculum centred on the child, highly trained educators, high ratio of staff and a stimulating environment. Furthermore, the report highlighted the importance of holistic development, a child's right to be educated, appropriately trained adults and the recognition that every child is unique, naturally inquisitive and loves to explore.

Soon after the Hanney report was published, the Learning Country document (WAG, 2001) became available and set out the agenda for education and lifelong learning in Wales to 2010. A mixture of constructivist, developmental and socio-cultural positions, with an emphasis on

exploration, active learning and child-centred learning, underpinned the key messages from this report. Play was emphasised throughout as the most appropriate way for children to learn. This led to the development of the FP framework for children’s learning for 3-7 years, which was piloted in settings from 2004 (Thomas and Lewis, 2016). In November 2005 and February 2006 Siraj-Blatchford *et al.* carried out the Monitoring and Evaluation of the Effective Implementation of the Foundation Phase (MEEIFP). This was a two-year evaluation and its findings argued that best practice was for a more experiential, child-centred and play-based practice with an adult there to support, scaffold and guide learners.

The FP curriculum consists of seven areas of learning and the documentation clearly states that ‘Personal and Social development, Well-being and Cultural diversity is at the heart of the FP and should be developed across the curriculum’ (WAG, 2008c, p.14). According to Aasen and Waters (2006, p.124) this ‘places social interaction at the core of development and the child is viewed as an active meaning-maker.’ This supports the focus of the child in this research as being an active learner, constructing their own knowledge and understanding, with the support of an appropriate learning environment and knowledgeable adults. Dupree, Bertram and Pascal (2001) also argued that early years curricula should focus on children’s interests and needs, this is reinforced in the framework underpinning the FP, where the emphasis is starting where the child is and building upon their interests (WAG, 2008c). The seven areas of learning are shown in the table below and the FP policy guidance makes it clear that each area should not be ‘approached in isolation’ but ‘work together’ (WAG, 2008c, p.14).

Personal and Social Development, Well-Being and Cultural Diversity	Language, Literacy and Communication Skills	Welsh Language Development
Knowledge and Understanding of the World	Physical Development	Mathematical Development
Creative Development		

Table 1:1 *The FP areas of Learning*

Along with the seven areas of learning within the FP, there are three modes of provision, continual, enhanced and focused. The continuous provision is a constant of the learning environment on offer, allowing consolidation of skills through playful activities. Examples of

continuous provision are reading areas, maths areas, role-play and sand and water areas. Here practitioners observe the children to determine their interests. Wood and Attfield (1996, p.80) argued for a learning environment with, 'learning initiated by the child' instead of or being predetermined by the adult. The continuous and enhanced provision allow the child to follow their own interests with the focused provision building upon these interests.

In the enhanced provision, the practitioner adds resources to the continuous provision based on the observed interests of the children and linked to the current theme for that term. Finally, the focused tasks are the adult-led provision where new skills are taught. Maynard *et al.* (2012) argued that the continuous provision was child-centred, the enhanced provisions linked to teacher initiated activities and the focused provision linked to teacher directed tasks.

The experiential learning training pack offered to FP practitioners conceptualised the different provisions as a triangle (Department for Children, Education, Lifelong Learning and Skills: DCELLS, 2007 p.9) with the continuous provision at the bottom, occupying the greatest space. This suggested that there was an expectation for most learning to stem from the continuous provision- in other words children would spend the majority of their time involved in child-initiated activities in which they would exercise levels of autonomy. This was followed by the enhanced provision and finally the focused provision occupied the smallest space at the top of the triangle. However, despite guidance being issued to practitioners, an evaluation of the FP carried out in 2015 found that there was often confusion over the three types of provision, with literacy and numeracy especially, only being taught through the more adult-led focused provision (WG, 2015b). The evaluation recommended that practitioners were given more guidance on how to deliver the three types of provision.

One reason for literacy and numeracy being taught mainly through adult-led provision was the introduction in 2013 of the literacy and numeracy framework (LNF) (Andrews, 2013), for learners aged 5-14 years. This was quickly followed by the introduction of literacy and numeracy tests starting with children in year two of the FP. This led some practitioners to believe the philosophy of the FP was being eroded (Thomas and Lewis, 2016). They felt there was a paradox between providing a holistic, child-centred curriculum and accountability through meeting targets, test requirements and learning outcomes imposed by the Welsh Government (WG).

Perhaps this explains the research findings from researchers at Cardiff University, who recently completed a three-year evaluation of the FP. This evaluation found that, 'adult-led focused provision was observed far more frequently than child-led continuous and enhanced provision' (WG, 2015b, p.56) and that this increased for older children (aged five to seven years) in upper Foundation Phase classes. The reasons given for this by practitioners was that there was a need for a return to more traditional and formal pedagogies to ensure children performed well in the literacy and numeracy tests (WG, 2015b). However, it could be argued that measuring children's progress against targets and test scores also undermines a play-based approach, as practitioners are looking at what children can do rather than how they do it, reverting to a product not process pedagogy. This is what Nutbrown (2011) argues against, stating it is more important to focus on the processes children go through to construct their knowledge rather than measuring the end product.

Conversely, a move towards embedding more literacy and numeracy in the FP actually makes this research extremely timely and relevant. This is because previous research into schemas has indicated that supporting children's schemas can help to develop children's knowledge and understanding in literacy and numeracy (Nutbrown, 2011). Therefore, if the FP is moving towards embedding more formal literacy and numeracy in the curriculum, supporting schemas could help some children to construct their knowledge and understanding in these two curriculum areas. Additionally, a study by Arnold *et al.* (2010) found that when children were supported in their use of their preferred schemas their emotional well-being increased. Here, she has made the connection between children's schemas and their social and emotional development (PSE). This is interesting as the FP curriculum places Personal, Social and Emotional (PSE) development at the heart of the FP curriculum (WAG, 2008c), so Arnold's research would suggest that supporting children's schemas could support a child's PSE. However, this is not the focus for this PhD but adds support to recognising the worth of supporting children's schemas in the FP.

However, currently, schemas do not feature significantly in Foundation Phase policy and documentation issued to practitioners. There are only brief mentions of schemas in the FP policy documents 'Teaching and Learning Pedagogy' (WAG, 2008b) and the 'Foundation Phase Child development Profile Guidance' (WAG, 2009). In the 'Teaching and Learning Pedagogy' policy document, there is a mention of schemas on page nine under the heading, 'The Child as a Learner'. Here it states that, 'By repeating a learning experience they develop schema or

patterns of thoughts that are strengthened until they are able to make connections’ (WAG, 2008b, p.9). Then again on page 22, under the heading ‘Observation’ it states that, ‘Observation may draw attention to particular schema or patterns of thinking that predominate a child’s play’ (WAG, 2008b).

In the ‘Foundation Phase Child development Profile Guidance’ on page 19 under a section on ‘Cognitive Development’ and a subheading, ‘Developing concepts/schema’ it states that children should develop concepts ‘through using and understanding experiences and knowledge’ (WAG, 2009, p.19). However, there is no clear guidance given to practitioners on how to recognise and develop schemas in young children in these policy documents or in any of the other Welsh Government guidance on the Foundation Phase. This would seem to suggest that schemas are not regarded as important and are not well understood in the FP and an enquiry to the Welsh Government seemed to support this. Their response indicated that schemas were, briefly, included in one of the training modules on the Foundation Phase on child development. Nevertheless, it was up to individual authorities and schools on how the training materials were used and whether schemas were mentioned at all (Appendix 5).

Therefore, there is no consistent approach to training and guidance on supporting and developing schemas in the Foundation Phase in Wales. The Welsh Government also stated that FP settings use a range of other tools to support children’s learning such as learning styles and assessment for learning. Whilst these are important, and this research is not advocating the omission of any methods that can support and develop children’s learning, previous research has shown that schemas do support knowledge and understanding, and individual learning needs (Athey, 2007; Nutbrown, 2011; Atherton, 2013 and Constable, 2013). Therefore by omitting schemas as a way to support a child’s knowledge and understanding within the FP could be deemed a missed opportunity. This thesis seeks to redress this by providing empirical evidence that children’s schemas can be supported within the FP curriculum and are a window into a child’s way of thinking and coming to know.

1:3 Research questions and structure:

This research focuses on children’s schemas within the Foundation Phase (FP) curriculum and explores FP stakeholders’ perceptions of schemas. It is timely as the curriculum in Wales is

changing in 2019 initially for learners' three to fourteen, following the Donaldson review (Donaldson. 2015). The new curriculum advocates keeping the ethos of the FP but with more autonomy for practitioners and this increased autonomy means there is an opportunity for practitioners to adopt schemas as part of this new curriculum.

The research undertaken in this thesis, consists of two cycles of action research, the first a pilot study (Action Research Cycle One) undertaken between 2012 and 2013, and a further study in 2014-2015 (Action Research Cycle Two) and is underpinned by the following research questions:

Cycle One (2012-2013):

- What is the knowledge and understanding of the FP stakeholders of schemas within the chosen setting?
- Do children exhibit schemas in the Foundation Phase curriculum and how are schemas best identified?
- Can the Foundation Phase learning environment support children's schemas once identified?

Cycle Two (2014-2015):

- What is Foundation Phase stakeholders' knowledge and understanding of schemas across South East Wales?
- Can children's schemas be observed in the Foundation Phase curriculum?
- Can Foundation Phase practitioners be supported to nurture and nourish children's schemas?
- Can nurturing and nourishing children's schemas support Foundation Phase outcomes?

This study is organised into a series of seven chapters, which reflect the research journey. The literature review is subdivided into themes. Theme one discusses and contrasts the constructivist theories of Piaget and Vygotsky. Theme two discusses the concept of schemas starting with Piaget and then draws on previous research findings from Athey (1990, 2007); Meade and Cubey (2008); Arnold *et al.* (2010); Nutbrown (2011); Atherton (2013) and Constable (2013). These researchers have linked children schemas with literacy, numeracy and scientific concepts, early learning goals in the English Early Years Foundation Stage curriculum, social and emotional development and dispositions to learning. The third theme analyses the ambiguities of play-based learning in early

childhood education and discusses the use of schemas within play-based curricula. It concludes by suggesting how the play-based FP curriculum could also support children's schemas.

Chapter 3 explains the research design and includes information about the setting used, the methodology adopted (Action Research), the sampling techniques, the data collection methods (observations, photographs, questionnaires and interviews) their limitations and the ethical considerations. Here the pilot study (Action Research Cycle One) is summarised, with recommendations made that have influenced Action Research Cycle Two, which is presented in the following chapters.

Chapter four is the first findings chapter and focuses on the first two stages of the second action research cycle based on Mills and Butroyd's 2014 model of action research: **Finding a focus** and **Clarifying the focus**. Here all the responses from the completed questionnaires from a wide range of FP stakeholders are discussed and analysed. This builds upon the questionnaire findings in the Cycle One, summarised in chapter three. These responses have helped to determine the next stage of the action research cycle: **Implementation**, which is presented in chapter five.

Chapters five presents the observations and photographs with six children as they used their schemas to develop their knowledge and understanding over two school terms. This reflected the responses to the questionnaires in chapter four, where FP stakeholders felt they lacked knowledge of how to recognise and support children's schemas within the FP learning environment. The observational data is analysed and interpreted adopting a model used by Atherton (2013) and based on Athey's (1990, 2007) interpretation of Piaget's schema levels. In addition, links are made to the FP curriculum areas of learning and FP outcomes.

Chapter six presents and analyses the responses from the semi structured interview carried out with the practitioners involved in the action research at the end of the study. This interview **evaluated** the research and considered ways forward to **disseminate** the research findings to a wider audience, thus supporting the final stages of Mills and Butroyd's 2014 model of action research.

Chapter seven concludes the thesis with a summary of the overall findings, potential limitations, recommendations, contribution to knowledge and directions for further study.

Chapter 2: Literature Review

2.1 Introduction:

Recognising that children actively construct their knowledge and understanding, this literature review begins by identifying and discussing the key theorists that have informed and underpinned this research. The chapter is set out into three themes, theme one is a discussion of Piaget and Vygotsky's theories of how children construct and develop knowledge and understanding. Theme two presents prior research on how children actively use their schemas to construct their knowledge and understanding and theme three discusses other play-based curricula that have embedded schemas into their pedagogy.

Both the theories of Piaget and Vygotsky are included as within the 'Learning and Teaching' pedagogy document issued to FP practitioners, their theories are cited as underpinning the ethos of the Foundation Phase (FP), where this research took place (WAG, 2008b). Piaget (1953, 1969, 1972) is relevant to this research for his work on children being active constructors of knowledge and his work on schemas. Vygotsky's work is important for his theory that children are also active constructors of knowledge and understanding, but need social interaction to further their understanding (Vygotsky, 1978). The FP curriculum supports both the theories of Piaget and Vygotsky, as here children are viewed as active meaning-makers within a social learning environment with supportive adults attuned to their ways of thinking.

Guidance issued to practitioners in the FP states quite clearly, that children are actively learning from birth. The FP aims to build upon these prior learning experiences and empower children, 'to take greater charge of their lives in order to enhance their self-confidence, competence and self-esteem' (WAG, 2008b, p.5). Brierley (1994) reinforced this concept of children being active learners from birth by arguing that the period between birth and puberty was critical in terms of learning, further emphasising that in the first five years brain growth was particularly rapid. Additionally, Shore attests the time of early childhood as being the, 'most critical learning phase', and 'influenced the rest of development' (Shore, 1997, p.51; Gopnik, Meltzoff and Kuhl, 1999, p.190). Meanwhile, Gopnik, Meltzoff and Kuhl (2001, p.195) acknowledged the importance of worthwhile early experiences in stating that, 'the brain changes in radical ways over the first few years of life...it actively tries to establish the right connections...in response to experience.'

Finally, Nutbrown (2006, p.125) makes the point that children should be at the centre of the learning environment and the early years curriculum should be driven by a 'learner and person-centred ethos [which] affords children's minds the respect they deserve.' Therefore, it appears that the FP curriculum reflects such ideas, with the need for children to be active meaning-makers and social actors in the learning environment, with supportive adults who are able to nurture their development

The literature review continues by discussing the concept of schema drawing on the work of Piaget as the originator of schemas, through to other researchers who have taken Piaget's work forward: Athey (1990, 2007); Meade and Cubey (2008); Nutbrown (2011); Atherton and Nutbrown (2013); Arnold (2013) and Constable (2013). These researchers have continued to explore and advance Piaget's work on schemas. The aim of this study is to explore how schemas enable children to develop their knowledge and understanding within the Foundation Phase (FP) in Wales. The research will highlight how a knowledge of schemas can facilitate adults to become co-constructors of knowledge and understanding with young children within a play-based curriculum such as the FP. This chapter concludes with comparison of early years play-based curricula that have supported children's schemas, making a comparison with the play-based FP curriculum in Wales. This theoretical chapter is deemed fundamental to this research as underpinning the thinking and mode of analysis adopted throughout. It begins by discussing the theories of Piaget and Vygotsky.

2:2 The theories of Piaget and Vygotsky:

Today in education, emphasis is placed on children's active learning and how practitioners are able to support this. A small-scale study by Robson and Hargreaves (2005) highlighted the importance of placing emphasis on children's own choices and allowing children time to carry out child-initiated activities alongside supportive practitioners. Here children are considered as *social actors* actively constructing their knowledge (Uprichard, 2008). This links to the ethos of the Foundation Phase (FP) curriculum in Wales where children are seen as active meaning-makers and constructors of their own knowledge and understanding (WAG, 2008c). Throughout their time in the FP, children are rapidly acquiring new skills and practitioners need to have an understanding of child development and plan activities accordingly (WAG, 2009). May (2011) makes the point that acquiring knowledge in a child's early years is nearly always linked to active first-hand experiences. Therefore, practitioners working in the FP are encouraged to observe

children, find out what their interests are and plan experiential learning experiences that reflect those interests. Here the practitioners are considered as co-constructors of knowledge alongside the children.

Central to knowledge development and understanding is forging the link between already acquired knowledge, and that which is new (May, 2011). One of the most influential pioneers of understanding of how children construct knowledge in this way was Jean Piaget. Piaget (1953, 1969, 1972) was one of the main proponents of constructivism along with Vygotsky, but Vygotsky differed from Piaget in being known as a social constructivist. Vygotsky (1978) emphasised the belief that children learn from being part of a social environment and interaction with more knowledgeable others, whilst Piaget considered children learnt more from working on their own or with peers of equal ability.

Both are important to this research and are discussed in relation to how their theories support children's active experiential learning. Piaget is discussed first in relation to his theory of how children actively construct knowledge and understanding (1962). Then Vygotsky is discussed in relation to his theory of learning taking place in a social learning environment and the important role of adults as co-constructors of knowledge (1978). Both the theories of Piaget and Vygotsky underpin today's FP curriculum, where children are viewed as active meaning-makers, constructing their knowledge and understanding in a social learning environment with equal and more knowledgeable others (WAG, 2008b).

Piaget (1896-1980):

Piaget has been hugely influential in the study of child development. He believed that knowledge must be invented or constructed by each learner through their actions (Piaget, 1972). His theory was that human beings are organisms constantly adapting to their environment and that knowledge is not pre-formed in people and cannot therefore, be transmitted from one person to another (Green and Gredler, 2002). Piaget argued against children being told knowledge, but finding it out for themselves, through active explorations (1972). As Weeden and Winter (1999) argued if knowledge is simply transmitted to pupils then they only gain a surface understanding with no sense of purpose. In support of Piaget's theory, children are viewed as active constructors of knowledge in the FP as seen through the continuous and enhanced provision on offer on a daily basis (WAG, 2008c). However, there are times when adults do need to support children's

knowledge construction through direct teaching especially to correct and avoid misunderstandings. This is seen in the FP when adults engage with children in focused tasks sharing and transmitting knowledge so this would be in contrast to Piaget's theory.

Piaget described the processes by which children actively gain (construct) knowledge as:

- Assimilation – the integration of new knowledge and understanding into existing ideas.
- Accommodation- where assimilated knowledge is differentiated according to new experiences

(Piaget, 1972)

He believed that nature and nurture contributed to intellectual ability and stressed that children needed to be active learners (Piaget, 1972; Maynard and Thomas, 2009). Piaget (1969) believed children thought differently at different stages of their lives and the changes in thinking as children moved from one stage of development to another led to deepening knowledge and understanding. He argued that children and adults needed to adjust their thinking continually, in terms of new ideas and acquired knowledge. Piaget said that there were stages in a child's life during which his or her thinking shares key features common to the thinking of all children within the same age range. He postulated that to foster cognitive development in the classroom, teachers needed to organise activities that challenge current thinking- the nurture part of his theory.

However, Piaget was critical of formal education that did not allow children to construct knowledge through experiential activities, experience and personal reflection. He argued that knowledge is only gained 'superficially with no change in thought' unless it means something to the child (Piaget, 1995, p.204). Piaget stated that, 'at every level experience is necessary to the development of intelligence' (Piaget, 1953, p.362). Wood reaffirmed this view of the child by stating that children are, 'architects of their own understanding' (1988, p.225).

Piaget (1973) put forward a theory that involved four distinct stages of cognitive development. He regarded development as discontinuous in as much as the children need to proceed through the four stages without missing any of the stages out or returning to them, i.e. the stages were invariant. The four stages are defined as follows: The sensori-motor stage, approximately 0-18 months; The pre-operational stage, approximately 18 months -7 years; The concrete operational

stage, approximately 7 years-12 years and the formal operational stage, approximately 12 years-adulthood.

In the sensori-motor stage the infant is seen to develop their cognition through their senses and active exploration (Piaget and Inhelder, 1969). Piaget proposed that human beings learn through repeatedly acting on objects and materials within the environment. He identified many of these early actions,

...like putting things next to one another (proximity) or in series (order), actions of enclosing, of tightening or loosening, changing viewpoints, cutting, rotating, folding or unfolding, enlarging and reducing and so on'

(Piaget and Inhelder, 1956, p.453)

Piaget believed that human beings build up working theories through repeating these actions. Piaget (1971a, p.63) described 'assimilation' as 'the process whereby an action is actively reproduced and comes to incorporate new objects into itself (for example, thumb sucking as a case of sucking)'. This has been supported by the Alexander *et al.* (2009) who summarised that, 'Piaget's recognition that children actively construct their knowledge of the world through their actions upon it has been upheld' (p.91). The sensori-motor stage is further subdivided into six sub stages. These sub stages chart the increasing development of the infant from repeated primary reflexes at birth through to the beginnings of representation at eighteen months. For Piaget, this final stage in the sensori-motor period is the transition to symbolic or representational thought (Halpenny and Pettersen, 2014). It is in this final sub stage that infants fully understand object permanence. By using these repeated actions throughout all the six sub stages, the infant is continually assimilating and accommodating information in order to reach and maintain equilibrium.

The next stage—the pre-operation stage represents the age of the children in this research. A child's cognition continues to develop in this stage and children increasingly engage in imaginative, symbolic play and pretend play. When young children re-present their earlier experiences, they often use 'symbols' to signify or to stand for the objects, people or events they are re-enacting. These symbols can be actions, objects, pictures or words. Piaget (1972) cited observations of his own daughter engaging in imaginative play representing this stage of

development and thinking. This stage is sub divided into the following two sub stages: *Symbolic function* and *Intuitive thought*. Within the first of these sub stages (two to four years) the infant increasingly uses symbols such as images, words and gestures to represent objects. Additionally within this subs stage children are egocentric, only seeing things from their point of view (Halpenny and Pettersen, 2014). In the second sub stage, *Intuitive thought*, children begin to be able to search for logical explanations, begin to classify objects but have difficulty in arranging things in order (seriation) and to understand conservation. The child in the pre-operation stage continues to initiate activities where they can explore and expand their thinking, and can use their preferred schemas to facilitate this.

The concrete operational stage signposts the development of logical thought in children aged seven to eleven years. Here children can conserve numbers and quantities and reverse their thoughts when problem solving (Piaget, 1969). The final stage in Piaget's theory of development is the formal operations stage, beginning at about eleven years of age. Here thinking is more flexible without the need for concrete props and more symbolic. However, Sunderland points out that Piaget failed to fully describe this last stage (1992). The lack of a full description of this last stage may be because Piaget did not believe that development ended once the formal operations stage was reached, he held the belief that development never ends (Piaget, 1987). What Piaget did postulate, 'was that the structure of the formal operations stage is a final form of equilibrium' (Lourenco and Machado, 1996, p.155).

Piaget regarded the stages of development as invariant, occurring in a fixed order and with no omission. In each of the stages children are constructing their knowledge and understanding of the world. This has been one of the main criticisms of Piaget's work especially by Neo-Piagetians such as Case (1992), who have accused Piaget of neglecting to address the process of transition across stages and the issue of individual differences (Lourenco and Machado, 1996). However, Piaget did recognise that individual differences in genetics and environmental factors could also affect the rate at which children move through the stages (Piaget, 1976). Piaget's theory also claimed that children's patterns of thinking and knowing are distinct at each stage and that development is characterised by the ability of the child to make a leap, intellectually, from one way of thinking about the world to another more advanced level of thinking (Piaget, 1972; Maynard and Thomas, 2009; Lourenco, 2016).

Piaget developmental stage theory allowed practitioners to align their pedagogy with the cognitive levels of the children they were teaching and assumed that readiness to learn was something that could not be hurried. This is one of the underlying principles of the Foundation Phase curriculum in Wales, with a stage not age approach to learning (WAG, 2008d). However, Piaget was critical of purely instructional teaching, arguing against, 'rote learning of data and facts without involving the construction of operational instruments or forms of thinking' (Lourenco, 2012, p.285). Piaget & Inhelder (1969) always considered the person's actions and coordination of actions the decisive factor responsible for an individual's own development, knowledge and learning. Piaget argued for the teacher to, 'create and organize classroom experiences that challenge students' thinking' (Green and Gredler, 2002, p.56). The FP policy guidance supports this view with a very clear message to practitioners to accompany and support children on their learning journey with a move away from a didactic pedagogy (WAG, 2008c).

As stated earlier, the main criticism of Piaget's developmental stage theory centres on the fact that the stages are linear in progression and that one stage replaces another. Piaget did recognise that children develop at their own rate but that they needed to pass through the same succession of stages. Bruce (2011) argued against the discontinuous, linear stages of development, but supported the notion of every child being unique and developing at their own individual rate. Burman (1994) also argues against confining children to particular stages of development. This is supported by the fact that many researchers have shown that children will progress through the developmental stages postulated by Piaget at an earlier age than stated (Bruce, 2011).

However, Cohen (2002) points out that Piaget never believed there was a fixed time for each stage in his theory of development but believed the stages and sub stages followed one another in a fixed inevitable pattern. In addition, for Piaget the key element in development was not the age but the sequence in which it occurred (Montangero, 1991; Smith, 1991 and Strauss, 1989). Therefore, in Piagetian theory, 'age is at best an indicator, not a criterion, of developmental stage' (Lourenco and Machado, 1996, p.147). This resonates with the FP where the policy documentation argues for a stage not age approach to pedagogy and that all children are unique (WAG, 2008c).

Although Piaget's work has been criticised for emphasising the artificial stages of cognitive development, he also identified certain continuous ongoing processes that foster this cognitive

development. He believed a child actively constructs knowledge (constructivism) in reaction to the experiences offered and was interested in how children '*come to know*' or to use Piaget's terminology, '*genetic epistemology*' (1971b). Piaget's theory of cognitive development reflected a pattern of continuous adjustment to new ideas, concepts and meanings (Piaget, 1950). Children and adults adapt to and make sense of new information through experience and actions.

To recap, he described the processes by which children actively gain (construct) knowledge as:

- Assimilation – the integration of new knowledge and understanding into existing ideas.
- Accommodation- where assimilated knowledge is differentiated according to new experiences-

(Piaget, 1972)

According to Piaget, the balance between assimilation and accommodation varies. He stated that assimilation was 'the process whereby an action is actively reproduced and comes to incorporate new objects into itself (for example, thumb sucking as a case of sucking)' (Piaget (1971a, p.63). Accommodation was the process of changing or adapting existing concepts to embrace new knowledge (Piaget, 1971a). When children are not actively developing they are in a steady state, which he termed 'cognitive equilibrium' (Berk, 2009, p.225). Piaget describes equilibrium as follows: '...there is equilibrium when an external intrusion is compensated by the actions of the subject' so an individual's knowledge meets the challenge (Piaget, 1980, p.151). He believed intelligence comprised of equilibrium between assimilation and accommodation (Piaget, 1950). Similarly, when children were going through rapid cognitive change they were in a state of, 'disequilibrium or cognitive discomfort' (Berk, 2009, p.225).

Piaget (1980) named this to-ing and fro-ing between equilibrium and disequilibrium, equilibration. According to Piaget, development is driven by the process of equilibration (Piaget, 1980). Equilibration can be thought of taking place as follows: First children are satisfied with their mode of thought and therefore are in a state of equilibrium. Then, they become aware of the shortcomings in their existing thinking and are dissatisfied (i.e. are in a state of disequilibrium and experience cognitive conflict). Lastly, they adopt a more sophisticated mode of thought that eliminates the shortcomings of the old one (i.e. reach a more stable equilibrium). Every time equilibration occurs, more cognitive gains are made.

Siegler and Ellis (1996, p.214) have made the point that Piaget was ahead of his time in his thinking but a criticism of his work was the 'vagueness and lack of precision' in the explanation of assimilation, accommodation and equilibrium. They argue that Piaget placed more emphasis on identifying changes in thinking rather than understanding how they occur (Siegler and Ellis, 1996). In fact, Piaget himself was not very satisfied with his explanation of developmental change and was the first to recognise the limitations of his theory (Lourenco, 2016). However what Piaget had achieved was to move beyond the merely descriptive elements of development to giving some reasons or as he put it, whilst in conversation with Bringuier,

...I have drawn a quite clear general skeleton, but one still full of gaps of such a kind that, in filling them one will be led to differentiate its connections, in various ways, without at the same time altering the main lines of the system.

(Bringuier, 1980, p.140)

Another criticism levelled at Piaget's theory of development was that it could be considered a deficit model more concerned with what a child could not do. This was particularly evident in the pre-operational stage of development where this research is situated. Here Piaget noted that children in this stage do not yet understand concrete logic, cannot mentally manipulate information and are unable to take the point of view of other people, which he termed egocentrism (Piaget, 1951). Susan Isaacs (1885-1948) was the first researcher to challenge Piaget's deficit model of cognitive development (Isaacs, 1930). Through detailed observations Isaacs was able to show that children are competent even at a young age as long as they are offered worthwhile curriculum content. Isaacs offered positive descriptions of children's cognitive abilities – what they could do rather than what they could not do. She also believed that Piaget placed insufficient emphasis on children's social interactions.

Donaldson also challenged the validity of Piaget's experimental approach, with children seen as lone scientists. She believed that children learn together and this social interaction can help a child reach the next stage of development quicker than Piaget thought. As with Isaacs, Donaldson also emphasised what a child could do rather than what they could not do (Donaldson, 1978). She also repeated Piaget's experiments and suggested that children could do better on set tasks such as conservation, perspective taking and transitive inference if the context was familiar to them (Donaldson, 1978; Gelman and Baillargeon, 1983). This was in contrast to the original experiments carried out by Piaget who was more interested in how things become known

(epistemology) rather than a child's understanding of events (1962). Nevertheless, despite her criticisms she acknowledged that Piaget had made a significant contribution to knowledge of child development (Donaldson, 1987). However Smith (1993) and Lourenco and Machado (1996) argue Piaget never argued for cognitive incompetence in children, rather he argued for *evidence of cognitive competence*. For Piaget the questions raised were not whether thinking was logical or not but what kind of logic were children exhibiting. In addition, when Piaget discussed the things children could not do in a particular stage of development he also defined the things they could now do (Lourenco and Machado, 1996).

In 1970, Piaget revised his sequential approach to children's development and likened it instead to a spiral or iterative process, with intellectual development expanding as children continually reconstructed previously learnt ideas (Piaget, 1970). This supports a child's schema where they will use repeated behaviours on different objects to develop and consolidate their thinking and understanding. Piaget's methodology has also faced criticism for the fact his sample size was so small, with his initial observations being on his three children. Although later studies included larger cohorts, Piaget did not record the exact numbers used (Gray and Macblain, 2012). Calloway (2001) has also pointed out that Piaget has generalised results derived from data gathered from studies of white middle class children to other cultures and classes.

The under-emphasis of the importance of language and the social context in which learning take place has also been a criticism of Piaget's theory (Winegar and Valsiner, 1992). This is in direct contrast to the theories of Vygotsky, who also believed children were active constructors of knowledge but disagreed with Piaget view of discontinuous development. Vygotsky believed that cognitive development was supported by social interactions in contrast to Piaget's belief that the lone child constructs knowledge from the environment (Vygotsky, 1978). However, Piaget did believe that dialogue between children of equal abilities did play a part in cognitive development (Piaget, 1950; Tudge and Rogoff, 1989). In fact, Piaget himself stressed that although not sufficient, social factors were necessary for cognitive development (Piaget and Inhelder, 1973). He argued for student experimentation to be both independent and spontaneous (Green and Gredler, 2002). This is important for this work as it aims to show that a child needs to actively construct and develop his or her own knowledge and understanding but that this occurs in a social learning environment such as that espoused in FP.

Despite the criticisms of Piaget's theory, his ideas still influence education in a number of countries. There is an emphasis in the FP in Wales on a stage not age approach to pedagogy i.e. only introducing concepts when the child is developmentally ready (WAG, 2008c). In addition, the FP advocates a pedagogy where the child is seen to be an active proponent of his own knowledge construction (WAG, 2008b). Thus, Piaget's theory of children constructing their knowledge through active learning is relevant to this research, set within the FP curriculum (1962).

Vygotsky (1896-1934):

Although both Piaget and Vygotsky were termed constructivists, Vygotsky emphasised the belief that children learn from being part of a social environment and was known as a social constructivist. The focus of Vygotsky's theory was to delineate cognitive development and the process children went through to achieve cognitive outcomes (Green and Gredler, 2002). Vygotsky also emphasised the role of culture and context with language in thinking. Vygotsky's theory was that children learn from being part of a social context. What appears first on the social plane is internalised and becomes part of a child's thinking. Vygotsky (1978, p.46) stated that

Within a general process of development, two qualitatively different lines of development, differing in origin, can be distinguished: the elementary processes, which are of biological origin, on the one hand, and the higher psychological functions, of sociocultural origin, on the other. The history of child behaviour is born from the interweaving of these two lines.

Vygotsky emphasised the need for more knowledgeable others to support children and to accelerate their learning (Vygotsky, 1978). He stated that a children's learning was principally shaped by their cultural and social influences and interactions. However, as with Piaget, Vygotsky believed that learning occurred through experience and the learner constructs their knowledge. He believed that language supports cognitive development and that social interactions benefit children's thinking due to the input of language (Vygotsky, 1978). In contrast, Piaget believed that language was a system for representing the world and was quite separate from action that leads to reasoning and logical thinking (Piaget, 1959). He discussed a child's different behaviour before and after the inception of language, but argued that 'the changes which occur in intelligence when language is acquired shows that language alone is not responsible for these transformations'

(Piaget, 1968, p.89). Piaget espoused that sources other than language can explain certain representations (1968). He contended that symbolic play occurred about the same time as language but 'independently of it' but was of 'considerable significance in the young child's thinking' (1968, p.89).

As Cohen (2002) writes, Piaget argued that language came out of the logic and cognitive development of the child. Only at the end of the sensori-motor periods, when the child becomes capable of symbolic representation, do they start to learn to think and speak like an adult. Marti (1996, p.58) stated that Piaget's view is often expressed as 'inside-out',

...cognitive processes are constructed internally and it is only subsequently and secondarily that this construction has external repercussions, which modify the child's relationship with...,the environment. Vygotsky's conception, on the other hand, is described as being 'outside-in', that is, the child first establishes relationships with others and these relationships, once they are internalised, constitute the basis of the child's cognitive processes.

When comparing and contrasting the theories of Piaget and Vygotsky, it has been stated that Piaget's theory focuses on the child constructing their knowledge individually; whereas Vygotsky argued for social interaction being fundamental to development (Lourenco, 2012). Vygotsky talked of collaborative instructional practice stating that co-operation and collaboration are essential in teaching: 'We know that the child can do more in collaboration than he can independently' (Vygotsky, 1987, p.168-169; 216). For Vygotsky instruction was 'driving force of development' (Daniels, 2001, p.55). However, as stated previously, Piaget did affirm that, 'the individual would not come to organise his thoughts in a coherent whole if he did not engage in thought exchanges and cooperation with others...' (Piaget, 1950, p.174). Therefore, what has been perceived as essential distinction between the two men is in fact, not such a fundamental difference after all.

However, Vygotsky did speak of more knowledgeable others supporting children in their learning (Nicolopoulou, 1993). This is where Piaget did disagree with Vygotsky. For Piaget there was little point in a child participating in an activity they were not ready for even if with a more knowledgeable other. Piaget felt this would just lead to the more knowledgeable other imposing their views and would not benefit the other child (Matusov and Hayes, 2000). Piaget talked of collaboration between equal peers as being more important for developing knowledge and

understanding (Lourenco, 2012). In the FP curriculum in Wales, both approaches are advocated with time being given for the child to work alongside their peers and to work with more knowledgeable others (WAG, 2008c).

Similarly, to Piaget, Vygotsky also felt that young children learn by first hand experiences and build upon previous experiences (Meade and Cubey, 2008). Rogoff (2003) supports this and wrote that cognitive development involves shared endeavours with other people, building on cultural practices and traditions. The Foundation Phase (FP) espouses this experiential approach between children and peers. Here, children are encouraged to be hands on learners and learning does indeed build upon prior learning experiences. This model of delivery adopted by the FP, believes the child to be an active learner with his or her own interests, which practitioners can build upon. This puts 'the child and not the curriculum at the centre of learning' (Davies, *et al.*, no date).

Another important tenet of Vygotsky's theory was that teaching is only useful when it moves the learner from where they are to where they could be with help, he termed this the Zone of Proximal Development (ZPD). As Vygotsky stated:

Instruction is only useful when it moves ahead of development.
When it does it impels or awakens a whole series of functions that
are in a stage of maturation lying in development.

(Vygotsky, 1978, p212)

It can be argued then that Vygotsky was interested in the process children go through to make progress rather than the end- product. This is also evident within the FP curriculum where it is stated that children are on a learning continuum (WAG, 2008c).

Vygotsky stated that the ZPD depends upon, 'social interaction within a shared cultural framework. He placed the interaction with adults and more knowledgeable others at the centre of this zone (Haenen, Schrijnemakers and Stufkens, 2003). This interaction consists of both instruction and joint activities' (Nicolopoulou, 1993, p.8). Vygotsky (1978, p.90) wrote that, 'Learning awakens a variety of internal developmental processes that are able to operate only when the child is interacting with people in his environment and in cooperation with peers'. This resonates with this research in exploring *how* children construct their knowledge and understanding through their schemas, and how adults can best be supported to facilitate this within a social learning environment such as the FP.

Vygotsky's work influenced the work of others such as Bruner a cognitive psychologist and social constructivist. He was influenced by Vygotsky's work on the Zone of Proximal Development (ZPD) and developed his concept of scaffolding using this as the template (Bruner, 1977). Whereas Vygotsky has been criticised for not providing empirical evidence for his concept of ZPD, Bruner has provided empirical evidence for scaffolding (and the ZPD) through his experimental work (see Wood, Bruner and Ross, 1976). Effective scaffolding involves giving learners a clear purpose, providing an appropriate challenge, using questions and behaviours that can help children with given tasks and collaborating with the children on appropriate tasks. Here, the learning can be thought of as dual-agentic with the learner and the teacher working and co-constructing knowledge together (Silcock, 2003). This is evident in FP practitioners' pedagogy where practitioners work alongside learners, asking questions and giving support when required. Then when a learner becomes more competent the practitioners does not need to offer as much support, allowing the learner autonomy in their practice. Therefore, although Vygotsky's work on the ZPD was criticised for not providing empirical evidence at the time, it can be argued that daily practices in the FP do now provide this empirical evidence of both the ZPD and scaffolding.

Chaiklin (2003,) however, offers a warning about the interpretation of the ZPD. He argues that, it has been applied too generally if it is interpreted as being applicable to all types of learning and as learning always requiring a more competent other. Chaiklin (2003) also makes the point that the ZPD was not the central concept in Vygotsky's theory of child development but it has been adopted by educationalists as the main tenet.

Both Piaget and Vygotsky have been thought of having opposing views about the process of development and learning, but both offer something to this research in terms of advocating the child as an active learner, constructing their knowledge in a supportive learning environment with supportive adults. Piaget put forward a theory of children's thinking and understanding developing continuously through the processes of assimilation and accommodation. Vygotsky spoke of successive internalisation and externalisation leading to the child developing their knowledge and understanding. Both men placed a great emphasis on actions being important to construct knowledge and understanding (Lourenco, 2012).

In addition, both Piaget and Vygotsky shared many similar concerns about formal education with both arguing against didactic teaching and adult imposed activities without the child being an

active learner. Vygotsky made the link between the roles of *more knowing* people in helping children to construct knowledge and develop thinking, with dialogue supporting the understanding of the children's learning continuum. Woolfolk (1993) agrees by stating that, the creation of knowledge cannot be separated from the social environment in which it is formed, learning is viewed as a process of active knowledge construction. Rose and Gilbert (2017) argue that 'nurturing and contingent relationships mediate much of young children's learning.' Here the focus is on viewing the learning as an active co-constructor of meaning and knowledge (Adams, 2006). This is an example of what Vygotsky termed 'assisted discovery' in contrast to the independent discovery put forward by Piaget (Berk, 2009, p.267).

However, Vygotsky gave little information in his writing about his research methods and included very little raw data. In addition, Cohen (2002) writes that Vygotsky did not design any studies that attempted to falsify his hypothesis. This may be due to his short life and the limited amount of time he had to carry out research. There has also been criticism of Vygotsky's theory in elevating language to be of the highest importance in the development of cognitive processes. Rogoff (2003) states that in some cultures there is less emphasis on literacy and schooling but that children learn through being part of community activities with observation and practice being more important than verbal instruction. Moll (1994) also argues that Vygotsky's theory does not explain exactly how children internalise their social experiences to move ahead in their mental functioning.

Nevertheless, both theories of Piaget and Vygotsky underpin this research in exploring children's schemas in the child-centred, play-based Foundation Phase curriculum. The research explores Piaget's theory of children actively constructing their knowledge and understanding, and how schemas can facilitate this. In addition, it also explores Vygotsky's theory of the role of the supportive adult in facilitating this knowledge within a social learning environment, such as the FP. The next section discusses Piaget as the originator of schemas and explores previous research into children's schemas in early years settings.

2:3 Schemas: Piaget and Others

This theme of the literature review looks at schemas from their Piagetian origin and through the lens of different researchers who have taken Piaget's work forward. It discusses how schemas

can link to a child's development of thinking, knowledge and understanding within an early years curriculum.

Piaget - the originator of schemas:

Piaget was the first pioneer to identify and discuss schemas as a means of constructing knowledge and the use of observation to understand where children are in their learning journey. Piaget suggested that children organise their knowledge and understanding of the world into cognitive structures called schemas (1953; 1959 and 1970). Piaget believed that children learned through repeated actions and behaviours on objects and materials within their environment. Through these repeated actions, working theories are built up and developed. Any new experiences are fitted into the existing schema (assimilation) so that equilibrium is maintained or if the experience is new or different then the child alters (adapts) their schema to accommodate this new experience. In this way, new thinking and knowledge is constructed and cognitive gains made.

An example of this is seen in conservation tasks. A child is asked to count out two equal number of coins in two lines and is able to state they have the same amount. Then when one row is spaced out more widely the child in the preoperational stage of Piaget's developmental theory, will say the longer line has more. In Piagetian terms, the child has a separate schema for number and a separate one for length but at this stage in their cognitive development they are assimilating the two schemas in parallel. The child is not able to synthesise the two different schemas together or accommodate them. The visual aspect (row length) takes precedent over the abstract (number of coins). Once the child is able to accommodate these two schemas together, they will be able to state that both rows still have the same number of coins. In the process of becoming able to do this, the child will experience some discomfort or disequilibrium in their thought processes until they reach equilibrium (Piaget, 1954). Piaget argued that children have an inherent need to make sense of the world and make an effort to reach equilibrium. They will abandon schemas that no longer fit in an effort to reach this equilibrium.

Piaget (1962) postulated that schemas function at four levels or stages and Chris Athey (1990; 2007) exemplified these stages in her research. At stage 1 called the sensori-motor stage, schemas function in an active way. Here a schema is demonstrated through repeated actions such as a rotational schema being seen through children twirling a hoop, drawing or painting circles and constructing spirals or coils out of playdough. At stage 2, schemas feature both symbolic and

linguistic development. Here children begin to use objects to represent something else (symbolically) and start to structure language, using appropriate vocabulary to support their thinking and actions. An example would be children using an enveloping schema to cover themselves to become a 'monster'. At stage 3, schemas are operating at the functional dependency level. Here relationships are based on actions and their effects so a child with a trajectory schema will discover in order to ride a bicycle from A to B, the pedals need to be turned to make the bike move. The final stage that schema operate at is stage 4, termed the development of thought. This is when children are able to recall and represent events about people and objects without needing recourse to a concrete reminder. An example is a child with an enclosing schema bandaging a toy dog whilst talking about a trip to the vet.

Piaget stated that throughout all his four developmental stages the child experiences the environment and builds upon their cognitive structures or schemas. Children do not function at one schemas level or stage but move in and out of them in accordance with their developing intellectual capabilities at any given time (Bruce, 2011). Arnold (2013) agrees, arguing against thinking of these stages as hierarchical but more as interacting depending on the activity, a person is engaged in. She states that the four levels or stages in which schemas manifest themselves can be thought of 'as a progression in 'coming to know'' (p.9).

Schemas are not static but continually evolve as new ideas and experiences are encountered. May (2011) states that a child's mind is like a jigsaw and that the child is constructing knowledge based on their experiences, abilities and interests. This resonates with the principles of the FP where there is a requirement to start with what the child knows and is interested in and build upon it (WAG,2008c). Schemas are the tools a child can use to complete more pieces of the jigsaw (Halpenny and Pettersen, 2014). Piaget (1950) theorised that action-based, dynamic schemas become internalised in later life, here problem solving no longer needs to be physical but problems can be thought through. Bruce (2011) concurred with this stating that schemas do not disappear in later life but coordinate and integrate to become more complex and sophisticated networks of behaviour or concepts. This can be seen when older children are able to mentally visualise a problem and come to a solution without having to physically act upon it. Although the research on schemas with older children is limited, Arnold has revisited children she previously worked with to discuss their interests now they are in secondary school (Mairs, *et al.*, 2013). Here

she has found that the children do still have interests that link to their schemas from their time at Pen Green.

Piaget's work on schemas has provided a basis for understanding child development. By identifying children's schemas, educators can provide learning experiences attuned to their patterns of interest, develop their threads of thinking and therefore provide consistency of learning opportunities (Nutbrown, 2011). Again, this can be linked to the ethos of the Foundation Phase (FP) curriculum, where the child is encouraged to be an active explorer, and to be provided with activities that support their current interests (threads of thinking)(WG, 2015a). This is the rationale for citing this research in exploring children's schemas in the FP.

Defining Schemas:

Schema is the label Piaget gave to cognitive structures that individuals use to internalise their actions. Piaget held that, 'thought consists of internalised and co-ordinated action schemas' (Piaget, 1959, pp.357-86). For Piaget the function of a schema was to allow generalisations to be made about objects and events in the environment where the schema was being applied (Piaget, 1970). Although Piaget identifies schemas as cognitive structures or mental maps, there are many other definitions with no single definition on which all agree (Athey, 2007). Piaget stated that, 'Schemas of action [are] co-ordinated systems of movements and perceptions, which constitute any elemental behaviour capable of being repeated and applied to new situations, e.g. *grasping, moving, shaking* an object' (Piaget, 1962, p.274). Whilst Neisser offered the following definition of schemas, 'as a pattern of action as well as a pattern for action' (Neisser, 1976, p.56). Gardner (1984, p.64) supported Neisser's definition of the active nature of schemas by stating that 'Individuals bring schemas to bear on objects in the environment . . . the child is involved in knowledge construction.' Meltzoff and Moore (1998, p.229) agreed that schemas are 'initial mental structures' that 'serve as discovery procedures', again echoing the active nature of schemas.

Athey (1990) building on the work of Piaget, offered her own definition of schemas by stating that schemas were, 'a pattern of repeatable behaviour into which experiences are assimilated and that are gradually co-ordinated' (p37). McVee, Dunsmore and Gavelek (2005) also supported the notion of schemas as being active, organising features that the mind imposes on experiences but also as a 'mental representation that mediates activity' (p.550). Then more recently, Nutbrown's

definition of schemas was a 'pattern of behaviour which has a consistent thread running through it' (2006, p.10). Finally, for Louis *et al.* (2008) schemas were defined as, 'The word 'schema' is generally used to describe patterns of repeated behaviour which children use to explore and express their developing ideas and thoughts through play and exploration' (p11). Echoing Louis *et al.*'s (2008) definition my own understanding and definition of schemas, as seen in practice in the FP classroom and through my analysis of the literature, is that they are repeated patterns of behaviour and actions that children use to facilitate and consolidate their growing knowledge and understanding.

Piaget's work on schemas has been researched and taken forward by a number of researchers: Athey (1990, 2007); Meade and Cubey (2008); Arnold *et al.* (2010); Nutbrown (2011); Atherton (2013) and Constable (2013). These pioneers have stated that children use their schemas in their active explorations to construct knowledge and understanding. The following section of the review explores their respective contributions to the knowledge base on schemas.

Chris Athey:

Athey (1990) declared herself to be a constructivist but also recognised the importance of social interaction in the construction of knowledge and understanding. She defined constructivists as child-centred teachers who want to be aware of the process of *coming to know* (Athey, 2007). In a constructivist pedagogy the teacher considers what the child brings to the learning situation as well as what they want the children to learn (Athey, 2007). The teacher or practitioner would arrange the learning environment so the child can actively construct knowledge. This resonates with the research in this thesis where children have been observed constructing their knowledge in the continuous and enhanced provision of the FP learning environment and how their preferred schemas facilitate this.

Athey was the first person to build on Piaget's work on schemas in the 1970's and published her findings in her book, 'Extending Thought in Young Children' (1990). Here she defined schemas as, 'a pattern or repeatable behaviour into which experiences are assimilated and that are gradually co-ordinated' (1990, p37). In Athey's work on the Froebel project (1972-1977) she found that, schemas do not disappear as children's thinking matures, but combine to increase in complexity (Athey, 1990, 2007). When children are exploring their dynamic schemas through their repeated actions, they will try them out on materials found in the environment (Arnold, 2015). When

expectation of what will happen occurs then this new information is assimilated into their schema. If the materials do not behave in the way expected then this new information needs to be accommodated into their schema and their thinking adapted. Once this new knowledge and thinking is understood, then equilibrium has been reached once more (Arnold, 2015). This resonates with what Donaldson wrote of schemas as, 'organised behaviour patterns which can be used intentionally through the emergence of the process of assimilation and accommodation' (1978, p.134).

Whilst Piaget was the first to identify schemas, Athey was the first to pioneer observations of schemas (Athey, 1990; 2007). She worked with Tina Bruce and analysed observations using Piaget's different schema levels or stages to make a detailed study of how young children acquire knowledge. The aim of this research was to look for schemas in a nursery setting. Athey worked with children aged two to five years, an age group Piaget was less preoccupied with (the children in this research are three to five years so Athey's work is particularly relevant). She argued against using 'deficit descriptions' of young children and she and her team focused on 'what children, parents and teachers can do' (Athey, 1990, p.xii). Again this resonates with this research being carried out in the FP as this is also a can do curriculum, starting with a positive view of the child and building on it (Thomas and Lewis, 2016).

Over a two-year period more than five thousand observations of twenty children were undertaken (Athey, 1990, 2007). By observing children at play, Athey was able to make a detailed study of how young children acquire knowledge and how schemas supported this. She carried out detailed written observations and this is relevant as this is the method adopted in this research. Athey shared her observations with parents and they reciprocated by sharing their own observations of examples of children's schemas at home. Athey reported that 'Ongoing analysis of observations made daily during the project provided the main substance of communication with parents' (1990, p.51). The observations were interpreted using Piaget's notion of schemas and the project revealed links between speech, comprehension and prominent schemas. Athey (1990; 2007) named specific dynamic schemas emerging from action in her research as shown in table 2:1.

Dynamic Vertical
Dynamic Back and Forth
Circular direction and rotation
Going over, under or on top of
Going round a boundary
Enveloping and Containing
Going Through Boundary

Table 2:1 *Athey's typology of action based schemas*

Athey confirmed that children gain new ideas and understanding through assimilating experiences (content) into existing thoughts (forms/schemas). She argued that through the process of assimilation and accommodation forms of thought begin to coordinate leading to, 'higher levels and more powerful schemas' (Athey, 2007, p.50). As Piaget states, 'If early schemas are applied to a diversity of events in the environment then the schema will have assimilated many contents' (1953, p.384). This resonates with this research as children in the FP have a diverse learning environment to explore and discover.

Athey (2013, p.9) argued that action-based 'schemas manifest themselves in different ways.' She determined in her research that there was a sequence starting with motor observations and that before abstract thought children spent time, 'exploring functional dependency' and 'symbolic representations' (Meade and Cubey, 2008, p.49). Athey stated that at the symbolic representation level children will use actions, mark making and other graphic forms and speech (Athey, 2007; Arnold, 2013). She found in her research that as children mature and gain more experiences schemas combine and 'develop into systems of thought' (2007, p.153). In Athey's work she observed that the most motor actions occurred at three years and one month; symbolic representations at four years and one month and thought level at four years and five months (Athey, 1990).

In addition to the dynamic, action-based schemas, Athey also identified graphic schemas and space schemas (2007). In the 5000 plus observations undertaken by Athey, 'forty six percent were drawings, paintings and three-dimensional constructions' (2007, p.62). When analysing the marks and drawings, Athey paid great attention to the form of thinking shown in the work. Even if children named the drawings different things there was often an underlying common form. This

was in agreement with the work of Inhelder and Piaget (1964, p.64) who stated that children's drawings and pictures represent 'conceptual attributes' the child is familiar with and their underlying form of thought or schemas interest.

In her work with the Froebel project, Athey identified twenty-four distinguishable marks and these were sub-divided into two criteria, straight 'lines and curves' (2007, p.62). When analysing these marks Athey explored the forms of thinking displayed by the children. So if a child named a drawing 'wheel' and then 'flower' this could be a representation of a particular graphic form such as 'circular enclosure' (2007, p.66). This is important because without a knowledge of schemes practitioners may focus on the content rather than the form and miss the link to an underlying schematic form.

In her research with Henry, Atherton (2013) describes how he showed a link between his dynamic action schemas and his mark making, both evidencing his current schemas interests. In this research, there were also occasions where children seem to represent their dynamic schemas through drawings and paintings, reflecting their forms of thinking (schemas). This is important as educators can think of drawings and mark making as merely pre-writing skills, thus missing the relevance to supporting children's developing knowledge and understanding.

Janet Shaw (1991), who worked as a community teacher in the North of England, drew on Athey's work. However, she was critical of whether Athey's work did constitute a true partnership with parents. Shaw argued that the professionals involved in the Froebel research project defined the agenda (schemas) rather than negotiated with the parents. Additionally, in Athey's work, it was not clear whether all parents changed the way they viewed children's behaviour when they became knowledgeable about schemas and if they did to what extent this happened.

Nevertheless, Athey's contribution to knowledge and understanding of children's schemas cannot be underestimated. Her research was the first empirical study of young children that revealed aspects of their thinking. Other research studies have built on Athey's work as a basis for understanding how children make sense of the world and the following work details some of them.

Building on Athey's research:

Meade and Cubey carried out two studies in to children's schemas in New Zealand in 1993 and between 2003 and 2006. The findings from this research indicated that children attending the settings, which were promoting learning through schemas, had more positive dispositions to learning. The first study focused on nine children aged between four and five years of age focusing on their mathematical and science related schemas. This was an action research study where the teachers and researchers were developing, 'new understandings of pedagogy' (Meade and Cubey, 2008, p.15).

The data were collected through observations of the nine children to determine their dominant schemas. Parents were also asked to keep records of schemas seen at home through observations. In addition, another eight children were chosen as comparison subjects, giving a total sample size of seventeen children. Nine learning competencies were assessed and compared in all children. The competencies were placed into two categories: *Being* and *Doing* (Meade and Cubey, 2008). The four *Being* competences were: social-emotional; communication; exploration and intrapersonal. These competencies were measured using observation, assessments and interviews with 'significant' adults in the child's life. The five *Doing* competences were about what the children could do. These were social problem solving; early literacy; early mathematics; logical reasoning and motor skills. These were assessed by means of an interview with the children.

Overall the outcomes for the children in the schema setting were higher than in the comparison centre, with the results seeming to be linked with the 'schema children having more interactions and opportunities to explore' (Meade and Cubey, 2008, p.86). However, the sample size was small so Meade and Cubey stipulated that explanations that schema children showed better scores could only be speculative (2008).

In a second in-depth case study of six children carried out by Meade and Cubey (2008) it was found that children's dispositions of concentration, persistence and involvement were stronger when their schematic interests were supported. Here the adults viewed the children as, 'active and competent learners' (Meade and Cubey, 2008, p.127). This positive view of the child supported dispositions to learning in science, mathematics and literacy. This has relevance for

this research, as the FP curriculum is one which views the child as active, competent and able (WAG, 2008c).

Meade and Cubey also made links in their research between supporting schemas and the following three learning goals from the New Zealand Early Years Curriculum, Te Whariki:

- Goal 1: Children's play is valued as meaningful learning and the importance of spontaneous play is recognised
- Goal 3: children learn strategies for active exploration, thinking and reasoning
- Goal 4: children develop working theories for making sense of the living, physical and material worlds

(Meade and Cubey, 1995)

These learning goals are not dissimilar to the FP outcomes where children are encouraged to become active learners to make sense of the world, develop ways of problem solving and play is seen as of 'vital importance' (WAG, 2008c, p.6). Therefore this has significance for this research as Meade and Cubey's work has shown how supporting schemas can support children in meeting specified learning goals. Children in the FP in Wales are required to meet specified FP outcomes and chapter five makes links between children's schemas and specific FP outcomes, thus echoing the findings of Meade and Cubey. However as stated earlier, Meade and Cubey (2008) recognised that their study was only on a small sample of children and as they stated the results can only be speculative. Again, this resonates with this study as being with a small number of children.

Cath Arnold and the team at Pen Green in Corby have explored the link between schemas and emotions (Arnold, *et al.*, 2010). Here Arnold discussed individual case studies of children and through observations, linked their schemas to their emotional well-being. She proposed that children's schemas and emotional events in their lives were closely linked. Arnold drew links between 'schemas explored and emotions experienced' but did accept that schemas were not necessarily prompted by emotions' (2010, p.11).

Another area of Arnold and the Pen Green team's research has been to present observations of young children's schemas in detail but to then also revisit these children in later life. What has been interesting is when revisiting these children they remember their time at Pen Green but also still seem to have interests that still reflect their originally observed schemas. An example is Jack whose schemas interests were trajectories and connections (Mairs *et.al.*, 2013). Whilst at Pen

Green, Jack constructed a number of models including an umbrella out of construction materials, when the team revisited him aged eleven, Jack's interests still included making models albeit more complex versions than an umbrella. This illuminates what Bruce meant by, schemas not disappearing in later life but becoming more complex and sophisticated (2011).

Cathy Nutbrown's research (2006, 2011) discovered links between children's schemas and their talk, action, representations and thinking. Nutbrown (2011, p.46) defined schemas as, 'threads of thinking' and schemas to be at the, 'core of children's developing minds.' She built on the work of Piaget, Vygotsky, Athey and Bruce and collected observations in an early years setting over a ten-year period. Through these observations, she made links between children's schemas and developing understanding of maths, science and literacy (Nutbrown, 2006, 2011). Like Athey, Nutbrown argued for the process of learning or *coming to know* as more important than the end product (2011).

In Nutbrown's research, in regards to mathematics, 'three major schemas emerged...dynamic vertical, dynamic circular and enveloping/containing and with each schema, one idea appeared to dominate...

- Dynamic vertical – children were involved in activities to do with height
- Dynamic circular – children were exploring aspects of rotation and roundness
- Containing/enveloping – instances to do with capacity were observed

(Nutbrown, 2006, p.60)

Like Athey, Nutbrown identified links between the 'form and content of young children's writing and other underpinning threads of children's thought and action' (2006, p.80). Nutbrown also observed that children 'represent writing as an activity, practising the *feel* of writing' (2006, p.80). Nutbrown has also drawn attention to the importance of stories as a means of nourishing children's schemas, making links between children's preferred schemas and different stories. She has stressed that stories are a, 'key source of learning material in the early years' with 'many books *fostering* more than one schema' (2011, p.128).

In keeping with other studies into schemas, Nutbrown, (2006, 2011) also used naturalistic observations as a tool to identify children's schemas. This supports the research in this thesis in capturing evidence of children's schemas behaviours through naturalistic observations. Children's preferred schemas are a window into their thinking and are individual to a child; they

are the ways they make sense of the world around them. If practitioners can understand and support children's schemas and plan activities that could support individual schemas, children may become more deeply involved and engaged in the activities on offer, which in turn could lead to deeper learning.

Nutbrown also published work with Frances Atherton on schemas in children aged from birth to three in 2013. Here, Atherton observed seven children over eighteen months in a day care setting and the role of the adult and the learning environment were noted. Photographs of the children, 'at play highlighted consistent patterns in children's actions, speech and representations' (Atherton and Nutbrown, 2013, p.x). Parents were invited to share their stories of their children's schemas behaviours at home and parents were positive about coming to understand their children's behaviours through schemas. The observations of the children's schemas were linked to the schema levels postulated by Piaget and put into practice by Athey (2007). The children's schemas were also analysed in terms of curriculum content with links made to the Early Years Foundation Stage (EYFS) curriculum. This research resonates strongly with the research undertaken in this thesis where children's schemas are analysed through schema levels and links made to the Foundation Phase (FP) curriculum. Atherton also discussed the importance of the role of the adult in accompanying children in the learning environment through, 'attuned, matched learning encounters' (2013, p.x).

The methodology adopted in this research is one of action research. Here the researcher (me) has worked with the practitioners in the chosen setting to develop their knowledge and understanding of schemas, hence echoing the work of Atherton (2013) in recognising the importance of the adult as a co-collaborator in a child's learning journey.

Finally, the last study into schemas that has influenced this research is that of Constable (2013). Constable observed children's schemas in a school setting with children aged four to five years and made links to the Early Years Foundation Stage (EYFS). She has shown how children's learning can be taken forward within the EYFS curriculum by supporting their schemas. This is similar to the research in this thesis, which has gathered evidence of schemas in a FP school setting. Constable has given examples of how children's different schemas can be supported in a busy school setting under common early years themes or topics and she has provided evidence of how children have taken their own learning forward using their preferred schemas.

For example, Constable (2013) has recorded in her work, that a child with a circular rotational schema could be supported through activities such as working with materials to represent planets under the theme of 'Space'. Constable (2013, p.62) has then linked this to specific EYFS early learning goals such as, 'Children can handle equipment and tools effectively and with an increasing degree of accuracy' (40-60 months). Here the child can explore roundness as part of their schemas interests within the whole classroom based theme of Space and meet the required early learning goals for physical development within their age range. Another example cited by Constable is a child with an enveloping and containing schema who can be given opportunities to build a den outdoors with others. Here the child has achieved the early learning goals for 30-50 months, 'Children can play in a group, extending and elaborating play ideas' (2013, p.71) whilst also being supported in their enveloping and containing schemas. Additionally, she has indicated (through the Leuven Scale) that children's levels of involvement were greater when they were engaged in activities that nurtured and nourished their schemas.

All the above studies into children's schemas have used detailed naturalistic, narrative observations to identify, support and nurture schemas. The researchers have effectively used schemas to support children's development. This research builds upon these studies by using detailed observations of children in a FP setting, adding to the research base on schemas. It analyses the children's schemas through the different levels evidenced by Athey in her research and makes links to FP outcomes thus resonating with the work of Arnold *et al.* (2010); Atherton (2013) and Constable (2013). As Atherton (2013) asserts, the real significance of schemas is for practice, with a knowledge of schemas allowing practitioners to understand *how* children learn. Knowing about a child's schema allows practitioners to tune into children's forms of thinking and their unique ways of *coming to know*.

The next section considers play-based curricula and how they have embraced schemas. It compares and contrasts the English early years EYFS curriculum with the Welsh Foundation Phase curriculum as neighbouring countries that have both adopted a play-based approach to learning. However, in contrast to Wales, the Early Years Foundation Stage (EYFS) in England has included schemas in policy documentation and provided guidance to EYFS practitioners on including schemas as part of their pedagogy.

2:4 Embracing schemas in the early years, play-based curriculum:

A play-based approach to learning is not without conflicting opinions and tensions but is considered fundamental to children's development and education, particularly in the early years (Moyles, 1989, 1994; Bruce, 1997; Wood and Bennett, 1997, 1999; Wood and Attfield, 2005; Wood, 2007, 2009; Broadhead, Howard Wood, 2010 and Andrews, 2012). Even as far back as 360 BC, Plato recognised that, 'children's enjoyment of learning was enhanced through play' (Andrews, 2012, p.41). Nevertheless, even as Plato promoted play he thought that children needed to move towards more self-discipline as they became older, thus already indicating a tension between play and responsibility (Andrews, 2012).

Research carried out by Dweck (2006) emphasised that play ensures children develop a belief in themselves as thinkers and learners. May (2011) states that play, 'is the most effective way in which children learn new concepts (p.24). Meade (2001, p.23) agrees by arguing that play is important for developing 'memories of skills, dispositions, and schemas.' Bergen (1988) also argues that early play experiences are crucial in laying down foundations for problem solving. Friedman postulates that there is a dramatic relationship between brain development and appropriate stimuli in the early years (2006). Oyman (2000) stated that the brain develops through ongoing interactions within a person and between a person and the environment.

Athey (1990, p.205) also argued that early learning is critical for brain development as this is when the brain is most 'susceptible to environmental modification'. Carpendale, Lewis and Muller (2018) in congruence with Athey, state that the brain is shaped through experience. Gopnik, Meltzoff and Kuhl (1999) argued for the importance of play and play experiences, stating that sensory play experiences support connections made in the brain. Thus the early years learning environment is crucial as a foundation for building worthwhile play experiences, supporting brain development (Penn, 2005). In the FP, there is an emphasis on the value of play with WAG (2008d, p5, p7) stating that, 'Play is an essential ingredient in the curriculum...' and 'the value of play and active learning cannot be emphasised strongly enough.'

However, as Moyles (1989) attests, trying to reach an agreement on what play actually is can be problematic and therefore makes evidencing its effectiveness difficult. In literature about play, four major distinctions appear (Goodman, 1994). The first links play as a pleasurable activity and regards work as requiring effort and can be unpleasant. However, this distinction can be difficult

to accept, as there can be pleasure associated with working hard to achieve something. In addition, as Vygotsky (1978) pointed out, some activities can be acknowledged as pleasurable but not as play. Secondly, play can be regarded as freedom to pursue creativity and spontaneity, whereas work, in contrast, limits freedom and requires discipline. Again, this can be disputed as children like order and rules even when playing. The third distinction between work and play is that of play as a process and not an outcome. However, even considering play to be a process is fraught with tension as process can be interpreted differently by stakeholders (Howard and McInnes, 2013). This links back to Athey (1990) and Nutbrown's (2011) work discussed previously, where they argue for education to be concerned with the process of learning and not the product. Smith is in agreement with this with his research into play supporting the notion of 'performance over outcomes' (2010, p6-7). Nevertheless, this too can be a point of contention where play often has an end-point and these end products are often evaluated. The final distinction is that play is often freely chosen and work is forced or required. This too can be ambiguous and today practitioners are mindful of not making this sharp distinction between work and play.

Van Oers (2013) writes that Sutton-Smith extensively discussed the ambiguity surrounding play and its value in a child's development in 1997. Sutton-Smith argued that there were many claims regarding play and its developmental value but none, which could be evidenced, in empirical research (Sutton-Smith, 1997). In agreement, Burghardt (2005) and Smith (2010) stated that many studies concerned with play and learning in relation to cognitive development, lacked empirical evidence. Smith also contended that much of the work evidencing play with developmental progress and learning was not always replicable, generally lacked ecological validity and contained methodological weaknesses (Smith, 2010). A possible reason for the problem of evidencing the developmental and learning potential of play was postulated by Howard and Wood (2002), who stated that it might be due to the lack of any clear definition of what play actually is.

Nevertheless, the benefits and enjoyment of play for children was evident in the researcher's own experiences in the classroom with children aged three to five years. Here, children were given opportunities daily to initiate their own play by choosing resources and activities that reflected their current interests. Observations noted the child's desire to engage in play and playful experiences as a way to develop their knowledge and understanding. Palaiologou

reinforces this point by stating that 'play involves cognitive skills, senses, physical, emotional and social interactions, it contributes to children's development (2017, p.1259).

As Smidt argues, 'Play is a way of being able to use *hands-on or real or life-like situations* to answer questions that arise in children's heads...(2011, p.3). Indeed, play is often cited as a central tool for learning within the early years of a child (Bruce, 1987, Anning, 1997). Therefore, play could be seen as a vehicle for children to construct knowledge and understanding at their own pace and in a way that was individual to them. In fact, it could be argued that the introduction of the Foundation Phase (FP) curriculum epitomises the importance of play, already seen in the early years, by extending a play-based pedagogy to children aged three to seven years.

Early years curricula such as the Early Years Foundation Stage (EYFS) in England and the FP in Wales are careful to espouse an ethos of learning through purposeful play and play-based pedagogies. The word 'work' is not associated anywhere with learning in policy documents and guidance associated with these early years curricula but play is still not clearly defined. Sutton-Smith also finds play difficult to define. In his research, he defined play as having genres such as pretence, skill, risk and fantasy (Sutton-Smith, 1999). Nevertheless, this can still be argued as play being ambiguous but this can also be of the most significance, as play can be seen as a journey or growth for the child. This resonates with the principles of the FP where learning is recognised as a continuum with play providing the vehicle (WAG, 2008c)

Piaget and Vygotsky had differing ideas on play and its role in pedagogy. Both Piaget and Vygotsky emphasised the role of play for learning and constructing knowledge. Piaget (1951a) saw play as process of assimilation of experiences, serving as an index of the child's ability rather than promoting cognitive development. He claimed that, '...play in turn reinforces cognitive activity' (Piaget, 1980, p.23) and that play develops as a need to make sense of lived experiences. Piaget stated that symbolic play empowers children by allowing them to consolidate past experiences in their own way or on their own terms. However, for Piaget, symbolic play was an idiosyncratic activity of the individual child, regardless of whether the child was playing with others or on their own (Piaget, 1951).

In contrast to Piaget, Vygotsky saw pretend play as a product of social collaborations and that the role of the adult was crucial in constructing knowledge (Gray and MacBlain, 2012; Vygotsky,

1967). Vygotsky believed that in pretend play children could reach higher levels of cognitive development (Vygotsky, 1967). He believed that imaginary play laid down the blueprints for later life allowing children to become reflective and understand negotiation and co-operation. Vygotsky (1967) stated that symbolic or imaginative play served as a zone of proximal development where a child is able to function beyond their actual development. As Elkonin (2005) contends Vygotsky believed pretend play to be the leading activity in the preschool years. However, Rubenshtein (1946, as cited in Elkonin, 2005) argued that this was too narrow a concept of play and that neglects other forms of play that were not make believe. Nevertheless, both Piaget and Vygotsky, despite their differences, recognised the importance of play in a child's ongoing development and in the construction of knowledge.

Conflicts and tensions in adopting a play-based approach to learning:

Despite these past pioneers and early years curricula emphasising the importance of a play, there are conflicts and tensions in adopting a play-based approach to learning. For example, in the study of Wood and Bennett (1997) early years teachers reported that there was a need to ensure that content was covered which left limited time to make the observations deemed necessary in order to ascertain the interests of children. Furthermore, time spent on teacher-led activities left little space for adults to interact with children in meaningful ways. There was also a perceived pressure from parents and other staff members to produce '*work*' which was often viewed as meeting a particular outcome or producing a product as opposed to valuing play-based pedagogy as a process.

A reoccurring theme within these studies was also a perceived gap between rhetoric and practice. Aubrey (2004) examined research studies with a focus upon pedagogy within early years settings (e.g. Bennett and Kell, 1989; Pascal, 1990; Cleave and Brown, 1991). Whilst in each study practitioners claimed that pedagogy was '*activity-based*' or '*play based*' this was rarely the case. This led Aubrey to ascertain that, 'whilst teachers recognise and report the value and benefits of young children's activity-based learning, the gap between reported and actual practice is significant' (Aubrey, 2004, p.637). The British Educational Research Association and Special Interest Group also described this difficulty between play and practice in research in 2003. Here they discussed how parents found it difficult to associate play with learning, believing that children come to school to work. Added to this was the burden on

teachers to deliver an ever increasing curriculum content resulting in practitioners relegating play as something children were left to do on their own.

Other studies on play such as that by Sylva *et al.* (1980) found that adult interactions with children on a daily basis were not focused on supporting play but were to do with the mundane running of the setting (cited in Llewelyn Jones, 2004). This was also reinforced by the work of Meadows and Cashdan (1988) who found that teachers were not interacting in meaningful ways with the children when they were engaged in free play activities. This could be due to a number of factors such as the drive for evidence-based learning, leading to a lack of time for practitioners to interact with children during their free choice play-based activities. Research into children's perceptions of play by McInnes *et al.* (2013) found that when adults interacted with children and asked open-ended questions the children regarded these activities as play and the adults as playful. However, in settings where adults directed the activities and asked more closed questions, the children were more likely to regard an activity as not play and the adults as not playful.

In the FP documentation, adult involvement in play is reinforced where it clearly states that, 'Practitioner involvement in children's play is of vital importance...' (WAG, 2008c, p.6). Brooker and Edwards (2010) suggest play pedagogy should be a negotiated space shared by both children and practitioners. Here both the child and practitioner would have a voice on play and play pedagogy would be co-constructed between the adults and the children. This is seen in the FP where children are regularly asked their opinions about what resources to include in for example, the role-play area. Adults continually observe the children at play and adapt the continuous and enhanced provision to match children's play intentions. Atherton and Nutbrown (2013) argue for a physical learning environment that is supported by insightful and understanding adults.

Research has also shown that teachers' engagement with learners' interests strengthens motivation, effort and attention to given activities (Dewey, 1913; Wade 1999, 2001; as cited in Hedges, Cullen and Jordan, 2011). Therefore adults play an important part in how children '*come to know*' or make sense of their world. Smidt argues for adults to be 'playful practitioners' who 'provide the contexts and arrange the environment ...to allow children to be in charge of what they do, where they do it and with whom' (2011, p.117). Goouch (2009) contends that it is both possible and desirable to maintain, 'a pedagogy steeped in play...' definitely in the early years but also beyond (p.141). The FP has tried to do this by extending the active play-based curriculum for children up to the age of seven.

However, despite the acknowledgement of the importance of play, governments are still in favour of an emphasis on literacy and numeracy and standardised assessments (Thomas and Lewis, 2016; Palaiologou, 2017). Alongside this drive for literacy and numeracy to take centre stage, there is a need to get children in the early years ready for school. Bodrova and Leong (2003a) have described this as 'the disappearance of play from early childhood classrooms' (p.12). In addition, they argue that play actually fosters increases in literacy skills, social development and concentration (Bodrova and Leong, 2005). The FP has placed far more emphasis on literacy and numeracy since its inception in 2008 with the introduction of the Literacy and Numeracy framework (LNF) and the statutory literacy and numeracy tests in 2013 and 2014 respectively. This has led to some FP practitioners indicating an erosion of play in the FP and a return to more formal teaching (Thomas and Lewis, 2016).

Similarly, a study into practitioner understanding of active play-based learning in Scotland has indicated that not all the characteristics of active learning were present (Stephen, Ellis and Martlew, 2010). Here staff were found to plan focused play-based activities but little evidence of free choice spontaneous play choices. This led to child centred and child initiated tasks being overshadowed by progress towards specific targets linked to literacy and numeracy (Stephen, Ellis and Martlew, 2010). This very much resonates with the current status of the FP as detailed above with its now greater focus on literacy and numeracy.

In England the early years foundation stage (EYFS) is the play-based curriculum for children between 0-5 years, and the policy guidance maintains that when playing, children learn at their highest level (Department for Children, Schools and Families and Qualifications and Curriculum Development Agency, 2009). In contrast to the Welsh FP outcomes, children in the EYFS work towards attaining early learning goals (ELG). However reiterating the concerns raised previously, there are concerns over the fact that the pressure to meet these early learning goals could erode time to play and that children are being prepared too early for formal education. As Duffy (1998, p.13) contends, 'Preparing children for the next stage in their education is short sighted.' Even the updated EYFS in 2014, although appearing to support a play-based approach to learning, had the underlying focus of preparing children ready for school. The terminology used is that of, 'planned purposeful play' (DFE, 2014, p.9), which places the emphasis on the adult for instigating the play leading to play not being freely chosen by the child. This leads to practitioners, again, feeling the need to justify play by linking it to the EYFS early learning goals.

In 2007, Athey questioned the intention of the EYFS to raise educational standards without equipping teachers with the knowledge of *how* children learn. This was supported by the Tickell (2011) review into the 2008 EYFS, which found that there was still some confusion over how practitioners met the need to plan for purposeful play. Athey (2007) argued that aim of education must be 'cognitive improvement' (p.31) with more attention paid to *how* children learn. Nutbrown (2011, p.142) also supports this by stating that when working with young children the importance should not be on the 'national policy of the day, but on the process of learning'. Melhuish *et al.* (2008) argues it is the quality of experience that children get that allow them to make educational gains. However, in contrast to Wales, the English EYFS **has included** schemas in past policy documents and research in England has shown how this play-based curriculum can support and nurture schemas.

This is important for this study, as previous studies in England, which have shown that the EYFS can support children's schemas, have linked schemas to curriculum concepts and early learning goals (Atherton, 2013 and Constable, 2013). Correspondingly, the FP in Wales has many similarities to the English EYFS with both curricula espousing a child-centred, play-based pedagogy and both advocating children as active learners in a social learning environment (DFE, 2014 and WAG, 2008c). Therefore, as previous research has shown that such a curriculum can support children schemas, then in theory, the Welsh FP should also be a curriculum that can nurture and nourish children's schemas. However, as stated previously, to date there has been no research into whether or not the FP can and does support children's schemas. This research seeks to redress this by offering new and original contributions to knowledge and understanding into children's schemas in Welsh FP.

The following section charts the role of schemas in early years curricula.

Exploring the role of schemas in the curriculum:

In the mid 1980's some English Local Education Authorities (LEA's) such as Cleveland and Sheffield encouraged teachers to develop their understanding of schemas and link it to practice (Nutbrown, 2011). These LEA's produced observation booklets that identified certain schemas. Since then there has been a growing interest in studying schemas and their place in the official early years curriculum in England (DCSF, 2008).

Research carried out by Arnold *et al.* (2010) Nutbrown (2011), Atherton (2013) and Constable (2013) has shown how schemas can be embedded into the English, Early Years Foundation Stage (EYFS). Here, through detailed observations of children during play activities, the researchers were able to note children's preferred schemas and to support them with appropriate resources that nourished their forms of thought and supported their development of curriculum concepts. By following and supporting these threads of thinking (schemas) the researchers noted how the children used their schemas during play to solve problems and gain information about the world around them. This reinforces the importance of play-based provision for young children, where children are able to problem solve and try out ideas in an environment with supportive practitioners. As Smidt (2011) states a child engaging in play will be exploring the world, people and the objects within it. This very much resonates with the principles underpinning the FP in Wales where children are viewed as being on a learning continuum with play as the vehicle supporting the construction of knowledge and understanding (WAG, 2008c).

In the original 2008 EYFS Policy guidance there was guidance on how to incorporate schemas. This was included in the document, 'Practice Guidance for the Early Years Foundation Stage' (DCSF, 2008). Schemas were explicitly included under 'Knowledge and Understanding of the World' and 'Physical Development.' However, this did not mean schemas could not be seen across the EYFS curriculum. In fact practitioners following the EYFS curriculum, were offered the following comprehensive definition of schemas in the glossary of the May 2006 EYFS consultation document:

Schemas are patterns of repeated behaviour in children. These patterns can be observed running through their play and may vary from one child to another. If practitioners build on these interests, powerful learning can take place.

(DFES, 2006, p.45)

The importance of schemas was also referred to by the 'National Day Nursery Association' (2012) who stated that: 'All practitioners should have an understanding of the different types of schemas and how these link to the age/stage of development of the children in their care' (NDNA, 2012, p.5). However, in the updated EYFS 2014 policy guidance, all explicit mention of schemas was omitted, but there was still the need to provide an enabling environment based on children's

interests so there was still an implicit support for schemas. This is similar to the FP where the practitioners need to start with the child and build upon the child's interests (WAG, 2008c).

EYFS practitioners are required to assess the children in their care and the focus for doing this is, as in the Foundation Phase (FP), through observation. Through these observations, practitioners can evidence if a child is showing any signs of repeated schemas. Once identified then planning for individual children can incorporate their preferred schemas. As Bruce, Louis and McCall (2015, p.77) state, 'Knowing about schemas gives practitioners a framework through which to interpret their observations.' In the policy guidance on the EYFS there are many references to active learning, play and exploration, creativity and critical thinking all key concepts that equally apply to the development of schemas (Louis *et al.*, 2008; DFE, 2014). There is an emphasis on the EYFS, as in the FP, on practitioners supporting children as they engage on their learning journey. This support can be in the form of planning activities that nurture a child's preferred schema. Whalley (2011), Meade and Cubey (2008) and Arnold *et al.* (2010) (cited in Nutbrown and Atherton, 2013) have all emphasised that, 'an informed understanding of schema theory can have a rejuvenating effect on curriculum design and adult engagement in the learning process... (p.23).

All the previous studies into children's schemas have used detailed observations of the children at play to discover their schemas. The researchers have then nurtured and nourished these schemas through the provision of resources and activities. Palaiologou (2016a) highlights the importance of observation for identifying children's interests and skills and that observations should be at the centre of practitioner practice. Roberts (2002) agrees arguing that close observation of children will allow practitioners to identify prominent schemas, which in turn will value their interests and needs. Athey stated that, 'mental representation cannot be studied directly, but it can be construed', thus also emphasising the importance of detailed observation (2007, p.55). Finally, Bruce contends that 'knowing the schema informs the adult's curriculum plans and helps the adult to plan with appropriate selection and flexibility' (Bruce, 2011, p.97). Atherton and Nutbrown support this (2013, p.23) by pointing out that:

An informed understanding of schemas gives practitioners insight into the richness of children's thinking and helps adults to be thought-provoking in a relevant way as they unite with children on their learning journeys.

Therefore as practitioners in the FP are already used to using observations as the main method of supporting children, observing children's schemas could be included in the everyday practice of the FP.

Even the introduction of the literacy and numeracy framework in the FP lends to the timeliness of this research. This is because previous research into schemas has indicated that supporting children's schemas can help to develop children's knowledge and understanding in literacy and numeracy (Nutbrown, 2011). Therefore if the FP is moving towards embedding more formal literacy and numeracy in the curriculum, supporting children's schemas could support their literacy and numeracy development. In addition, the proposed introduction of the new curriculum in Wales in 2019 for learners aged three to fourteen (initially) with its emphasis on more teacher autonomy can also be an opportunity to include schemas in the curriculum (Donaldson 2015). This again supports the timeliness of this research in working with practitioners to develop knowledge and understanding of children's schemas.

2.5 Summary and Conclusion:

Theories on how children construct and develop their knowledge and understanding through active explorations (Piaget) within a social learning environment (Vygotsky) have formed an integral part of this discussion. Both theories were debated and critiqued and links between these theories and the underpinning ethos of the Foundation Phase curriculum in Wales discussed. This was followed by a discussion on Piaget's work on schemas and how supporting children's schemas were a window into their thinking and *ways of coming to know*. Athey's seminal work of putting Piaget's concept of schemas into practice was explored along with more recent research studies into schemas (Athey, 1990, 2007; Arnold, *et al.*, 2010; Arnold, 2013; Nutbrown, 2011; Atherton, 2013 and Constable, 2013).

The final theme of the literature review considered the tensions and conflicts surrounding play-based curricula such as the Early Years Foundation Stage (EYFS) in England and the Welsh Foundation Phase (FP). It debated how the EYFS has supported practitioners in using schemas in their pedagogy through curriculum policy documents. This is in contrast to the neighbouring play-based FP curriculum in Wales, which has barely included schemas in curriculum policy or practice and underlines the rationale and originality of this research in exploring schemas in the FP.

Therefore, this literature review has identified a gap in the knowledge base around schemas and provided the rationale for exploring schemas within the Welsh play-based experiential FP curriculum. In addition, this research seeks to develop FP practitioner knowledge and understanding of schemas through an action research methodology as outlined in the next chapter.

Chapter 3: Establishing a Research Design

3:1 Introduction:

This chapter considers the research design of this study. The choice of methods and data analysis are explained and justified and ethical dilemmas considered. The action research design was shaped by the research questions under investigation alongside philosophical, ontological and epistemological beliefs. As Willan argues, the aim for research must be to 'inform understanding' (2010, p.207). As the introduction has outlined the aim of this thesis was to explore children schemas within the Welsh Foundation Phase (FP) curriculum through two action research cycles. This aim was met through consideration of the following research questions:

Cycle One (2012-2013):

- What is the knowledge and understanding of the FP stakeholders of schemas and schemas behaviours within the chosen setting?
- Do children exhibit schemas behaviours in the Foundation Phase curriculum and how are schemas best identified?
- Can the Foundation Phase learning environment support children's schemas once identified?

Cycle Two (2014-2015):

- What is Foundation Phase stakeholders' knowledge and understanding of schemas across South East Wales?
- Can children's schemas be observed in the Foundation Phase curriculum?
- Can Foundation Phase practitioners be supported to nurture and nourish children's schemas?
- Can nurturing and nourishing children's schemas support Foundation Phase outcomes?

The action research adopted Mills (2011) model and Mills and Butroyd (2014) model as follows:

Cycle One: Initial exploration of children's schemas in a FP setting (Pilot Study- Action Research Cycle One-using Mills (2011) action research model)

Cycle Two: Collaborative intervention with FP practitioners based on findings learned from Cycle One (Action Research Cycle Two-using Mills and Butroyd's (2014) action research model).

The rationale for moving from Mills 2011 model to Mills and Butroyd's 2014 model was that the 2014 model fitted more appropriately with the research being undertaken in Action Research Cycle Two. In the 2014 model, the final stage is dissemination and evaluation of the research and this supported one of the aims of this research to develop FP practitioner knowledge and understanding of schemas.

3:2 Theoretical Framework:

The theoretical framework underpinning this research and derived from the review of literature is Piaget's theory of constructivism and concept of schemas. Piaget postulated that children actively construct their knowledge and understanding through assimilation and accommodation, feeding into cognitive structures, which he termed schemas (1969). In this research, children are seen as active meaning makers, using their schemas as a way to assimilate and accommodate their knowledge and understanding of their experiences in a social learning environment (the FP).

As stated in this review of literature, Athey (1990) considered herself to be a constructivist teacher and she argues that constructivist teachers are, 'interested in the processes by which children construct their own knowledge' (p.32). Schemas, as repeated patterns of action, can be regarded as processes children use to construct their knowledge and understanding of the world around them. Piaget talked of genetic epistemology as the development of knowledge and his work has, 'illuminated cognitive structures in children' which he termed schemas (Athey, 1990, p.3). He argued that children actively assimilate content into these cognitive structures, accommodate their understanding, and thus develop their thinking or cognition (Piaget, 1969). As Athey writes, 'The concepts of constructivist theory, such as 'action', 'schema', 'assimilation', 'accommodation'... can illuminate the learning of young children during the process of 'coming to know''(1990, p.32).

Constructivism does not provide one single overarching theory of education and neither does it provide a perfect set of pedagogical rules or principles. Two variations, cognitive-constructivist and social-constructivist are both common in constructivist literature (Rogoff, 1999). Cognitive constructivists, in general, base their perspectives on the ideas of Piaget while social-constructivists tend towards the ideas of Vygotsky (1986) and Bruner (1999). Cognitive constructivism focuses on individual, separate minds that construct knowledge from experience in the world (Roth, 1999). However, the notion of the individual learning in isolation has been increasingly challenged and there has been a growing interest in the role of the social in learning,

where development is viewed as being embedded in social, cultural and interactional settings (Wertsch, 1998). Cobb (1999), in a comparison and contrast of the two models, concludes that constructivists are primarily concerned with understanding how individuals learn. This research is concerned with the processes children go through to construct their knowledge and understanding and how schemas can facilitate this process.

Nutbrown (2006) argues that schemas provide another way of looking at a child and is a way of labelling children's consistent patterns of action. The observations of the children gathered throughout this research were analysed using the different schemas levels as postulated by Athey (1990, 2007) in her research and used by subsequent research studies into schemas (Meade and Cubey, 2008; Arnold, *et al.*, 2010; Nutbrown, 2011; Atherton 2013; Constable, 2013 and Deguara and Nutbrown, 2017). Therefore this research explores how schemas can support the construction of knowledge and understanding (cognition) or children *coming to know* through their active explorations in the Foundation Phase curriculum.

In addition, this research represents a synergy between the theories of Piaget and Vygotsky. As stated in the introduction and literature review, the FP supports both these theorists (WAG, 2008b). Piaget's theory is evident in the encouragement of the children to be active learners, in constructing their knowledge and understanding in the continuous and enhanced provision on offer. This research seeks to explore how Piaget's theory on schemas facilitates this. Vygotsky's theory is evident in this research by the FP practitioners working alongside the children, supporting them to construct their knowledge and understanding in a social learning environment and how their observed schemas can expedite this.

There has not been any research into children's schemas in the Welsh Foundation Phase (FP) and this research seeks to address this. This work differs from other studies into schemas in that it is action research, with both the FP practitioners and myself working together with the children to explore their schemas. Therefore, this research will develop FP practitioner knowledge and understanding of schemas and how schemas can best be supported within the FP learning environment. An output of this research will be a suite of resources and tools that can support children's schemas across all FP areas of learning and linking to FP outcomes. This is an original contribution to knowledge and adds to the knowledge base on schemas.

Paradigm or worldviews:

The research also needs to consider the philosophical assumptions and beliefs the researcher brings to the research process and design. Philosophical assumptions in a research study are the set of beliefs or assumptions that guide the inquiry (Creswell and Plano Clark, 2011). This can be termed a worldview or paradigm or as Mukherji and Albon (2015) stated a research paradigm is the adoption of a philosophical outlook on knowledge construction.

Creswell (2014) argues for four worldviews that can inform a methodological approach. These are Positivist, Constructivist or Interpretivist, Participatory and Pragmatist worldviews. Positivism is associated with quantitative approaches, Constructivist/Interpretivist with qualitative approaches, Participatory with political worldviews and Pragmatism with mixed methods (Creswell and Plano Clark, 2011). In a positivist practice, knowledge is arrived at through the gathering of facts that provide the basis for formulating laws. In this tradition, the purpose of theory is to generate testable hypotheses that can be conducted in a way that is value free (Bryman, 2012).

However, this research does not seek to generate a hypothesis, but to explore and interpret children's schemas through qualitative observations, photographs and discussions in a school setting. It also seeks to explore FP stakeholder's perception of schemas through completed questionnaires and interviews. This can be deemed as the study of the social world or as Bryman (2012, p.28) states, 'The study of the social world requires a different logic of research procedure, one that reflects the distinctiveness of humans as against the natural order.' Thus, this research adopts a constructivist paradigm. Proponents of such a paradigm argue for an understanding of the lived experiences of those taking part in the research (Schwandt, 1998). Therefore, researchers working within such a paradigm are interested in conducting research within naturalistic settings, for example classroom environments, as opposed to experimental conditions.

As well as determining the paradigm stance within a research study, one's ontological and epistemological position needs to be made clear. Ontology can be defined as the nature of reality and epistemology as how we gain knowledge or what is the relationship between the researcher and that being researched (Creswell, 2011). Within a constructivist paradigm, the ontological stance taken is that knowledge is subject to interpretation and the epistemological stance is that

knowledge is attained through personal meaning making. In this research, the practitioners and myself, interpreted observations and photographs to identify evidence of schemas when the children were engaged in personal, self-chosen activities. This links to the epistemological stance of children constructing their knowledge through their personal schemas. In adopting such a paradigm there needs to be a recognition of the researcher's own values and beliefs (axiology) and professional knowledge. Hence, there is discussion further along in this chapter that discusses validity and reliability.

3.3 Research Design:

Denzin and Lincoln (2008, p33) argue that a 'research design describes a flexible set of guidelines that connect theoretical paradigms first to strategies of inquiry and second to methods for collecting empirical materials.' This research adopted an action research (AR) methodology with two cycles as stated previously.

Action Research:

Action Research (AR) is where educators adopt an exploratory, investigative approach to their own professional context (Burns 2009). This is reinforced by Stringer (2014) who emphasises action research as a mechanism for practitioners to engage in systematic inquiry. However, it could be argued that this research contains many of the features associated with an ethnographical methodology. Ethnography involves the researcher immersing him or herself in a group or setting for an extended period, as was the case with this research. Creswell (2003) discusses the purpose of ethnography as developing a holistic picture of those being researched, and states that this includes interviewing all relevant people involved with those being researched. While this study does involve immersion in the setting, observations of the children's lived experiences whilst in the setting and interviews with the practitioners, the children's parents were not involved and there were no observations in the home setting. Thus, this research cannot claim to be a complete ethnographical account of the children's lived experiences.

Data were gathered qualitatively through observations, photographs and interviews with staff and through the completion of questionnaires by a range of FP stakeholders across South East Wales. Each of the data methods were discussed between the researcher and the practitioners involved in the research. Both the researcher and the staff in the setting worked together to

observe and photograph evidence of the children’s schemas in action. Koshy (2010) argues that people working together with a common purpose carry out action research. In this research, the common purpose was to recognise children’s schemas and how the FP could support those schemas once recognised. For this research Mills 2011 model of action research was adopted for Action Research Cycle One and Mills and Butroyd’s 2014 model for Action Research adopted for Cycle Two as shown below.

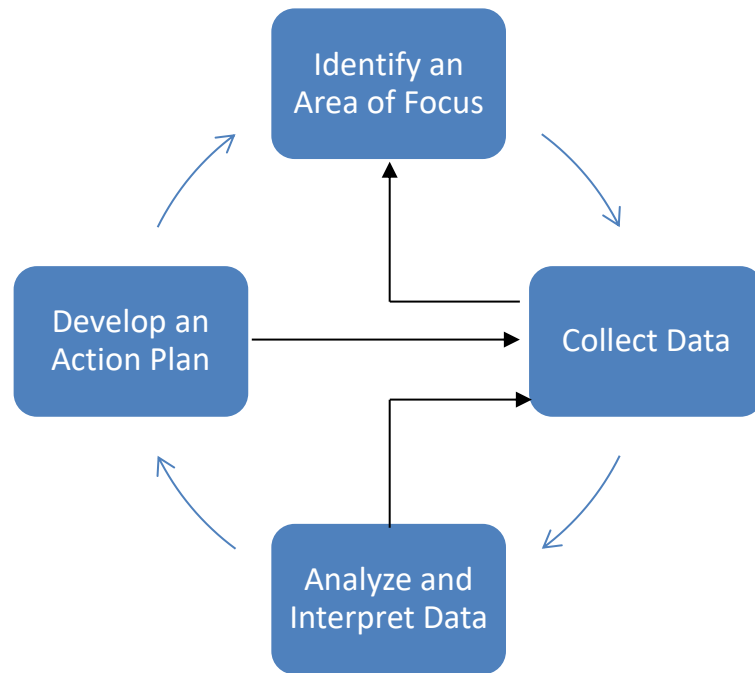


Figure: 3:1 Mills’ model of action research (Mills 2011, p.19)-Adopted for Action Research Cycle One.

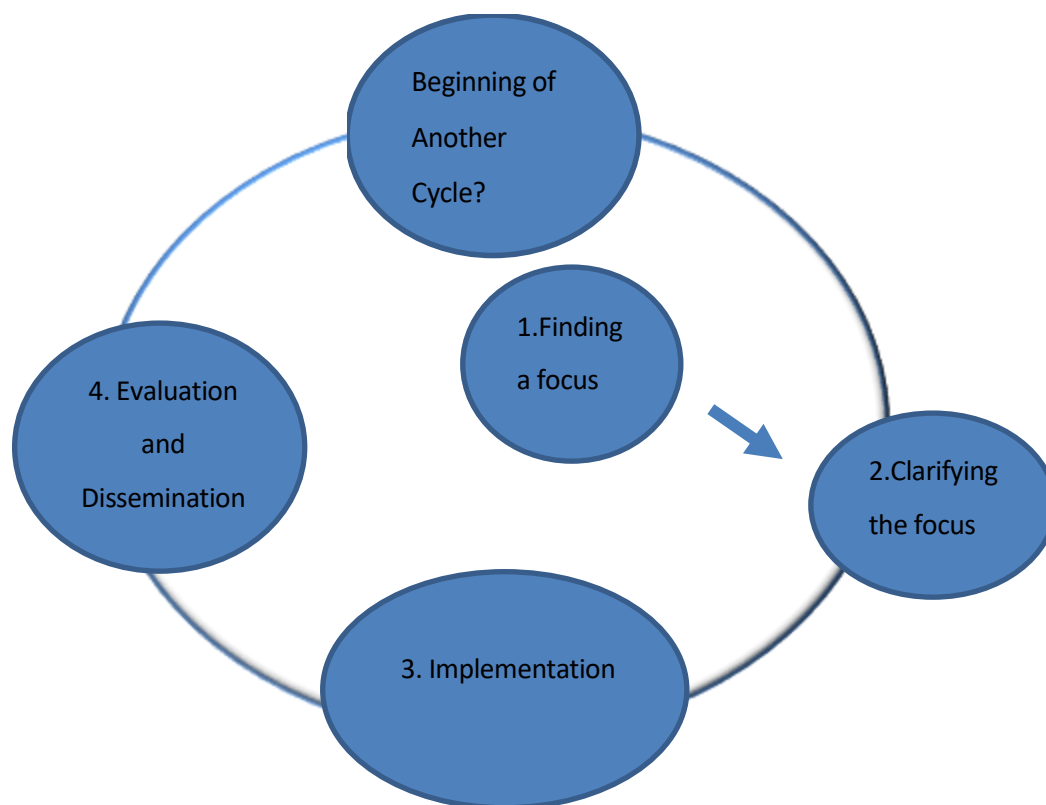


Figure: 3:2 Mills and Butroyd's model of action research (Mills and Butroyd 2014, p4)-Adopted for Action Research Cycle Two.

Both these models was suited to this study and to working with staff in a classroom environment as both were dialectic models that could be adapted to different situations (Ivankova, 2015). Furthermore, both models supported the iterative and cyclic nature of action research. As Grant, Nelson and Mitchell (2011, p.2) postulate each cycle builds upon the other and is a process of, 'research, learning and action'. However, in the second cycle of action research Mills and Butroyd's 2014 model was deemed more applicable to the research being carried out. The stages in this cycle were more relevant to the research being undertaken in Cycle Two, with the analysis of wider FP stakeholders' perception of schemas and the findings from Cycle One helping to find, shape and clarify the focus in Cycle Two.

Throughout the action research cycle there needs to be reflection and discussion on the part of the researcher and the practitioners (Ivankova, 2015). Schön (1991) talks of a reflexive process like a spiral where multiple perspectives can be unearthed. Mills (2011) and Mills and Butroyd (2014) agree with this by postulating that action researchers incorporate a reflective stance into their daily practices to critically examine and improve them. Somekh (2006) argues that action research involves negotiation and discussion when both researchers and practitioners work together. However, Greenwood and Levin (2000) maintain there can be issues relating to the

democratic and collaborative nature of action research. In this research, the researcher and the practitioners worked together, to reflect upon the observations and photographs and the story they were telling of the children's lived experiences in the setting. Therefore, there were no issues of the researcher being more dominant than the practitioners as all involved had an equal voice and opinion throughout.

In the past action research has been criticised as lacking the rigour of other research methods as it is a negotiated process between the researcher and practitioners in the setting and could be seen to lack the formality of other approaches. However, this criticism is essentially about procedure and action research should be judged on outcomes (Newby, 2014). It does need to be a negotiated approach but that can be strength of action research in that it is a democratic process. Kemmis and McTaggart (2007) emphasise this allows all stakeholders to engage in the research process. In this study, the practitioners were an equal part of the research process from the offer to take part being open to all practitioners in the lower FP, to the gathering and analysis of the data and to the development of a suite of resources to support children's schemas in the FP. The children were part of the research process with always having the option not to take part in any observations or to not having their photograph taken. Permission was always sought from them before any evidence of their work was used in this study.

In both Cycles of AR research, I spent the first term in the setting getting to know the children so when the observations began in the second term the children were used to my presence. Additionally, I had worked in the setting previously albeit not with the practitioners involved in the research, and had ten years teaching experience so understood the daily routine of a busy classroom. This meant that I was not seen as an outsider coming in to a strange environment, interrupting the routines, but as a past colleague working in collaboration with the practitioners in the setting. As Mills and Butroyd (2014) state, 'Action researchers do not do research *on* their learners or colleagues, but collaborate on research *with* them (p.7).

Palaiologou (2017) on discussing action research in a school setting, makes the point that the research needs to be relevant to the needs of busy practitioners. Herr and Anderson (2005) support this by arguing that action research is best done in partnership with stakeholders with an interest in the issue under investigation. This research explored how schemas could become

part of the FP curriculum using the learning environment (continuous and enhanced provision) and curriculum planning already in place, thus not adding to the workload of the practitioners. In addition, the practitioners involved in this research had expressed an interest in exploring children's schemas believing there was a relevance to embedding schemas with the existing FP curriculum.

Participatory or collaborative research methods see children as competent social actors in their own right-as beings rather than becomings (Holloway and Valentine, 2000). Grover (2004) asserts that participatory methods of research can be seen as producing more authentic knowledge about children's realities. Galini and Efthymia (2010) argue for collaborative action research as providing practitioners and researchers with the framework and means to reflect upon their work and take action with regard to specific concerns and situations in their classrooms. This research aimed to capture and explore children's lived experiences in a FP setting and how they used their schemas to construct their knowledge and understanding. Therefore, the research was *with* children and not *on* them and sought to address how practitioners could take action to recognise and support children's schemas.

Both the researcher and the practitioners listened to and observed the children as they engaged in activities they had chosen. Clark and Moss (2001) have spoken of researchers' need to use the myriad of symbolic languages through which children represent themselves. They advocate combining the visual with the verbal (Gallacher and Gallagher (2008). This research does this by capturing children's dialogue in the observations and their actions in the photographs. Palaiologou (2017) concurs with the need for practitioners to be involved in all parts of the research process, from the data gathering to the analysis of the data. Throughout this research both myself, as the researcher and the practitioners in the setting worked together to capture and analyse evidence of children's schemas.

Elliott (1991) also argues that action research more often improves practice rather than producing new knowledge. This is also reinforced by Mukherji and Albon (2010, p.90) who write, 'it (action research) aims primarily to create change rather than produce new knowledge.' In contrast, McNiff and Whitehead (2011) argue that action research does generate new knowledge that supports new theory. This research did generate new knowledge and understanding of children's schemas in the FP and how adults could support children's schemas; thus reinforcing

the findings of McNiff and Whitehead. In addition, it did create a change where practitioners reconsidered how to best facilitate children's schemes within the FP setting through their pedagogy; therefore also supporting the findings of Elliott and Mukherji and Albon. Park (1999) encapsulates participatory research as being, 'motivated by action and ends with action' (p.148). This research was motivated to explore children's schemas in the FP and ended with the practitioners including schemas as part of their planning across the FP curriculum.

The Setting- Cycle One and Two:

The chosen setting for both Cycles of the Action Research was a primary school in South East Wales. The children were from a mixture of backgrounds but the surrounding area was classed as deprived with high unemployment. The school had 245 pupils on roll with 100 of them in the Foundation Phase from Nursery through to Year Two. The proportion of free school meals in the school was 28.70%, which is typical for schools in this area. In the last inspection, Estyn (2010) rated the school as 'good'. The first Cycle of Action Research took place in 2012-13 and is summarised in this chapter. The second Cycle of Action Research took place in 2014-15 and the findings from this cycle are presented in chapters 4, 5 and 6 of this work. The reason for choosing the same setting for the second Cycle of Action Research was because the staff had shown an interest in continuing to develop their own knowledge and understanding of schemas from the findings of Cycle One of Action Research.

During both cycles of research there were seven staff in the early years lower Foundation Phase (FP), with classes consisting of one teacher, one higher level teaching assistant (HTLA) and five support staff. In Cycle One in the Nursery, there were thirty children and in the Reception class there were twenty four children with four having 'play plans' and on the additional needs register, having being identified as requiring extra support. Play plans were documents which had targets agreed between the setting and the parents for the children and were reviewed on a termly basis. In Cycle Two there were thirty five children in the Nursery class and twenty seven children in the Reception class with nine having 'play plans' and on the additional needs register having being identified with additional learning needs.

The Nursery and Reception classes were separate from the rest of the school with their own outdoor yard but both classes were open plan, with children having free flow access between both classrooms. Resources were shared between both classes and both classes followed the

same termly topic. Each class had a reading area, a wet play area and carpeted areas for using construction equipment. Both classes shared an enclosed outdoor area with a wooden climbing frame and wooden playhouses. Nursery and Reception children shared the yard, usually at different times of the day. There was a water tray and sand tray outside, wooden playhouses and usually bikes and cars for the children to use during outdoor sessions. There was a role-play area in the Nursery class but this was shared with the Reception class. Tables were at a minimum in line with the ethos of the FP and there were lots of space in both classrooms for carpet activities (WAG, 2008c).

Both Nursery and Reception followed a timetable with whole class input first thing and then the children were engaged in a mixture of adult and child-led activities. There were plenty of opportunities for play-based active learning in the continuous and enhanced provision on offer. This setting was familiar to me as I had been employed there as an Early Years teacher seven years ago. However, I had not worked with the current Nursery and Reception teachers or additional practitioners.

Summary of Action Research Cycle One:

The first Cycle of Action Research started in 2012 and explored whether children aged three to five years in school based FP setting, were exhibiting examples of schemas and if the offered learning environment could support children's schemas. In addition, another aim of the first cycle was to investigate practitioners' perceptions and knowledge of schemas within the chosen setting. Qualitative findings were collected through narrative observational field notes and photographs during the children's everyday activities in the setting. Foundation Phase staff knowledge and understanding of schemas in the chosen setting were gathered through the use of questionnaires and semi-structured interviews. One of the strengths of action research is to gain a more in-depth understanding of a concept or an issue, which in turn provides future opportunities for more rigorous research (Punch, 2009). The following research questions underpinned the First Action Research Cycle.

Cycle One (2012-2013):

- What is the knowledge and understanding of the FP stakeholders of schemas within the chosen setting?
- Do children exhibit schemas in the Foundation Phase curriculum and how are schemas best identified?
- Can the Foundation Phase learning environment support children’s schemas once identified?

The timetable for Cycle One (Table 3:1) was as follows, following Mills (2011) model of action research as depicted in Figure 3:1.

Cycle One	Actions
Stage 1: Identify an area of Focus September 2012-December 2012	Ethical clearance obtained to observe the children in the setting Information and Consent letters sent home to parents Researcher to regularly attend setting so children become used to her presence Decision to use observations and photographs with children as most appropriate methods to identify children’s schemas Questionnaires to FP staff to determine knowledge and understanding of schemas in the setting.
Stage 2: Collect Data Stage 3: Analyse and Interpret Data January 2013 – July 2013	Researcher to carry out observations and photographs with children in chosen FP setting to identify examples of schemas in the continuous and enhanced planning. Findings analysed through schemas levels and discussed throughout with the Nursery and Reception teachers. Questionnaires analysed by researcher, Nursery, and Reception teachers.
Stage 4: Develop an action plan July 2013	Semi-structured interviews with two practitioners at the end of the cycle to review findings and develop an action plan for Cycle Two of the Action Research. Review of the current questionnaires to adapt questionnaires for use with wider FP stakeholders in Cycle Two.

Table: 3:1 *Timetable for the research*

Data were gathered with six children, exhibiting a range of schemas over two school terms, through observations and photographs. These children had implicit parental consent (**opt out**) to take part in the research (see appendix 1 for example of information letter sent to parents). The head teacher reviewed the research proposal and the parental information letter and was happy with the option of parents opting out of the research. Ethical approval from the university’s ethic champion, for Cycle One, was obtained prior to the study commencing (see appendix 2). The

selection of the children was an example of purposive sampling. Purposive sampling is, carried out with links to the research aims (Bryman, 2012). Therefore, the aims were to explore children's schemas so the six children chosen exhibited different examples of schemas. An alternative definition of purposive sampling is that the researcher decides what needs to be known and sets out to find participants who are able to provide the information required (Bernard, 2002).

The researcher was a non-participant observer during the observations. The observations and photographs were analysed through the different schemas levels as pioneered by Athey (1990; 2007) in the Froebel Research project:

- Motor Level
- Symbolic representational level
- Functional dependency relationship –based on actions with their effects
- Thinking level
- Discussion

(Athey, 2007, p.116)

The above levels can indicate a hierarchal order in which schemas are explored. However, Arnold cautions against this and points out, 'the development of understanding and knowledge is more complex than this' (2013, p.172). In fact, although in chronological terms, children do move from simple actions to symbolic representation, functional dependency and development of thought, it is better to think of the levels schemas operate at as augmenting each other and children using all these levels as and when necessary to develop their knowledge and understanding. In the First Cycle of Action Research, the children's schemas were analysed through all the different levels indicated above and the findings were discussed with the Nursery and Reception teacher in the setting.

The schemas exhibited by the children in the First Cycle of Action Research (AR) are shown in the following table:

Type of schema:
Dynamic Vertical
Dynamic Horizontal
Positioning
Connecting
Enveloping and Containing
Dynamic Back and Forth (Transporting)
Rotational (Dynamic Circular)

Table: 3:2 *Types of Schemas exhibited in the First Cycle of AR*

The above schemas were identified through non-participant, narrative observations during the children’s free choice explorations in the continuous and enhanced provision in the FP setting. Palaiologou (2012), states that narrative observations have the advantage of giving detailed information and allows the observer to capture activities and behaviours. Andrews (2012), defines non-participant observations as the observer ‘looking through a window’ (p.71). The observer is not involved in the children’s activities and their impact is minimal. This is in contrast to participant observations where the practitioner interacts with the children.

The analysis of the observations and photographs from the First Cycle of Action Research showed that children aged between three to five years did assimilate and accommodate schemata in the continuous and enhanced provision in their attempts to develop their knowledge and understanding. It also determined that narrative observations and photographs were the most appropriate methods to recognise children’s schemas in the setting. This answered the research question:

- Do children exhibit schemas in the Foundation Phase curriculum and how are schemas best identified?

The findings also determined that the FP provision on offer in the setting (continuous and enhanced) did facilitate children's schemas, thus answering the research question:

- Can the Foundation Phase learning environment support children's schemas once identified?

Another aim of the First Cycle of Action Research was to determine FP practitioner knowledge and understanding of schemas in the setting. This was completed in two parts. The first was through the completion of pilot questionnaires (see appendix 3) at the start of Cycle One in November 2012, by all practitioners teaching in the FP. Before giving out the questionnaire the researcher did explain the research to the practitioners in the setting and what data would be collected as part of the research and how it would be used. Practitioners were also told that the questionnaires were anonymous and that completion was voluntary. Fourteen staff out of sixteen in total completed the questionnaires. The practitioners were given two weeks to complete the questionnaires. The findings from the questionnaires were analysed by both the researcher and the Nursery and Reception teachers at the end of the research. The second part was an evaluation of these questionnaires at the end of Cycle One, to see if any amendments were needed in preparation for their use in Cycle Two of the action research.

Findings from the questionnaires in Cycle One indicated that was a lack of knowledge and understanding by practitioners in the setting on what schemas were and how they could be supported in practice. Practitioners also indicated that they had little or no training on schemas as either teachers or additional practitioners. This answered the final research question for the pilot study:

- What is the knowledge and understanding of the FP stakeholders of schemas within the chosen setting?

At the end of the First Cycle, the practitioners were asked to evaluate the questionnaires before their use in Action Research Cycle Two. Denscombe (2003) argues in favour of using a pilot questionnaire so that researchers will, ask the vital research questions needed and there is the opportunity to find out how long the questions take to answer. Evaluating the questionnaire also supports the work of Roberts who attests, 'Your pilot work should have given you the chance of testing out the way you are going about the task of data collection' (2010, p.106). Thus the

findings from this evaluation were used to redesign the questionnaires for future use with wider FP stakeholders in Cycle Two.

During the evaluation, practitioners felt that some questions needed to be moved around and others to be more precise, thus generating more specific and useful information. This supports the work of Mills (2014) who attests that questionnaires should elicit useful responses and Wilson (2017) who states questionnaires can be viewed as a pragmatic approach to answering research questions. As this research is exploratory, qualitative questions had an importance as they allowed the researcher to surface points that they may not have been aware of and gave the stakeholders the opportunity to raise their perceptions without constraint. The following table summarises the practitioner feedback on the evaluation of the questionnaires.

Practitioner evaluation of Pilot Questionnaire:	Changes to Main Study Questionnaire:
Definition of schemas –practitioners felt this would help as some practitioners may have some understanding of schemas but not be familiar with the term ‘schema’	Now included in this questionnaire at the start.
Practitioners felt that if they had no knowledge of schemas then it was pointless in completing all the questions, especially those they could not answer. They suggested allowing participants to move straight onto next relevant question.	Give respondents the option to go to next relevant question in the questionnaire.
More specific question to gather practitioner knowledge of schemas-felt question was too ambiguous	Include rating scale from 1-5 for staff to indicate their knowledge of schemas
Move question on training to start as this question follows on from question on knowledge of schemas	Training question moved to start of questionnaire
Separate question on observing schemas and how this is recorded –as some staff only answered one part of this question not realising it was two questions	Now two separate questions-allowing practitioners more space to answer
Be more specific on linking planning and schemas	Ask specifically if schemas are used in future planning
No opportunity for practitioners to consider the FP documentation in relation to schemas	New question asking practitioners to rate FP documentation in regards to information on schemas

Table: 3:3 *Amendments to the Questionnaire*

At the end of the First Cycle (July 2013) the Nursery and Reception teacher were interviewed to explore their thoughts on the research carried out in their classrooms (see transcript in appendix 4). This was also to consider the next stage in the research or as Mills (2011) model of action research states, **Develop an action plan** (See Figure 3:1).

When interviewed both practitioners stated that they had little knowledge of schemas and that schemas were not planned for in the setting (resonating with the findings from the questionnaires). Nevertheless, they had been interested throughout research Cycle One to see how children's actions could be interpreted differently when viewed through a schematic lens. However, they both felt that unless schemas were included in FP policy guidance and training it would be difficult to translate this into practice. The Welsh Government (WG) were contacted during Cycle One to ask why schemas were not part of FP policy and guidance documentation. Their response was that it was up to practitioners to decide whether or not to include schemas in their pedagogy. They also indicated that some training had been available (Module on Child Development). However, this was not evident in the responses from the practitioners in the setting. They made the point that if they did not know about schemas how could they decide whether to include them in their pedagogy or not? The official response for the WG can be found in appendix 5.

Both practitioners talked of some sort of toolkit or suite of resources available in the setting that could guide practitioners in the initial recognition of schemas. In addition, they felt that once schemas had been identified, there needed to be ideas for resources and activities that could support schemas. Finally, they also felt that they wanted more experience on being able to recognise and support schemas and once recognised and supported, how schemas could link to FP outcomes. Therefore, they felt that they needed to carry out more research into schemas in order to develop their own knowledge and understanding. This supports Palaiologou (2017) who states, when working alongside practitioners the research must be relevant to their needs. These interview findings helped to shape the design of Cycle Two of the Action Research.

The findings of Cycle One of the Action Research in relation to the research questions asked can be summarised as follows:

Research Question:	Findings:
What is the knowledge and understanding of the FP stakeholders of schemas within the chosen setting?	Limited Knowledge and a need for practitioners to carry out more research into recognising and supporting schemas in the setting. This underpinned adopting an Action Research methodology again in Cycle Two.
Do children exhibit schemas in the Foundation Phase curriculum and how are schemas best identified?	Yes, a range of different schemas were evidenced and narrative observations and photographs were deemed the most appropriate methods to capture this.
Can the Foundation Phase learning environment support children's schemas once identified?	Yes, children exhibited their schemas using resources available in the FP learning environment. Schemas were evident in children's freely chosen activities in the continuous and enhanced provision

Table 3:4 *Summary of the Research Findings from Cycle One of the Action Research*

Action Research Cycle Two (2014-2015):

Prior to Cycle Two of the research starting in September 2014 the researcher held an information session with the FP practitioners in the chosen setting (the same setting as in Cycle One). The information was in the form of a power point presentation recapping the findings from Cycle One and a proposed outline for Cycle Two. After the presentation, there was an opportunity for the practitioners to ask any questions and to suggest any of their own ideas for forthcoming research. This allowed the practitioners to become involved in the action research right from the start. Three FP practitioners agreed to work with the researcher and these were the Nursery teacher, the Reception teacher (same participants interviewed in Cycle One) and an additional practitioner now working with the Reception class. There was also a discussion around determining wider FP stakeholders' knowledge and understanding of schemas across South Wales. This was because the only perception of schemas was from the completed questionnaires gathered in Cycle One in 2012 -2013. Therefore, both the practitioners and I felt it was important to gather knowledge and understanding of schemas from a wider range of FP stakeholders. This would determine what knowledge and understanding other FP stakeholders might already have about schemas and what they felt was missing. This then would help to **find** and **clarify** the focus for the subsequent

research (stages one and two of Mills and Butroyd’s 2014 model of action research- see figure 3:2). Therefore, in the first term of Cycle Two of the Action Research, it was decided to send out the amended questionnaires (from Cycle One) to a range of settings and to evaluate the findings.

The timetable for Cycle Two of the action research was therefore as follows:

Cycle Two	Actions
Stage 1: Finding the Focus and Stage 2 Clarifying the Focus September-December 2014	Meeting with practitioners in setting to discuss and explain research. Development of poster depicting action based schemas (displayed in setting for duration of research) and schema key ring cards. Initial snap shot observations by practitioners involved in the AR of children’s schemas to begin to identify any schemas being shown by the children (shared with researcher). Questionnaires sent out to range of FP stakeholders and analysed. Ethical approval obtained for researcher to carry out observations in setting
Stage 3: Implementation January – July 2015	Consent form sent out to parents and children chosen for the research. Observations and photos of children’s schemas by researcher and practitioners. Ongoing discussions and interpretations of observations and photographs analysed schematically by researcher and practitioners involved in the AR. Links made to FP outcomes and FP AOL
Stage 4: Evaluation and Dissemination July 2015	Evaluation of the research through semi-structured interviews with staff. Reflection on using schemas as another lens to view children through. Development of resources to support practitioners in identifying schemas in FP settings. Discussion on how to disseminate findings to a wider audience.

Table: 3.5 *Timetable for the research*

This second Cycle of Action Research built upon the findings from the first Cycle of Action Research and was underpinned by the following research questions-which also built upon the research questions explored in Cycle One:

- What is Foundation Phase stakeholders’ knowledge and understanding of schemas across South East Wales?
- Can children’s schemas be observed in the Foundation Phase curriculum?
- Can Foundation Phase practitioners be supported to nurture and nourish children’s schemas?
- Can nurturing and nourishing children’s schemas support Foundation Phase outcomes?

The first research question was amended for the second cycle where the focus shifted from setting to geographical region. This was to gather a wider perspective on the status of knowledge and understanding of schemas by FP stakeholders and supported the validity of the research by

gathering data from a much larger sample of people. This would also determine if there was a gap in FP stakeholders' knowledge of schemas, which future dissemination of this research could fill, thus adding to the worth and contribution to knowledge of this study.

The second research question now explored if schemas could be observed with a different cohort of FP children from Cycle One, thus adding more data on how children use their schemas in the FP to construct their knowledge and understanding. The third research question developed from the interviews with the FP practitioners at the end of Cycle One. Here, they had emphasised a need to carry out more of their own research into schemas and to work on developing a toolkit or resource that could facilitate FP practitioners in supporting schemas. The final research question was also generated from the interview with practitioners at the end of Cycle One, where they wanted to explore how supporting children's schemas could facilitate meeting FP outcomes across the different FP areas of learning. Practitioners felt this would add to the worth of adopting schemas as part of the FP pedagogy and practice and develop their understanding of how supporting schemas could facilitate knowledge development within the FP curriculum.

Sampling and participants- Cycle Two:

All research involves sampling and for Cycle Two of this action research study, purposive sampling was used again, as in Cycle One, to select children for the study. Purposive sampling has the advantage of allowing the researcher to focus on people that are critical for the research. As Punch (2009) states if the research in question highlights relationships between variables then purposive sampling is appropriate as this allow maximum opportunity for the relationship to be observed. The focus is on generating in depth information and understanding of individual experiences (Creswell, 2013; Tashakkori and Teddlie, 2010). The semi-structured interviews and the completion of the questionnaires in Cycle Two, were also examples of purposive sampling as all participants needed to be working in the FP to be considered relevant for the research. This is in agreement with Bryman (2012) who argues that purposive sampling is carried out with links to the research aims.

During the first term of Cycle Two (September to December 2014), when the researcher was awaiting ethical approval to carry out observations, the three practitioners (who had agreed to work with the researcher) within the setting began to note any incidences of repeated schemas by the children. This allowed an initial determination of the types of schemas being exhibited by the children in the setting (the practitioners did not need ethical approval to observe children as

this was part of normal FP practice). To support these initial observations, the researcher and the practitioners developed a poster depicting different types of schemas. This was part of a suite of tools developed to recognise and support schemas and was used as a reference point throughout the research (see figure 3:3). These observations were shared with the researcher and a list of potential children was drawn up. This was cross-referenced with those children who had been given parental consent in January 2015 to take part in the research, to decide upon the final children to include in the study.



Figure: 3:3 Poster depicting action (dynamic) schemas

In addition, the practitioners involved in the research along with myself also designed, and used key ring cards to recognise schemas (see figure 3:4). These were in the form of flash cards defining different types of schemas and were also part of the suite of tools to recognise and support schemas. The rationale was that these could be referred to quickly during observations to support practitioners in having a quick visual reminder of examples of schemas when observing children.



Figure: 3:4 Schema Key Ring Cards

In January 2015 the final sample of children were chosen for this study- all aged between three to five years of age. The children were chosen on the criteria of showing repeated evidence of different types of schemas and having parental consent. For this part of the study the parents were asked to give explicit (**opt-in**) consent for their children to take part by completing and signing a consent form. This was a requirement of the ethical procedures in the faculty of life sciences and education at the university where the researcher was now employed. The consent letters and information letters were sent out at the beginning of January 2015 and were asked to be returned within two weeks. An example of both the information letter and the consent form can be found in the appendices 6 and 7 respectively.

In the Nursery class twelve signed consent forms were returned and in the Reception class ten were returned. This was a disappointing return of parents giving consent as there were thirty-five children in the Nursery class and twenty-seven children in the Reception class. Poor return rates where participants are asked to opt in are not uncommon due to a number of factors such as parents not completing the consent forms or consent forms going missing (Boody *et al.*, 2011; Bryman, 2012).

The school did send out an email to the parents in the Nursery and Reception class reminding them to return the forms but no more forms were returned and the school did not want to pursue the parents any further (they did not want, as the head teacher put it, "*to hassle the parents*"). This was frustrating, as some children initially identified in term one as showing evidence of repeated schemas, could no longer be considered for the study. This can be considered a limitation to this study as it meant that only a small sample of children were eligible to be included. However, previous studies on children's schemas have been based on small sample sizes, Arnold

et al. (2010); Nutbrown (2011) and Atherton and Nutbrown (2013) and this study has sought to build upon these studies.

Out of these twenty-two children with parental consent, five did not show repeated examples of schemas. These were omitted from the study, leaving seventeen children to choose from. Out of these seventeen potential participants, three of the children did not attend the setting on a regular basis so these were not considered for the study. This was because as stated previously, prior to starting the observations with the children, the researcher had spent a term building up a rapport with the children in the setting. As these three children had only been in the setting infrequently when the researcher was present, there had been less of an opportunity to develop a relationship with them. As Verma and Mallick (1999) state children need time to become used to the presence of the researcher. By not regularly being in the setting in the first term when I was there may have led to the children not feeling comfortable being observed by me in terms two and three. Therefore, it was decided, on discussion with the practitioners, not to include these three children in the research. This left fourteen children, seven in Nursery and eight in Reception, with these fourteen children showing a range of different types of schemas. However, the number of children included also needed to be manageable for the detailed narrative observations required to highlight the children's schemas. In discussions with the supervisory team and based on previous studies (including Cycle One) into children's schemas, six children with different schemas were deemed a manageable number to research, allowing for the in-depth detailed observations required. The criteria for choosing the children can be summarised in the following table.

Criteria:	Rationale:
Children in a FP setting	Meets aim of the research: To explore Schemas in a FP setting
Children in Nursery and Reception class	Children in these classes are aged between 3-5 years and schemas are deemed more prevalent in children up to the age of 5 years
Consent	Only children whose parents consented were able to be considered
Children exhibiting repeated episodes of different types of schemas based on Athey's typology (1990 and 2007)	To be authentic examples of schemas (as detailed by Athey 1990,2007) children need to show repeated examples of schemas

Number of children to include in the research	A manageable number to carry out detailed narrative observations
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Table 3.6 *Criteria for the purposive sampling*

Methods:

The empirical data collected in Cycle Two of this Action Research study employed methods of observations, photographs, stakeholder questionnaires and semi-structured interviews with practitioners. Ormston *et al.* (2014, p.20) argues that, ‘there is no single, accepted way of carrying out qualitative research but some of the main methods include observation and interviews all of which apply to this study (Punch, 2009; Yin, 2014). Adopting multiple methods is usually associated with qualitative researchers to help them ‘look at something holistically and comprehensively, to study it in its complexity, and to understand it in its context’ (Punch, 2009, p.161).

Observations can vary, from being unstructured to structured and from being participant to non-participant (Sharp, 2012; Bell, 2010; Mukherji and Albon, 2015; Punch, 2009). For the purpose of this study, focussed narrative observations were carried out over two terms as this method of observation allowed detailed information to be gathered as determined in Cycle One. Palaiologou (2012), states that narrative observations have the advantage of giving detailed information and allows the observer to capture activities and behaviours. However, this type of observation is also time intensive, relies on memory, and needs concentrated attention by the observer. They can be snapshot comments or detailed records and narrative observations have the advantage of recording specific behaviours and their progress over a period.

During the narrative observations, the researcher and practitioners were non-participants. Creswell (2013) provides the following definition of a non-participant observation, ‘an outsider of the group under study, watching and taking field-notes from a distance’ (p.167). The observer is not involved in the children’s activities and their impact is minimal. Non-participant observations occurred when the children were engaged in freely chosen activities in the continuous and enhanced provision in the setting.

Even though the main purpose was to remain a non-participant there were occasions when children engaged with us. For example, interaction took place when children approached the practitioners or myself and asked questions such as “*What are you writing?*” or “*Can I see the*

photo you just took?" Also on some occasions, the children included me and other practitioners in their play activities. Any such interactions have been noted and included in the narrative observations detailed in chapter five.

Carrying out narrative observations allows researchers time to observe the children without interruption but to be part of their learning journey too. Forman and Hall (2005) argue that through observing children we discover what the child thinks, so observing children allows a window into their world. As Cohen, Manion and Morrison (2011) stated narrative observations are useful for studying small groups, when the need is to gather detailed information. In addition, I am familiar with process of observing children as having previously worked as an Early Years practitioner for over ten years. This meant I was familiar in carrying out the process of observations and interpreting the finer details. Also for the practitioners, involved in the research, observations were part of their usual FP practice so they were very experienced in observing children. Moreover, being very familiar with the field and context can often aid the understanding and significance of the phenomena observed or analysed.

Broadhead (2004), when discussing observations in the early years, stated that practitioners needed to move from simply watching children to reflecting on what was seen. Nutbrown agrees by arguing that, 'watching children and listening to them are essential to understanding their learning' (2006, p.34). Palaiologou (2016a, p.97) argues that non-participant narrative observation, 'aim to record specific behaviours . . . over a period of time.' This fits in with the aims of this part of the study, to record children's specific schemas over two school terms. All observations and photographs were discussed and reflected upon by the practitioners and myself, and interpreted using Athey's (2007) schema stages or levels.

The issue of subjectivity needs to be considered when carrying out observations and the part the researcher's own self plays in the production and interpretation of observational data. As Denscombe (2003, p.268) writes, 'The researcher's identity values and beliefs cannot be entirely eliminated from the process.' Therefore, it is important to acknowledge that any observations made are open to an individual interpretation. Moreover, observations can be over-analysed where the researcher might misinterpret and go beyond what has actually been seen (Mukherji and Albon, 2015). As stated above the observations were interpreted by everyone involved in the action research and the observations were triangulated with photographs and examples of the children's

speech. This supports Palaiologou (2016a), who states that narrative observations need to be supplemented with other evidence which also helps to reduce subjectivity.

In addition, it cannot be ignored that observing behaviours can alter the very behaviour being observed and would therefore not be a true reflection. However, this was not deemed such an issue in this study, as the children in FP settings were used to being observed as part of on-going everyday practice. This is reflected by Welsh Government (WG) policy and practice where observations of children, 'should be an integral part of the daily outline of practitioners working within the Foundation Phase' (WAG, 2008a, p.3). Therefore, observations of children were a regular feature in the setting.

McNaughton Nicholls *et al.* (2014) state that behaviours are more likely to change when single observations take place. However, in this research this was not an issue as the researcher and practitioners engaged in regular observations over a period of two school terms. Foster (1996) states that spending longer periods in a setting, such as a school where children and practitioners can become accustomed to the presence of the researcher, helps the participants become more at ease and act more naturally and this addresses the issue of reactivity. In addition, the researcher had already spent one day a week in the setting for a term before beginning any observations. This allowed the researcher to get to know the children and the children to get used to the researcher's presence and this has been termed 'comfortableness' by Atherton and Nutbrown, (2016, p.66).

Photographs:

Annotated Photographs were used to support and supplement the written observations. These photographs were included alongside the observations and analysed alongside the findings presented in this study. Cottle (2016) states that photographs allow for a rich insight into the child's world in the setting; they can provide a representation of a person's lived experiences within a given time and environment. Visual images can also help to eliminate any observer bias in the interpretation of written observations.

Pink (2004) argues that visual images are nearly never used on their own, being accompanied by other research methods. In this work, the photographs have been selected to capture evidence of the children's schemas and used alongside the written observations. The photos capture the

details, 'of each child's personal exploration priorities....' (Atherton and Nutbrown, 2016, p.3). These photographs were included alongside the observations and analysed in the findings presented in this study but, for purposes of confidentiality and child protection (as requested by the setting and USW ethics committee) the children's faces were obscured (pixelated) or the photographs were cropped. As Palaiologou (2016b) argues, in research there is a duty to protect the participant's identity. The use of video recording was discussed but the head teacher was reluctant to give permission for using this as a method of observing the children. This was because some parents had refused permission for their children to be videoed whilst in school.

Nutbrown (2010) has commented on the use of pixelated images of children, considering it a crisis of representation. She has argued that pixelating an image could distort what is real. However, the ethics committee at USW made it clear that if photographs were to be used then parental consent was required along with the consent of the '*gatekeeper*' at the setting and that all images needed to be anonymised. Schulz, Schroeder and Brody (1997, p. 483) envisage this as a continuous struggle between caring, 'for persons in the research and how to share their stories in meaningful and ethical ways.'

On discussion with the practitioners, it was decided wherever possible to photograph the children from an angle or behind. This would still allow for the anonymity required by the setting and pixelation or cropping of images would only be used when unavoidable. This is what Nutbrown (2010) terms, 'creative responses to new problems' (p.11). This allowed the researcher to adhere to the restraints on the use of photographs required by the setting and the ethics committee at USW, whilst still capturing a true real life reflection of the children's schemas in the setting. However, Phelan and Kinsella (2013) argue that photographs can reveal aspects of an individual's experience beyond their control. Therefore, throughout this research permission was always asked from the children before any photographs were taken and they were always given the opportunity to view any photos taken. If the children rejected the photographs then they were deleted but this never happened during the research.

Palaiologou (2012) states that when you interpret a photo you need to consider the features that carry meaning. She supports the use of indicators in photographs and 'what they might show' (p.93). In this research, the photographs were used as visual indicators of the children's schemas and were interpreted alongside written narratives and children's speech. Rose (2007) argues that

photographs can show things that can be hard to capture in writing and can be used alongside other methods of data collection. Whilst observations provide a written narrative of children's preferred schemas, the photographs allowed a visual interpretation as well.

Blaikie (2001) argues that photographs need an explanatory narrative to avoid misunderstandings. This is supported by Riley and Manias (2003, p.3) who state that visual images 'rely upon other cognitive and sensory faculties for interpretation.' This can also be a criticism of the use of photos, as the reader will always see the images from their own perspectives and bring their own understanding (Atherton and Nutbrown, 2013). Stanczak (2007) agrees with this acknowledging that the meanings of images relies upon how they are interpreted. In addition, a knowledge and understanding of schemas may influence the perspective of the person viewing it (Atherton and Nutbrown, 2013). In this way the meaning and interpretation attached to photographs is subjective to the viewer. To try to minimise subjectivity all the photographs were discussed and interpreted by the researcher and the practitioners involved in the action research. In addition, the photos were annotated by children's speech where applicable, also adding to the meaning of the images depicted. As Cruickshank and Mason (2003) assert photographs do not talk for themselves but the information has to be interpreted and understood in the relevant context. The photographs used in this study captured specific moments in time, illustrating the children's schemas at that time.

Throughout all stages of this research, the photographs were used as another lens to depict the child's way of coming to know and highlighting their use of schemas or threads of thinking. Here the child was viewed as an expert and not being 'othered' in the research (Lahman, 2008, p.286), but being viewed as 'other-wise' (Nutbrown, 2010, p.11) with a different kind of wisdom from whom the researchers could learn. Atherton and Nutbrown describe photographs as, 'pauses in action; they hold a moment that has gone but can still be seen' (2013, p.30). During each session in the setting, the photographs were discussed and analysed schematically by the researcher and the practitioners. Drawing on the works of Piaget, (1953, 1959 &1970), Athey (1990, 2007), Nutbrown (2011) and Atherton (2013), this was a collaborative, ongoing, iterative process throughout the research.

The next section discusses the questionnaires that were distributed to a wide range of FP stakeholders to gather data on knowledge and understanding of schemas across South East

Wales. As discussed in the summary of Cycle One, the original questionnaires completed by the FP practitioners in the setting, were evaluated and updated, taking on feedback given. These updated questionnaires were distributed to a wider range of FP stakeholders across South East Wales.

Questionnaires and Questionnaire Design:

During Cycle Two, questionnaires were distributed to a much wider range of Foundation Phase (FP) stakeholders than in Cycle One, in order to ascertain their knowledge and understanding of children's schemas. Examples of stakeholders chosen were FP advisory teachers, private nursery staff and practitioners (including additional practitioners) from a range of settings. Foundation Phase advisory teachers were responsible for delivering FP training to practitioners so they were included to determine if they themselves had any knowledge and understanding of schemas.

Chosen settings and stakeholders were contacted in a number of ways. Some were contacted via email with an accompanying letter (appendix 9) detailing the research and the questionnaire for completion (appendix 10). Others were asked in person if they were willing to take part, (here the researcher gave out the information letter detailing the research with a hard copy of the questionnaire) and the questionnaires was left for completion. These were collected two weeks later. As in Cycle One, the respondents were told they could withdraw their consent for their questionnaires to be used at any time (researcher's contact details were on the information letter) and stakeholders were only asked to identify their roles and location of work (i.e. Caerphilly) on the top of the questionnaires. The practitioners in the chosen setting, who had completed the questionnaires in Cycle One, were not asked to complete the questionnaires again.

Settings were from a number of local authorities across South Wales, including Caerphilly, Cardiff, Monmouth, Rhondda Cynon Taff and Blaenau Gwent. Two local Further Education colleges also agreed for the researcher to attend evening classes to ask Early Years Degree students and additional practitioners studying for diplomas in childcare, to complete the questionnaires. As in the questionnaires used in Cycle One, the questions were a mixture of open and closed questions. The design of this questionnaire was modified based on the evaluation of the pilot questionnaire used in Cycle One. As Punch (2009) asserts piloting contributes to improving the quality of the data. The changes to the questionnaire are recapped below:

Practitioner evaluation of Pilot Questionnaire:	Changes to Main Study Questionnaire:
Include a definition of schemas –practitioners felt this would help as some practitioners may have some understanding of schema type behaviours but not be familiar with the term ‘schema’	Now included in this questionnaire at the start.
More specific question to gather practitioner knowledge of schemas- felt question was too ambiguous	Include rating scale from 1-5 for staff to indicate their knowledge of schemas
Move question on training to start as links to question above-questionnaire would flow more	Training question moved to start of questionnaire
Separate question on observing schemas and how this is recorded –as some staff only answered one part of this question not realising it was two questions	Now two separate questions-allowing practitioners more space to answer
Be more specific on linking planning and schemas	Ask specifically if schemas are used in future planning
No opportunity for practitioners to consider the FP documentation in relation to schemas	New question asking practitioners to rate FP documentation in regards to information on schemas

Table 3.7 *Changes to questionnaire in main study*

With open questions, there is more opportunity to achieve richer data but they do take more time to complete and the data needs more in depth analysis. Creswell and Plano Clark (2011) stated that open questions allow the participants less restriction in responding. Closed questions provide shorter answers so require less time to analyse but do not usually contain opinions and can lead to some participants frustrated by the lack of opportunity to express their views. Therefore, the questionnaires used contained a mixture of both types of question, allowing a mixture of in depth and succinct answers.

Consideration as to how the questionnaires would be distributed was required as this could have a profound effect on the number that are completed and returned. The number of questionnaires returned is known as the response rate and can be increased by ensuring the questionnaire is attractive and easy to use (Cohen, Manion and Morrison, 2007). Potential respondents were contacted via email or in person. If those contacted via email had not responded after two weeks a follow up email was sent repeating the initial information. Cohen, Manion and Morrison (2007) argue that the response rate can be increased if follow ups and reminders are sent. If there was still no response then the respondents were not contacted again. With those contacted in person, then anyone not wishing to take part did not complete the questionnaires. By asking the

respondents to either complete the questionnaires in person or via email meant there was no cost to the participants and this can increase the response rate.

Advantages of emailing and self-completing questionnaires are that they can be administered in large quantities thus increasing the response received. Interviewer effects can be eliminated as Bryman (2012) has indicated that the characteristics of researchers can have an impact on respondents' replies but can vary from context to context. In addition, self-completion questionnaires can be more convenient for respondents to complete as they can do so in their own time. Disadvantages of self-completion questionnaires are that there is no-one present to help explain any questions which may be causing difficulty (Bryman, 2012).

A total of ninety-eight questionnaires were sent out and eighty-seven were returned giving a response rate of 88.76%. The analysis of the questionnaires can be found in chapter four.

Semi Structured Interview with practitioners:

A semi-structured interview was carried out with practitioners in the chosen setting at the completion of Cycle Two of the research. This was to ascertain practitioners' opinions of the action research and if they now felt they had more knowledge and understanding of schemas. As in Cycle One, a semi-structured interview was considered the most suitable method to use as it still had a clear set of issues to address, but allowed the interviewer the flexibility of determining the order to ask the questions (Denscombe, 2014). In addition, semi-structured interviews are particularly useful because they provide the interviewer with more opportunities to probe responses for further clarification and to gain more detail (Mukherji and Albon, 2010; Cohen, Manion and Morrison, 2011). Bloor *et al.* (2001) argue that giving practitioners the opportunities to voice their opinions allows them to, 'play an active collaborative role in the research process' (p.12).

The three practitioners, who had worked with the researcher on the action research in Cycle Two, were interviewed. These were the Nursery Teacher (NT), the Reception Teacher (RT) and one of the Additional Practitioners (AP) based in the Reception class. The NT and RT were the same practitioners interviewed in Cycle One but the AP had not been interviewed before. The interviews were not tape recorded or videoed. This was in response to one of the practitioners not feeling comfortable with this method of recording. As they stated, "*I would rather you not tape or video me, it puts me off answering the questions.*" A transcript of the questions asked can

be found in appendix 11 and the responses are presented and analysed in chapter six. As in Cycle One, the participants were told their participation was completely voluntary and that they would be, 'informed about the purpose and procedure of the interview' (Kvale, 2007, p.27).

In action research, interviews can be used as a first-hand completed account of the issue being explored. Another advantage to using interviews are that they provide essential evidence when making conclusions. They can supplement and provide clarity to information gathered on questionnaires. Disadvantages of interviews are that they can be time consuming and there can be bias in responses. Studies by Robson (1993) and Fielding and Thomas (2008) have found that it is impossible to control completely the effect an interviewer will have on the interview situation. In order to try to counteract this the interviewer asked the same questions in the same order to all interviewees. In addition, as the practitioners interviewed had been an equal part of the action research process throughout the study, there was no concern over power issues having an effect on the process (Mukherji and Albon, 2010).

After the interviews had been transcribed by the researcher they were shared with the interviewees to confirm they were an accurate account of what was said. This provide reliability and validity to the data gathered in the interviews. A limitation of interviews is that they can be very time consuming and so it is important to ask the most appropriate and relevant questions (Punch, 2009; Sharp, 2012). Pole and Lampard (2002) criticise interviews for being an 'artificial act' between people (p.127). However, Cohen, Manion and Morrison (2011) counter this by stating that interviews are beneficial in allowing a more detailed response than in a questionnaire. In this research, the interviews were part of a range of methods used to gather data on stakeholders' perceptions of schemas.

Themes and issues that emerged from the overall findings of the Cycle Two of the action research guided the questions put to the participants in the semi-structured interview. That is, they were designed to explore the participants' thoughts and opinions on supporting children's schemas within their own FP practice. In this way, the interviews sought to gain a better understanding of the practitioners' perceptions of schemas. The following table summarises an overview of the research methods adopted for Cycle Two:

Methods:	Participants:
Questionnaires	Foundation Phase Stakeholders across South East Wales.
Observations:	Children, carried out by Researcher and Practitioners
Photographs	Children, Carried out by Researcher and Practitioners
Semi-structured interviews	Researcher and Practitioners

Table: 3.8 *An overview of research methods adopted for this study*

Data analysis:

The foci in the data analysis of this research were as follows. Firstly, it was to analyse wider FP stakeholders' perceptions of schemas through completed questionnaires. Secondly, it was to identify evidence of children's schemas in the Foundation Phase (FP) in Wales through analysis of observations and photographs. Thirdly, it was an exploration of how the FP curriculum could support children's schemas by making links between observed schemas and FP provision, outcomes and areas of learning. Finally, it was an overall evaluation and discussion of the findings through a semi-structured interview with the practitioners who were part of the second cycle of action research.

As part of action research, the data gathering and analysis were cyclical, iterative and reflective. Both the practitioners and the researcher scrutinised the photographs and observations and organised them under the different stages of schemas behaviours as categorised by Athey (1990; 2007). This allowed the children's individual lived experiences in the setting to emerge. Nutbrown (2011, p25) suggest that knowledge of schemas provides, 'another way of looking at children' and 'provides professional language to refer to children's consistent and persistent patterns of action' (p24). The observations provided written accounts of the children's activities in the setting during free choice sessions using the continuous and enhanced provision and across the seven areas of learning in the FP curriculum. Analysing the observations provided accounts of the children actively using their schemas to assimilate and accommodate new information and construct understanding.

Analysis of the completed questionnaires and semi-structured interviews were grouped under subheadings to provide an account of stakeholder perceptions of schemas across South Wales. It also allowed the deliberation and reflection of their possible meanings to be considered. Patton (1990, p.514) makes a number of suggestions for easing the path to an effective, inductive, analysis of qualitative data. He advises being open about multiple possibilities and ways of thinking about a problem – ‘*side-tracking*’ and ‘*zigzagging*’ in the attempt to make connections. Punch (2009) suggests that data analysis needs to be ‘systematic, disciplined and able to be seen and described’ (p.171). Therefore, the data analysis in Cycle Two consisted of uncovering patterns, themes and making comparisons (Creswell, 2013; Mukherji and Albon, 2015).

The next section discussed the validity and reliability of the research.

3:4 Validity and Reliability:

In any research validity and reliability needs to be carefully considered. Denzin (1970) describes two types of validity in observationally based studies:

- Internal validity contemplates factors that confirm that the results are the genuine product.
- External validity considers factors that ensure that the results are applicable to other situations

Internal validity was accounted for as the children were observed in their familiar environment where they feel most comfortable and relaxed (Langston *et al.*, 2004). This means that the children were observed during their normal routines, allowing for more genuine results. In addition, any observational data and photographic evidence were discussed between the researcher and the practitioners in the setting to support validity. The data gathered from the questionnaires, in this part of the study, were from FP stakeholders not known to the researcher. Therefore, there were no concerns around the researcher influencing the answers given or the participants trying to *please* the researcher with the answers.

Positionality needs to be considered in regards to internal validity, where researchers bring their ‘own position’ to a situation regardless of the research being undertaken. Positionality can be regarded as an awareness of the relationship between the researcher and others (Bourke, 2014). In gathering the data the researcher was the data collection instrument and the researcher’s own subjectivity will play a part in the research process along with the reporting of the findings. Bourke (2014) attests that positionality represents the space in which objectivism and subjectivity meet.

Here there is a dialectic relationship between the two but researchers need to acknowledge this conflict and strive to maintain objectivity but stay mindful of our subjectivities.

As Punch and Oancea (2014) attest, 'any research should include recognition and scrutiny of the researcher's position...' (p.58). This 'own position' has both advantages and disadvantages, as a researcher can bring specialist knowledge to a research project which brings better understanding but less objectivity. For this part of the research, objectivity was maintained as the children being observed were unknown to the researcher (the children in the Action Research Cycle One had moved on). This meant that there was no prior knowledge of any schemas the children may or may not have exhibited before the research was carried out. Moreover, being very familiar with the field and context, can often aid the understanding and significance of the phenomena observed or analysed. As long as the researcher recognises these potential issues and care is taken during the planning of the research to minimise these then reliability and validity should be maintained. Working together as action researchers can help to bring understanding and objectivity to the research. In this research, observations, photographs and interpretations have been a shared ongoing process between the researcher and practitioners.

External validity can be more problematic as Punch (2009) argues that 'the transfer of observed research to other situations may be a problem' (p.44). This can be a particular issue in action research and small case studies where the action is localised in one work site. However, it is important to note that as this study was carried out in a FP setting some of these concerns can be alleviated. The FP curriculum is the same statutory curriculum, in all FP settings. Therefore, children and practitioners are working within the same framework and provision, planning through play, observing children and planning for the same seven areas of learning. This means that if it can be shown that children's schemas can be supported through the continuous and enhanced and provision in one FP setting and across the seven areas of learning, then it could be argued that children's schemas could equally be supported in other FP settings.

Richards (2003), however, warns of the danger of worrying too much about the generalizability of a piece of research and that if we think too broadly the eloquence a particular research brings is lost. Bassey (1998) argues for relatability as being more important than generalizability. Although the use of schemas to support children's knowledge and understanding in the FP is unknown, similar research has been successfully undertaken in the Early Years Foundation Stage

in England (Arnold, *et al.*, 2010; Nutbrown, 2011; Atherton, 2013 and Constable, 2013). This supports the argument of Hammersley (1992) who writes that we can generalise from the analysis of a single case study by comparing relevant aspects of other cases to our own and links to Bassey's concept of relatability (1998). Therefore, it can be possible to relate the research findings from this case study in one FP setting to previous research already carried out in England, in EYFS settings.

3:5 Ethical Considerations (Cycle Two):

Ethical research is about the sensitive use of methodological tools to gather someone's perspective. It is defined as, 'The moral philosophy or set of moral principles underpinning a project' (Aubrey *et al.*, 2000, p156). Ethical issues need to be considered when undertaking any research and the usual ethical conditions apply for the researcher before the work can begin. Permission needs to be obtained from the gatekeeper of the setting and from the children's parents to observe their children. For the practitioners working in the setting this is not an issue but the researcher coming into the setting needs to ensure all ethical procedures have been followed (see ethical approval in appendix 8). The ethical procedures for Cycle One have already been discussed and will not be repeated here.

According to Silverman (2006, 2013) it is only since the late twentieth century that ethical protocol has seriously been considered in research. The first British Education Research Association (BERA) ethical guidelines were formally adopted in 1992 and more recently, revisions about cultural sensitivity were adopted in 2011 (BERA, 2011). The BERA (2011) guidelines state that when researchers engage in any form of research there needs to be a consideration of how this research impinges on others. They argue that all participants must understand the research process and how the subsequent findings will be reported. Greig, Talyor and MacKay, (2007) state this is about treating participants well '*prior*' to data collection, '*during*' data collection and '*after*' data collection. Throughout this research, there have been ongoing discussions with the practitioners in the setting and through interviews at the end of the research.

For this research, the parents of all children in the setting were given detailed information before the research commenced and asked to give informed consent. Only children who had parental consent (**opt- in**) took part in this research. Parents were also given the opportunity to see any observations and photographs with their children throughout the research period. Furthermore,

they could withdraw their child from the study at any point. This is in agreement with the European Early Childhood Education Research Association (EECERA) ethical code where it clearly states that consent is an ongoing process (Bertram *et al.*, 2015). The children were always asked if it was okay to take their photograph and they were always given the opportunity to look at any photographs taken. If at any time a child indicated that they did not want to be observed or their photograph taken, then this was abide by. Dockett and Perry (2007, p55) suggest this is an example of what researchers consider, 'on-going opportunities' allowing children to negotiate, continue or withdraw consent.

The University of South Wales operates an ethical review system for all research involving human research participants. Ellis (2007, p.4) describes these as ethics of 'procedure and practice' ensuring that researchers consider all possibilities that may happen when out in the field. Since the pilot study detailed in Cycle One, the researcher had changed faculties and was now employed in the faculty of life science and education (FLSE). This had required the researcher to complete an ethics form for consideration by the FLSE ethics committee (see appendix 8).

As detailed signed informed consent (**opt-in**) was sought from parents of the children to take part in this study-this differed from Cycle One when parents were required to inform the setting if they did not want their children to take part (**opt-out**). Any parents not giving consent were respected and their children were not considered for this study. Although the parents were required to give consent for their child to take part, throughout the study the children's consent was also sought. This was through asking them if it was okay to take their picture or if it was okay to photograph their work (play dough creations, Lego and brick models, drawings and paintings). The photographs were always shown back to the children if they asked to see them and if they stated they were not happy with the image, it was deleted. This is in accordance with the UN Convention on the Rights of the Child (United Nations, 1989) where it clearly advocates listening to a child's voice. Therefore, in relation to children, informed consent was gained throughout and considered to be an ongoing negotiation (Mukherji and Albon, 2015; EECERA, 2015). All photographs were pixelated or cropped to provide anonymity of the children as discussed previously.

All the classroom practitioners were asked if they wanted to take part in the action research and the Nursery teacher, the Reception teacher and the Additional Practitioner in the Reception class agreed to work with the researcher. This was in the form of verbal consent and anonymity of the

practitioners was agreed in the reporting of the findings, as were any details of the setting used. Again, as with the children, the practitioners could ask to be withdrawn from the research at any time. In addition, their responses in the semi-structured interviews at the end of the research were shown to them before being included in the final research thesis. This is known as member-checking and as Creswell (2014) states, this is often to determine the accuracy of findings where the researcher takes the data back to the participants to validate the findings. This was also a way of ensuring regular feedback to the practitioners and is suggested good practice by EECERA's ethical code (Bertram *et al.*, 2015).

Ethical protocol, as Greig, Taylor and MacKay, (2007) state, should also be considered after data collection. The participants (children and practitioners) have remained anonymous (Bell, 2010) and the school has not been named in this research. Part of the Data Protection Act 1998 legislates that researchers should for example, store data securely and ensures that participants know how the data will be used (Mukherji and Albon, 2015). Therefore, data were stored on a secure University password protected computer. Once the observational field notes and interview transcripts were typed up, the original handwritten forms were destroyed. All the children included in this research were allocated pseudonyms and all practitioners involved in the research have been referred to by their job role initials i.e. NT= Nursery Teacher. The stakeholder questionnaires were anonymous and the respondents were only asked to indicate on top of the completed questionnaires what their job role was, what year of the FP they worked in if applicable and their location of place of work.

3:6 Summary and Conclusion:

This chapter has outlined the research design for this study including the two action research cycles followed. The findings from Action Research Cycle One have been summarised and how it has informed and shaped the design of Action Research Cycle Two. The theoretical framework underpinning and guiding this research has been detailed, along with the philosophical position of the researcher.

The methodology and methods used in Cycle Two to gather data to answer the research questions have been outlined, along with any limitations of the chosen methodology and methods. The data analysis employed to explain and present the findings for Cycle Two have also been discussed. Ethical considerations have also been addressed for both cycles.

The next three chapters detail the findings from Cycle Two of this action research study. The first chapter presents and analyses wider FP stakeholders' knowledge and understanding of schemas across a range of settings in South Wales. This supports the first two stages of the 2014 Mills and Butroyd's Model of Action Research: 1: Finding the Focus and 2: Clarifying the focus.

Chapter 4: Stakeholder Perspectives on schemas (Action Research Cycle Two)

4: 1 Introduction:

One of the contributions to knowledge of this research was to establish:

- What is Foundation Phase stakeholders' knowledge and understanding of schemas across South East Wales?

This chapter explores the first and second stage of Cycle Two of the Action Research model. This builds upon the findings in the pilot study (Action Research Cycle One) where fourteen Foundation Phase (FP) practitioners in the chosen setting answered a questionnaire to determine their knowledge of schemas. Cycle One indicated there was a lack of knowledge and understanding of schemas by the FP practitioners in the setting. However, these responses were only from one FP setting, so in order to answer the research question above and to gain a more comprehensive understanding of schematic knowledge by FP stakeholders, a wider range of stakeholders were asked to complete a revised questionnaire. The questionnaire was amended based on the feedback given in Cycle One as detailed in chapter three. An example of the amended questionnaire can be found in appendix 10.

This questionnaire was distributed and analysed in the first term by the practitioners and myself between September to December 2014. Analysing the responses to these questionnaires helped the FP practitioners and myself to **find** and **clarify** the focus for the second cycle of action research. This supports the first two stages of the Mills and Butroyd's Model of action research (2014) as highlighted in yellow below:

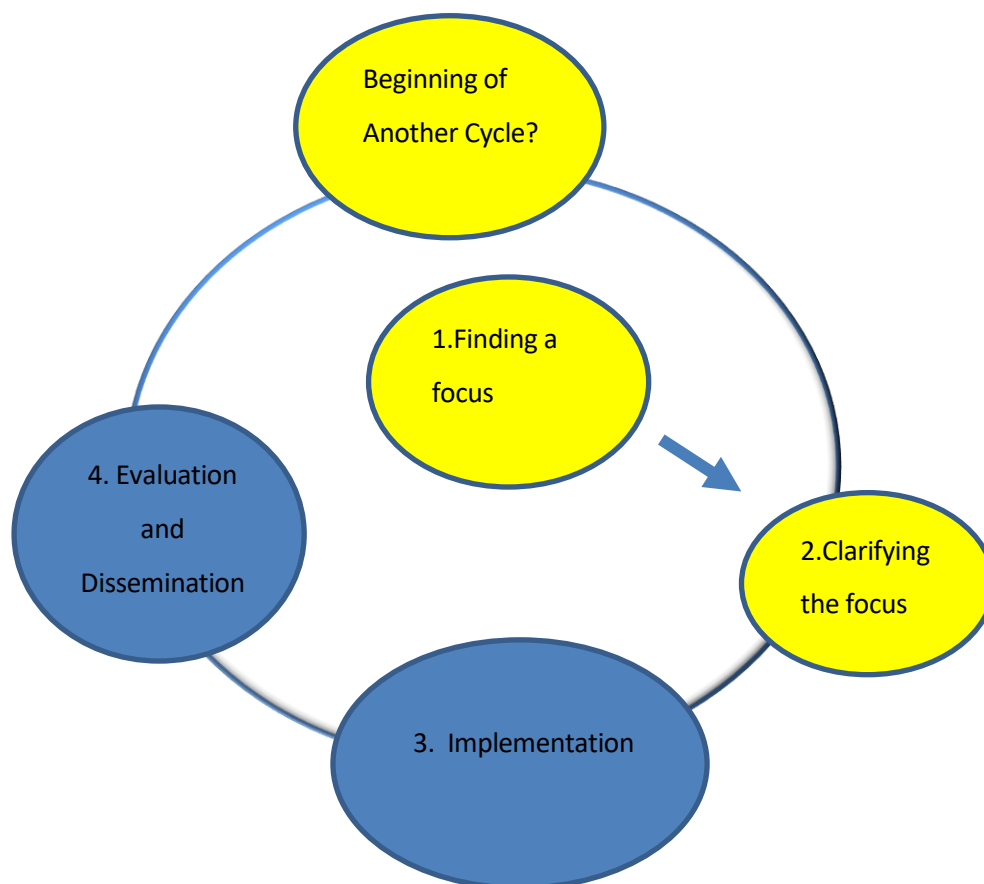


Figure: 4.1 Mills and Butroyd's model of action research (2014, p.4) adopted for Cycle Two

4:2 Foundation Phase Stakeholder Questionnaires:

Context:

For this part of the study, 98 questionnaires were sent out or given to participants. This allowed data to be gathered on knowledge and understanding of schemas from a wide range of Foundation Phase (FP) stakeholders. Examples of stakeholders chosen were FP advisory teachers, nursery managers and practitioners (including additional practitioners) from a range of settings. Foundation Phase advisory teachers were responsible for delivering FP training to practitioners and they were included to determine if they themselves had any training on or knowledge and understanding of schemas.

Nursery managers, in private settings, which delivered the FP curriculum, were also included. This was to explore if their settings had knowledge of a schemas and if they had access to other training (that may have included schemas) than that provided to schools by the local authority. The term practitioners included FP classroom teachers and any support staff who delivered the FP

curriculum. Settings were from a number of local authorities including Caerphilly, Cardiff, Monmouth, Rhondda Cynon Taff and Blaenau Gwent. Two local Further Education (FE) colleges also agreed for the researcher to attend evening classes to ask early years foundation degree, final year degree students and additional practitioners studying for diplomas in, 'Supporting Teaching and Learning' to complete the questionnaires.

Chosen settings and stakeholders were contacted in a number of ways. Some were contacted via email with an enclosed letter (appendix 9) detailing the research and the questionnaire for completion. Others were asked in person if they were willing to take part (here the researcher gave out the information letter detailing the research along with a hard copy of the questionnaire) and the questionnaires left for completion. These were collected two weeks later. As in the pilot study, the respondents were told they could withdraw their consent for their questionnaires to be used at any time (researcher's contact details were on the information letter). All responses were anonymised with the stakeholders only asked to identify their job roles. The practitioners in the chosen setting, who had completed the questionnaires in the pilot study, were not asked to complete the questionnaires again.

Advantages of emailing and self-completing questionnaires are that they can be administered in large quantities thus increasing the response received. Interviewer effects can be eliminated as Bryman (2012) has indicated that the characteristics of researchers can have an impact on respondents' replies but can vary from context to context. In addition, self-completion questionnaires can be more convenient for respondents to complete as they can do so in their own time. Disadvantages of self-completion questionnaires are that there is no-one present to help explain any questions, which may be causing difficulty (Bryman, 2012). Furthermore, there can be a problem with knowing who has actually completed the questionnaire. This was addressed in some part for the emailed questionnaires by sending the questionnaires to a specified person. However, these personal details were not included on the printed out copy of the questionnaire when analysed.

The way a questionnaire is distributed can influence the response rate. As stated above the potential respondents were contacted via email or in person. If those contacted via email had not responded after two weeks a follow up email was sent repeating the initial information. Cohen, Manion and Morrison (2007) argue that the response rate can be increased if follow-ups and

reminders are sent. If there was still no response then the respondents were not contacted again. With those contacted in person, anyone not wishing to take part did not complete the questionnaires.

87 out of the 98 questionnaires were completed and returned giving a response rate of 88.76%. By asking the respondents to either complete the questionnaires in person or via email meant there was no cost to the participants and this can increase the response rate. The next section details the findings from the stakeholder questionnaires. The findings have been analysed by the practitioners and myself through the responses given and presented through subheadings, graphs and quotes from the stakeholders involved. Some of the data have been presented numerically, in graphical form, for ease of interpretation. As Mason (2018) attests, the researcher may present data in other ways, in a mainly qualitative study, to support and enhance their analysis.

4: 3 Questionnaire Findings:

The analysis of the questionnaire is organised by responses to the questions asked as follows:

Knowledge and Understanding of schemas (N=87).

The first question asked staff to rate their current knowledge of schemas, this was to determine stakeholders' perceptions of schemas from a wider audience. The responses are displayed in Figure 4:2. This chart and all subsequent charts display responses to questionnaire items in terms of the percentages of participants responding in a particular way.

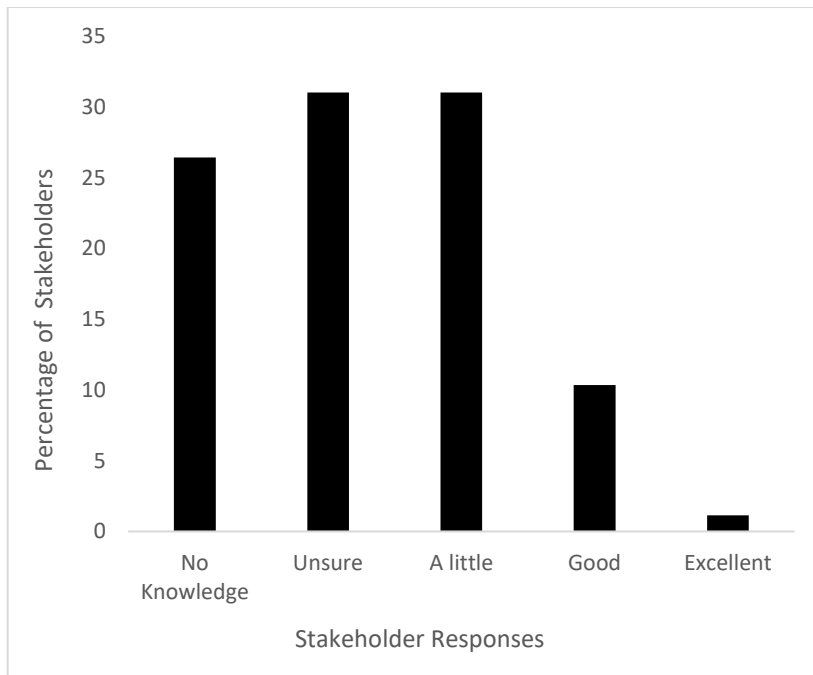


Figure 4:2 Stakeholders' knowledge and understanding of schemas

All the responses were from a mixture of stakeholders (classroom practitioners, FP advisors, degree students and additional practitioners).

Out of 87 responses received only just over 1 % of stakeholders felt they had excellent knowledge of schemas based on the definition given at the start of the questionnaire. There was good awareness amongst just over 10 % of stakeholders but just over 88.00 % of stakeholders felt they had little, were unsure of, or had no knowledge of schemas. This reflected the findings in the responses from the practitioners in Cycle One, where they indicated very little or no knowledge of schemas.

The next question asked stakeholders to define what the term schemas meant to them. Stakeholders who had indicated in the first question that they were unsure or had no knowledge of schemas (N=50) did not answer this question as the questionnaire asked them to go straight to question eight. This was based on feedback from the pilot questionnaire where respondents had felt there was little point in answering every question if they indicated they had no knowledge of schemas or were unsure of schemas at the start. Feedback suggested it would be more relevant to be given the option to proceed directly to the next relevant question. Therefore, these responses are based on 37 respondents.

There was a range of responses from staff who felt they had excellent, good knowledge of schemas as shown below:

"It is about understanding how children learn and explore"

"Schemas link to brain development and they need to play in certain way to make sense of the world"

"A vital part of a child's development but frequently missed and not recorded."

There were more limited responses from staff with a little knowledge such as:

"Based on individual needs"

"Behaviours shown by children"

"Exploring the world using sensory experiences"

From these responses, it would seem that there is a wide range of stakeholders' interpretations and understandings of what schemas are. However, these responses highlight a potential weakness in the questionnaire with the inclusion of a definition of schemas being given at the start. This could mean that some respondents used this definition to influence their answers. This was always going to be the risk in providing a definition but this was in response to the feedback received on the pilot questionnaire. Here the practitioners involved in the pilot study, argued that some people might actually understand or have knowledge of what schemas were but not know the actual term 'Schema'. Therefore providing a definition solved this but potentially caused other issues.

In addition, as the responses were written without the researcher being involved, then a further limitation to these responses were that they was not an opportunity to probe further. Asking the respondents to elaborate on their answers may have allowed the researcher to discover who had simply reworded the definition in their responses. However, this would have meant that responses were not anonymous and may have affected the number of stakeholders willing to participate.

Training in recognising schemas (N=37):

The third question asked stakeholders about any training they may or may have received on schemas. This was to build on the findings of the pilot study where nobody in the setting had received any training on schemas apart from information given on some childcare course when they were students. Again, the findings are based on thirty-seven responses.

The responses were as follows:



Figure 4:3 *Any training on schemas?*

For those who did answer this question only just over 43.00% of stakeholders had received any form of training on schemas. This ranged from:

“As a student, but I don’t think I quite got it”

“Briefly mentioned in one of the Foundation Phase training modules”

“Attended a training course that mentioned schemas”

The rest of the stakeholders indicated that they had gained knowledge of schemas as students when researching for assignments on their early years degrees or as students on childcare development courses. No-one stated that they had ever received training on initial teacher training courses or on post graduate education courses. This would seem to echo the findings from the pilot study. However, it must be acknowledged that the FP stakeholders surveyed were all based in one geographical region (South Wales) so these findings cannot be generalised across Wales. Nevertheless, if the responses of stakeholders in this study are

indicative of FP stakeholders in general then it would indicate a gap in the knowledge and understanding of schemas. These findings would also support why over half of the stakeholder responses for question one (57.47%) indicated no knowledge or unsure knowledge of schemas. This is also in contrast to the response from the WG in Cycle One (appendix 5) where they indicated there had been training available for all FP stakeholders on using schemas as part of their pedagogy. In addition, 57.00% of the 37 participants stated they had no training on schemas at all.

Typology of Schemas (N=37):

The follow on question from this asked if stakeholder knew any types of schemas. The stakeholders, who indicated excellent knowledge of schemas and some of those with good knowledge, were able to list types of action-based schemas such as:

“Transporting” (N=5) “Rotational” (N=1) “Enveloping” (N=1) “Positioning” (N=1)

However one stakeholder, who also circled having good knowledge of schemas and had defined them as: *“repeated behaviours,”* stated: *“Attention Deficit Hyperactivity Disorder (ADHD)”* and *“Autism”* as types of schemas. Another, who had also indicated good knowledge, wrote the word *“Piaget”* as their response to this question. This would seem to indicate that for some stakeholders the practicality of what schemas *actually are* is unclear, even if they think they have good knowledge and understanding.

In contrast, some of the stakeholders who indicated they had a little knowledge were able to name some types of schema. Again, this demonstrated the lack of clarity around the terminology and concept of schemas.

Observing and Recording Schemas (N=37):

Stakeholders were then asked if they noted children’s schemas in their observations (question five) and how they recorded them (question six). One stakeholder, who indicated having excellent knowledge of schemas, stated that, *“In the past, schema was an important focus for observation”* and that they recorded them through, *“Daily observation, linking with children’s self-chosen play.”* However, they did not elaborate as to why schemas were not an important focus now.

Those stakeholders who indicated good knowledge gave the following responses:

“We record schemas as part of children’s developmental profiles”

“We link schemas to children’s self-chosen play”

“We sometimes say they moved the sand into the water tray, but we don’t call it transporting”

Another stakeholder commented that, *“We use them (schemas) in key worker planning and assessments”* and they were evidenced through, *“Photo evidence and written post-it notes.”*

This would indicate that some stakeholders were supporting and developing children’s schemas. However, some practitioners who indicated a good knowledge and understanding of schemas stated that they *did not* note children’s schemas in their practice. Again, as in the pilot study, this indicates a lack of clarity, policy guidance and specific training in supporting children’s schemas in the FP curriculum. Those practitioners who were unsure or had no knowledge did not answer this question.

Question seven built on the previous questions by asking if stakeholders used information on children’s schemas to inform future planning (N=37).

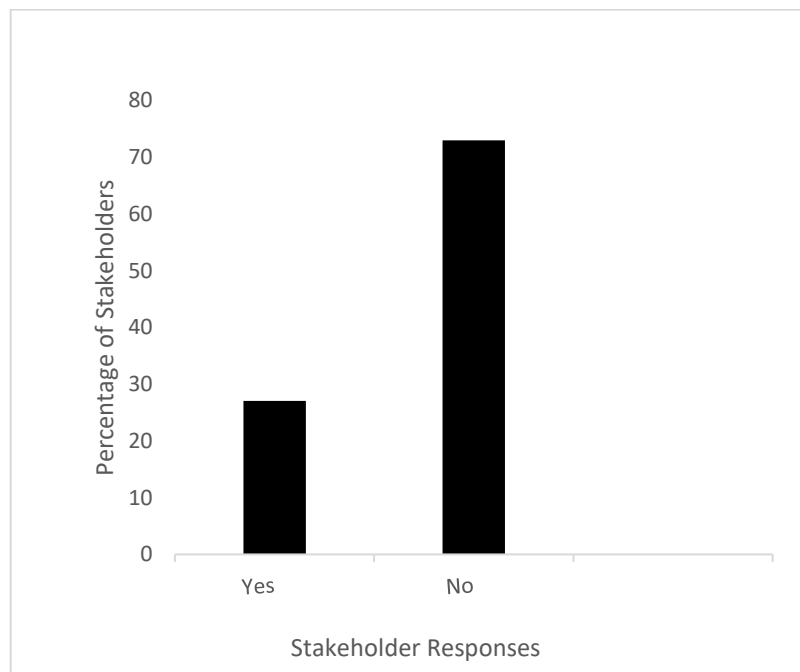


Figure 4:4 *Are schemas used to inform future planning?*

These findings indicate that over 72.00 % of the stakeholders who answered this question did not use schemas to inform future planning. 27.00 % indicated that schemas were used but this question did not give the respondents an opportunity to elaborate on how this was achieved. This was a potential weakness in the questionnaire design.

The follow up question (question 8) to this was whether stakeholders felt schemas *should be* included in planning and how would this help a child’s development. Stakeholders were asked to refer to the definition at the start (if needed) to remind them of what schemas were before answering this question. The results were as follows and this were based on the full 87 responses as all stakeholders were given the opportunity to answer this (N=87):

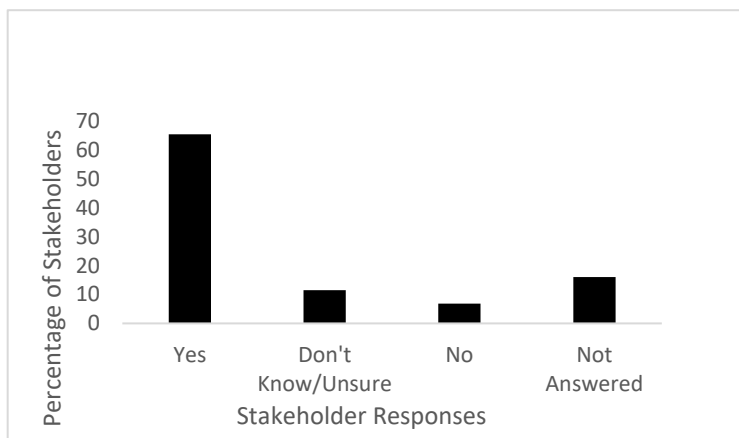


Figure 4:5 *Should schemas be included in planning?*

Here many more practitioners felt schemas should be used in planning (65.52%), even if they were not doing so at the current time. Out of those who answered yes some of the following reasons were given:

“It (schemas) encourages children to learn in ways they have displayed in the class”

“The learning environment would be enhanced with materials to support children’s schemas and move their learning on”

“Schemas define the child’s learning and suppressing the child’s schema can delay development”

“Yes if full training is given”

Only one practitioner who answered “No” provided any more detail and stated: *“Not really as it’s difficult to plan for the individual on our planning sheets.”*

From these responses it would seem that over half the stakeholders surveyed (65.52%) felt that schemas should be included in the planning. This supported the worth of using schemas as another way to support children’s learning and supported the rationale for this study. However again there are limitations to the usefulness of these responses. Asking the stakeholders to refer to the definition at the start could have influenced their answers. On reflection, it might have been better not to ask them to do this. In addition, in this question, the words, “**should be**” were in bold and this could mislead respondents into thinking that they should answer “yes.” As Newby (2013) writes, ‘The way we phrase a question can affect the responses we get’ (p.14).

Policy Documentation and Guidance:

The next question referred to the FP policy documentation and asked stakeholders (N=87) if they felt it provided sufficient information on schemas. This question was in the form of a rating scale with 1=Not enough through to 5= Excellent.

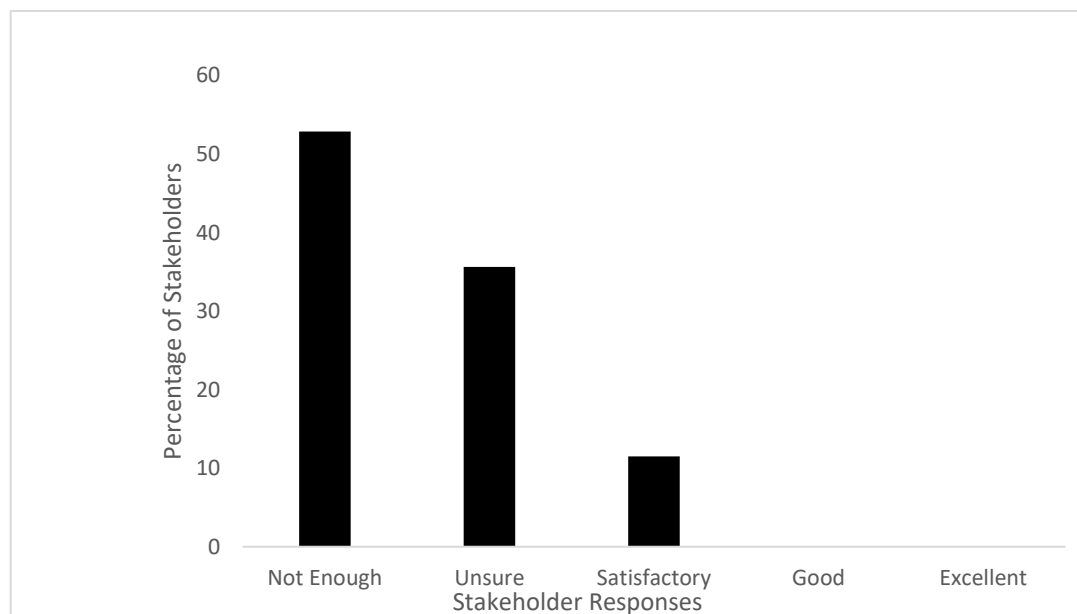


Figure 4:6 *Is there sufficient information on schemas in FP policy documentation?*

These findings clearly indicate that stakeholders *do not* think that the FP documentation provided enough information on schemas (52.87%). This is not surprising because, as stated previously, there are only brief mentions of schemas throughout the whole FP policy and framework documents. It could be argued that as there are only brief mentions then this is a pointless question. However the reason for asking this question was to reinforce that the FP

curriculum policy documents *do not* currently support children’s schemas and that these are the only policy documents that are available to FP stakeholders. Therefore, even if a stakeholder had good knowledge of schemas and tried to use them in their planning, there is little advice and guidance provided by the Welsh Government to support this.

It was unclear what those who thought there was satisfactory information or who were unsure were basing their answer on. On reflection, there should have been a second part to this question asking why they gave their answer, allowing for more clarity and detail. This is what Newby means when he states, that when devising questionnaires we have to consider the answers we may get (2013).

Could the FP curriculum support schemas and why?

The final question asked stakeholder to consider could the FP curriculum support children’s preferred schemas and why (N=87).

The responses are shown in the bar chart below:

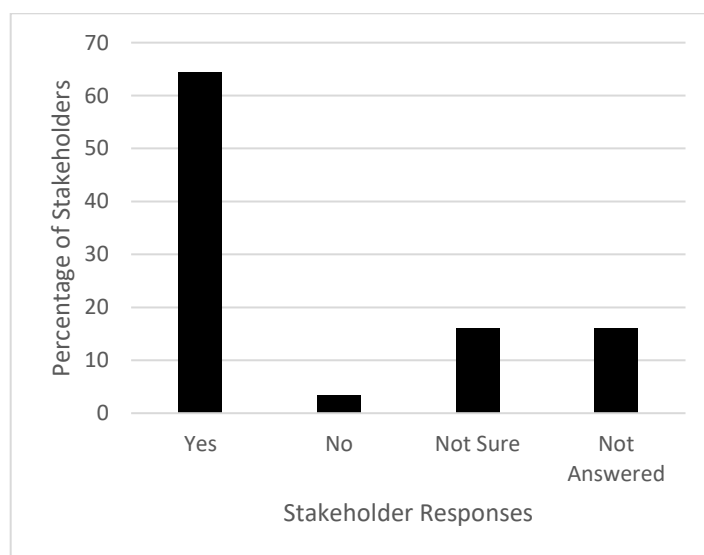


Figure 4:7 *Is the FP curriculum a perfect vehicle to develop children’s schemas and why?*

These responses indicated that the majority of stakeholders (64.37%) did agree that the FP could be a curriculum to develop children’s schemas. When asked why some of the responses included:

“When adults fully understand schemas they are able to intervene appropriately and effectively with young learners to extend their thinking, or stand back and do nothing at all”

“Good to support their learning, but literacy and numeracy must still be included”

“Gives them [children] the freedom to use and experiment their schemas as it concentrates on own choice”

Some stakeholders who also answered “yes” were more cautious in their responses:

“It is but many settings do not implement the FP properly so would hinder schematic play”

“Only if practitioners are allowed to spend time observing schematic play”

“The ethos of the FP should provide the perfect environment for schemas play. (But)How would the development of the child be measured in line with current requirements?”

The three percent of stakeholders who had answered “No” stated that:

“Don’t see how it (schemas) fits in with the new documentation and testing”

“Don’t think schemas are catered for as the FP is becoming more skills based, so less opportunity to practice their schema”

“Children need to be taken beyond their individual play choices to explore something new”

These responses highlight a concern of a move away from a play-based pedagogy to more formal teaching. However, the majority stakeholders were supportive of the FP being a curriculum that could accommodate children’s schemas. There was some concern over how the requirements of the FP, in terms of testing in year two and the emphasis on literacy and numeracy, could incorporate schemas. Undoubtedly, a shift away from a child-centred, play-based approach would affect children’s abilities to use their preferred schemas. However, the rhetoric from the Welsh Government (WG) states they are still committed to the ethos of the FP and that learning through play is still the vehicle to support learners (WG, 2015b).

Perhaps this last question highlights the need for training on schemas more than any other responses does. With appropriate training, these concerns over how schemas could be included alongside the current FP curriculum requirements could be alleviated. Training would provide an

understanding of how schemas could actually complement the FP and be embedded in the continuous and enhanced provision and the areas of learning. This supported the findings from Cycle One, where practitioners wanted to carry out more research into schemas themselves and develop a suite of resources to support FP practitioners.

4:4 Summary of questionnaire findings:

The questionnaire was exploratory and had some limitations as discussed, but the findings are potentially interesting and worthy of further investigation. It was apparent from the stakeholders surveyed that more than half the respondents had no or very little knowledge and understanding of schemas. This was comparable with the findings from the pilot study (Cycle One). The implications of this were that if stakeholders did not know about schemas then they would not use them in their practice. The effect of this could be that supporting children's ways of learning could be missed and knowledge development constrained. Athey argues that through schemas teachers learn about how children make sense of the world and get to understand the individual (1990). If stakeholders were able to recognise and support children's schemas then they could understand what children were doing and why they were doing it (Nutbrown, 2011). This supports a child-centred, holistic approach to pedagogy which are the principles underpinning the FP (WAG, 2008c).

What was also evident from some of the responses given was that there was some confusion over what stakeholders understood schemas to be. Nevertheless, stakeholders were able, in some instances, to link schemas to learning through play and being child centred. This was important as these are key principles associated with the ethos of the FP and underpins the importance for situating this study in the FP.

Across setting in South Wales, the majority of stakeholders have indicated that they have not had training on schemas. This is not surprising, as schemas do not feature significantly in the FP documentation. However, as found in Cycle One children in the FP do use schemas in their free play in the continuous and enhanced provision. Therefore, this potential lack of training could potentially lead to FP stakeholders not recognising, nurturing or nourishing these ways of '*coming to know*.' As Athey maintained children have an intrinsic motivation which needs to be furthered by supportive adults and resources in the environment (2007).

When stakeholders were asked if schemas were noted in observations and how this was recorded, again there was a mixed response. Nutbrown makes the argument that there needs to be a match between what is taught and what is learnt, with observation the key to doing this (2011). Therefore, if stakeholders were able to observe children's schemas and plan activities to incorporate these schemas then teaching is "in tune' with children's cognitive concerns' as schemas are the ways some children make sense of the world and develop their understanding (Nutbrown, 2011, p.29). Stakeholders who responded "yes" to noting schemas made links between children's play and schemas and the importance of observing this play. Throughout the FP, observation is denoted as the main way to assess children (WAG, 2008a). Therefore, if stakeholders were able to use observation to recognise children's schemas and then plan accordingly, a match could be made between the offered and received curriculum. This can lead to higher levels of involvement, deeper level learning and cognitive gains but only if stakeholders are confident of schemas in their own right (Mairs *et al.*, 2013; Constable, 2013).

When asked about including schemas in planning, stakeholders were supportive of this, although the majority of them did not plan for them at the current time. Stakeholders, who provided more explanation on why they should be included, made links to child development and how supporting schemas could move learning along. As Meade and Cubey (2008) postulate, when adults recognise, support and develop a schema, learning is extended. Therefore, although the majority of FP stakeholders were in favour of schemas the issue was a lack of training and policy guidance to support schemas within the FP curriculum.

The final two questions asked stakeholders to consider the FP documentation and curriculum guidance linked to schemas. As discussed the majority of stakeholders felt there was not enough information included in current FP documentation. As discussed in Cycle One, when the Welsh Government (WG) were approached to ask why schemas were not part of FP policy documentation, the answer given was that it was up to practitioners if they wanted to include schemas in their pedagogy (appendix 5). The issue with this response is if practitioners/stakeholders do not have any knowledge or training on schemas, then how can they include them in their pedagogy? The WG also alluded to there being some training available on schemas but the findings from this questionnaire and the questionnaire in Cycle One did not fully corroborate this.

Nevertheless, despite a lack of guidance and training sixty five percent of stakeholders did feel that the FP curriculum could support children's schemas. On reflection the wording of this question is misleading as it includes the word '*perfect vehicle*' when asking about the FP curriculum supporting children's schemas. By including the word '*perfect*' some respondents may have been persuaded to answering "yes" as perfect means something good and right. This is what Newby terms, 'getting the phrasing right' (2014, p.313). However, there was a second part to this question, which asked the respondents to explain why they had answered "yes" or "no", giving the opportunity to provide more detail. This meant the respondents could not just answer "yes" because they thought they had to; they needed to give reasons for their answers, helping to eliminate some potential bias from the inclusion of the word '*perfect*'.

These responses were interesting as there seemed to be a feeling amongst stakeholders of supporting schemas in a FP pedagogy but concerns over the added pressures of the literacy and numeracy framework and how schemas could be included in this. Research by Athey (1990, 2007) and Nutbrown (2011) have made clear links between children's schemas and literacy and numeracy. Nutbrown attests that teaching cannot be effective without understanding how children think and develop knowledge (2011). So recognising and supporting schemas within the FP curriculum would have the potential to assist children's understanding across all areas of learning, including literacy and numeracy. She goes further by stating that, schemas can be considered at the very centre of children's thinking and development (2011). Therefore, a progressive, child-centred curriculum that puts the child at the heart of everything, such as the FP purports to be, should be supportive of children's schemas.

Nevertheless, schemas will not become part of the FP curriculum unless stakeholders are knowledgeable about them. Nutbrown maintains that schemas remain invisible to the untrained eye and important cognitive links will be missed (2011). Therefore, one of the recommendations from this research will be to include schemas in future FP documentation and policy guidance, with training provided for FP stakeholders. The questionnaires have provide interesting and new information on stakeholder's knowledge and understanding of schemas and their opinions on whether the FP curriculum and provision could support schemas.

4:5 Conclusion and next steps:

The analysis of the completed questionnaires between the practitioners, and myself (the researcher) enabled us to **find** and **clarify** the focus for the next stage of Action Research Cycle Two-the **Implementation**. This also built on the findings from Action Research Cycle One, summarised in chapter three. Here, practitioners indicated that they wanted to take an active part throughout any further research into children's schemas, in order to develop their own knowledge and understanding. Therefore, reflecting upon the responses given by FP practitioners and stakeholders in Cycles One and Two of this research, the **implementation** stage of Mills and Butroyd's 2014 model of action research was shaped as follows:

- Ongoing observations and photographs of children's schemas in the continuous and enhanced provision by the practitioners and myself.
- Reflection and analysis of the observations and photographs using Athey's (1990, 2007) schematic levels by the practitioners and myself.
- Links made to FP areas of learning and outcomes by the practitioners and myself.
- Output from the research in the form of an ongoing working document or suite of tools to facilitate and support the recognition of schemas by adults working in the FP

In addition, this builds upon previous studies into children's schemas by researchers such as Athey (1990, 2007); Meade and Cubey (2008); Arnold *et al.* (2010); Nutbrown (2011) and Atherton (2013) who have shown how detailed observations can illuminate children's forms of thought and support their knowledge construction.

Therefore, the next chapter (chapter five) presents the observations and photographs of six children's schemas over two terms in one FP setting. The data gathered were analysed schematically and links made to FP areas of learning and FP outcomes, thus showing how schemas can be supported within the FP provision and across the FP curriculum.

Chapter 5: Searching for and Supporting Schemas- Implementation of Cycle Two

5:1 Introduction:

Chapter four concentrated on **finding** a focus and **clarifying** the focus for the **implementation** stage of this research. This chapter presents six children's stories over two terms in a Foundation Phase (FP) setting. The data have been gathered through observations and photographs evidencing the children pursuing their preferred schemas in the continuous and enhanced provision on offer. It addresses the following research questions:

- Can children's schemas be observed in the Foundation Phase curriculum?
- Can Foundation Phase practitioners be supported to nurture and nourish children's schemas?
- Can nurturing and nourishing children's schemas support Foundation Phase outcomes?

These are explored through the **Implementation** (stage three) of the second cycle of action research as shown below.

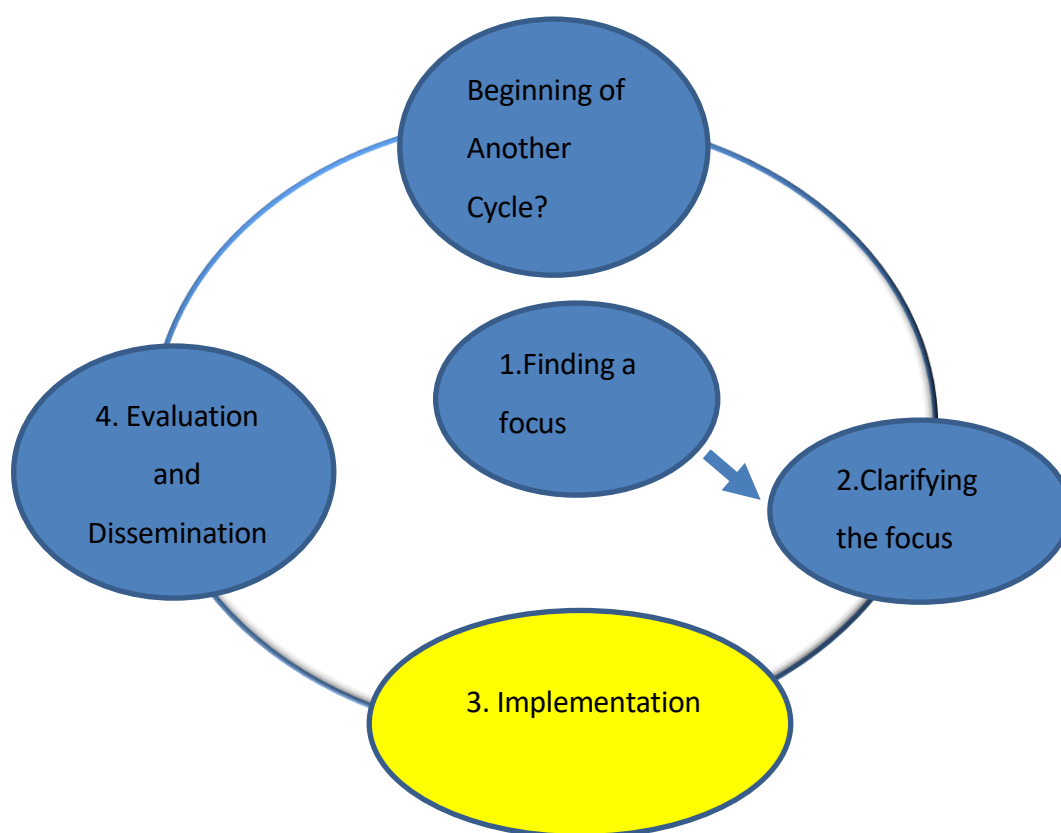


Figure: 5.1 Mills and Butroyd's model of action research (2014, p.4)

The observations and photographs presented have been purposively chosen as evidence of the children's schemas. The reflections upon and analysis of the observations and photographs have been based upon ongoing discussions between the practitioners and myself (the researcher) as part of the action research design adopted for this research. The data gathered were analysed through the different schemas levels as postulated by Athey (2007) and through a curriculum lens. Links were made to FP outcomes, thus answering the research questions posed at the start of this chapter. The presentation of the data adopted the structure used by Atherton (2013) in her research.

Previous studies have made links between children's schemas and the English Early years Foundation Stage curriculum (EYFS) (Arnold, *et al.*, 2010; Atherton, 2013 and Constable, 2013). However there has not been any research carried out into children's schemas in the Early Years Foundation Phase (FP) curriculum in Wales. This research seeks to address this deficit, adopting an action research approach to gathering empirical data on children's schemas in one FP setting. The children were observed in a typical FP setting over a period of two terms and across the continuous and enhanced provision on offer in the setting. All the children observed were between the ages of three and five years in the Nursery and Reception classes. The Nursery children were observed during the mornings as they only attend a half day. Reception children were observed in the afternoons, although both the Nursery and Reception children had free flow access between both classrooms and shared resources. The children had a separate outdoor yard from the rest of the school, which was shared by both Nursery and Reception. Six children were chosen for this second cycle of action research based on parental consent and evidence of repeated schemas.

For the purposes of confidentiality, the children were given pseudonyms as shown in the following table:

Class	Pseudo-Name	Gender	Age (Years)	Observed Schemas Behaviour
Nursery	Ellie	F	4	Enveloping and Containing Schemas
Nursery	Amy	F	4	Dynamic Back and Forth and Dynamic Vertical Schemas
Reception	Oscar	M	5	Connecting, Disconnecting and Dynamic Vertical Schemas
Reception	Harri	M	5	Dynamic Back and Forth & Dynamic Vertical Schemas
Reception	Lewis	M	4	Dynamic Circular (Rotational) and Transporting Schemas
Reception	David	M	5	Positioning and Orientation Schemas

Table 5.1 *Child participant pseudonyms and observed schemas*

5:2 Findings, Discussion, Analysis and Reflections-The children's stories

Initially I will present Ellie's story and discuss how she pursues her enveloping and containing schema during her lived experiences in the FP setting. Ellie's schemas will be evidenced through her actions, speech and mark making and analysed through a schematic and curriculum lens. Although the observations and photographs are categorised under the different schemas levels postulated by Athey in her work (1990, 2007), in some instances children were using schemas at a motor level combined with a functional dependency level and at a symbolic level and where this happened this has been noted in relevant the discussion and analysis. All observations have taken place over two school terms from January 2015 to July 2015. The first narrative observations depict Ellie's story of her using her Enveloping and Containing schemas in the continuous and enhanced provision within the FP setting.

Ellie's Enveloping and Containing Schema:

Ellie was a quiet child and the practitioners had noted that she seemed to like her own company and quite often engaged in solitary play. She had an older sister in the year one class and when it was break time Ellie would, at times, stand at the fence watching her older sister on the big yard. Ellie turned four in the autumn term of this study. The first set of observations detail her using her schemas through her motor level actions.

Motor level observations:

Today the class are outdoors and have free choice as to which pieces of equipment they want to play with. Ellie runs straight across to the large plastic cubes and hides inside. After a minute or so, she pops her head out and sees some of the children nearby. She hides back inside the cube

and calls out, *"I am hiding, come and find me."* Several children run over to her and shout they have found her. She laughs and gets out of the cube and spends the rest of the time outside running around the yard with them. On another occasion when outdoors, Ellie picks up a cone and finds a ball to fit inside. She carries this around the yard to show others saying: *"Look what I made-it is a new game, look!"*



Figure: 5.2 Ellie 'inside' the cube



Figure: 5.3 Ellie places ball 'inside' the cone

Today when I arrive the practitioners are keen to show me a photograph of Ellie at the playdough table taken earlier in the week. They tell me that Ellie spent the whole time layering playdough over the picture and then proceeded to push the cutter into the playdough mass until it was covered. She was talking to herself as she did this saying, *"All the way in, that's right all inside now. It has gone inside."* Ellie stayed at the playdough table until it was time for outdoor play, completely absorbed in the action of enveloping and containing the cutter within the dough.

The practitioners tell me that without a developing knowledge of schemas they would not have even really noticed what Ellie was doing. However now they have decided to keep the playdough as an activity for the next few weeks but are going to add different 2D shaped cutters. They will then sit alongside Ellie and discuss the different names of the shapes. Then if Ellie is receptive to their presence, they will invite her to cut out the shapes using the playdough. Thus, they will be supporting Ellie's schema but also developing her knowledge and understanding of 2D shapes.



Figure: 5.4 'Covering' the picture and cutter with playdough

Today Ellie goes straight to the construction area where she collects a number of toy cars. Next, she walks over to the reading area and goes to the bookcase, which is in the shape of a racing car. She begins to place the cars along the seating area and keeps going until she fills up the whole area. One of the practitioners (who is part of the action research) says to Ellie, "*Are you fitting all the cars inside the seat space?*" "*What will you do once it is all full of cars?*" Ellie is very engrossed in her actions and only looks up once she has finished. She says to the practitioner, "*I have filled the cars all inside the seat, it is all covered*". Here Ellie has assimilated the vocabulary used by the practitioner and accommodated it to her own speech.

As she speaks, she gestures with her hands by making an enclosed shape. Ellie continues by saying, "*I want to keep them there, can I?*" The practitioner agrees to this until 'Milk and Quiet Time', as then, she explains to Ellie the children will need to be able to sit on the seat to read their books. Ellie seems happy with this, sits on the carpet by the bookcase, and begins to read a book she has chosen. She stays there until it is snack time.

On a different day, Ellie is outside. She runs straight over to the bowls of water inside the tyres. She spends time dipping her hands in and out of the water. She laughs as the water covers her hands and does this repeatedly. She does not speak but laughs aloud.



Figure: 5:5 'Filling' up the seat with cars.



Figure: 5:6 Dipping hands 'inside' the water

This morning when I arrive at the setting, the practitioners tell me that they have provided the class with a cloth to make a den. They tell me the children have been really excited by this new development but that Ellie and two other girls called Della and Emma have spent the last few days continually under the den. They have taken books and toys into the den and have even asked to drink their milk inside there. The practitioners have noticed that Ellie is interacting a lot more with other children when she is inside the den as quite often she plays on her own. However, inside the den she is a happy to spend time in the company of others, laughing and giggling with other children. They have also noted that Della and Emma seem to demonstrate an enveloping and containing schema.

As I observe Ellie under the cloth, another child comes over and leans on top of the den to write on a piece of paper. This cause the cloth to starts to bunch up and Ellie s quick to tell this other child to stop this as it is spoiling their 'home'. Ellie spends the whole session, before break, inside the den chatting to the other girls in there with her.



Figure: 5:7 Hiding 'under' and 'inside' the den

Discussion and Analysis:

As can be seen both indoors and outside Ellie is using the learning environment to explore and investigate her enveloping and containing schema. According to Athey (2007, p.47), this investigating and 'experiencing' is 'the stuff or content of mind.' Here the thoughts of the children are translating into their physical concrete actions. Children exhibiting a containing (enclosing) or enveloping schema often place themselves inside spaces as seen by Ellie inside the cube and den. Ellie carries out her explorations through purposeful play using the content available both indoors and outdoors. This supports Nutbrown's work where she argues that forms of thought can be 'nourished' if supported with 'suitable content' (2011, p.14). Nutbrown (2011) contests that practitioners need to provide resources and activities that can support schemas.

Ellie chooses to play with resources that reflect her patterns of thought. In climbing inside the cube Ellie was able to facilitate a game of 'Hide and Seek' using her containing and enveloping schema. She had understood the rules of the game and the need for her to call out to other children in order for them to find her. A further development in the use of her schema was to use the ball and cone in a different way and to invent a new game. Bruce (2005, p.65) has commented on the fact that, 'children's schemas seem to make children alert to certain events and properties of objects in the environment.' Here Ellie has been able to use the cone and ball and combine it with her schematic interests to invent a new game. These resources are freely available in the outdoor environment so Ellie would have had experience of the usual ways of playing with this equipment but has chosen to adapt her thinking to develop a new game. Nutbrown (2011) talks of the important of consistency of resources in settings. Ellie would have known that she was able to freely use the cone and ball and that they would be there for the duration of her time outside. This allowed her the time to nourish her forms of thought (containing and enveloping) with the available content (ball and cone). Here Ellie has built upon her previous knowledge of how to play with the ball and cone and accommodated her thinking to construct a new game.

In these observations, Ellie's demonstration of her chosen schema supports Neisser's definition of schemas as, 'Patterns of action as well as patterns for action' (1976, p.56). Here Ellie has shown actions that support her schemas but she has also demonstrated some of the thinking behind her actions through her speech. Ellie uses her enveloping schema to involve other children in her game of hide and seek, by calling out for the children to find her. When she is playing with the playdough, she is talking to herself, explaining her actions. Then when she is filling the seat with

cars, she is able to explain to the practitioners what she is doing and ask for the cars to be allowed to remain where they are. When the practitioner is talking to Ellie about the cars she is using attune speech as she uses words such as “*inside*” and “*covered*”, This reflects the actions of Ellie’s enclosing and containing schema and reinforces what Nutbrown stated, ‘children are more likely to assimilate language used by adults when it matches children’s interests’ (2006, p.40). Athey (2007, p. 164) agreed with this by arguing that, ‘a match [ought to] exist between existing forms of thought and appropriate speech’ when working with young children.

Here the adult did not immediately ask Ellie to return the cars to the carpet area but was content to stand back and observe Ellie’s actions and then intervened appropriately. Ellie’s interest was on ensuring the cars were inside the seating area and worked persistently to fill the whole space. On first glance, this could seem like an aimless task but for Ellie there was a need to complete the job in hand and to seek reassurance that the cars could stay in this space. The FP framework talks of children’s play being taken seriously and that, ‘Children learn through first-hand experiential activities with the serious business of ‘play’ providing the vehicle’ (WAG, 2008c, and p.4). Athey (2007, p.14) stated that if a child’s behaviour or actions are interpreted schematically then a ‘wide range of behaviours’ can be supported and ‘interpretations are positive...instead of attributing naughtiness.’ Here Ellie is developing her understanding of, ‘spatial interrelations among object’ (Piaget, 1954, p. 196). Ellie was not aimlessly placing the cars inside the bookcase seat, but there was an intent and purpose to her actions. She was adjusting the spacing between the cars and noting how the cars fitted into the given space.

An adult not attuned to children’s schema could have insisted Ellie return the cars to the construction area but instead the practitioner, being aware of her preferred schema, allowed Ellie to complete her task. This was an example of the benefit of adopting an action research approach to this research, as the practitioners were able to develop their own understanding of schemas and support Ellie in her schematic pursuits.

Whilst working with the playdough, Ellie was interested in enveloping and covering the picture with the dough and burying the cutter inside the dough. Athey in her work, discusses the move from the sensori-motor stage to the pre-operational stage where children begin to recognise the relationship between, ‘motor actions and effects that give information’ (2007, p.47). Here Ellie recognises that by physically covering the picture and the cutter they will disappear from view.

This is reflected in her speech where she talks of the cutter being, “*inside and all the way in*”. Here she is developing her knowledge and understanding, through her enveloping and containing schemas, of the malleability of playdough to allow objects and pictures to disappear. Athey (2007, p.47) further postulates that:

A child understanding of the relationship between his or her motor actions and the sensory or perceptual feedback that follows is central to the constructivist view of learning.

In this example, Ellie is constructing her knowledge of the malleability of play dough and using it to nourish her schema. In addition, this observation has allowed the practitioners to ponder on how to use Ellie’s schematic actions with the playdough to introduced 2D shapes. They have used Ellie’s enveloping and containing schema as a way into her thinking and are considering using that to introduce mathematical concepts.

Throughout the observations Ellie has enveloped or enclosed objects including herself, she has used resources in the classroom to nourish her schemas. Playdough is a material that can be transformed through motor actions and Ellie is able to use her it to explore her containing and enveloping schema. The playdough observation occurred after Ellie had hidden herself in the cube outdoors so there was the possibility that she had internalised or assimilated the action of enveloping or containing herself and then accommodated her thinking with the playdough by enveloping and containing the picture and cutter. Her speech seemed to support this as she talked of “*inside*” and “*gone*”.

Another example of using a material to nurture her schema can be seen with the water outdoors. Ellie chose to dip her hands in and out of the water continually. Although she does not accompany her actions with speech, she is laughing and totally absorbed in her play. This observation was after Ellie’s actions with the play dough, so it may have been she was continuing her explorations of containing and enveloping (*form*) using the water (*content*). Bruce (2005, p.65) talks of schemas making children, ‘alert to certain events and properties of objects in the environment.’ Did Ellie choose to play with the water outdoors because it afforded her the opportunities to ‘contain’ and ‘envelop?’ Piaget (1953) postulated that children’s schemas are continually modified and adapted through active learning and the accommodation of new experiences. This would suggest that children create links in their thinking and that influences further actions or as Nutbrown would term it they are developing threads of thinking, which, ‘connect different areas

of content' (2011, p.46). If Ellie understood that there needed to be enough water to cover her hands then this would be what Athey (2007, p.142) would term a 'functionally dependent relationship'. However, without accompanying speech this can only be speculative.

Inside the classroom, Ellie has chosen to spend the morning inside the den. As stated in the observation the practitioners introduced this based on their observations of number of children, including Ellie, who demonstrated evidence of an enveloping and containing schema. The practitioners had noted an increase in Ellie's interaction with other children under this den. The children inside the den with Ellie had also shown evidence of an enveloping and containing schema. Arnold *et al.* (2010) has carried out research into whether children with similar schemas play together. However, Nutbrown cautions that, more research is needed in this area (2011) and this is out of the scope of this PhD but could certainly be a focus for further research.

Here, the practitioners have adapted the resources available in the continuous and enhanced provision to support the children's schemas. As discussed in chapter one of this research, in the FP there are three types of provision, continuous, enhanced and focused. The continuous provision is what is always available and examples would include the sand tray, water tray and role-play area. The enhanced provision is the resources that are added to the continuous provision and are normally linked to the theme or topic being explored in the setting. Athey (2007); Meade and Cubey (2008); Nutbrown (2011) and Atherton (2013) have emphasised the importance of sensitive adults and suitable environments. The sheet was already in the setting as part of the role-play but the practitioners have taken it and used it in a different way (allowing the children to create a den), thus nurturing Ellie's schematic interests. This has also supported Ellie's personal and social development, as she was able to engage with other children who shared her schematic interests. She was also able to express her disapproval when another child seemed to be interfering with the den. The next set of observations depict Ellie using her schemas through symbolic and functional dependency levels.

Symbolic Level and Functional Dependency Observations:

Today, in setting, Ellie places a funnel inside the dinosaur's mouth and then over his face. She tells another little boy that she is, "A dentist" and "He is having his teeth out." The little boy asks her does it hurt and she replies, "No silly you are sleeping, but there was blood when I woke up." Ellie continually places the funnel over the dinosaur's head as the boy watches. She is talking to herself

saying, *"It won't hurt, you will be sleeping and then the bad teeth will be all gone. When you wake up you will have a present cos you have been so good."* The little boy says, *"I had a present for being a good boy at the doctors."* Ellie looks at him and replies, *"Well this was a big present cos I was really brave and it did hurt after but my bad teeth were gone."* Ellie continues to play with the dinosaur and funnel until tidy up time.

On a different occasion when the children leave the carpet for free choice activities, Ellie goes straight to the table top resources, which are wooden blocks. Ellie starts to play with the wooden blocks with another child. They are spending time covering a toy car with the blocks. When one of the practitioners asks her what she is doing she answers by saying that it is, *"A garage for the car with a roof. I have a garage at home do you?"* The practitioner says, *"Yes she does"* and she asks Ellie, *"Why does it need a roof?"* Ellie looks at the practitioners and frowns before replying, *"Because otherwise the car wouldn't be inside and it would get wet silly."* Ellie and the other child continue to add blocks until the car is completely enclosed. The other child finishes off by adding a cotton reel to the top. Ellie laughs and says, *"It is the chimney-look!"* The other child jumps up and down on the spot and agrees, *"Yes we have a chimney on our garage-look Miss, look!"* The practitioner kneels down to their level and says, *"Yes you have, I have never seen a garage with a chimney before, it must be a very special garage."* Ellie seems to ponder this for a minute and then says, *"It is a special garage it has a special chimney inside to keep the car warm."* The practitioner replies, *"I would like a garage with a chimney, do you think I could build one?"* Ellie looks at her and then replies, *"No silly you can't build one, you are a teacher, not a builder."* The other child agrees and takes Ellie's hand, *"Come on let's go and tell everyone to come and see our chimney garage."* They leave the table and start to walk around the room asking children to come and see what they have built. However, as it is nearly break time the practitioners tell the children to get their coats on for play so Ellie and her friend line up ready to go outside.



Figure: 5:8 The dinosaur having teeth out Figure: 5:9 Garage with car 'inside' and 'Chimney' on top.

Today when I begin to observe, Ellie goes straight to the role-play area which has been set up as a 'Vets'. She takes a toy cat and a blanket from the role-play and sits down at a table. Here she proceeds to wrap the blanket all around the cat until only its head is visible. Ellie talks to herself as she does this, saying, "You are ok now I have you safe and warm." Ellie then places the cat and blanket inside the cat carrier and walks around the classroom. Some children stop and ask her what is inside the carrier and she says, "It is my cat Tiddles, I am taking him for a walk but it is cold so he needs a blanket to keep warm." On another occasion, Ellie is sitting at the table on her own. She repeatedly covers a toy dinosaur with a bowl. When a child asks her what she is doing, she replies by saying, "Hiding the dinosaur to stay safe." She keeps doing this repeatedly, lifting up the bowl and then placing it back over the toy dinosaur until it is completely covered.



Figure: 5:10 'Covering' the cat to keep him warm Figure: 5:11 'Hiding' the dinosaur to stay safe

Discussion and Analysis:

Athey defines functional dependency as, 'the effects of action on objects or material' (1990, p.70). In the dinosaur and funnel observation, Ellie understood, from recalling her own experience that the funnel (dentist's mask) needed to go over the dinosaur's mouth to make him fall asleep to have his teeth out. When Ellie is playing with the toy cat she is showing an understanding of functional dependency as she understands that the effect of enveloping or containing the cat in the blanket will keep the cat warm. This is an example of Vygotsky's private speech, and a step on the learning continuum from social speech to inner speech and finally verbal thinking (1987). When she is hiding the dinosaur she understands and states, that the effect of the bowl covering the dinosaur will hide it from view and keep it 'safe.'

In the first observation with the dinosaur, as well as showing functional dependency, Ellie can be viewed as demonstrating symbolic representation by using the funnel as the dentist's mask. Athey (1990, p.40) termed symbolic representation as, 'when the child uses some simple object to represent objects...' This could also be considered as evidence of the 'Thought' level of schemas behaviour as Ellie is giving a verbal account of her experience of visiting the dentist, 'in the absence of any material or situational reminder of the original experience' (Athey, 1990, p.68). During this observation, there were no books or posters on the wall of the setting depicting the dentist. The practitioners had not discussed the role of the dentist with the class. Therefore, there were no concrete reminders to prompt Ellie's recollection of her visit to the dentist. Piaget (1959, pp.357-386) postulated that 'thought consists of internalized and co-ordinated action schemas'. Here Ellie talks of the need for the mask to go over the dinosaurs head and that this will make him sleep so he can have his teeth out. Ellie then actions this by placing the mask over the dinosaurs head, representing and recalling her own experience.

Similarly, in the other observations, Ellie can be seen using the blocks to represent a garage with a 'cotton reel' chimney and the white bowl to represent a protective cover for the dinosaur. Piaget and Inhelder (1969), stated that imitation consist of both sensory-motor actions and representations. Ellie used actions through her enveloping and containing schema to represent having teeth out, to build a garage and to cover up the dinosaur and cat to keep them safe. In the garage observation, Ellie seemed content to work alongside another child, assimilated the information for including a chimney, and accommodated her understanding to accept this addition to the garage. The use of blocks representing a garage can also be considered what Athey

(2007) would term an example of perceptual patterns. Here, children represent their patterns of thinking (schemas) through two and three-dimensional representations. So Ellie was using her enveloping and containing schema through her actions of physically building with the blocks but also creating a 3D model of the garage.

Arnold *et al.* (2010) linked schemas to emotional development and it could be argued that Ellie was representing her fears of visiting the dentist by choosing a dinosaur as the patient rather than a friendlier toy. This seems to be reinforced through her language when she talks of the experience involving blood and hurting afterwards with the reward of a gift for being brave. However as stated before the link between schemas and emotional development can only be speculative without further research. Here Ellie is moving from representation of action to representation of thought through her retelling of a trip to the dentist. This can also be seen in the cat observation, she is showing an understanding of the need for a blanket to keep the cat warm (functional dependency) and is able to vocalise this thought. She is treating the cat as a living being and is showing the need to care for the cat to keep him warm. She is able to recognise that the blanket represents safety and warmth for the cat. Additionally, Piaget would state this is an example of animism, where children attribute human qualities to inanimate objects (1929).

In the final observation, Ellie is talking to herself about the need to keep the dinosaur safe by covering him with a bowl so he is hidden from view. Constable (2013) states, children with an enveloping schema like the feeling of being secure, here Ellie would seem to be transferring this need to the dinosaur. Here, Ellie may be building on her previous experience of climbing inside the cube outdoors and under the cloth den in the classroom. When Ellie was inside the cube and den she could not see anyone and therefore they could not see her so she may have felt safe and secure. By covering the dinosaur with the bowl she had hidden it from view and therefore it represented being safe. Shaw (1991) stated in her research that emotional experience as well as intellectual experience can be organised into schemas. This resonates with the observations with Ellie as there seems to be a common thread of safety running through them. Although this was not the focus for this research it was another interesting insight into Ellie's way of thinking through her schemas.

When Ellie was playing with the dinosaur and toy cat she was providing a monologue or as Piaget would describe it, ego-centric speech, intended to, 'accompany, to reinforce, or to supplement

action' (1959, p.17). When Ellie was talking about the need to hide the dinosaur to keep it safe, this was a missed opportunity to ask Ellie why the dinosaur needed to be kept safe. If she had explained why this may have led to a further uncovering of her underlying thread of thinking at this time. This is what Nutbrown meant when she stated, 'it is only when practitioners seek to understand the meanings behind what they have seen that the real worth of observational practices [is] realised (2006, p.133). Piaget (1959, p.263) asserted that it was the responsibility of the adult, 'to reduce the child's soliloquy to a satisfactory proportion and to develop dialogue.'

These observations have shown evidence of the dynamic aspect of Ellie's enveloping and containing schemas. The following observations will identify Ellie's schemas (enveloping and containing) represented through her mark making over the two school terms.

Ellie's Enveloping and Containing Schema: Mark Making observations:

The children always had access to paper and colouring materials on the tables when I was in the setting. Ellie did spend time colouring and drawing pictures and especially liked using the felt pens and colouring in pictures from the film 'Frozen'. On one occasion whilst observing Ellie, she asks the practitioner sitting alongside her at the table to draw her family, which she does. Ellie then draws her own people on the paper (Figure 5:12). She spends time adding features such as hair around the head and eyes and legs inside the figures. Once she has finished she shows the practitioner. The practitioner (part of the action research) asks Ellie to tell her about the picture. Ellie begins by pointing to the figures on the paper. She says, *"This is mummy and me and Rose (her sister). We are all going out to play in the park. Mummy says we need to wear our coats as it is cold outside."* The practitioner points to the picture and asks, *"Is that Rose in the pink dress or you?"* Ellie answers, *"It is me cos pink is my favourite colour and Rose likes purple, see (points to the figure in purple) and she is smaller than me."* The practitioner asks, *"and when you got to the park what did you go on?"* Ellie seems to consider this for a moment and then she stands up and gestures with her hands, *"I went in the tube thing, you climb up and go inside it and then you slide all the way down to the bottom and get out"*. She moved her hands in a downward whooshing motion. The practitioner says, *"That sounds like fun and a bit scary?"* Ellie replies, *"It wasn't scary as mummy was at the bottom to catch me."* The practitioner smiles and says, *"That was ok then. We need to get ready for assembly now so do you want to put this picture in the box to take home to show mummy?"* Ellie nods and takes the picture to the going home box.

During a different session, Ellie worked with another child to colour in a picture from 'Frozen' and then proceeded to add kisses all around the picture. She told the other child, *"Look we have to put the kisses all around as we love Elsa don't we?"* The other child agrees saying, *"We love kisses they are special."* Both girls work together to enclose the picture with kisses and then they take the picture over to the going home box. Interestingly, this is the same girl who was with Ellie in the den in an earlier observation. Although not part of this research, practitioners have noted this child also has a fascination with enveloping and containing.

Today, during outdoor play, Ellie plays alongside Fern and they spend the whole time mark making with water on top of a slate covering over a tyre. Both girls ensure that they paint inside the circular piece of slate and work hard to cover the slate lid completely with water. There is no speech evidenced throughout this observation. Once the lid is covered with water Ellie leaves to play with one of the bikes. On a different day, the children have been given access to water and chalk outdoors. Ellie goes over to a rectangle that has been drawn out of chalk by one of the practitioners. I watch her alongside the nursery teacher. As we watch, Ellie picks up the brush and paints with the water inside the rectangular shape. She uses a mixture of swirls and long strokes, going right up to the edge of the shape. She keeps going until the shape is completely full. Ellie stands back and admires her work. She looks over towards the nursery teacher and says, *"Look Miss I have filled it all up."* The nursery teacher walks over to Ellie and says, *"You certainly have, I really like the way you have used long strokes and swirls to fill up the shape."* Ellie nods and says, *"I know it is all inside, can I do another one now?"* The nursery teacher replies by saying, *"Well we need to go in now for fruit tuck but I will get some paper and paint and you can draw your own rectangle and fill it in later on."* Ellie considers this, nods saying, *"OK"*, and runs over to line up to go back inside. The nursery teacher says to me, *"I am finding it fascinating to look at what the children are doing through schemas. Before this research, I would have just thought she was playing with water, which she is but she is also representing her thinking about insideness through her painting. I know now that I need to give Ellie more opportunities to do this and I will."*



Figure: 5:12 A picture of the family (curves and lines)



Figure: 5:13 Enclosing the picture with kisses (Horizontal and Vertical lines and proximity)



Figure: 5:14 Water painting with Fern



Figure: 5:15 Filling in shapes with water

Discussion and Analysis:

Piaget (1969, p.356) stated that, 'all knowledge has to do with structures' and he identified two kinds of cognitive patterns, figurative linked to perception and operative, linked to actions. Perceptual patterns were, as considered by Athey (2007), represented through children's two and three-dimensional models as shown by drawings model making, constructions and clay. Athey (2007) found that straight-line trajectories preceded circular trajectories and both were evident in Ellie's drawings and mark making. The crosses in Figure 5:13, were examples of vertical and horizontal trajectories and in the picture of her family (Figure 5:12), Ellie drew bodies as straight lined shapes and hair as horizontal scribbles. Previous observations of Ellie showed her putting herself and objects inside containers. She enclosed herself and toys inside different, materials and in her mark making, she put crosses (kisses) around the main picture and in the observation outdoors, she painted watermarks inside the lid. In her picture of her family, she included straight line and circular enclosures with legs inside the body and eyes and mouth inside the head. Hair

was around the circular enclosures representing the head. This picture could be seen as an example of what Athey (2007) categorised as, circular enclosure curved marks placed in proximity with each other with the circular eyes inside the circular head. Ellie is showing some precision with the placing of her marks. In Figures 5:12 and 5:13, she ensured that in her family drawing, she positioned her marks on the page, representing heads, bodies and legs and the kisses were around the main picture in the colouring observation.

There could be possible link between Ellie's figurative actions through mark making and her operative actions evidence in previous observations. In placing the kisses around the main picture (Figure 5:13) and the placing of the blanket around the cat (Figure 5:10) and the blocks around the toy car (Figure 5:9) she is using her enveloping and containing schema to evidence her forms of thought and knowledge and understanding. In the observation with the toy cars (Figure 5:5) she filled the available space and she did the same in the picture (Figure 5:13) with the 'kisses', filling up all the space on the page and with the water on the slate lid and inside the rectangle shape on the yard (Figures: 5:14 & 5:15). This is an example of what Piaget and Inhelder (1956, p.77) stated when they argued that mark making derived from physical actions and that it was, 'based originally upon a sensori-motor and ultimately on a mental representational space determined by the co-ordination of these actions.' This fits with the observations of Ellie as the drawing with the kisses and the painting with the water occurred after the observation with the toy cars.

When Ellie is mark making using the water she is positioning her marks inside the circumference of the lid. However, there was no speech accompanying this observation so it cannot be determined what Ellie was actually representing with the water. Nevertheless, there is evidence of threads of thinking throughout her dynamics actions and her figurative representations. She is using different media to represent her threads of thinking of '*insideness*' through enclosing and containing. She chooses to paint inside the rectangle shape and is eager to share her finished work with the class teacher. She talks of "*filling it up*" indicating her understanding of needing to ensure the marks reach all the borders of the shape. This links back to the observation with the cars when Ellie spoke of '*filling up*' the space on the bookcase. As in the car observation, the teacher has listened to Ellie and has recognised her need to enclose and contain. She has reassured Ellie that she will be able to continue her schematic pursuits indoors through painting. Athey (2007, p.187) argued that, 'Wherever children have plenty of material and freedom of choice in early

education, schemas will be obvious to the aware observer.’ Here the practitioner is the aware observer, allowing Ellie the freedom and choice to continue to use her enveloping and containing schema with different materials inside.

Here Ellie was using environmental content to pursue her dynamic thought patterns through both actions and figurative representations. The practitioner accompanied Ellie’s speech with appropriate talk using what Athey (2007) terms, ‘links between forms of thought, the content of thought and appropriate speech’ (p.169). Ellie’s mark making suggested a depiction of her form of thinking shown in her dynamic actions. Anning (2003, p.30) states that children have the ability to represent their thinking in a number of ways through ‘...physical actions and graphical representation.’ The practitioner has then used this opportunity to reflect on what she has seen and to consider how she can support Ellie’s schema through providing resources and opportunities indoors. This is what Schön refers to as ‘reflective conversation’ (1991, p. 132) the practitioner has discussed the observation with me (researcher) and reflected upon what to do next.

Curriculum links:

These observations and photographs have shown Ellie’s enveloping and containing schema and links have been made to different schema levels and mark making. However, these observations and photographs of Ellie’s schemas also show links to the FP curriculum as follows:

Physical Development:

FP Outcome 2: ‘They play with different pieces of equipment’ (WAG, 2008c, P.54). This has been evidenced throughout Ellie’s actions over the two terms.

Knowledge and Understanding of the World:

FP Outcome 2: ‘They are beginning to understand the passing of time ...remembering significant events’ (WAG, 2008c, p.52). Ellie has recalled her trip to the dentist and represented this through her enveloping and containing schema.

Creative Development:

FP Outcome 3: ‘Children build upon their knowledge of the characteristics of a range of materials/resources through exploring and investigating’ (WAG, 2008c, p.56). Ellie has used playdough, water and colouring materials to explore her schema.

Personal Social Development Well-Being and Cultural Diversity:

FP Outcome 2: 'They demonstrate affection for other children and may play with them' (WAG, 2008c, P.44). Through the construction of the den and the garage for her car, Ellie has played with other children who seem to share her schematic interests.

Language, Literacy and Communication Skills:

Foundation Phase Outcome 4: 'Children draw on increasing vocabulary and use complete sentences' (WAG, 2008c, p.46). Ellie has been able to use complete sentences to explain her actions and has used words synonymous with her schema, e.g. *inside, around and filled*.

Mathematical Development:

Foundation Phase Outcome 2: 'Children use mathematics in day-to-day activities and in their play' (WAG, 2008c, p.48). Ellie has explored the concept of number, shape and areas when she has ensured she has enough cars to fill the seating area of the bookcase and enough blocks to build her 3D garage.

Final Reflections on Ellie's schemas:

On-going observations have shown a correspondence between how Ellie uses resources in the continuous and enhanced provision to pursue her enveloping and containing schema. She has done this through her actions and mark making using a variety of materials and tools with correspondence to *form* in mark making and *form* in dynamic actions evidenced. Figurative representation has a foundation in dynamic action and both Athey (2007) and Meade and Cubey (2008) observed this in their work.

These observations represent the times the practitioners and myself witnessed Ellie using her schemas during her freely chosen activities. It was important for myself and the practitioners to present the observations in an accessible style that reflected Ellie's lived experiences in the setting. However, it is important to note that these observations have been purposively picked (as with all the observations in this work) as ones that evidence examples of Ellie using her schema in the setting. This supports what Miles and Huberman (1994, p.56) highlighted stating that, 'the observer is constantly making choices about what to register and what to leave out... .' This supports Basit (2010) who asserts, 'The data generated through observation have to address the research questions and deliver what the researcher sets out to investigate.'

As discussed in the methodology, observations can be considered subjective, with the observer imposing their own interpretation on the findings. However, as discussed all observations and photographs were reflected upon, discussed and interpreted collectively as part of the on-going action research. This supports Cohen, Manion and Morrison (2007) who postulate that there has to be agreement on the interpretation of the phenomenon under research (schemas) by all those involved in the research. This also supports the methodology as being that of action research where all participants were fully engaged in all stages of the data gathering.

There were opportunities for the adults in the setting to connect with Ellie and to capture her interest and enjoyment. This reinforces the importance of adults having knowledge and understanding of schemas and using this knowledge as another lens to view children through. Without a knowledge of enveloping and containing schemas Ellie's actions could be dismissed as a series of unconnected events and the threads of thinking underpinning her actions missed (Nutbrown, 2011). Instead, when viewed schematically there are emerging 'patterns of cognition' (Athey, 2007, p.28) and these actions highlight Ellie's *coming to know*. Vygotsky (1978) postulated that good learning was that which is in advance of development but required the sensitive intervention of the guiding adult. Therefore, adults in the FP need to be aware of schemas as way of constructing knowledge and understanding for some children. Adult's supporting Ellie's schemas can provide activities that develop her knowledge and understanding but also support her enveloping and containing schemas, thus becoming Vygotsky's guiding adult (Vygotsky, 1978).

Ellie's lived experiences in the setting supports Neisser's definition of schemas as, 'Patterns of action as well as patterns for action' (1976, p.56). Here Ellie has shown actions that support her schemas but has also demonstrated some of the thinking behind those actions through her speech. She has re-enacted a trip to the dentist by providing an explanation to a nearby child and has discussed her reasoning behind filling the rectangle with water and her need to fill up the bookcase with toy cars. When under the den and building the garage, Ellie is happy to play with other children who seem to share her schematic interests. This has been an interesting discovery for the practitioners as they were concerned that Ellie seemed on her own a lot. It seems that if other children are able to share Ellie's interest in enveloping and containing she is happy to play with them. As indicated earlier, Arnold *et al.* (2010) has spoken in her research of whether children with the same or complementary schemas seek each other out but more research is needed in this area (Nutbrown, 2011). However, in the context of this research, observing that

Ellie seemed happy in the company of children who share her schematic interests has allowed practitioners to consider ways to encourage this more. By providing resources that nourish Ellie's schema may encourage Ellie and others with the same or complementary schemas to play together thus developing Ellie's cooperative play.

As shown Ellie's schemas can be evidenced across the FP areas of learning and linked to a number of FP outcomes. Ellie was exploring her spatial awareness when she climbed inside the tube and under the den. There was a growing understanding of area when she filled up the bookshelf with cars and 3D shapes when built a garage for her car. She explored volume and displacement when she pushed her whole hands into the water.

The stance adopted by the practitioners and myself in this research, is one where we want to recognise, understand and celebrates the uniqueness of each child represented in this research. It has not been our intentions to measure how many times the children use their schemas, rather to observe these repeated actions and to further our knowledge and understanding of them. Identifying, supporting and nurturing Ellie's schemas enabled myself and the practitioners involved in this research to reflect upon the learning environment and the learning experiences on offer. By analysing the findings both schematically and through a curriculum lens, myself and the practitioners have engaged in an on-going dialogue, considering how FP practitioners can be supported to nurture and nourish children's schemas. This has formed the basis for the beginnings of the development of a working toolkit or resource to support FP practitioners in providing a match between schemas and the FP curriculum.

The next observations and photos in this chapter presents Amy and Harri's dynamic trajectory schemas.

Amy's and Harri's Dynamic Back and forth and Dynamic Vertical (Trajectory) Schemas:

The following observations and photographs detail two children with the same schemas behaviours. The reason for including two children with the same schemas was because the practitioners in the setting were concerned over Harri's lack of concentration and lack of engagement with other children, Therefore, Harri was included on the request of the practitioners (with agreement from his mother). It was hoped that by viewing Harri's actions through a schematic lens, activities could be provided that would encourage Harri to engage more with others and help develop his concentration skills. They start with observations of both children using their schemas at a motor level.

Motor level observations:

Harri was in the reception class and was five years old when the observations started and was an only child. The practitioners reported that Harri was very much a solitary child who did not really interact with the other children. He enjoyed playing on his own and often spoke aloud to himself. It had been very difficult to engage Harri in any focused tasks and he would often wander away from the practitioners and go into the book area. Here, he would sing nursery rhymes to himself or one of the stuffed toys he was playing with, a toy teddy being a particular favourite. Outdoors at the start of the year, it had been noted that Harri would not walk across the rope bridge joining the two parts of the climbing frame; instead, he liked to drop items inside the large plastic cube on the yard or play with the water station.

Amy was one of the oldest children in the nursery, turning four years old in the autumn term. She was an only child and the practitioners stated that she was always very active and liked to be outdoors as much as possible. She was very sociable and enjoyed playing with a number of other children in the class. The following presents Amy's and Harri's explorations over two school terms, detailing how they used her dynamic back and forth and vertical schemas in the learning environment on offer. Amy was included in this research as the practitioners wanted to have a better understanding of ways they could channel Amy's endless energy into worthwhile pursuits.

The first observations detail Amy and Harri's motor level explorations using their dynamic vertical and back and forth schemas.

Amy- Motor level observations:

Amy runs straight over to the climbing frame. She climbs up the rope steps and proceeds to slide down the metal pole. She repeats this action repeatedly. For the whole of playtime, Amy repeatedly climbs the steps and slides down the pole. On a different morning, I am watching Amy on the bikes outside. She is with another boy and they are riding up and down and across the yard and in and out of the plastic cones. Amy stops riding now and then and looks back at the other boy who asks her to wait for him to catch up. Amy waits and they ride off again together. Amy carries on doing this until it is time to go back indoors.

Today indoors, Amy is playing with on the carpet with the trains. She is busy joining the magnetic trains together to form a long vertical line. Then she pulls and pushes the trains back and forth along the carpet. She is very absorbed in her actions and frowns with concentration as she continues to make the line of trains longer and longer. Now she starts to pull the trains along the mat back and forth where she is sitting. Another boy come over to the carpet and begins to join the wooden tracks together. Amy watches him and he asks, *“Do you want to put your trains on here?”* Amy nods and begins to add her trains to the tracks. They play together adding more tracks and pushing the trains back and forth until it is time to line up for assembly. Although they are not talking, they seem happy and relaxed in each other’s company.



Figure: 5:16 Sliding up and down the pole



Figure: 5:17 Riding up and down
the yard with a friend



Figure: 5:18 Amy pushing the trains
back and forth

Harri-Motor level observations:

It had been noted at the start of the observations, that Harri would not cross the rope bridge. However today outside Harri walks across the rope bridge for the first time. The other children pat him on the back and say, “*Well done.*” Although Harri does not acknowledge the children, he does smile and keeps walking back and forth across the rope bridge. One of the practitioners (involved in the action research) tells me this is a massive achievement for him as he has been afraid to walk across the bridge before today. We keep watching Harri and he keeps walking back and forth till the bell rings for the children to return indoors.

Today indoors as I observe Harri, he builds a tower with empty butter tubs (used as word tins in the setting) and keeps building them up and knocking them down. He counts as he builds and gets to ten before he hits them over. The practitioner (part of the research) tells me he does this every day whilst the Teacher does input, as he is reluctant to sit on the carpet. She adds that they now allow him to do this, as they now know it is part of his trajectory schema and not an example of Harri misbehaving. This is one occasion of many that Harri builds a vertical tower with the tubs. There is no accompanying speech detailing his actions but as soon as Harri knocks down the tubs he starts again.

Today, the children have been given a choice of activities to play with Harri goes straight over to the maths area. He plays with the wooden abacus and moves the beads on the abacus from side to side. He does not speak but once all the beads have been moved to one side he repeats the process and moves then back. He notices me watching him and I smile. I move a bit closer and I

ask him, “Are you counting the beads? How many have you counted?” Harri looks at me and walks away. One of the practitioners who is part of the research comes over and says, “He won’t answer you directly. When we need to observe him counting, we just stand by him and listen without actually asking him anything directly. He does count using the beads or quite often he will sing number songs to the puppets.” I realise that I have intruded on Harri’s activity and make a note to myself that I will need to ensure for future observations I am a silent observer and only engage in conversation with Harri if he initiates it with me first.



Figure: 5:19 Harri walking across the bridge for the first time



Figure: 5:20 Harri stacking tubs



Figure:5:21 Moving the beads from side to side

Discussion and Analysis:

Athey defines an interest in trajectories such as vertical ascents and descents as a 'dynamic vertical schema' (2007, p.116). Similarly she described horizontal trajectories such as back and forth or side to side as a 'dynamic back and forth schema' (p.122). Amy and Harri both selected and used equipment in the learning environment that allowed them to pursue their dynamic vertical and back and forth schemas. For example, Amy chose to descend from the climbing frame using the metal pole rather than use the wooden steps (Figure 5:16). Here she is using her motor actions and bodily movements to support the dynamic vertical aspects of her schema. This supports a definition of schema by Johnson (1987, p.19) who talked of, 'embodied patterns' inferring to both bodily movements and perceptual interactions achieved through significant experiences. Here the pole allowed Amy to use her body freely to descend repeatedly and thus increasing her perception of descending from a height.

Amy also explored her dynamic horizontal schema when she rode the bicycle around the yard (Figure 5:17). Here she rode in and out of the cones and back and forth transporting herself across the perimeter of the yard. She was with another of her classmates on this occasion and wanted him to join her but understood she needed to wait for him to catch her up. This is an example of Piaget's socialised speech, where Amy listened to her friend's predicament and understood she needed to wait (1959). Amy has engaged in a form of 'cognitive de-centering' where she has taken on the need to wait for her friend, understanding his perspective of not being able to ride as fast as she can (Bodrova and Leong, 2011, p.62).

Atherton (2013, p.52) in similar observations of children riding around outdoors, has stated that children could be experiencing higher order concepts such as, 'speed, distance and force.' Amy needed to change direction to move in and out of the cones and she has shown an understanding of direction and steering to cover the distance needed to reach the end of the cones. Here Amy could be co-ordinating her trajectory schemas with a transporting schema as she is displacing herself from one part of the yard to another.

Both Athey (2007) and Tovey (2007) have considered the use of the environment to enhance learning and the FP makes it very clear that both the indoors and outdoors provide opportunities to stimulate children's learning and development (WAG, 2008c). However, Athey differs from Tovey in arguing that it is not the actual outdoors that provided the challenge for children but

how it is used by the children and what is provided by supportive adults. Therefore, an adult that recognised Amy's use of her horizontal trajectory schema in riding the bike could consider extending her learning through providing more challenging obstacle courses for her to navigate.

Amy explored the dynamic horizontal aspects of her schema through joining the trains together in a long horizontal line (Figure 5:18). When Amy joins the trains, she is making connections, adding to the creation of a beginning and an end. However if only the finished product was viewed, rather than the dynamic process of connecting the trains this could be missed. Atherton warns of missing the dynamism of such actions if only the end 'static configuration' is viewed (2013, p.49). Amy has understood that she need more trains joined together to make a longer moving vehicle. Here concepts of length, height, distance and addition begin (Atherton, 2013). Amy is happy to engage with another child and to add her trains to the tracks he is building. Here the boy's actions fits with her schema and they are able to work together.

Harri also chose to use his dynamic vertical and horizontal schemas in a number of ways both indoors and outside. At the start of this research (in the autumn term), the practitioners had stated that Harri would not walk across the rope bridge joining the climbing apparatus outdoors. Initially, when he was observed outdoors, this was the case as he avoided this bridge. However in the spring term he overcame his fear of walking across the rope bridge and transported himself across it repeatedly (Figure 5:19). It was impossible to understand, without a verbal explanation from Harri, why he suddenly decided he was no longer afraid to walk across the bridge. Perhaps Harri had watched other children walking across and this had given him the confidence to try it out. Here Harri was displacing (transporting) himself (Athey, 2007) and he may have developed a greater perceptual awareness and become more comfortable in the outdoor environment, having been using it during the previous term. Robson talks of 'spatial orientation' and coming to know environments through cognitive mapping and developing this can be a long process (2012, p.172). Thus allowing Harri to have access to the outdoors on a regular basis, may have allowed him to develop an awareness of the outdoor equipment. Then combining this with his horizontal trajectory schema, allowed him to develop the confidence to walk across the bridge.

Inside on several occasions, during whole class input, Harri stacked margarine tubs in vertical towers (Figure 5:20). The practitioners have noted Harri's need to stack the tubs whilst listening

to input and now, with a knowledge of schemas, have decided that it was more relevant for Harri to build his vertical towers than insist he sits on the carpet. They have noted that he listened to the input whilst stacking the tubs and that the physical action of building with the margarine tubs seemed to relax him. This could be considered as timeliness of intervention because the practitioners had not intervened by stopping Harri from building his towers, but instead had allowed him to carry on. Gopnik, Meltzoff and Kuhl (2001) argued for the need for adults to be in step with a child's thinking. Here the practitioners have a growing awareness of schemas and have been sensitive enough to allow Harri to build his vertical towers. Arnold *et al.* (2010) has spoken of children performing rituals in her research, using their schemas as a form of security. Therefore, it may have been that Harri needed to go through the ritual of stacking tubs every time the practitioner gave input to the whole class. Perhaps this allowed him to feel calm and secure before he was required to carry out focused tasks with the rest of the class. However, without any speech it is impossible to say what Harri was thinking whilst he stacked the tubs, only to speculate.

With the observation of Harri and the abacus, he moved the beads across the frame repeatedly. As there was no speech accompanying his actions, Athey (2007) would categorise this at the motor level of schemas functioning. I, as the observer, had tried to engage Harri in conversation linking his activity to mathematical development. Athey (2007), Meade and Cubey (2008), Nutbrown (2011) and Nutbrown and Atherton (2013) all agree that children's schemas explorations can all lead to mathematical learning. However, although Harri may have been using mental arithmetic and counting silently I spoilt this by assuming that this was what Harri was doing. Here, I was guilty of assuming I knew what Harri was thinking and I was not an attuned adult instead I had used what Athey (2007) termed associative language rather than a conceptual accompaniment. Nutbrown also contests that schemas can provide a way to become, 'in tune with children's cognitive concerns' (2011, p.29). However, I was not in tune with Harri and this resulted in him leaving the activity. This made me rethink my approach to observing Harri and after my discussion with the practitioners; I decided I would be a *silent observer* and not an *intruder*. Atherton (2013) in her research argues for waiting to be invited into children's play and I reflect that next time I will do this.

When observing Amy and Harri's active play both indoors and outdoors their dynamic vertical and horizontal schemas are evident. Amy and Harri have used their schemas to develop their

understanding across a range of activities, supporting the concept that children fit together relevant experiences (Nutbrown, 2011). They are not engaging in aimless activities but each has a focus and purpose. Their motor level actions combined with their trajectory schemas have allowed them to develop confidence (Harri crossing the bridge) and to join in play with other children (Amy riding the bike and playing with the trains). The next section explores Amy and Harri's dynamic vertical and horizontal schemas at a symbolic level.

Amy's and Harri's Dynamic Back and forth and Dynamic Vertical Schemas: Symbolic level observations:

Amy:

Today outdoors, Amy is busily dunking a bottle in and out of a bucket of water. Amy ties string to water bottle and dips it in and out of bucket- says it is a "boat." She keeps lifting the water bottle in and out of the water. One of the practitioners (not involved in the action research) asks her if she has been on a boat. Amy replies, "Yes on my holidays and it went up and down and daddy was sick everywhere." The practitioner says, "Oh no, poor daddy." Amy nods and carries on bobbing her boat up and down.

On another occasion, Amy is inside and she is sitting at the playdough table. She spends time rolling out the playdough and then squashing it into a flat shape. She asks the child next to her if she "Wants some cookies?" The child nods and Amy take a pair of toy scissors and cuts out the playdough into a round cookie like shape. Amy passes the child the 'Cookie' which she pretends to eat. Amy asks, "Do you like it, it is a chocolate one?" The child nods and say, 'It is yummy'. Amy smile and takes the dough back and then proceeds to rolls it out again. She is humming to herself and she proceeds to roll the dough back and fro repeatedly.

Today, Amy is outdoors once more, she is with a little girl, and they are busy building with the big bricks. They keep adding the bricks and Amy says, "I want the tower to be as tall as me, how many bricks will that be?" The other little girl seems to think and says, "This many" and holds up five fingers. Amy starts to count out loud, "1, 2 3..." She keeps counting till she gets to twenty and says, "We will need that many to be as tall as me," and spreads her hands wide. She continues by saying, "I will run and get more bricks," and runs over to the box of bricks. The practitioner outside with me (part of the AR) is also observing the children and says, "It is fascinating to watch, I can see now how the bricks support Amy's vertical schema. I will make sure we leave the bricks outside

so she can come back and use them again.” Amy carries on building with her friend until the bell goes for the end of outdoor play.



Figure: 5:22 Amy dunking her ‘boat ‘ in and out of the water



Figure: 5:23 Rolling playdough to make cookies



Figure: 5:24 Amy building a tower taller than she is.

Harri:

When I begin to observe Harri today he is outdoors in the sand tray. He tips sand into the sieve and lets it trickle out. He does this from different heights. He turns to the child next to him and says, “*This is my cake, it has sprinkles on it, it is a birthday cake.*” The child nods and says, “*It is my birthday tomorrow, my cake will be chocolate.*” Harri stops and seems to think about this before responding with, “*I like chocolate too. This is a chocolate cake.*” Harri carries on adding sand to the sieve and letting it drop into the sand tray below. Although there is no more

conversation with the child next to him, he is content to carry on with his actions, smiling to himself.

When I observe Harri today, he continually picks up Teddy and throws it onto the floor. As I watch him he continues to throw teddy up and down whilst singing, 'Humpty Dumpty.' I ask him if he likes that rhyme and he tells me, "Yes it is my song it goes up and down." The following week when I am observing him again, he goes to reading area and takes the caterpillar puppet and pushes it on and off the bench. As I watch, he starts singing, 'Humpty Dumpty' again. One of the practitioners (involved in the AR) tells me that in singing lessons at the moment Harri always wants to go out the front to be 'Humpty' and likes the bit when he falls off the wall. She tells me that Harri has continually used the puppets to role-play the rhyme in the reading area. We watch him together for a while and we both agree that in singing lessons next week it would be a good idea to sing and role-play other rhymes such as 'Jack and Jill' which will also support Harri's trajectory schema of falling downwards. In addition, role-playing this rhyme will afford Harri the opportunity to co-operate with other children, which will be good for his social development. The practitioner tells me that they have added action rhyme books to the reading area with the intention of encouraging Harri to sit with others to listen to the rhymes and to sing them together.



Figure: 5:25 Sprinkles sand to make a
cake



Figure: 5:26 Role playing *Humpty Dumpty*
with Teddy



Figure: 5:27 Caterpillar's turn to be *Humpty*

When I arrive in the setting today, Harri is outdoors by the big plastic cube and he is singing “*10 green bottles*” to himself as he drops a cardigan down into the cube over and over again. Next, he drops the cardigan completely inside the cube, peers in to look at it, and laughs. Harri repeatedly drops the cardigan inside the cube and retrieves it by pulling it in a downwards motion. The practitioner (not part of the AR) standing next to me says, “*This is typical of Harri, he never really plays with others but is happy to be on his own.*” I point out to the practitioner that although he is in his own, there is so much more to this observation. I discuss Harri’s use of his dynamic vertical schema and he that he has chosen a number song, which supports his schema. The practitioner listens and says, “*I never would have got all that from observing him. I would have probably have just thought, there’s Harri happy in his own world.*”



Figure: 5:28 Pulling the jumper in and out of the cube singing, *10 Green Bottles*

Discussion and analysis:

Both Amy and Harri are using their dynamic back and forth and dynamic vertical (trajectory) schemas to explore the learning environment. They deliberately chose resources that supported their schemas and used them in a number of different ways. Atherton (2013, p.50) talks of children being 'discriminating' in the 'use of content' and the relationship between '*forms of thought*' and environmental content.' Amy chooses a bottle to become a boat to dunk up and down, playdough to make cookies and bricks to build a vertical structure. Harri, uses a sieve to allow the sand 'sprinkles' to fall downwards, puppets to represent 'Humpty' falling off the wall and a cardigan and cube to represent 'bottles' falling from the wall. This reinforces Neisser's definition of schemas as being, 'a pattern of action as well as a pattern for action (1976, p.56).

All these actions were accompanied by speech to explain what the actions represented. Athey (1990, p.40) discusses symbolic functioning as, 'children become able to represent known events symbolically' and symbolic representation as either remaining 'internal or manifesting in drawings, symbolic play or speech.' In the examples observed, Amy and Harri are able to represent their forms of thought symbolically through their actions, play and speech. Piaget (1959) talked of socialised speech with the need to engage with the listener. Amy does this when she talks about her boat trip, cookies and building a tower taller than she is. Harri engages his listener when he discusses adding 'sprinkles' to his birthday cake. Harri also demonstrated Piaget's (1959, p.17) ego-centric speech, with no 'social function' when he sang the rhyme 'Humpty Dumpty' and '10 Green Bottles' using the puppets and the cardigan to accompany his trajectory schema. Here his speech was intended to, accompany, to reinforce, or to supplement action. However when I asked Harri if he liked the rhyme, 'Humpty Dumpty' unlike the last time I tried to engage in conversation, this time Harri is happy to reply to me. Perhaps Harri was now more comfortable in my presence and more accepting of my place in the classroom. This is what Atherton (2013, p.26) terms a, 'coming to know each other' and allowing, 'trust and openness to develop.'

Nutbrown (2006, p.52) reinforces the importance of using, 'appropriate descriptive language, language of *form* as well as appropriate content descriptions.' This is applicable here when the practitioner asks Amy about her boat trip but misses the opportunity to reinforce her *forms of thinking* – the trajectory aspects to her actions. Athey (2007, p.152) talks of the need for 'precise language' and the need for 'conceptual rather than associative' accompaniment when responding

to children (p55). The practitioner has focused on the boat in Amy's actions rather than also focusing on the trajectory movements. This is an example of what Athey (2007, p66) terms 'focusing on content' at the expense of 'form.'

Perhaps the observations with Harri are even more demonstrative of this, with the practitioner focusing on the fact Harri is on his own with no acknowledgement of his symbolic actions when he is singing 10 Green Bottles. The significance of Harri's actions here were not his propensity to play alone but his desire to assimilate relevant content into his prevailing forms of thought (trajectory schema). These observations also highlights the need for practitioner training in recognising schemas and supporting them. The development of a working resource as an output of this research will help to achieve this.

However, the practitioners involved with this research have started to recognise and support the schematic endeavours of Amy and Harri. This has been shown when the blocks are to be left outdoors for Amy to use again and the addition of more action rhymes in singing lessons and action rhyme books in the reading area. Here the practitioners have recognised the need for Amy and Harri to have extended opportunities to use their schemas within the FP learning environment.

As stated before Harri tended to spend a lot of time on his own in the setting and most of the observations reflect this. However in the sand observation (Figure 5:25) Harri engaged with another child and was happy to play alongside this child. The child was able to tune into Harri's thinking when he accepted Harri was making a cake and the sand represented the sprinkles on this cake. Here they were able to have a conversation and Harri was happy to conclude that his cake was chocolate, supporting the cake the other child talked of. Here Harri has assimilated the information about a chocolate cake and has accommodate his thinking to reveal the cake he is making is also chocolate. Piaget (1959) attested that children strive continually to share their thoughts through communication. Harri, was an attuned listener and adapted his thinking to enter into a collaborative dialogue with the other child. Perhaps Harri had hoped that the other child would carry on talking and they could play together. However, on this occasion this did not happen.

Amy's and Harri's Dynamic Back and forth and Dynamic Vertical Schemas: Functional Dependency level observations:

Amy:

Outdoors Amy finds some ice on top of the plastic cube and she carries it over to the wall and rubs it up and down until the ice melts. She keeps finding ice to rub up and down the wall. As she does this, she stops and looks at me and says, *"The ice is getting smaller, look."* I look and agree and I say, *"You rubbing it makes it get smaller, the faster you rub the smaller it gets."* Amy asks me, *"Why?"* I reply by saying, *"When you rub something fast it makes it heat up, it is called friction and this heat makes the ice melt."* Amy puts her hand to one side, looks at me, and repeats the word 'friction'. I say *"Why don't you go and get some more ice and rub it really fast up and down and see what happen?"* She runs off and gets another piece of ice and tries it out, she laughs and says, *"It does look, it gets smaller when I rub it fast"* Amy now runs over to show her friends and then spend the rest of playtime rubbing ice up and down the wall. She keeps doing this on her own and I can hear her saying, 'friction' under her breath.



Figure: 5:29 Rubbing ice up and down the wall

Today outdoors Amy is positioning bricks in a horizontal pattern to make a large rectangle shape. She keeps adding bricks and then lie down but her feet dangle over the edge. She says to herself, *"Silly Billy you need more bricks."* She sees me watching her and collects more bricks. Now she lies down and smiles, she sits up and says to me, *"I have made my bed; I needed more bricks cos I am a big girl now. I have a new bed at home and it is this big"* (she stretches out hers arms to show me). I say, *"Well done you have added more bricks now and made the bed longer so it fits you."* She looks at her bed and nods, *"Yes I have made a really long bed."* She call over to a group

of children standing by the fence, *"Come see my long bed."* They wander over and watch Amy lying on the bed pretending to be asleep. One asks can she have a go on the bed and Amy jumps up and lets her. The children spend the rest of the time outside taking it in turn to lie in the bed giggling as they do so.



Figure: 5:30 Adding more bricks till her 'bed' is long enough

Harri:

At the water feature outside Harri is concentrating on holding a measuring cylinder steady while another boy pours water into it. He does this until the cylinder is full. Harri then carefully carries the full cylinder over to the water feature where he pours water into the yellow tubing. He watches until the water comes out from the bottom of the tubing onto the yard. Another boy comes over and asks Harri what he is doing. Harri explains, *"The water goes in the top of the yellow bit and then it runs down here and comes out here"*, he points to the bottom of the tubing and the puddle of water forming on the yard below the tube. The boy goes and fetches a small silver bowl full of water and says to Harri, *"Can I put this water in there?"* Harri nods and stands back, the boy tries to tip the water into the top of the tube but it spills over onto the boy's shoes. Both boys laugh and Harri says, *"Silly water!"* The boys abandon the silver dish and both use the cylinder instead. Both boys carry on playing with the water feature until the end of play, taking it in turns to tip water into the yellow tubing and waiting for it to come out the other end.



Figure: 5:31 Pouring water in to fill the cylinder



Figure: 5:32 Pouring water in the top to make it

come out at the bottom

Discussion and Analysis:

Both Amy (Figure:5:29) and Harri (Figure: 5:31&5:32) are interested in how the ice gets smaller through rubbing up and down and how the water travels through the tubing to the ground respectively. For Amy there is a growing awareness that as she rubbed the ice it became smaller and she has been introduced to a new term, 'friction'. She has developed an understanding that the ice getting smaller depends upon her up and down movements and the more she does this the smaller the ice gets. For Harri, he has understood that in order for the water to travel to the bottom of the tubing it need to travel from the top downwards.

With Amy, I was able to develop her thinking by introducing the concept of friction as causing the ice to become smaller. Although Amy would not at the age of five, be able to fully comprehend the meaning of friction, she was able to assimilate this new word into her vocabulary and accommodate her thinking to understand that this was causing the ice to become smaller. Here I was scaffolding Amy's learning or using her 'zone of proximal development' to take her learning forward (Vygotsky, 1978, p.84). In the future when Amy hears this word, this may evoke the memory of her rubbing the ice up and down the wall and aid an understanding of what friction can do. This is an examples of what Athey (2007) meant when she stated that schemas exist in a continuum from motor action to thought.

For Harri, the water represents a visual perception of a vertical descent with the water. Here, Harri has chosen media available in the setting that supports his schema. Neisser (1976, p.57) argues that:

...the perceiver engages in an act that involves information from the environment as well as his own cognitive mechanisms. He is changed from the information he picks up.

So for Harri, he has realised that in order for the water to appear at the bottom of the tubing he needs to pour it in at the top. He has also noted that certain containers are better to pour from, with the cylinder being the more suitable. Piaget and Inhelder (1956) asserted that, co-ordinating actions is no part of the physical experiment, but a part of intelligence mechanisms.' Harri has co-ordinated his thinking to understand that in order to get the water to the bottom it needed to go in the top of the tubing. However, in order to get the water into the tubing in the first place a suitable container was needed, with the silver bowl being discarded for a cylinder. Also, Harri has called the water '*silly*', he has attributed a human behaviour to the water and this is an example of what Piaget (1929) would term animism and is a feature of the pre-operational stage of development.

Outside Amy has used the blocks to build a representation of her bed. It could be argued that Amy is using her schema at a symbolic level here as she is using the bricks to create a model of her bed. However, she is also exhibiting functional dependency in realising that in order to make her bed the right size she needs to add more bricks. Arnold (2013) has stated that children will draw upon all that ways schemas manifest themselves in order to develop knowledge and understanding.

It could also be argued that Amy is demonstrating her schema at a 'thought level' as she was able to recall the shape and size of her bed from memory and recreate it with bricks (Athey, 2007, p.116). Here there was a '*coming to know*' in Amy's thinking, with the understanding that she needed more bricks to make her bed become longer. Athey talked of 'accommodations or steps forward in knowledge' (2007, p.51). Amy has assimilated the knowledge that her bed is too short and has accommodated her thinking to realise she needs more bricks to make it longer. Atherton (2013, p.49) argues that, 'through... trajectory behaviours an understanding of higher order concepts such as length, distance and addition germinates.'

Amy's and Harri's Dynamic Back and forth and Dynamic Vertical Schemas: Mark Making observations:

Amy:

Amy is sitting at the painting table today when I begin to observe her. She is carefully painting in vertical stripes up and down her picture. She carries on until the whole picture is completed. She runs over to the practitioner and shows her. She compliments Amy on her good work and tells her to place it on the dryer. On a different day, the children are mark making outdoors. Amy has chosen a large piece of white chalk. She sits on the yard and draws along a straight line. The practitioner with me (part of the research) sits alongside her and asks her, *"What are you drawing Amy?"* Amy replies by saying, *"It is a big line and I am going to walk along it on tippie toes."* The practitioner says, *"That's really interesting, and I can see the line is really long, you will need to balance carefully to make sure you don't fall off mind."* Amy stands up, starts to walk across the line and shouts over to the practitioner, *"Look, see I can do it."* The practitioner nods and claps her hands, *"Yes you can, clever girl, you are balancing along the straight line."*



Figure: 5:33 Painting her balloon



Figure: 5:34 Chalking a straight line
to balance along

Harri:

Today Harri is at the painting table and he is part of a group of children painting a pirate for a classroom display. He dips the brush into the paint and makes a series of marks on the paper. The practitioner working with him (and part of this research) encourages Harri to dip his brush into

the paint and to try to add the features of the pirate. She says, *“Well done Harri, that’s right look you can make long line for his mouth and eye brows.”* Harri nods and carries on painting in vertical lines. The practitioner now says, *“If you move the brush up and down and side to side you can make a nose shape and two eyes.”* Harri says, *“There, it is his face. It’s finished now, I want to go and play.”* He begins to remove his apron. The practitioner says, *“Thank you Harri, I will put your name on it and put it to dry.”* Harri walks away and the practitioner says to me, *“That is one of the longest times we have been able to get Harri to do any mark making at all.”*

On another occasion when I begin to observe Harri, he is at the writing table and the children are designing treasure maps as part of the ongoing theme of ‘Pirates’. Harri has a choice of coloured pencils but he chooses to use a writing pencil and he scribbles all over his map in a series of horizontal scribbles. The practitioner (not part of this research) tries to get Harri to use another colour, she shows him the example of a treasure map, and reminds him of the book they have read this week about treasure maps. Harri refuses and says, *“No I want to use this one”*. He then gets up and says, *“All done, can I go now?”* The practitioner sighs and says, *“Ok Harri off you go”*. Harri leaves the writing area.



Figure: 5:35 Painting a pirate



Figure: 5:36 The finished picture

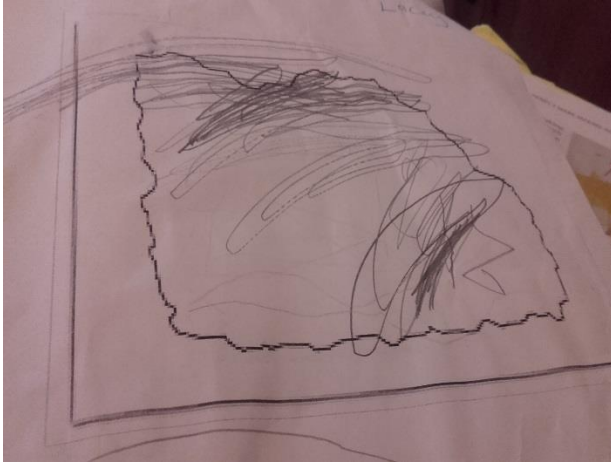


Figure: 5:37 Designing a treasure map

Discussion and analysis:

Both Amy and Harri have use their trajectory schemas in their drawings. Amy has painted her balloon in strips of colour and chalked a long straight line. Harri has painted a pirate and designed a treasure map. Piaget (1969) identified two types of cognitive patterning, figurative linked with perception and operative linked with action. Amy and Harri's figurative aspects of their dynamic vertical and horizontal schemas could be evidenced through their mark making. Both children have used vertical and horizontal marks in their paintings and drawings. These are an acknowledgment of what Athey meant when she argued, 'mark and model making are abstractions from the child's own movements' (2007, p.75). Both children have used their bodies previously to represent vertical and horizontal movements (Amy down the pole and Harri across the bridge) and these have translated in the marks they have chosen to make. This also resonates with Piaget and Inhelder (1956, p.77) who stated that mark making was derived from physical action and was, 'based originally upon a sensori-motor... action.'

Amy combined her mark making to facilitate her bodily actions when the chalk line became a balancing rope. The adult with her, was able to encourage and support Amy with this. Similarly, the adult with Harri, when he was painting the pirate face, was able to support his forms of thought by using appropriate language. This allowed Harri to remain focused in the activity for a longer time than had been previously evidenced. By tuning in to Harri's forms of thought the practitioner seemed able to engage him for longer supporting what Atherton (2013, p.64) meant

by, 'a dialogue of conceptual correspondence.' In contrast, in the observation of the treasure map (Figure: 5:37) the practitioner was not able to support Harri's mark making with language that matched his schema and as a result he left the activity quite quickly.

When examining Harri's treasure map (Figures: 5:36) there are a number of scribbles running both vertically and horizontally. Athey referred to these as, 'continuous horizontal and vertical scribble' (2007, p.62) and Piaget referred to these as 'aimless scribble' (1969, p.63). This type of mark making is normally associated with younger children than those of Harri's age. However, this may be because Harri did not spend a lot of time engaged in mark making activities whilst in the setting, instead preferring more action based pursuits as evidenced in most of the observations.

Athey (2007) distinguished twenty-four different marks, which she subdivided into straight lines and curves. In Harri's pirate picture and treasure map the lines would be categorised as, 'vertical line' and 'continuous horizontal and vertical scribble' (Athey, 2007, p.62). Athey also categorised space orders, which she referred to as the spatial relationship between things. In both of Harri's mark making the spatial relationship would be classed as, 'Proximity between marks' (2007, p.63). This is also an example of what Piaget and Inhelder (1956) would categorise as the, 'most elementary spatial relationship.' Again, this would normally be evident in children younger than Harri but again this could be linked to his reluctance to choose mark making as an activity.

However, there needs to be a word of caution here. If Harri's drawings were viewed in isolation, they could very well be dismissed as scribbles with no real meaning. Viewing the finished Pirate picture there is little resemblance to a face. However, the practitioner working alongside Harri, has allowed him to represent the features as he sees them and to use his dynamic vertical schema to support him. Here the practitioner has focused on the forms of thought rather than the content. Athey (2007) and Nutbrown (2011) state that children's schemas or forms of thought manifest themselves in their drawings. Therefore when viewed schematically and with an awareness of Harri's dominant dynamic vertical and horizontal schemas then a different understanding emerges. Here the marks are a representation of Harri's schema from his sensori-motor actions through to his figurative representations (Piaget and Inhelder, 1956).

Amy in contrast was very precise when painting within the lines of the balloon and when drawing her chalk line. She accompanied her chalk line with her play intentions when she indicated the line was drawn for her to balance along. Coates and Coates (2006) have stated the importance of

listening to children's talk when they make marks indicating that this can illuminate children's play intentions and their thinking. Here Amy has spoken of her desire to walk along the chalked line, thus linking her mark making with her intended actions. She had combined her preferred dynamic trajectory schema with her mark making, allowing her to balance on her tiptoes along the line she had made. Both Athey (2007) and Meade and Cubey (2008) observed in their work, that figurative representations had their foundations in sensori-motor actions and both Harri and Amy have evidenced this in their mark making.

Curriculum Links:

These observations and photographs have shown Amy's and Harri's dynamic vertical and back and forth (horizontal) schemas and links have been made to different schema levels. However, these observations and photographs also show links to the FP curriculum as follows:

Physical Development:

Foundation Phase Outcome 2: 'They play with different pieces of equipment' (WAG, 2008c, P.54). This has been evidenced throughout Amy and Harri's actions over the two terms.

Knowledge and Understanding of the World:

Foundation Phase Outcome 2: '...handle and explore the use of a range of equipment/tools' (WAG, 2008c, p.52). Amy rubs the ice to make it smaller. Harri tips water into the top of the tubing to see it come out the bottom.

Creative Development:

Foundation Phase Outcome 2: 'They assemble materials into artefacts that have meaning to them' (WAG, 2008c, p.56). Amy makes 'play dough' cookies. Harri adds 'sand sprinkles' to his cake.

Personal Social Development Well-Being and Cultural Diversity:

Foundation Phase Outcome 4: 'Children will take part in cooperative play independently (WAG, 2008c, p.44). Amy builds a train track with another child and Harri works with another child at the water feature.

Language, Literacy and Communication Skills:

Foundation Phase Outcome 2: They try out a variety of instruments to make marks' (WAG, 2008c, p.46). Amy and Harri mark make using a variety of media.

Mathematical Development:

Foundation Phase Outcome 2: 'Children use mathematics in day-to-day activities and in their play' (WAG, 2008c, p.48). Amy counts to make a tower taller than her and Harri sings, '10 Green Bottles' when he is playing outdoors.

Final Reflections on Amy and Harri's schemas:

On-going observations have shown a correspondence between how Amy and Harri use resources in the FP continuous and enhanced provision to pursue their trajectory schemas at different levels. They have done this through actions and mark making using a variety of materials and tools with a correspondence to *form* in mark making and *form* in dynamic actions evidenced. The role of the adult has also been discussed and the importance of having a conceptual accompaniment through language and actions considered. Working with the practitioners in the setting and observing the children through a schematic lens allowed different ways of understanding to emerge. For Harri, the observations have shown his actions to be 'fitting' rather than 'flitting' when viewed through a schemas lens (Nutbrown, 2011). Knowing about Harri's schema would enable the practitioners to plan and provide activities that would support his ways of coming to know, allowing him to engage with other children and increase his concentration skills. This was shown when Harri was playing with the water feature outside, when he added sand 'sprinkles' to his cake and when he spent a longer amount of time drawing his pirate face.

Both Amy and Harris were developing a knowledge of forces such as friction (ice rubbing) and gravity (dunking boats, water flowing down tubes, sand through sieves and sliding down poles). There was an awareness of height (stacking tubs and building brick towers) and direction and distance (Harri over Rope Bridge, Amy in and out of cones). Mathematical development can be seen when Harri sang '10 Green Bottles' and Amy counted bricks. Fine motor control was evidenced through both children's mark making activities.

However, it also became clear that all practitioners working in the setting needed to be aware of schemas and not only those involved in the research. This reinforced the need for training (as

discussed in chapter 4) and a resource that practitioners could use to support them in shaping their practice to support and nurture children's schemas. As Atherton states children, 'should meet with practitioners who have a preparedness to respond to individual need, to particular important instincts' (2013, p.149).

The next section focuses on Oscar and his connecting, disconnecting and dynamic vertical schemas.

Oscar's Connecting, Disconnecting and Dynamic Vertical Schemas:

Oscar was five years old when the observations began and the practitioners stated that he was a very reserve child who was quite happy to play on his own. He attended the Reception class full time. Oscar's schemas were evidenced through his physical actions, his speech and mark making during free choice activities with the continuous and enhanced provision in the setting. The first set of observations and photographs demonstrate Oscar using his schemas at a motor level.

Motor level observations:

Today, when I begin to observe Oscar he is outdoors in the sand tray. He is continually delving his hands into the sand. He is smiling to himself, seemingly oblivious to the other children around him. He ignore the resources in the sand tray and just pushes his hands in and out of the sand. On another occasion, he is playing alongside another child. The child is holding the bucket under the sieve, which Oscar has filled with sand. Oscar is trying to fill the bucket with the sand and he keeps scooping sand into the sieve and watching it fall into the bucket. Oscar is not speaking to the other child but the other child keeps asking Oscar to "*fill up*" the bucket.

When I observe Oscar today, he is building a high vertical tower out of Lego with some other children. The practitioner with me (part of the AR) tells me that Oscar loves the Lego and will always choose it if given the opportunity. She says that they have been observing Oscar on the days I am not there and tells me that he is fascinated with 'Rockets and Space' and has been building 'Rockets' indoors and outdoors using Lego blocks and bricks. Although Oscar is not talking, the other children are egging each other on to build a tower as tall as they can.

As we continue to observe Oscar, the tower falls down and they all laugh and start again.



Figure: 5:38 Pushing his hands into the sand



Figure: 5:39 Filling the bucket with sand



Figure: 5:40 Building a tower of Lego

When I arrive at the setting today, the practitioners are keen to share with me a picture of Oscar from earlier in the week. They were observing him outdoors and he went into the wooden playhouse and balanced himself between the wooden cooker and roof using his hands and feet. They tell me that usually he would have been told off straight away and made to stop, but with a growing awareness of his connecting and dynamic vertical schemas, they allowed him to continue for a bit. They tell me he carried on balancing between two points until he seemed to tire and got down. One of the children watching him asked him what he was doing but he did not answer and walked away.



Figure: 5:41 Connecting his body between 2 points

Discussion and Analysis:

Oscar has used the resources indoors and outdoors to support his connecting and disconnecting schema and his dynamic vertical schema. In the sand tray there was a fascination with delving his hands downwards (vertically dynamic) and upwards repeatedly. He seemed fascinated in ensuring that his hands connected completely with the sand, so they became completely hidden (Figure: 5:38). Similarly, when Oscar is using the sieve to fill the bucket (Figure: 5:39) there is a need to hold the sieve above the bucket to allow the sand to travel downwards into the bucket. Here Oscar has rejected more traditional tools such as a spade to fill the bucket, preferring a sieve, which supports his dynamic vertical schema. Atherton talks of children being both physically and mentally active (2013). Oscar is physically active in filling the bucket and mentally active in choosing resources that support his schema.

Sand is a material that provides Oscar with a 'sensory or perceptual feedback' when he uses his motor actions to connect his hands with the sand (Athey, 2007, p.47). Oscar can feel the sand connect with his hands and such first-hand exploration and experience is the "stuff" or 'content' of the mind' (Athey, 2007, p.200). When Oscar was using the sieve to fill the bucket he was able to visually see the sand fall vertically downwards to fill the bucket. Bruce (2005) argues that schemas make children more alert or aware of properties of objects in the environment. Here Oscar is using the resources in the environment that allowed him to combine his need to connect with trajectory movements (Mairs *et al.*, 2013). The observation with the sieve and bucket occurred after the observation of Oscar delving his hands into the sand. Therefore, maybe Oscar was re-enacting the downward motion of his hands into the sand with the motion of the sand through the sieve. Then he replicated the covering of his hands with the sand by covering the bottom of the bucket with sand. However, without speech this is only an interesting speculation.

When Oscar is building with the Lego, he is determined to build the tower as high as he can (Figure: 5:40). Here he connected the Lego bricks to make his vertical structure. There was a need for Oscar and the other children to make the tower as tall as possible and Nutbrown (2011) believes that vertical trajectories assist in developing knowledge of height. Again, there is no speech from Oscar but he is content to work alongside others to build the tower. The practitioners have noted Oscar's connecting and dynamic vertical schemas and were now happy to allow him time to explore how high his tower could be. Here, Oscar was content to allow other

children to help him with the tower, when on many other occasions he preferred to play on his own. Arnold (2013) has questioned in her research if children with similar schematic interests play together. In this observation, it may be that as all the children were focused on the same outcome, a tall tower, Oscar was happy to play alongside them.

The photograph and observation by practitioners of Oscar inside the wooden place house, showed him using his body to connect between two points. Meade and Cubey asserted that young children explore things in many different ways such as through perceptions and bodily actions (2008). Meade (1994) as cited in Meade and Cubey (2008, p.44) talks of 're-cognition' where different kinds of information from new experiences are fed into existing cognitive structures (schemas). Oscar, using his body to stretch between the two points could be a re-enactment of the tower building in the class on the previous occasion. He was exploring connections and vertical trajectories by using his motor-actions. Practitioners not aware of Oscar's schemas could have easily stopped this behaviour and tried to divert him into a more 'suitable' activity. Nutbrown and Page (2008) have stated how practitioners can upset or frustrate children's schemas if they interrupt or stop them. Atherton argues for practitioners to develop their knowledge of schemas as this allow an alternatives view of a child's actions to emerge (2013).

Piaget (1953) stated that schemas are continually modified thorough new experiences. Here children are able to link their thinking to further action and the practitioners have allowed Oscar the opportunity to do this. However, this activity could be considered dangerous and in the future practitioners may need to think of other ways for Oscar to use his schema. This has provided a more evidence of the need for a working resource to nurture and nourish schemas through appropriate activities in the learning environment. As Atherton attests, 'A schematic interpretation of children's behaviour works with existing policy in deepening our understanding of children's *forms of thinking...*' (2013, p.155).

Oscar's Connecting and Disconnecting and Dynamic Vertical Schema: Symbolic level observations:

Today outdoors, Oscar is inside one of the wooden playhouses and he is building a tall structure out of wooden blocks. He is taking the lead and directing the other children where to put the bricks. The children are working well together and this is one of the only occasions where I have observed Oscar engaging with the other children. He is saying, "Quick, I am holding the bottom,

you need to add more bricks to the top to make it bigger.” The girl with him adds more bricks and Oscar says, *“Yea we have made a rocket, it will fly to the moon.”* The other children shout, laugh and clap and one of the boys says to me, *“Take a picture Miss quick”*. I say, *“OK”* and take the photo. Then Oscar and the others come over to look at the picture I have taken.

When I get to the setting today Oscar is building with the Lego in the table top tray. He is concentrating on making his structure and sees me watching him. I ask him, *“What are you making today?”* He ignores me initially and carries on building. After a few moments, he turns to look at me and says, *“It is a rocket.”* I say, *“It looks like it will go really fast; I like how you have connected all the bricks to make the Rocket shape.”* Oscar looks at his rocket and smiles, he turns to me and says, *“Yes it will go whoosh up into the sky.”* He uses his hands to propel the Lego Rocket into the air, making a whooshing sound. Then he walks around the room ‘flying’ the Rocket from side to side and up and down, all the time telling the children, *“It’s my space Rocket to fly to the moon.”* He carries on doing this until the class are told to tidy up for lunch when he disconnects all the bricks and places them back in the tray.



Figure: 5:42 Making a ‘Rocket’



Figure: 5:43 Making a Lego ‘Rocket’

Discussion and Analysis:

In the above observations, Oscar was using the resources available in the environment to support his connecting and trajectory schemas. Throughout the observations, there was an underlying theme of ‘space’ running through Oscar’s creations. These observations also indicated an interweaving of the dynamic action level of Oscar’s schemas with the figurative aspect (Athey,

2007). Oscar has used large wooden bricks and small Lego bricks to depict a 'Rocket' thus using his connecting schema at a symbolic level (Figures: 5:42 and 5:43). Oscar was able to select resources and utilise them in a way that 'was meaningful to him' (Atherton, 2013, p.161). He was able to direct the children to build the wooden rocket and to describe to me what he had built with the Lego bricks.

Piaget talked of there being a transition from monologue to speech that conveys thought (1959). Here Oscar has conveyed his instructions to the children building the rocket and he has engaged in conversation with me about his 'Lego Rocket'. As the adult with Oscar, I was able to use Athey's 'precise language' (2007, p.152) by reinforcing the concept of connecting and praising the finished 'Rocket'. Oscar was then happy to reply to me and expand on his answers. When Oscar was building the large wooden 'Rocket' outside, he was happy to work with other children. As stated previously Oscar tended to play on his own, but here as the children were co-operating with Oscar on a shared theme he was happy to be part of a group. Arnold (2013) talks of children who have a shared purpose and understanding working together. When building the wooden 'Rocket' there was a shared purpose and the children's actions fitted with Oscar's connecting and vertical trajectory schemas.

Oscar's Connecting and Disconnecting and Dynamic Vertical Schema: Functional Dependency level observations:

Today Oscar is playing with the trains on the carpet. He spends time connecting a long line of trains and then proceeds to run them along the tracks. One of the other children is also playing with the trains. He plays alongside Oscar and they work together to make a longer track. Oscar says to the other boy, *"I know let's add more trains and then we can have the longest train in the world."* The other boy says, *"Yeah, come on we will have the longest one won't we?"* They both spend time adding more tracks and trains and spend the rest of the time in the construction area moving their trains around the tracks. When the children are asked to tidy up for playtime, Oscar spends time carefully disconnecting each train before putting it away.

Outdoors, Oscar is working with another child and they are joining the bricks to make a long path. The practitioner, outdoors with me, tells me that they have continued to leave the bricks out as part of the outdoor provision as they have noted that Oscar plays with them repeatedly. Both children keep adding bricks until the path stretches across the yard, the practitioner goes over and asks them what they are building and both children say, *"It's a path to a secret place."* They

keep building the path and then they walk over it going back and fro repeatedly. The practitioner asks, *“Where is your secret path going, can you tell me?”* Oscar considers this question and then say, *“It is a path to Space.”* The other child with him jumps up and down and agrees laughing saying, *“Yeah it goes to Space, up and up.”*



Figure: 5:44 Connecting the trains



Figure: 5:45 Connecting the blocks to make a path

On another occasion when I am in the setting, the practitioners shares a photograph and observation with me, which shows Oscar and another child riding around the yard. However the practitioners tells me that before they started riding the bike, Oscar and this other child took the large dominoes and connected them to create a vertical and horizontal pathway which they rode parallel to (Figure: 5:46). She says, *“I stood back and let them build with the dominoes as I was curious to see what they would do. I have never seen anyone use the dominoes like that. I think it is fascinating now that I know about Oscar’s schemas to see how he will try to tailor activities to match them. Without knowing about schemas I would probably have tried to get him to play dominoes in the traditional way, but he didn’t want to do that, he wanted a vertical and horizontal path to ride alongside.”* She ends by telling me that they have shared this observation in the weekly planning meeting and they have decided to leave the dominoes outside for a bit longer so Oscar can continue to play with them.



Figure: 5:46 Riding inside the 'dominoes' pathway'

Discussion and Analysis:

In the train observation (Figure: 5:44) Oscar was happy playing alongside another child in order to build a longer train. Here Oscar was once again able to convey his thoughts and to understand that in order to make the train longer was dependent on connecting more trains. Athey's research described observations of children connecting objects to make things bigger and longer (2007) through functional dependency. Oscar adds more trains to the track to make a longer train (Figure: 5:44). Similarly outside, Oscar needed to add more bricks to make a longer path to reach a 'secret place' (Figure: 5:45). Athey argued for the importance of early experiential activities with objects in order to develop conceptual understanding. The path building occurred after the observation with the train track. It could be argued that Oscar recalled how he needed to add more trains to make a longer overall train, so he was able to recall this previous experience when he needed to add bricks to make a longer path. This supports the work of Vygotsky (1978) who postulated that a child's thinking depends on memory. Vygotsky stated that, 'for the young child, to think means to recall' (1978, p.51).

In these observations, the adults have noted Oscar's preferred schemas and have supported them by ensuring resources are always available that nurture and nourish his forms of thought. This was especially prevalent in the observation with bike and the dominoes. Here the practitioner has stood back and observed Oscar to see how he used the dominoes, allowing him the freedom to create a pathway to ride along. The adult did not interfere and demand that Oscar use the dominoes in the usual way and thus directing him to a number activity. Instead, the practitioner allowed Oscar to use the dominoes to symbolise a path that was functionally dependent on connecting the dominoes in a certain formation. Although Oscar's use of the dominoes did not

support numbers or counting, he was developing an understanding of space and length (Nutbrown, 2011).

Oscar's Connecting and Disconnecting and Dynamic Vertical Schema: Mark Making observations:

Oscar's fascination of 'Space' continued into his mark making. Today when the children are given the opportunity to choose an activity, Oscar goes to the writing table. He chooses a yellow felt pen and begins to draw a picture (Figure: 5:47). Oscar spend time drawing figures all over the page and when one of the practitioners walks passed and asks him what he is drawing he says, *"It is a yellow spaceman and this is his helmet and his rocket."* The practitioner nods and says, *"Yes I can see, and later we are having a story all about an alien and his underpants, you will enjoy that."* Oscar nods his head and smiles. He carries on drawing for a bit longer before placing the drawing in the 'going home box.'

On a different day, the children are all outside and the practitioners have provided the children with chalk to use on the yard. When I arrive outside Oscar has gone back indoors to wash his hands but the practitioners on duty calls me over. She shows me Oscar's picture and tells me he has told her it is the *"Sun"* and a *"Space Rocket"* (Figure: 5:48). She tells me that they have been reading lots of books about Space and Oscar has really enjoyed them. Oscar reappears and she calls him over and says, *"Tell Miss what you have chalked."* Oscar seems quite shy and shakes his head. The practitioner prompts him by saying, *"Go on you worked really hard."* I kneel down alongside Oscar and say, *"It looks like the sun to me and is that the Rocket? It is fabulous and I really like how you have shown the rocket flying away really fast."* Oscar smiles and says, *"Yes it is really fast like the one I showed you in class."* I nod and say, *"Yes I remember it was the Lego Rocket and that went really fast too. You joined up all the Lego pieces to make a super-fast Rocket and now you have chalked a super-fast Rocket."* Oscar nods and I asked, *"So like with the Lego Rocket, can I take a picture of this Rocket?"* Oscar nods again so I take the picture. Then he asks, *"Can I go and play now?"* The practitioners says, *"Of course you can and we will leave this lovely picture here for everyone to see."*



Figure: 5:47 Drawing a 'Space' picture



Figure: 5:48 Chalking the 'Sun' and 'Rocket' outside

Discussion and Analysis:

Oscar's dynamic thought patterns could be easily discerned in his emerging drawings. Oscar has continued to pursue his ongoing interests in 'Space' through his mark making using both indoors and outdoors. Inside, he has chosen to draw a 'Spaceman' and 'Rocket' and this has continued outdoors with the chalking of the 'Sun' and a 'Rocket.' Both drawings combine radials, enclosures and connection with a proximity between the figures. There is also evidence of horizontal and

vertical co-ordinates in both pictures (Athey, 2007). In the paper drawing, Oscar has used graphic schemes to represent the enclosed facial features including dabs for eyes and a circle for a nose, vertical lines for the legs and horizontal lines for the mouth (Athey, 2007). In the chalked picture outside again there is evidence of vertical lines for the sun and horizontal lines for the wings for the rocket.

Oscar has also linked his chalked picture to his earlier rocket created out of Lego, thus showing a continuity in his schemas interests or forms of thought (Nutbrown, 2011). In the chalk picture, there is a dynamism with the rocket shooting off at a tangent away from the sun. When Oscar made his 'Lego Rocket', he went around the class whooshing the rocket up and down and sideways and he has recreated this statically in his picture. Athey (2007) acknowledged that 'mark and model making are abstractions from the child's own movements' (p.75). Piaget and Inhelder (1956, p.77) also confirmed that mark making was derived from 'physical action.' Therefore, Oscar's previous model making of rockets was manifested in his drawings, showing a connection between parts of the picture and a vertical and horizontal dynamism. He was able to recall showing me the Lego Rocket and link this to the picture he had chalked. He used the word "*fast*" to describe the movement of the rocket again recalling the movement of the Lego rocket around the classroom. Here Oscar has evoked a previous memory and used it in his mark making. Athey describe 'Thought level' as, 'earlier schematic levels that have been internalised' (2007, p.116). Therefore, when Oscar created the rocket out of Lego he was using his connecting and trajectory schemas through his motor level and his symbolic representational level and he was able to think about this when he chalked the rocket outdoors. Vygotsky (1978) also postulated that, 'for the young child, to think means to recall (p.51). He argued for children having real experiences which they could later evoke and develop their conceptual thinking. Oscar was allowed time to build his Lego rocket and to fly it around the room, he was able to then show this trajectory in his chalked picture. The use of the horizontal to represent the rocket's trajectory could be an early starting point for angles.

In her work, Athey lists core and radials as part of the marks she termed curves (2007). Nutbrown (2015, p.5) has determined that, 'When Spiders, spokes and sunshine appear in children's drawings, they have most of the marks they need to write all the symbols in the written scripts of many languages. Oscar has shown a core and radial sun in his picture and although I did not see Oscar writing, he was in one of the top groups in the Reception class for reading and writing.

In the chalk picture, there is also evidence of what Athey called, 'Representation of figures in different positions' (2007, p.63). Here the rocket is at a tangent to the sun and is 'flying away.' Cox (2005) talks of drawing being a constructive process, of 'thinking in action' (p.83). Atherton (2013, p.85) talks of the importance of being an, 'informed observer' and contributing, 'meaningful accompaniment' when acknowledging children's thinking that is evident in their drawings. Here the practitioners have praised Oscar's drawings and have asked him to tell them about the pictures, not assuming what they represent, thus empowering Oscar and recognising his ownership of these pieces of work. In addition, the practitioners have added books on 'Space' to the reading areas to support Oscar's current interests, becoming the attuned adults. As Atherton attests, viewing children through the lens, 'of schematic theory...allows accompaniment in learning...which affords children the respect they deserve' (2013, p.91).

Curriculum Links:

These observations and photographs have shown Oscar's connecting, disconnecting and dynamic vertical and back and forth (horizontal) schemas with links made to different schemas levels and mark making. However, these observations and photographs also show links to the FP curriculum as follows:

Physical Development:

Foundation Phase Outcome 3: 'They explore simple tasks using a variety of equipment for longer periods of time' (WAG, 2008c, p.54). Oscar showed high levels of concentration and engagement when he was involved in the activities evidenced above.

Knowledge and Understanding of the World:

Foundation Phase Outcome 3: '...handle and explore the use of a range of equipment/tools' (WAG, 2008c, p.52). Oscar was able to connect and use a range of resources in the learning environment that supported his schematic interests.

Creative Development:

Foundation Phase Outcome 3: 'Children build up their knowledge of the characteristics of a range of materials/ resources through exploring and investigating' (WAG, 2008c, p.56). Oscar explored sand as a material that he could use to cover his hands and he could manipulate to fall downwards into a bucket. He connected Lego and bricks to make rockets and paths.

Personal Social Development Well-Being and Cultural Diversity:

Foundation Phase Outcome 4: 'Children will take part in cooperative play independently (WAG, 2008c, p.44). Oscar has played cooperated with other children in building the rocket, the path, joining the trains and building the Lego tower.

Language, Literacy and Communication Skills:

Foundation Phase Outcome 2: 'They try out a variety of instruments to make marks' (WAG, 2008c, p.46). Oscar used felt pens and chalk to create his 'space' pictures.

Foundation Phase Outcome 3: They begin to use complete sentences (WAG, 2008c, p.46). Oscar was able to direct other children to build the big wooden rocket. He was able to explain his play intentions when he was creating the '*secret path*' and when he built the Lego Rocket. He was able to discuss his drawings.

Mathematical Development:

Foundation Phase Outcome 1: 'They demonstrated interest in position and the relationship between objects' (WAG, 2008c, p.48). Oscar positioned his body to connect between two points. He was able to chalk the 'rocket flying away' from the Sun.

Foundation Phase Outcome 2: 'They understand the concept of 'one more' (WAG, 2008c, p.48). Oscar understood he needed more blocks to make a taller rocket and a longer path.

Final Reflections Oscar's schemas:

Throughout this section, there has been written and photographic evidence of Oscar's connecting and trajectory schemas. As with the other findings, these written observations and photographs have been purposively selected to show Oscar's lived experiences within the school setting over two terms. Ongoing discussions with practitioners involved with this research have shown how they have embraced Oscar's developing schematic interests and his growing curiosity with the theme of 'Space.'

In 'systematically fitting together relevant experiences' (Nutbrown, 2011, p.67) Oscar has demonstrate a continuous flow of exploration and investigations that support his schemas interests. Oscar has combined both this connecting and trajectory schemas to create models and to produce drawings that show a connectedness and trajectories. Athey (2007), Meade and

Cubey (2008), Nutbrown (2011) and Atherton (2013) have all agreed that children's schemas can lead to mathematical development. Oscar has explored length, size and angles when he has used connections and trajectories in his play.

By becoming attuned to Oscar's schemas, both the practitioners in the setting and myself, have been able to ponder over the observations and the photographs to uncover his threads of thinking (Nutbrown, 2011). In this way, we have become the attuned adults and have been able to observe how he is constructing his knowledge and understanding of the world around him. Athey (2007, p.113) argued that children choose activities based on, 'commonalities and continuities ('cognitive constants').' Oscar showed this when he chose materials such as bricks and sand that could support his schemas. Athey (2007) argues that children continually construct new information into their forms of thought (schemas) this was shown with Oscar when he was able to transfer his previous physical actions of the motion of the Lego Rocket into his static drawing. Here, Oscar was able to recall and replay his actions with the Lego Rocket internally and then transfer this onto the paper. This again echoes Neisser's definition of schemas as, 'a pattern of actions as well as a pattern for action' (1976, p.56).

Throughout the observations and photographs, Oscar has shown a developing awareness of length (domino and brick pathway). There is a growing understanding of distance between two points (stretching himself in wooden playhouse) and height (Lego tower and wooden rocket). In his mark making, there was evidence of spatial awareness showing the rocket at a tangent to the sun and the spacing of the figures in his space picture.

The next set of observations and photographs explores Lewis' Dynamic circular (Rotational) and transporting schema.

Lewis' Dynamic Circular (Rotational) and Transporting Schemas:

Lewis was 4 years old when the observations started. The practitioners described him as a very sociable and capable child who was always on the go. He had a particular fascination with the TV show, 'Come Outside' and always asked for it to be shown during carpet time. Lewis did not seem to have any one particular friend in the class but did like to be quite boisterous with a particular group of boys and had been reprimanded for this on several occasions. What had become apparent from the practitioners' observations during the autumn term was that Lewis had demonstrated both dynamic circular and transporting schemas repeatedly. The first observations demonstrate Lewis' schemas at a motor level.

Motor level observations:

As it is a nice morning, the children are outdoors and they have been given free choice over the PE equipment. Lewis runs over to get the blue hoop. He then proceeds to walk all around the yard stepping in and out of the hoop on his own (Figure: 5:49). After doing this repeatedly for about ten minutes, he drops the blue hoop and picks up a red one. Now he makes his way over to the rope bridge and wheels the hoop through the bridge. Once he reaches the end of the bridge he turns and walks back through wheeling the hoop (Figure: 5:50). Lewis is not talking but seems perfectly content in his own company. He carries on with the hoop until the children are called to line up for assembly.

Today I am observing Lewis in the afternoon and he has chosen to play outdoors. He rushes over to the outdoor sand tray and picks up the sieve. The practitioner outdoors is part of the action research and we are observing Lewis together. As we watch he chooses a red sieve and twists it down into the sand (Figure: 5:51). As he does this it starts to fill with sand. Lewis looks up and seems surprised at the fact the sand is now inside the sieve. Lewis looks back down at the half-buried sieve and lifts it out of the sand and twists it back down so it starts to fill up again. He does this repeatedly, as if he is reinforcing that the sand does enter the sieve when he twists it downwards. The practitioner with me whispers, "*He is fascinated with that sieve and the sand isn't he?*" I nod and reply, "*Yes, if you watch he isn't using the sieve in a conventional way, but he is twisting it into the sand to fill it up, rather than pouring the sand into it. He seems surprised too, almost as if he did not expect that to happen. He is using his rotational schema as a way to get sand into the sieve.*" The practitioner nods her agreement and we carry on watching him. Lewis

does not speak and carries on twisting the sieve into the sand tray for a bit and then wanders away to ride one of the bikes.



Figure: 5:49 Transporting himself around the yard with a hoop.



Figure: 5:50 Transporting the hoop over the bridge



Figure: 5:51 Twisting the sieve into the sand

Today in setting, Lewis is outside again but he is with two other boys on a tandem bike (Figure 5:52). Lewis is the driver and the two boys are urging him to go faster. He pedals all over the yard and they cry out, "*Keep going, go faster come on!*" One of the practitioners hearing this comes over and tells them off saying they must be careful of other children who are also outdoors playing. The boys become quiet and Lewis frowns but begins to ride more slowly. He rides around the yard for several more moments before he stops and gets off the bike and despite the boys calling for him to return he walks away goes back indoors.



Figure: 5:52 Riding in tandem

Discussion and Analysis:

During the above observations, Lewis has chosen resources that have enabled him to use his dynamic circular (rotational) schema and his transporting schema. In the first observations outdoors, he has a choice of equipment but he chooses the blue hoop (Figure: 5:49). Here he walks all around the yard, transporting himself, stepping in and out of the hoop. Nutbrown (2011) evidenced that children with a dynamic circular schema explored rotation and roundness. Lewis wanted to transport himself around the yard but used the round hoop as the vehicle. Similarly, later on in the same observation, Lewis moved onto choosing another hoop but this time he transported the hoop across the rope bridge (Figure: 5:50). Piaget and Inhelder (1969, p.5) discussed, 'newly established connections integrated into an existing schema.' Lewis had prior knowledge of transporting himself within the hoop and was now able to transfer this to transporting the hoop over the rope bridge, thus combining his interests in transporting and rotation. Meade and Cubey (2008) highlighted in their research that children were able to develop new ideas when they made connections between schemas.

When Lewis was using the sieve in the sand he was not using it in the conventional way, instead he was twisting the sieve downwards into the sand, which forced the sand upwards into the sieve. As Lewis seemed surprised by this, it could be argued that he did not expect this to happen and he was assimilating new information (the sand being forced up into the sieve) and needed to accommodate his understanding to take account of this new development (Piaget, 1953). He then repeated this action to reinforce this understanding. This could be an example of what Piaget meant by disequilibrium, where thinking needed to be adjusted to take account of a new (or surprising) development (Piaget, 1954). This episode with Lewis reinforces the

need for close observation along with a knowledge of schemas as otherwise this could have easily been missed. Meade and Cubey (2008, p.152) proposed the idea of the 'novice adult' being an apprentice to schema theory. In this observation, the practitioner and I were able to view Lewis' actions through a schematic lens and note how his rotational schema supported a different way of getting sand into the sieve- developing his knowledge and understanding. Without a knowledge of schemas, this could have been missed or dismissed as Lewis just playing with a sieve in the sand tray. As Atherton (2013, p.109) writes, 'A knowledge of schema theory can be enlightening. It allows for previously unfathomable behaviours to be understood for the conceptual exploits they actually are.' Additionally, it could be argued that Lewis is also exploring functional dependency with the need to twist the sieve in order to get the sand inside (cause and effect). Athey (1990, p.70) states, 'functional dependency relationships are manifest when children observe the effect of action on objects or materials'. Atherton (2013), Nutbrown (2011) and Athey (2007) all agree that sensory and perceptual information alongside motor level actions leads to higher-level understanding. Here, Lewis has felt the force of twisting the sieve downwards into the sand and has observed the sand rising upwards into the sieve. He has repeated these actions to consolidate this knowledge of downwards force leads to upwards movement of sand.

The next series of observations illuminate Lewis' dynamic circular and transporting schema operating at a symbolic level.

Lewis' Dynamic Circular (Rotational) and Transporting Schema: Symbolic level observations:

Today Lewis is outside in one of the wooden playhouses. He is 'cooking' using the blue plastic saucepan filled with sand (Figure 5:53-blurred as action shot). He says, "*I am cooking popcorn- it will go pop in a minute.*" Lewis twirls the pan round and round as he 'cooks'. Another boy wanders into the house and Lewis asks him, "*Do you want popcorn; it will be ready now in a minute?*" The boy nods and Lewis gets excited and says, "*It is nearly ready, it will fill your belly*" and he rubs his belly with his left hand. One of the practitioners (involved in the action research) walks over to me and says, "*He has been carrying the sand into the play house all week. Then he pretends to cook and likes to share the food with others. I guess for him this is a really good way to use both his transporting and rotational schema.*" I reply, "*Yes he is really involved and excited and it is great that he can be allowed to move the sand here to role play his cooking.*" The practitioner nods, "*Yes before this research I guess we would have stopped him, but we are now trying to view his actions schematically rather than automatically insisting that the sand must stay in the sand*

tray. However, I think that we will perhaps discuss how we can still support Lewis' schemas through maybe more suitable resources than carrying sand all over the yard. We can chat in our review session later this week?" I agree and we both carry on observing Lewis making his 'popcorn' until the end of outdoor play.

When I begin to observe Lewis today he is dressed up in a firefighter's outfit (Figure: 5:54). He pretends to put out a fire in the classroom. He shouts out, "We're on fire" to the two boys with him. Now he walks to the toy sink in the home corner and he turns the knobs on the sink and pretends it is water to put out the fire. The two other boys (not part of this study) help him to get the 'water' to extinguish the fire. They keep rushing to the sink to twist the taps to get 'water' and pretending to hose down the carpet areas; Lewis makes a noise like water coming out of the hose and rotates his hands in a circular fashion. Now he makes the sound of a fire engine as he walks around the classroom. One of the practitioners tells me that earlier in the week, they watched a Welsh language video with firefighters in it and since then Lewis has dressed up as a firefighter on every possible occasion.

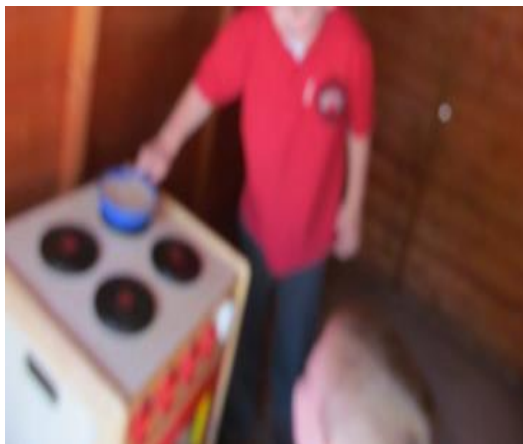


Figure: 5:53 Cooking 'Popcorn'



Figure: 5:54 Being a 'Fireman'

Today most of the children are sitting on the carpet watching a video on the interactive white board. However, Lewis is not sitting but is standing over another boy (Figure: 5:55). He is making a buzzing sound and he has four or five pencils in his hand. He begins to move the pencils over the boy's head in a circular motion. I carry on watching this go on for about two minutes until Lewis says, "You're all done, one razor cut that will be five pounds please." The boy pretends to give Lewis money who says, "Thank you" before moving onto the next child. He carries on 'cutting hair' until he moves onto a little girl who is not happy and tells the teacher. Now Lewis is made to hand over the pencils and told to sit and watch the white board. He does so but shouts out,

"It's not fair I want to cut hair. My dad cuts hair and I will too when I am big!" The teacher ignores him and he stays sitting, head lowered until the class are called to line up for assembly.



Figure: 5:55 Giving a child a 'Razor cut'

Discussion and Analysis:

Lewis has combined both his rotational and transporting schemas to cook the popcorn in the wooden house outdoors. He has twirled the pan and he may be replaying a memory of having seen popcorn cooking elsewhere. He is attaching appropriate speech to his actions and Athey (2007), in her work with the Froebel project, state that there was specific conceptual understanding if a child consistently attached appropriate language to actions. Lewis was able to provide a narrative to these actions and to share his thoughts with me and another child. It is worth noting that Lewis has chosen to 'cook popcorn' which is round and this again resonates with his fascination of the dynamic circular. He even used a circular action to rub his belly to indicate fullness. Lewis had chosen sand as the medium to represent the popcorn and this may be because it was transportable or it may have been that Lewis was recalling his previous experiences of working with the sand (Figure: 5:51). Perhaps he had remembered it was malleable and easy to work with.

However, Lewis' efforts may have been for nothing if he had been made to stop what he was doing and return the sand to the sand tray. Here Lewis was breaking the rules and practitioners not familiar with schemas may have found it difficult to accept this rule breaking. Atherton (2013) recognised for adults, 'to relinquish a level of control within the learning environment can be an unwelcome challenge' (p.42). However, this example reinforces the need for practitioners to have a knowledge and understanding of schemas. This would then allow adults to be in step with

a child's thinking (Gopnik, Meltzoff and Kuhl, 2001). Bruce adds to this by stating that 'knowing the schema informs the adult's curriculum plans and helps the adult to plan with appropriate selection and flexibility' (2011, p.97).

Here the practitioner has acknowledged Lewis' actions as part of his schemas. However, she was also aware of the potential issues around carrying sand around the yard and wanted to consider different resources to nurture Lewis' transporting and rotational schemas. This perhaps highlights the importance of taking time to reflect upon what is observed and having an informed discussion. Tait *et al.* (2018, p.123) write that, '...talking and thinking about something, in other words 'reflecting',... change would occur.' An alternative could be to set up a cooking station in the class for him to cook real popcorn. Athey (2007, p.144) points out that if viewing a child's actions schematically, 'interpretations are positive...instead of attributing naughtiness.' Atherton (2013, p.155) argues that, 'Acquiring a knowledge of schemas enables practitioners to view the play they observe differently.'

When Lewis is dressed up as the firefighter he is able to re-enact putting out a fire (Figure: 5:53). Vygotsky argued that children have a strong fascination with the adult's world and the jobs they do. As children cannot directly become a doctor or firefighter, they pretend to take on these job roles. Therefore, they enter the adult's world through imitation and 'sociodramatic play' (Karpov, 2003, p.146).

He twists the taps to get water out and then pretends he has a hose to dampen the fire. There are several links to his rotational schema here. The taps are twisted to get the water out and this is an example of functional dependency or 'cause-and-effect relationships' (Nutbrown, 2011, p.68). Lewis understands that he needs to twist the taps to get the water. The use of the hose was symbolised with the actions of Lewis rotating his hands and making the sound of the water gushing out. Lewis was issuing instructions to the other boys and this was an example of Piaget's socialised speech (1959). Here Lewis was exchanging his thoughts and play intentions with others.

The practitioner had indicated that Lewis had watched a video on firefighters earlier in the week and that this had ignited an interest in him dressing up as firefighter. Lewis was representing a previously seen event (video on firefighters) and this could be an example of what Piaget termed, 'deferred imitation' (1969, p.53). This was a representation 'in a physical act but not yet in thought' (1969, p.55), a representation or re-enactment of a previously seen event. Similarly,

when Lewis was giving the children a 'Razor Cut' he spoke of copying his father who was a barber. He used the pencils to symbolise the clippers and imitated the sound they made. Vygotsky discussed children repeating something they have seen others do. He declared that, 'Play is more nearly recollection of something that has actually happened than imagination. It is more memory in action than novel imaginary situation' (1978, p.103). In this instance, Lewis has recalled a memory of his dad cutting hair and has re-enacted this. Lewis was using his rotational schema to imitate the action of the clippers but was thwarted in his actions by being made to stop. Athey (1990) states that it is not necessary to love a schema. However, an attuned practitioner can find new ways to support children's schemas that are more acceptable. Later on when the practitioners and I were reflecting upon the observations and photographs from that day, I suggested setting the role-play area up as a Barbers for a time with appropriate tools. This could support Lewis without annoying other children. Bruce (2011) argues for, 'finding acceptable ways' for a child to use a schema and that schemas can help adults to support children in 'socially worthwhile directions' (p.104). The practitioners felt that perhaps they could adapt one of the wooden houses outdoors as a Barbers rather than change the whole role-play area inside. They wanted to keep the role-play area as an 'under the sea' theme in keeping with the topic that term. This was added to the planning for the next FP meeting and was agreed as a suitable way to support Lewis.

The next series of observations and photographs details Lewis' schemas at a functional dependency level.

Lewis' Dynamic Circular (Rotational) and Transporting Schema: Functional Dependency observations:

Today once again, Lewis is outside when I begin to observe him. He is standing next to the toy car by the fence (Figure: 5:56). He notices me nearby and tells me, "*I am going to McDonalds but I need petrol first.*" He twists opens the petrol cap, starts to make a glugging sound, and begins to jiggle on the spot, flapping his hands. He twirls his hands around and around still making the glugging sound. Then he stops and twists the petrol cap to close it. He turns to me and says, "*It is full now.*" He climbs back inside the car and pretends to turn the key and then he turns the wheel and begins to drive around the yard. He calls to other children that he is going to McDonalds and carries on in this way until it is time for his group to go back indoors.

Indoors, Lewis is sitting next to one of the practitioners involved in the research. The week before I had brought twistable pens into the setting and Lewis is showing her how to twist the pen to get the nib out (Figure: 5:57). She listens to him attentively and shows Lewis how she writes with the pen. She asks him to copy her and he takes his pen and draws some lines on the paper. The practitioner turns to me and says, *“Lewis has been doing some lovely writing with these pens Mrs. Thomas, haven’t you Lewis?”* Lewis looks at me and nods. I say, *“I can see Lewis, can you show me how to make these pens work?”* Lewis picks up another of the pens and begins to explain, *“You have to twist the top bit like this see, then the nib bit comes out, and then you can write with it.”* I take a pen, copy Lewis, and make a mark on the page. Lewis claps his hands and says, *“Yes that’s right, like that, it is all twisty it is.”* Another boy comes over and asks Lewis to come and play so Lewis wanders off. I sit with the practitioner and she tells me that the pens have been a real hit with Lewis and that he loves to show others how to use them. They have also been way to get Lewis to sit and do some mark making as prior to this he would never choose to sit at the writing table. Additionally, if he were asked to do some writing as part of a focused task he would try to complete it as quickly as possible so he could leave and do something else.



Figure: 5:56 Filling the car with petrol



Twistable pens

Figure: 5:57 Explaining that twisting the pen makes it work

When I begin to observe Lewis today he is at the sand tray again (Figure 5:58). Lewis uses the sieve in the sand to, ‘make a cake.’ He adds sand to the sieve and twists it, so it falls on to the blue bowl below. As he does this he says, *“This is the icing that needs to go on top to make it all pretty. My mummy makes cakes with white icing all over.”* There is a child next to him and Lewis

says, "Do you want some of my cake?" The child nods and Lewis pushes the bowl over to him and says, "Here you are then, a special cake for you." The boy pretends to eat the cake and Lewis laughs. They carry on playing with Lewis 'icing the cake' and the boy pretending to eat it till the end of playtime.

Today, Lewis is at the playdough table. He is cutting out round shapes in the dough by pushing the cutter into the dough and twisting it (Figure: 5:59). I ask him what he is making and he replies, "It is a green biscuit." I say, "A green biscuit, I have never had a green biscuit before!" Lewis laughs and responds, "It is not a real biscuit silly- billy it is pretend." I laugh and say, "Oh that's ok then, for one minute I thought you wanted me to eat a green biscuit." Lewis replies, "No I am making round biscuits because mummy makes round biscuits at home and I help her." I say, "I bet you like doing that." "Yes I do and I am a big boy cos mummy let me put icing and little round balls on top." I stop and think for a moment before I say, "I know, shall we see if we can make round biscuits in school too?" Lewis claps his hands and says, "Yes please." "Ok", I say, "I will ask Miss."

Later that day when I am reviewing the observations and photos with the practitioners I mention the biscuit making and the practitioner agree to discuss it at the next planning meeting.



Figure: 5:58 Adding sand to the sieve as 'icing'



Figure: 5:59 Making a 'biscuit' out of Playdough

Discussion and Analysis:

In all the observations detailed above Lewis was exploring the functional dependency aspect of his schema. He understood that he needed to twist off the petrol cap to get the petrol in and that

he needs petrol to make his 'car' go. He has explored how to twist the pens to release the nib to mark-make and that he needs to add sand to the sieve to make it fall into the bowl below to represent icing. Finally, at the playdough table he understood that to make a round shaped biscuit he needed to twist the cutter in the playdough. Nutbrown (2011) suggests that functional dependency relationships can be 'reinforced in different ways' (p.72). Here Lewis has used the available resources in the learning environment to nourish his schematic interests. He was able to recall a visit to McDonalds and it may have been that he needed to get petrol on the way so he was re-enacting this. This could indicate that, in this instance, Lewis was also using his schema at the thought level. In the Froebel project Athey (1990) proposed that thought was indicated when children could recall experiences without a concrete reminder of the event. Here he was using his rotational schema to twist off the petrol cap and then his transporting schema to travel to 'McDonalds' in the car. In terms of functional dependency, Lewis has understood that to get to McDonalds he needed to drive his car and that to get the car to move required petrol. Athey postulated that there is a match between 'forms of thought and appropriate speech' (1990, p.164). Here Lewis was able to combine his actions with his verbal intentions.

Inside, Lewis was fascinated with the twistable pens and this had been a way to encourage him to mark make. Prior to this Lewis had shown little interest in mark making but the introduction of the twistable pens has focused his attention and he was keen to explain to anyone who asked how they worked. The practitioner had noted this eagerness and asked Lewis to show her how to use the pens and then in turn encouraged Lewis to mark make (Figure: 5:57). Here Lewis' schema has provided an opportunity or opening for the practitioner to find a way to persuade Lewis to mark make. Previously Lewis had not shown any inclination to mark make but the addition of the twistable pens has changed this. Bruce (2011) makes the point that integrating the curriculum with an understanding of schemas allows practitioners to enhance and add to the learning environment. Athey (2007) confirmed that 'graphic representations are based on schematic form' (p.90). The twisting actions that were required to make the pen work allowed Lewis to use his rotational schema and to proceed to mark make.

In Figure 5:58, Lewis was using the sieve in the sand tray once again. This observation occurred after the observation of Lewis twisting the sieve downwards into the sand (Figure: 5:51). Lewis may have recalled this activity and that the sand would travel through the sieve. Athey (1990, p.70) stated that functional dependencies occur from the application of earlier schemas

behaviours and Lewis' actions would seem to support this. In addition, he was recalling an event from home where his mum had iced cakes and he was recalling how the icing sugar fell through the sieve onto the cakes. He has used his rotational schema at a functional dependency level to twist the sieve to make the sand fall into the bowl below. Nutbrown (2011, p.68) explains that functional dependency can be interpreted as, 'simple cause-and-effect relationships'. Here Lewis seems to understand that twisting the sieve causes the sand to fall and become '*icing*.' This could also be viewed as Lewis using his schema at a symbolic level as he is pretending the sand is icing sugar and at thought level, recalling an experience of baking without a concrete reminder (Athey, 1990).

At the playdough table Lewis was carrying on the theme of making food by twisting the round cutter into the dough to create his '*biscuit*' (Figure: 5:59). He was laughing as he explained to me that he knew biscuits were not green. Athey stated that when children become playful they are demonstrating knowledge that is, 'so well assimilated that it can be played with' (1990, p.75-76). Lewis has used his rotational schema to twist the cutter to make the biscuit shape, here as with the sand, he has chosen a material that was malleable. Perhaps Lewis has recalled his earlier experiences with twisting the sieve into the sand when twisting the cutter into the playdough to make '*biscuits*.' Piaget and Inhelder (1969, p.5) wrote that,

There is a continuous progression from spontaneous movement and reflexes to acquired habits and from the latter to intelligence. The real problem is not to locate the appearance of intelligence but rather to understand the mechanism of this process.

Here, Lewis has built upon his knowledge from his experiences of using the sieve and the sand and transferred this to the cutter and the playdough, with a developing understanding of cause and effect. Nutbrown (2011) linked language and thought to children's schemas. She stated that children interested in dynamic circular schemas (rotational) would understand the concept of round as in a round biscuit, again demonstrating Lewis using his schemas to develop his understanding. Lewis' schematic actions could also be viewed as symbolic and at a thought level; he has symbolised a biscuit and has recalled making biscuits at home. This is what Arnold meant when she attested that the different levels schemas operate at what can be seen as, 'a progression in 'coming to know'' (2013, p.9). Lewis has combined using his rotational schema at

a motor level, a symbolic level; a functional dependency level and a thought level to make his biscuit.

As the adult with Lewis, I was able to reinforce his use of the word 'round' and thus articulating his actions. Arnold (2013) states that accompanying language, 'help children to be aware of what they are doing (p.174). I was also able to suggest a way forward to extend Lewis' interest in baking and roundness by including a biscuit making activity in the class. This would support what Nutbrown (2011, p.144) meant when she asserted that a 'consideration of schemas' can 'inform day to day practices of teaching.'

The next sections explores Lewis' mark-making activities.

Lewis' Dynamic Circular (Rotational) and Transporting Schema: Mark-Making observations:

Lewis is mark making on the shed today when I walk over to observe him (Figure: 5:60). He is painting with water and when I ask him what he is doing he tells me that, *"I am doing an 'O' as that is in my name, can you see it look?" (There is an 'O' in his real name)* I say I can and I ask him if he can write any more letters in his name. He looks at me and ignores the question but says, *"You are obsessed with that camera you are."* He turns back to the shed and paints some more circular shapes. He swaps between his right and left hand and he continues to make circular marks all over the side of the shed. He glances over to me again and I feel that he is not happy with my presence so I stop the observation and walk away.

Today when I arrive at the setting one of the practitioners calls me over and shows me a painting that Lewis has done earlier that week (Figure: 5:61). She explains that Lewis had been asking to watch a TV show called, 'Come Outside' and in particular, an episode where they are using a combine harvesters to cut down blackberries to make squash. The practitioner tells me that Lewis loves this episode and always flaps his hands and jumps up and down when the harvester's blades rotates to cut the berries. After watching the show, Lewis wanted to paint and the picture shown below is the finished result. The practitioner tells me that when she observed him painting he had painted in large and small circles. When she had asked him to tell her what the painting was he became very excited and told her that the big circle was the machine with round blades and the little circles were the blackberries for the squash.



Figure: 5:60 Painting circles with water

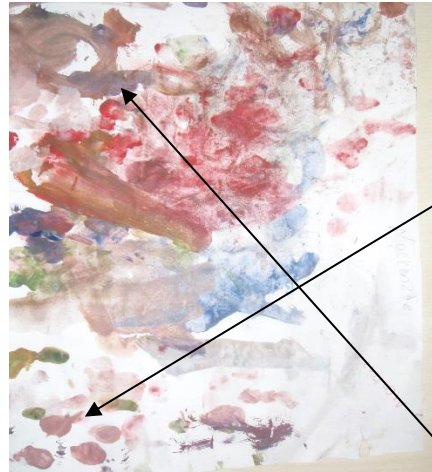


Figure: 5: 61 Cutting down the
Blackberries

The
blackberries

The Combine
Harvester with
rotating blades

When I begin to observe Lewis today, he is sitting at the writing table (Figure: 5:62). He is using the twistable pens and he selects a green one. He concentrates on drawing his picture, however this time I do not interrupt him remembering the water painting on the shed when I misinterpreted his actions. Lewis carries on drawing and then he says, *“Finished.”* He holds the picture up for me to see and I take this as a cue that he is happy to engage with me. I say, *“I love that picture, can I take a photo for my school work.”* Lewis nods so I take the photo. I ask, *“Would you like to tell me about your picture so I can write something about it for my school work?”* Lewis points to his drawing and says, *“It is a man going to the moon. He had this round helmet so he can see and breathe.”* As he tells me, he rotates his hands round and round. He continues, *“Then when he gets there he will have a round space machine that will let him land and then he will get out and run over the moon. There will be aliens there and he will make friends with them.”* I nod and say, *“That is a really good explanation of your picture; I can see exactly what you have drawn.”* Lewis nods and then he picks up the picture and takes it to the ‘Going Home’ box.

Later when I share this observation and photograph with the practitioners, involved in the action research, they tell me that they have been reading a book about aliens and the moon and Lewis (along with Oscar in the previous observations) has been really engrossed in the story and all things to do with Space. They also tell me again that the introduction of the twistable pens has really encouraged Lewis to sit at the writing table much more often than before.



Figure: 5:62 Going to the moon

Discussion and Analysis:

Lewis explores the indoor and outdoor environments with enthusiasm and this continues when I observe him mark making. Lewis use of circular shapes and themes of transporting berries and spacemen in his mark-making support Athey's belief that marks were, 'a figurative outcome of bodily movement' (2007, p. 78). Lewis has painted an 'O' shape on the shed and round blades and berries in his picture and has drawn a spaceman with a round helmet travelling to the moon.

Lewis has chosen water to make a letter from his name (Figure: 5:60). This was the first time I had witnessed him attempting to write recognisable letters and I was eager to pursue this with him. However, my eagerness had the opposite effect and dissuaded Lewis from attempting to write anymore of his name. Perhaps Lewis did not feel confident yet in writing his whole name and was worried about getting it wrong. Arnold (2013) writes about a similar situation with a child called John, where he was asked by an adult to write his name but instead drew a strawberry. Arnold considered that John may have decided to draw a strawberry instead of writing his name in case he got his name wrong.

The use of water to mark make could have been intentional too as water marks would quickly disappear unlike marks on a page. Therefore, if Lewis was not confident in his ability to write his name, using water would be a good way to practice without leaving any lasting images. Forman (1994, p.38) argued that different media allowed children to gain a 'bias' towards their properties and perhaps water afforded Lewis the advantage of making mistakes which were temporary. However, my mistake had been in assuming I knew what Lewis' intentions were. Atherton (2013,

p.37) states that 'to talk genuinely with children when they play demands a familiarity which can induce recall and enable relaxed probing.' Instead of concentrating on the form of Lewis' actions and providing an accompanying narrative to support this, I had tried to get Lewis to write more letters and he quickly became disengaged.

Lewis' description of the letter 'O' indicated his forms of thought and threads of thinking of roundness and rotation (Nutbrown, 2011). My mistake had been to become the teacher here, more interested in getting Lewis to write his name (content) and not a researcher focusing on schemas (form). Athey (2007, p.54) talks of, 'offered and received curriculum content' and the job of an educator is to get this right. I offered an outcome to Lewis, the writing of his name, which he received and dismissed. I was more focused on the outcome of his activity rather than the process he was going through. Lewis was able to indicate to me that my presence was no longer required and I respected that decision and withdrew.

When I next viewed Lewis' mark making I was able to see the schematic form present in his drawing of the Combine Harvester (Figure: 5:61). He had combined larger circles for the rotating blades with smaller circles for the berries. Athey (1990) reported that in her findings from the Froebel project there was a correspondence between mark making and environmental content. The practitioner had told me that Lewis really enjoyed a particular episode of 'Come Outside' and that was the berry picking one and that he had painted his picture not long after watching it.

Athey (2007) would categorise the circles in Lewis' painting as examples of curves with proximity between marks. This type of proximity was what Piaget and Inhelder (1956, p.48) termed, 'most elementary spatial relationship' and Athey stated this was found most frequently in younger children than Lewis' age. However, as stated previously Lewis did not show much interest in mark making and this may be reflected in his paintings appearing to not be as advanced as expected for his age.

Lewis was able to describe his painting to the practitioner using the words "*round*" to describe the circles on his page, thus linking the contents of his artwork to his forms of thought. Lewis was figuratively representing the images he had seen on the screen in his painting. Piaget and Inhelder (1956) and Athey (2007) asserted the impact of physical action on a child's ability to use paintings and drawings as representations.

In the final example of Lewis' mark making (Figure: 5:62) there seemed to have been a coordination in the development of Lewis' drawing of the 'Spaceman.' Here Lewis has added vertical lines and spirals to his picture. There was also evidence of an enclosure representing the space helmet and Lewis has attempted to draw features inside the helmet, eyes and a nose. This was an example of 'vertical order between elements' within a figure (Athey, 2007, p.63). Lewis was eager to tell me about his picture and I having learnt my lesson from the previous encounter with the water, did not presume anything. I did not want to repeat my previous, 'tactless out of place' comments (Atherton, 2013, p.39).

Lewis was able to tell me a whole story about his picture and combined his interest in rotation and transporting through his words and drawing. He was able to represent the round space helmet and the journey to the round moon in a round machine. This exemplifies what Athey (2007) meant when she said that as schemas coordinate Lewis was developing systems of thought. This drawing also supports Lewis' new fascination with Space and this picture can be viewed as a drawing becoming a 'constructive process of thinking in action' (Cox, 2005, p.123 cited in Atherton, 2013, p.83). Atherton (2013) urges adults to connect to children's forms of thought both dynamically and figuratively. Practitioners have done this through providing Lewis the opportunities to mark make using water, paint and the twistable pens. This has provided an insight into Lewis' thinking and allowed practitioners to nurture his schemes both indoors and outside. As Atherton (2013) attests to extend Lewis' thinking there needs to be 'an environment enriched with content' with 'understanding adults' attuned to children's ways of thinking (p.90).

The following evidences how Lewis' schemas can be linked to the FP curriculum.

Curriculum Links:

Physical Development:

Foundation Phase Outcome 2: 'They play with different pieces of equipment' (WAG, 2008c, P.54)

Lewis has chosen different pieces of equipment that support his schemas.

Knowledge and Understanding of the World:

Foundation Phase Outcome 2: '...handle and explore the use of a range of equipment/tools' (WAG, 2008c, p.52). As above, Lewis has chosen resources that support his schemas both indoors and outdoors.

Language, Literacy and Communication Skills:

Foundation Phase Outcome 2: 'They try out a variety of instruments to make marks' (WAG, 2008c, p.46). Lewis has used water, paints and the twistable pens in his mark making.

Creative Development:

Foundation Phase Outcome 3: 'Children build up their knowledge of the characteristics of a range of materials/ resources through exploring and investigating' (WAG, 2008c, p.56). Lewis has used sand and playdough as malleable materials to create cakes and biscuits.

Personal, Social Development, Well-Being and Cultural Diversity:

Foundation Phase Outcome 4: 'They are able to concentrate on a task' (WAG, 2008c, P.44). Lewis spent time re-enacting the role of a firefighter with other children. He concentrated on making 'cake' and 'popcorn' for other children.

Final Reflections Lewis' schemas:

The above observations and photographs portray Lewis' lived experiences and his ways *of coming to know* in the setting over two school terms. They have shown Lewis using his dynamic circular (rotational) schema and his transporting schema in the setting to make sense of the world. Lewis has purposively explored the continuous and enhanced provision in the setting both indoors and outdoors to nurture and nourish his schemas. This is an example of what Bruner (1966) termed an enactive child, exploring and using the resources in the environment to assimilate and accommodate understanding. Lewis was physically and mentally active as he remembered previous events from TV shows and at home and re-enacted them using his schemas.

The adults in the setting had recognised and supported Lewis' actions although at times they needed to consider other ways for Lewis to pursue his schemas. They were able to plan other activities that would allow Lewis to use his rotational and transporting schemas in ways that were considered more suitable. This supports the use of an action research methodology for this research as Koshy (2010) defines action research as continuous, evaluative and leading to modifications in practice as the research progresses.

However, when Lewis was 'cutting' children's hair the practitioners did stop him as he was upsetting another child. Although Athey (2007) argues that when actions are viewed schematically, they can be interpreted in a positive light. Bruce (2011, p.101) however states that

adults should not feel they must support unacceptable behaviour because it is part of a child's 'schema cluster.' Instead, Bruce argues practitioners need to find ways that are more suitable for a child to use their schema (2011). This is why the spending time with practitioners reflecting upon the observations and photographs was such an important part of this research. This facilitated a discussion resulting in setting up a role-play area outside as a barber shop to allow Lewis to 'cut hair' as he had seen his dad doing. In addition, in analysing the observations and photographs of Lewis the practitioners and I were able to add resources such as the twistable pens, which encouraged Lewis to mark make, something he had not been eager to do before.

Lewis had also made it clear when I as the adult got it wrong and this was an opportunity for me to reflect upon my actions. This also supports the worth of classroom based action research for the individual as Hopkins (2002, p.66) states, 'when we are engaging in classroom research, we can be said to be engaged in educational theorising, because we are reflecting systematically and critically on practice.' Atherton argues that practitioners need to 'attune and match their interventions with the cognitive concerns of young children' (2013, p.71). Here, I had not done this and Lewis indicated quite quickly his displeasure at my error.

Over the course of two terms the observations and photographs have demonstrated how Lewis used his schemas across the different levels of motor action, functional dependency, and symbolic representation and in thought (Athey, 2007). They have also highlighted how Lewis chose certain resources and used them within the learning environment to nourish his schemas, albeit not always to the delight of the practitioners and other children. However, this chapter has also highlighted how recognising a schema has supported the addition of worthwhile resources such as the twistable pens, which encouraged Lewis to show an interest in mark making. It has also shown how the practitioners considered ways to adapt the continuous and enhanced provision throughout the learning environment (Barber's shop and cooking activity) to support Lewis' schemas.

Lewis has used his schemas to explore the properties of shapes such as hoops rolling and circles in his drawing to represent berries and cutters. He has explored forces such as twisting with the pens, sieve and taps. There was an understanding that petrol was needed to make a car travel and an exploration of distance and speed through cycling all over the yard.

The next section details David's Positioning and Orientation schemas.

David's Positioning and Orientation Schemas:

David was five years old when the research started and attended the setting full time in the Reception class. He was quite quiet but enjoyed spending time outdoors usually climbing on top of the outdoor play equipment. He spent time playing alongside two other boys, Oscar and Luke and they enjoyed climbing outside and playing with the train tracks indoors. During the first term, the practitioners had noted that David seemed to spend time repeatedly positioning himself and various objects in the classroom and exploring how things looked from various angles. This indicated a positioning and orientation schema. Arnold *et al.* (2010, p.22) define a positioning schema as, 'children position themselves and objects in different waysSome objects can be placed in vertical, horizontal or oblique positions.' Louis *et al.* (2008, p.68) defines an orientation schema as, 'An interest in seeing things from different angles.' David combined both these schemas in a number of ways and the first series of observations and photographs describe David using his schemas at the motor level.

Motor level observations:

In my first observation of David, he is outside and he is climbing on top of the rope bridge on the outdoor climbing frame. He is with Luke who is trying to climb up the side (Figure: 5:63). David keeps climbing until he is almost on top of the rope bridge. One of the practitioners on duty, rushes over and tells David to get down at once. He reluctantly climbs down from the bridge and Luke joins him on the floor. The practitioner says, "*Come on now boys you know you can't climb the rope bridge like everyone else or you won't be allowed on there.*" Both boys shuffle away from the climbing apparatus and go and sit by the fence.

On another occasion when I observe David, he is outside again. Today he runs over to the large plastic cube and climbs on top of one of the cubes. Next, he edges his way over until he is balancing on the green pipe joining both cubes together (Figure: 5:64). He spreads his arms wide to stabilise himself and looks around. Today, the practitioner outside with me is part of the action research. She is watching David with me and says, "*He loves to climb on top of anything. I am trying to think of alternatives to support his schemas that are a bit safer.*" As we watch David, he climbs off the tubing and runs over to join Luke and Oscar who are building with blocks. I say, "*Perhaps in PE he could use the benches and climbing equipment to jump on and off as it would be in a safer environment and you can have the mats to land on. You could also teach him how to*

dismount safely?” The practitioner considers this and agrees, *“Yes we could and then if we did that he might not needed to climb on top of everything outside as he will know he will be able to do that in PE.”*



Figure: 5:63 Positioning himself on top



Figure: 5:64 On top of the cube

Today once again, David is outside with Luke. He is hanging upside down inside the rope bridge and both boys are laughing aloud (Figure: 5:65). As I watch, Luke keeps telling David to swing, *“Like a monkey.”* David does this and keeps laughing, whilst looking out across the yard. They carry on this way until Luke calls, *“My turn now, you watch me be a Monkey too.”* David lowers himself, climbs out and watched Luke repeat his actions, but with Monkey sounds which make David laugh even more.

In a different session when I observe David, he is indoors playing with the large pirate ship on one of the tables (Figure: 5:66). He is on his own and he keeps moving the crow’s nest up and down the pirate pole. Then he adds a pirate figure to the crow’s nest and moves the crows’ nest again until it is at a position he seems to want. Now he arranges the other pirate figures inside the ship and when he seems content with where they are he walks away.



Figure: 5:65 Hanging upside down



Figure: 5:66 Positioning the Crow's Nest

Discussion and Analysis:

In three out of the four observations detailed, David positioned and orientated himself in various different ways. He did not use the outdoor apparatus in the typical way but instead explored other ways of using it. Here David was climbing on top of apparatus (rope bridge and tube) and hanging inside, allowing himself a different viewpoint (Figures: 5:63, 64 and 65). Athey (2007), Nutbrown (2011) and Atherton (2013), argue that motor actions such as the above form the foundations for cognitive development, linking actions to thoughts. The co-ordination and connection of David's positioning and orientation schemas could result in him developing an understanding of how things look differently depending on the angle of interpretation. Nutbrown (2011) states that children can incorporate and co-ordinate a number of schemas during their development. Here it could be argued, that David is combining the physical actions of positioning his body on top of objects to facilitate a different viewpoint.

Piaget (1953) supported the view that a child's schema is continually altered based on the activities they engage in. David had tried to climb on top of the rope bridge, but was reprimanded, so when he next uses the rope bridge, he hangs inside it instead. It could be argued that David has assimilate the information that climbing on top is not allowed, accommodated his thinking to climb and hang inside the rope, believing this will be allowed. In this way he was still able to use his positioning and orientating schema but in a more acceptable format. Without speech, it is impossible to know what David was thinking but he was obviously having fun hanging upside down as evidenced by his laughter. Athey states that 'playfulness' signifies knowledge that is so well assimilated that it can be played with (1990, pp.75-76). David was happy to play at being a monkey perhaps secure in the knowledge that it allowed him to combine his positioning and orientation schemas in a fun way.

When David was positioning the pirates and the crow's nest, he could be exploring a projective representation (Figure: 5:66). He may have been positioning the crow's nest in the best possible position for the pirates to see. Piaget and Inhelder (1956, p.467) described projective representation as, 'the introduction ... of the "point of view" in relation to which the figures are projected.' This concurs with the findings from the Froebel project where Athey (1990) found that project children explored projective space either by objects in front of each other or objects and figures 'represented from different points of view' (p.110). However, in the absence of speech from David this can only be surmised.

The following series of observations and photographs of David show his schemas operating at a primarily a symbolic level. However if other levels are also evident these have been include in the discussions.

David's Positioning and Orientation Schema: Symbolic Level observations:

Today, David is building with the Lego on his own. He is building with each block placing one on top of the other one (Figure: 5:67). I keep watching until he finishes and when he has calls me over and says, *"Come see what I have made, it is a tall pirate."* He raises his hands to show me how tall the pirate is. I nod and reply, *"That's brilliant, I can see you have really worked hard to make that pirate. I really like the way you have positioned and placed each brick in the right place to make him become taller."* He nods and smiles, *"Yes I have made him big, he is too big for the pirate ship over there; he is a giant pirate."* I laugh and nod, *"You're right he is too big, I wonder what he can see as he is so tall?"* David considers this for a minute before responding, *"He can see everything."* He stretches his arms wide as he tells me this. I nod and say, *"I bet he can, where shall we put him?"* David looks around the room and points to the windowsill, *"Over there so he can see everything through the window."* I carefully pick up the pirate and carry him to the windowsill, placing him facing outside. David stands next to me and says, *"That's good now he can look out the window and see if there are any other pirate ships coming. Can we keep him there?"* I say, *"Shall we ask Miss?"* David nods so I go over and ask the teacher who is part of the research and she agrees, I tell David who claps his hands and runs off to tell his friends.

The following week when I return to the setting I can see the pirate is still on the windowsill. The teachers comes over and says to me, *"Come and see what David is doing today."* I follow her into the adjoining classroom and David is with several other children building with the large

construction bricks (Figure: 5:68). As we watch, David is saying to the other boys, *“Let’s make it really big as it has to keep the big pirate inside.”* The teacher asks David and the others what they are building and they reply together, *“It’s a pirate prison.”* She asks, *“Which pirate is going inside?”* David answers, *“My big pirate, the one over there.”* He points towards the other room. The teacher asks, *“Why is the pirate going to prison?”* David says, *“He has robbed all the treasure so he has to go in here till he behaves.”* *“Oh I see”* the teacher replies. *“Well I hope he has a good think in prison and then perhaps he can come out.”* David and the others nod with David saying, *“When I am naughty I have to stay in my room and have a think.”* The teacher smiles says, *“You are all working really hard positioning those bricks in the right place.”* The boys nod and carry on building and she walks back to me. We carry on watching and David positions himself inside the blocks and tells the boys, *“Nearly done now”* (Figure: 5:69). They keep building until the bell goes for assembly.



Figure: 5:67 Building a Pirate



Figure: 5:68 Building a pirate prison



Figure: 5:69 David inside the prison

On a different day, David is at the craft table where he is sticking materials onto a piece of paper (Figure: 5:70). He works hard to glue all the bits and pieces where he wants them. A practitioner walks past and praises David but does not stop to ask him what he is creating. David carries on, then stops, and asks the student teacher who is on another table to write his name on the paper. She does this but does not ask him what he has made so I ask David what he has created. He tells me it is a “*Treasure Island for pirates.*” He points to the blue circle telling me it is a “*lake for the pirates to sail on*” and then he shows me the red circle, which is “*next to*” the lake and is where the pirates have, “*buried their treasure.*” Then he show me the green grass which the pirate can sit “*on top of*” and eat their “*pirate food.*” I tell him that he has positioned everything in a good place and it looks exactly like a real treasure island. David smiles at me and tells me is going to place it in the going home box to show mummy and daddy. Later on, the teacher tells me that they have been reading a book about a ‘Treasure Island’ as part of their topic on Pirates and David was interested in the pictures of the Treasure Island.

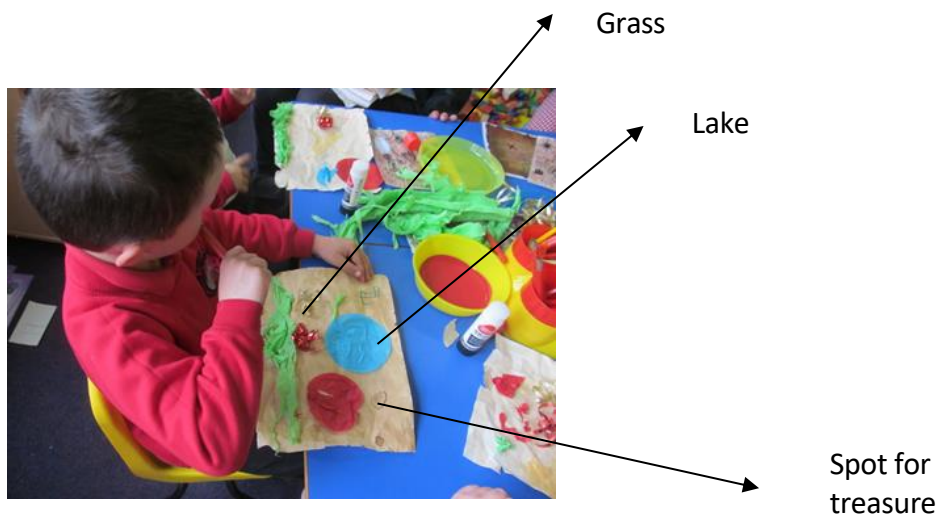


Figure: 5:70 A Treasure Island collage

Discussion and Analysis:

David has used his positioning and orientation schemas to represent symbolically, a number of things. Firstly, he has used the Lego blocks to represent a tall pirate supporting Vygotsky definition of symbolic play, ‘In play thought is separated from objects and action arises from ideas rather than from things: a piece of wood begins to be a doll and a stick becomes a horse’ (1978, p.97). In this example, the Lego has become the tall pirate. Vygotsky also stated that,

'...children's symbolic play can be understood as a very complex system of "speech" through gestures that communicate and indicate the meaning of things' (Vygotsky, 1978, p.108). Here David gestured to indicate that the pirate was tall and that he would be able to view everything if he was placed facing out of the window. Again, he seemed to be able to see things from the pirate's point of view in that he understood that the pirate needed to face outwards on the windowsill to see outside, demonstrating an example of projective space (Piaget and Inhelder, 1956).

Atherton (2014) discussed Jack who talked of building a high fence so Harriet was not able to see him. Atherton postulated that Jack was imagining what Harriet's view would be and in this example David is imagining what the pirate's view will be asserting he will be, "*able to see everything*" when he is placed on the windowsill facing outwards. This could also indicate functional dependency as David has understood that the pirate needed to be tall to see things. This corresponds to Athey's findings in the Froebel project where she stated that an example of a functional dependent relationship could be 'getting to a higher level' by 'increasing the height of the base-line' (1990, p.70).

Nutbrown (2011) identified that co-ordination of schemas advance into higher order concepts. Previously David had used his positioning and orientation schemas through his motor actions to climb on top of objects and to alter his viewpoint. Now he was able to combine his previous motor actions using the Lego as a symbolic representation of a tall pirate to explore height. Piaget (1959) stated that thought proceeded from action so David may have recalled and assimilated knowledge from his previous actions of making himself taller by standing on top of things and accommodated his thinking to build the pirate tall enough to see out of the window. In the observations of David and the large bricks, he was creating a prison cell for the tall pirate made in the previous observation (Figures: 5:68 & 5:69). Here there was a continuity of thought, a thread of thinking, a choice of resources that supported his ideas (Nutbrown, 2011). He had understood that the prison cell would need to be big enough for the tall pirate to fit in. Here, there was an understanding of size and space, a link to mathematical development (Nutbrown, 2011). David was able to tell a narrative to demonstrate what he was doing and to convey this to the adult. Then, the adult was able to use language that supported David's positioning schema and this led to a continuation of the story with David recalling his own experiences. Atherton stated that children would try to involve others by having a dialogue (2013). She further contested that if adults were attuned and receptive to children's schemas

by using speech that is a conceptual correspondence, then learning that was more worthwhile could take place. Vygotsky postulated that children discuss scenarios in their play with peers and were guided by mental imagery of future actions (Bodrova and Leong, 2003b). David was able to visualise how big the prison would need to be to fit the 'tall' pirate and to verbalise this to his peers by declaring they were, "*Nearly done now.*" This was also an example of Piaget's socialised speech, where David was exchanging his thoughts with others in order to encourage them to carry on building (Atherton, 2013).

Again, David could be exploring projective space as he was putting himself inside the prison to see if the pirate would fit. This was also an example of comparison where David seemed to compare himself to the size of the pirate using appropriate language. He was also exploring cause and effect through his language of, "*Nearly done now*" indicating more bricks were needed to make the prison big enough. He could have been recalling how he needed more bricks to build a tall pirate and now he needed more bricks to build a bigger prison. This supported Piaget's claim that 'sensory-motor activity constitutes the foundation of symbolism and representation...thought proceeds from actions (1959, p.283). Piaget also talked of 'figurative and operative aspects of knowledge' (1969, p.356). Figurative referred to perception and mental images and operative to action, here David perceived how big the prison cell needed to be through his actions of placing himself inside. Athey confirmed this, when she argued that figural representations included block constructions and that dynamic thought patterns emerged from action and figural representations (2007). Atherton (2013) wrote that young children's future symbolic representations occurs through the repetition of experimental actions at the motor level.

In David's collage work, he was observed carefully positioning objects onto his island (Figure: 5:70). He was able to explain using positional language, where the object was and what it represented. However, this was only apparent when I asked him about this work with the other practitioners not doing so. Athey (1990) stated that symbolic representation consisted of three sub-divisions including speech representation of either the static or dynamic aspects of objects or events that accompanied representations. Bruner (1974) also discussed three modes of representation with symbolic linked to speech. David evidenced this when he was able to provide a narrative of what each object represented in his island collage.

Vygotsky postulated that a child's thinking firstly depended on his memory and that 'their general representations of the world are based on the recall of concrete instances and do not

yet possess the characteristics of abstraction' (1978. p.50). Here the teacher had stated that David had listened to and seen pictures of a desert island in the book they were reading so he may have recalled this in his collage work.

However, unless I had asked David to tell me about his work this would have been lost and was a reminder of the importance of the adults' role when working with children. Atherton (2013) offers a salient word of caution when she writes that children need to be given time to become engrossed in their work without interruption. However, I had observed David asking one of the practitioners to write his name on his work, a signal that he had completed it and therefore I felt able to ask him about it. Meade and Cubey (2008) argue that adults have an important role in providing an environment not only rich in resources but also rich in conversations.

This would have been a missed opportunity to talk with David and to allow him to use his positional language, linking meaning to his form of thought. As Athey (1990) wrote, 'adult speech, meaningfully linked with a child's actions, helps "action" to become symbolic' (1990, p.72). Again, this raises the issue of FP practitioners being aware of children's schemas and talking time to talk with them, something this research seeks to address.

The next observations and photographs evidence David's schemas operating at a functional dependency level.

David's Positioning and Orientation Schema: Functional Dependency Level observations:

David is at the water tray when I begin observing him today (Figure: 5:71). He is filling a cup with water and pouring this onto the water wheel. This makes the wheel turn. David turns to the girl besides him and says, "*Look the wheel is spinning round when the water goes on it.*" The girl stops to watch and David repeats the action. David now chooses a bigger beaker and holds his arms up higher to pour water on the wheel, which moves faster (Figure: 5:72). He laughs and says, "*Look I have made the wheel go quicker now when there is more water.*" The girl next to him asks can she have a turn, and David nods his agreement. They carry on playing, taking it in turns to add the water to the wheel.



Figure: 5:71 Adding water to make the wheel Turn
Figure: 5:72 Pouring more water onto the wheel

Today David is with Oscar (connecting schema) and they are at the sand tray (Figure: 5:73). Oscar is holding a sieve full of sand and David is pushing the sand down and through the holes into a red bucket underneath. Oscar tells David, *“Come on we need to fill the bucket ready for the pirates to use.”* David nods his agreement and replies, *“I know it is the pirate party today and they need the sand to make big castles don’t they?”* Once the bucket is full, the boys attempt to carry it to the climbing frame but are thwarted by the practitioner (not part of the action research) who tells them that sand needs to stay inside the tray. They carry the sand back and continue to add sand to the bucket in the sand tray.

Inside David and Luke are building the train track (Figure: 5:74). David (yellow hat) is positioning the tracks together, making a ramp whilst Oscar holds the trains, waiting to add them to the track. Once the tracks are ready, David pushes a train up the ramp and watches as it rolls down the tracks. David and Oscar take it in turns to push trains up the ramp, watching them travel down the train line. They try to see which train goes the furthest along and David shouts out, *“My train is the fastest look! Oscar, if you give it a really big push it will go a long way.”* They carry on with this game until tidy up time.



Figure: 5:73 Adding sand to bucket



Figure: 5:74 Pushing the trains down the ramp

Inside David is at the mathematics area and he is playing with the bead apparatus (Figure: 5:75). He is moving the beads from one side to another, counting each bead as he does so. He counts aloud from one to twenty, moving each bead in turn. Then he repeats the action moving the beads back, reversing his counting as he does so, and counting back from twenty to one. The teacher is watching with me and makes a note of David's counting saying she will add this to his file, especially the fact he can now count backwards successfully. She adds that in the next planning meeting, this observation will be shared and other opportunities provide to support and extend David's ability to count backwards.



Figure: 5:75 Moving each bead to count

Discussion and Analysis:

In the above observations and photographs, David has exemplified Athey's definition of functional dependency relationships. She defined this has when children observe the effects of their actions

on objects or material' (1990, p.70). David has noted the effects of pouring water on the water wheel, the effects of pushing sand through the sieve and pushing the trains down a ramp to see how far they will travel. He has moved the counting beads in order to carry out one to one correspondence through counting (Figure: 5:75).

Throughout David has used his positioning schema to manipulate materials to suit his purpose. David had used the dynamic properties of both the water and sand to nourish his schema. With the water, David had realised that altering the size and height of the cup had caused the water wheel to move faster. Here David had assimilated the knowledge that pouring water on the wheel will make it turn, he then used a bigger beaker and held it higher which in turn made the water wheel turn faster, leading to him accommodating this new knowledge, all facilitated by his positioning schema (Piaget, 1971a). Similarly, with the sand David was supporting Oscar to position the sieve above the bucket so he could use his fingers to force the sand through the sieve (cause and effect).

When David was positioning the trains on the ramp and pushing them down he was exploring forces linked to speed and had realised that the harder you push the further the trains would travel. This supports Nutbrown's assertion that schemas support the development of 'higher-order concepts' (2011). This had turned into a fun game for David and Oscar and supported what Athey stated when she said the 'final part of the learning process, which is often left out of schooling, is the part when children can have some fun with their knowledge' (207, p.193). Dunn (2004) stated that some children play well together because they match in terms of thought and action. Here the train activity supports David's positioning schema and Oscar's connecting schema.

David continued to match content to his forms of thought when he moved the beads along the counting frame and counted to twenty. Here David had shown how he needed to move each bead in turn to count it (one to one correspondence), and then he reversed this by moving the beads back and counting back from twenty to one. Athey (1990, p.40) stated that 'One to one correspondence' is a mental activity applied to a range of objects at around 5 or 6,' David was 5 years old at the time. Piaget and Inhelder (1969, p.20) identified reversibility as the source of, 'future operations of thought' and 'the most immediate result of the reversibility structure is the formation of notions of conservation.' This observation showed David's growing awareness of

number and the teacher was keen to note this in David's file. By reversing his counting, David was able to see that he still had the same number of beads and this was an important step in his growing mathematical development. Using the counting frame supported David's positioning schema, allowing him to position each bead as he counted it. This was also an example of symbolic representation as David was using the beads to represent numbers.

The final observations and photographs detail examples of David's mark making.

David's Positioning and Orientation Schema: Mark-Marking observations:

Whilst observing David in the setting there were a few occasions when he chose to mark make using a variety of materials. One of the first occasions where I was able to observe David mark making was outdoors with chalk.

Today all the children are outside mark making with chalk. David spends time chalking a series of vertical lines, followed by a face at the end with two eyes and two ears (Figure: 5:76). The practitioner asks him what he has drawn and he says, *"It is a bouncy space alien that goes bong, bong like this."* At this point David jumps up and down on the spot. The practitioner laughs and says, *"It is a very bouncy Alien, but where is his mouth?"* David stops and considers this for a bit and then replies, *"He hasn't got a mouth cos Aliens don't eat food."* *"Oh I see, well that's ok then,"* she replies and David smiles and runs off to play on the bikes.

On the next occasion I see David mark making, he is sitting at the writing table and he is drawing his face as part of a Welsh activity (Figure: 5:77). He is sitting alongside the practitioner who is asking him to tell her all about his face. David is pointing to each feature in turn and telling the practitioner what they are and where they are. He starts with his eyes and says, *"These are my two eyes inside my head and then I have a nose and two arms at the side. Then this is my smiley mouth and my pink hair. I have two legs but there is no room for my body so I had to draw the legs here"* (he points to the legs sticking out of his body). The practitioner laughs and asks David, *"Why have you got Pink hair?"* David tilts his head to one side and replies, *"Cos pink is my favourite colour."* *"Ah I see, well let's see if you can answer the question on your work?"* *"Pwy wyt ti?"* David replies, *"David ydw i."* The teacher says, *"Well done"* and gives him a sticker. David jumps up and runs off to show his friends his sticker.



Figure 5:76 A funny space alien

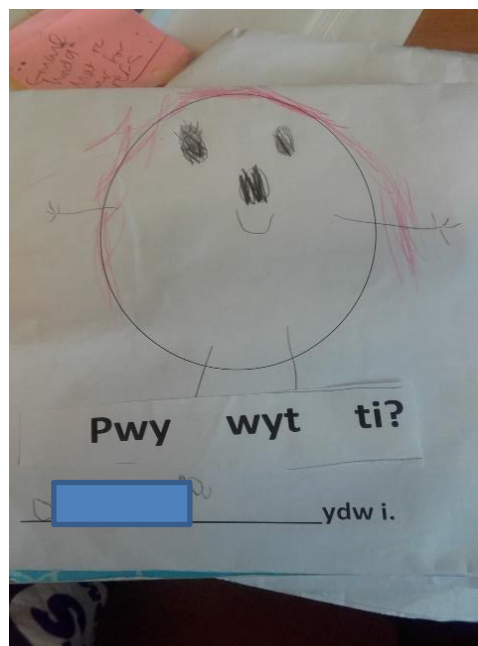


Figure: 5:77 A self-portrait

The last time I see David mark making he is indoors sitting on the craft table and he is drawing and colouring with crayons (Figure: 5:78). He is drawing a face first with a pencil and he is adding features in turn. Then he picks up a green crayon followed by a pink one and finally a blue one. He is chatting to the boy next to him. *“Look at my alien he has a small head but a big body. He is floating in space and he has a cloak on to help him fly to his planet.”* The boy next to him points to the picture and says, *“What is that circle in the middle?”* David replies, *“That is his eye, he has two eyes on his head but he also has a small eye in the middle of his body and a big eye at the bottom. He can see everything and catch things to eat.”* The boy replies, *“That’s stupid, Aliens don’t have eyes on their bodies, only in their heads.”* David becomes quite agitated by this and calls over to the teacher, *“Miss, **** says my picture is rubbish, tell him it’s not!”* The teacher walks over and calms the situation down by saying, *“Come on ****we don’t say unkind things about others’ work do we? I think David has done a lovely Alien picture, in fact I am going to put it up on the wall.”* David claps his hands and shouts, *“Yippee, my work is going up on the wall,”* The teacher takes the work and displays it above the board. David spends the rest of the morning bringing children over to see his work.



Figure: 5:78 An Alien

Discussion and Analysis:

Throughout David's mark making, he has used both his positioning and orientation schemas. When he was chalking the alien he was careful to position the head at the end of the springy body and to position two eyes inside the head and two ears on either side of the face (Figure: 5:76). Similarly, when he drew his face and alien using the pencil and crayons (Figure: 5:77&5:78) he was able to include facial features. Using Athey's (2007) categorisation David's marks would be distinguished as having the following spatial orders. Proximity: features of the face are near each other; Enclosure: features of face are enclosed. There are two other enclosures present on the alien's body as extras eyes. In Figure 5:78 there was also Connection: the head was connected to the body. In the face drawing, in the Welsh activity (Figure: 5:77), there was also evidence of horizontal and vertical co-ordinates with arms and legs positioned horizontally and vertically. Graphic schemas were also present in the drawings with circles for eyes and ears and an upward curve for the mouth, all enclosed (Athey, 2007).

In the face picture, there was evidence of arcs for hair on top and around the head. In her research, Athey (2007) discussed children having the perception that hair was on top of the head

and then moving onto representing this in their work. Here David has achieved this by placing pink hair on top of his head. There is also evidence of David's growing realisation of parts of the body. He has realised that legs are connected to the body but also need to go underneath and that there was no option for him to draw a body shape in this work so he did the next best thing and placed the legs directly underneath the head. Similarly, with his arms he has used horizontal coordinates to show arms connected to the head with fingers (again, this was the next best thing as there was no body shape to attach the arms to).

There is a progression in the face drawing and the alien drawing as David had now included an upward arc for a mouth. This is in contrast to the first picture where he left the mouth out. Nutbrown (2011, p.47) stated that through "the gradual evolution of schemas and the extension of early forms of thought" children form new understanding. Here David may have remembered his lack of mouth in the previous drawing and now included it showing a developing understanding or accommodation of knowledge. Athey (2007) noted that the arc shape appeared after straight lines, enclosures, core, and radials. However, in David's drawing of his face and the alien all these marks appeared together.

Interestingly, in the drawing of his face, David missed out his ears, which were a feature in the chalk picture and the alien picture. Athey found in her research that, 'in a drawing they [children] sometimes temporarily lost the order' (2007, p.68). Perhaps David had become preoccupied with the fact there was no body to attach the arms to and therefore had to attach them to the head, leaving no room for the ears. In the alien picture, the ears were evident and David ensured there was a triangular shape for the body. Here he was coordinating vertical and horizontal lines seen in his previous drawings and this supports Athey's categorisation where a triangular shape came after horizontal and vertical lines (2007).

In his chalk drawing, David also demonstrated movement by chalking a series of lines and bouncing up and down. Again, this could link to his orientation schema by having the alien jump up and down allowing him to view things from different angles. Deguara and Nutbrown (2017) argue that a child chooses to represent in their drawing their interests and concerns. David also mentioned movement in his crayoned picture where he stated that the alien was flying and would see everything. Again, this could link to viewing things from different directions and angles. Piaget

and Inhelder (1956) and Athey (2007) affirmed the effects of physical action and the co-ordination of these on the child's ability to use drawings for representation.

David had a persistent thread of thought and continuity running through his work (Nutbrown, 2011). In all the examples of David's mark making he used his positioning schema to place features in his work. He was able to share his thoughts with others and to explain his pictures. Athey (2007, p.169) stated that, 'intention and meaning were clearest' when children spoke in context. Van Oers (1997) stated that children's drawing are not merely illustrations but when accompanied by speech they represent meaning. The adults with David, were able to reinforce his schematic interests by using positional words or asking David to explain his work, becoming the attuned adult (Atherton, 2013). When David became upset, the teacher was able to reassure David that his work was good and reaffirmed this by placing it on the wall.

David's physical actions and drawings show the following links to the FP curriculum.

Curriculum Links:

Physical Development:

Foundation Phase Outcome 2: 'They play with different pieces of equipment' (WAG, 2008c, P.54) David has chosen different pieces of equipment (rope bridge, cube, sieves, water wheels etc.) that support his schemas.

Knowledge and Understanding of the World:

Foundation Phase Outcome 2: '...handle and explore the use of a range of equipment/tools' (WAG, 2008c, p.52). As above, David has chosen resources that support his schema both indoors and outdoors.

Language, Literacy and Communication Skills:

Foundation Phase Outcome 2: 'They try out a variety of instruments to make marks' (WAG, 2008c, p.46). David has used chalk, crayons and pencils in his mark making.

Creative Development:

Foundation Phase Outcome 3: 'Children build up their knowledge of the characteristics of a range of materials/ resources through exploring and investigating' (WAG, 2008c, p.56). David has used sand and water and collage materials to support his schematic interests.

Personal, Social Development, Well-Being and Cultural Diversity:

Foundation Phase Outcome 4: 'They are able to concentrate on a task' (WAG, 2008c, P.44). David spent time over his drawings, counting the abacus beads and on his collage of a Treasure Island.

Mathematic Development:

Foundation Phase Outcome 3: 'They rote count to beyond 10' (WAG, 2008c, p.48). David positioned the abacus beads along the frame to count to 20.

Welsh Language Development:

Foundation Phase Outcome 3: 'They respond to questions... ' (WAG, 2008c, p.50). David was able to answer who he was in Welsh.

Final Reflections David's schemas:

As can be seen both indoors and outside David used his positioning and orientation schemas as a constant thread of thought running through his actions (Nutbrown, 2011). David has positioned and orientated his body inside the rope bridge and on top of the cube to view things from different angles and viewpoints coordinating his schemas (Nutbrown, 2011).

Athey (1990) suggested that children explore topological space by positioning objects including themselves. David has positioned detail in his mark making to include the correct positioning of facial features. He has included movement in his drawings, vertical lines to represent jumping up and down and a verbal description of his alien flying to, "*see everything.*" This suggested a growing awareness of projective space where David was imaging what the alien could see by bouncing and flying (Athey, 2007). He may have recalled how his viewpoint altered when he hung upside down inside the rope bridge and climbed on top of the plastic cube. When David was moving the crow's nest, he was altering the view the pirate would see and this could have been another example of his developing understanding of projective space.

Gardner (1984, p.129) argued that, 'logical science and mathematics can be found in the simple actions of young children upon the physical objects in the world.' Here, David was using beads to support his counting in sequence. It could be argued that David was assimilating counting into his form of thinking (schema) by positioning the beads along the abacus frame. Nutbrown has argued

that schemas are the fundamental elements...for the process of learning (2011, p.46). Therefore, David's counting was facilitated by his positioning schema.

Throughout the observations, there were examples of David playing alongside Oscar. Both these boys seemed to have schemas that fitted, David's positioning schema with Oscar's connecting schema. This is an area that is currently under researched but the evidence from previous studies (Arnold, *et al.*, 2010) seemed to indicate that children do indeed form friendships with children who have similar interests. The train track activity allowed Oscar to connect the tracks and David to position the trains on the ramp, thus both boys' schemas were supported. In the sand tray, David was positioning the sieve to force the sand through to reach the bucket and Oscar was holding the bucket to allow the sand to fall in a downward trajectory. Here, this supported David's positioning schema and Oscar's trajectory schema.

David has explored shape and space when he has built a pirate prison and position when he hung inside the rope-bridge, climbed on top of the bridge and on top of the cube. He has investigated perspective when he moved the crow's nest and forces when he experimented with water falling onto the water wheel. His mathematical development was evident where he used the counting frame to count aloud. In his mark making and collage work, he has shown evidence of spatial awareness and has positioned features to convey meaning.

Again, in most of the observations the adults were supportive of David's actions unless they were deemed dangerous (climbing on top of the rope bridge). However, some adults who were not involved in the action research missed opportunities to engage in corresponding and conceptual dialogue with David (Atherton, 2013). Ideas for the dissemination of this research, as discussed in the next chapter will hopefully allow all adult working with children in the FP to have a growing understanding of the importance of supporting children's schemas.

5:3 Reflections of the children's lived experiences:

This chapter has shown how schemas support an individual child's thinking and cognitive development. In addition, it has sought to answer the following research questions:

- Can children's schemas be observed in the Foundation Phase curriculum?
- Can Foundation Phase practitioners be supported to nurture and nourish children's schemas?
- Can nurturing and nourishing children's schemas support Foundation Phase outcomes?

Observations and photographs of six children, whilst engaged in free choice activities, using the continuous and enhanced provision, were reflected upon and analysed. Discussions focused upon how the children used their preferred schemas to construct their knowledge and understanding of the world within the context of the Foundation Phase (FP) curriculum. Regularities and patterns in their threads of thinking were noted, analysed schematically and in terms of FP outcomes and areas of learning (AOL) (Nutbrown, 2011; WAG, 2008c).

The observations have provide an opportunity to gather datum on each child's way of '*coming to know*' and how they use their schemas to support their developing knowledge and understanding of the world around them. As Atherton (2013, p.139) warns, 'the correlations, associations and relationships in children's thinking, revealed in their play, cannot be understood unless those observing have a conceptual awareness of what is seen.' This chapter has provided opportunities to observe children's schemas in action and the 'development of conceptual knowledge' (Athey, 2007, p, 29). Thus raising the awareness of how children's schemas facilitate their construction of knowledge and FP curriculum concepts and outcomes.

When the children's schemas have been analysed through the different schema levels or stages, as used by Athey and Atherton in their research (1990, 2007; 2013), it became apparent that children used their schemas in different ways depending on the activity they were doing and the resources they were using. For example when using larger equipment outdoors, the children used their sensori-motor actions as expected. Then on some occasions, they used actions to explore functional dependency, seen with Lewis driving his car to get petrol or Oscar understanding you needed to add more bricks to build a longer path, Amy rubbing ice faster to make it melt quicker and David pouring water on the wheel to make it turn.

Throughout the observations, there were examples of children with the same and different schemas playing together. This is an area that is currently under researched but the emerging evidence from this study and previous studies (Arnold, *et al.*, 2010) seemed to indicate that children do indeed form friendships with children who have similar interests. Oscar and David played and used their connecting and positioning schemas to play with the train tracks and the sand. Ellie played under the den with Della and Emma who also seemed to have an enclosing and enveloping schema. However, more research needs to be done on this to offer a definitive answer.

Throughout this chapter, evidence has been presented of the children engaging in schemas behaviours using the FP learning environment. Classroom resources available in the continuous and enhanced provision provided children with the opportunities to use their schemas to consolidate their thinking and *coming to know*. The FP pedagogy which emphasises children learning through doing and using the outdoors regularly, has supported children in pursuing their schemas across the different FP AOL as shown in curriculum links for each child (WAG, 2008c).

There has been ongoing discussions and reflections of each observation and photograph of each child, between the practitioners and myself involved in the action research. Here we were engaging in an 'optimistic interpretation of children's behaviour' (Atherton, 2013, p.109); there was a consideration of the different concepts the children were exploring through their schemas. This has provided a starting point for considering other activities and resources that can be added to the FP provision to extend children's learning. However, there were occasions when practitioners, not involved in the research, stopped a child's schemas. This emphasises the importance of all FP practitioners have an understanding and awareness of schemas and how they can be suitably supported. As Atherton warns, 'the correlations, associations and relationships in children's thinking, revealed in their play cannot be understood unless those observing have a conceptual awareness of what is seen' (2013, p.139).

In consideration of this, the next chapter focuses on the dissemination and evaluation of this research and considers the best ways forward to support FP practitioners in becoming 'apprentices to schema theory' (Atherton, 2013).

Chapter 6: Evaluation and Dissemination: Interview with practitioners and ways forward

6: 1 Introduction:

The final stage of the second cycle focuses on the **evaluations and dissemination**. Following the discussions and evaluations of the observations and photographs with the children over two terms, the practitioners and myself sat down to evaluate the research and to discuss ways forward to disseminate the findings to a wider audience of FP stakeholders. This built upon the findings from the questionnaires in chapter four, where FP stakeholder felt unsure on how to include schemas in their pedagogy, how schemas could be embedded in FP provision and how supporting schemas could link to FP outcomes. These discussions also provided answers to the research questions:

- Can children's schemas be observed in the Foundation Phase curriculum?
- Can Foundation Phase practitioners be supported to nurture and nourish children's schemas?
- Can nurturing and nourishing children's schemas support Foundation Phase outcomes?

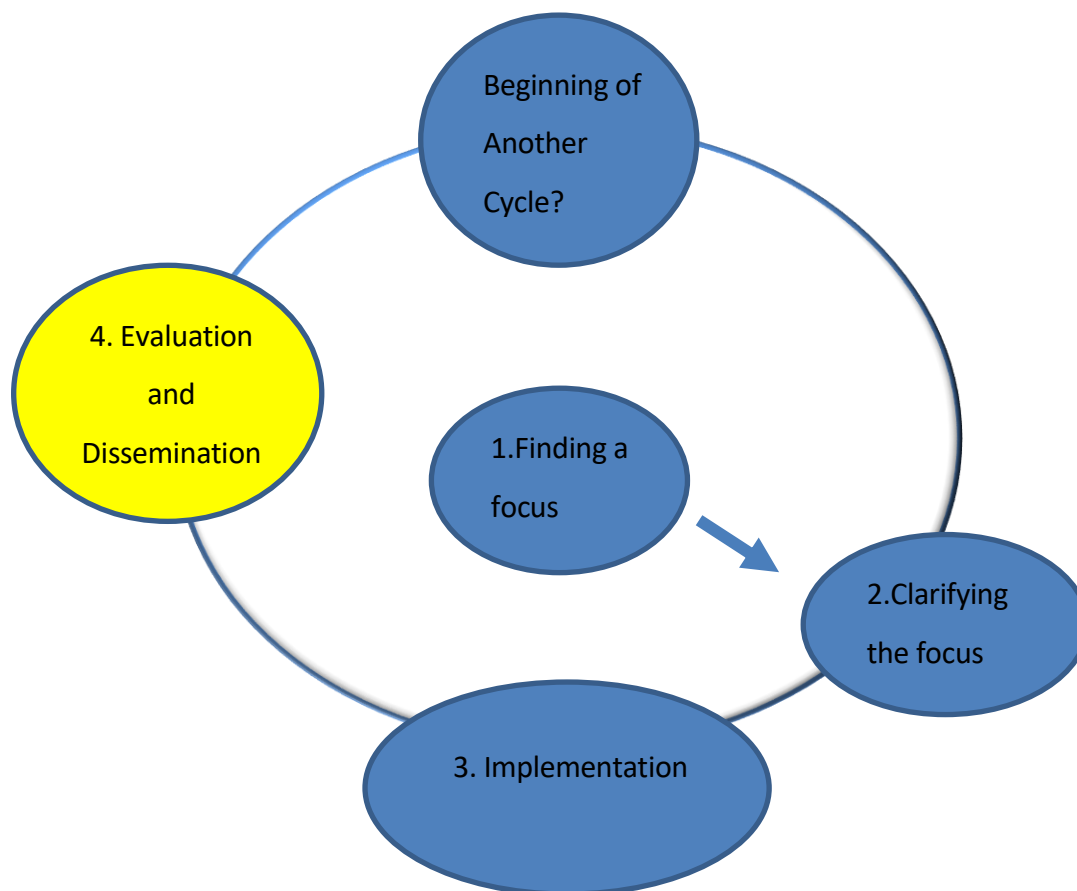


Figure: 6.1 *Mills and Butroyd's model of action research (2014, p.4)*

6:2 Evaluation of the Research: Interview Findings:

The practitioners and I evaluated the research and discussed ways forward to disseminate our findings. This took the form of a semi-structured interview in July 2015 in order to explore some of the findings from this research further.

Context:

The practitioners who had worked alongside the researcher were the Nursery Teacher (NT), the Reception teacher (RT) and the additional practitioner in the Reception class (AP). The intention of the interview was to explore the practitioner opinions on the action research undertaken in Cycle Two and their views on supporting schemas within the FP. The questions were designed to be answered in a flexible manner or reframed by the participants, an 'interactional exchange of dialogue' (Mason, 2018, P.110). As this interview focused upon the practitioners reflections, qualitative interviewing strategies were deemed appropriate since they enable exploration of participants' thinking in relation to given phenomena (King, 1994).

The interviews were face to face and this was important since it facilitated modification of questions and exploration of areas deemed important to participants (Robson, 2002).

Ethical issues were also adhered to by retaining the anonymity of the practitioners and their right to not answer any questions, not to have the interview recorded and to end the interview at any point and to withdraw their responses. The practitioners gave consent for the interview to be included in the final PhD thesis. The interview questions can be found in appendix 11. The following is an analysis of the responses given and the themes that emerged.

Interview Responses and Analysis:

To begin the practitioners were asked their initial thoughts and reflections on Cycle Two of the action research and all three felt it had made them more aware of schemas.

The AP stated,

"I have a better understanding of schemas."

Whilst the NT stated,

"I now know more about schemas, this has built upon the knowledge we had from when you came in last time".

The RT felt schemas were,

"Easy to observe and recognise especially having been more of a part of the research."

This supports the use of action research as informing practice as the practitioners were indicating they now felt confident in recognising and supporting schemas. As Mukherji and Albon (2010) write, action research seeks to work with practitioners in a setting and to inform practices. It also allows stakeholders to 'learn from the process' (Coe *et al.*, 2017, p.75). Here the practitioners now felt more confident in recognising and supporting children's schemas having learnt from being part of the action research.

Continuing with reflecting upon the research, the NT gave specific examples of how the research had affected her practice,

"(Schemas) Makes us more mindful and considerate of children's needs. Before I would have prevented schemas but now I wouldn't, I would plan for them. You could see that with Ellie and Harri, we all thought they were not mixing very well, but maybe it was that the activities we provided didn't capture their interest. When I observed Ellie with you, trying to examine the dinosaur's teeth, she was concentrating so hard and using her schema at different levels. I would have missed that detail if I hadn't began to recognise and note schemas. With Harri, he still flits from place to place but he does it with a purpose; again it is only knowing about his schemas that enables you to see that."

This is an important point as Nutbrown points out, an understanding of schemas allows practitioners to extend their own thinking and to improve and advance their pedagogy (2011). Athey termed this, 'Minute particulars of cognitive functionality' (2007, p.210). Here, practitioners were concerned over a lack of engagement with Harri and Ellie. However when viewed schematically, a different perception emerged. As Atherton and Nutbrown state schemas can provide a way into children's threads of thinking but only if adults recognise and support schemas behaviours (2013). Russell and Munby (1991, p.164) discussed reflection-in-action in their research as 'hearing differently or seeing differently'. Here the practitioners were seeing the children differently through a schematic lens. Schön (2007) argues that, 'the theory and its associated method are used to restructure what is going on so that the practitioners can explain it (p.318). Here the practitioners used their growing understanding of schemas through observations with the children to understand and interpret Ellie and Harri's actions.

The next question asked if the practitioners in the setting had used schemas since the pilot study in 2013 and if being part of this study (Cycle Two) had helped them to include schemas in their everyday practice.

The RT stated,

"I did recognise them when children did repeated actions, after you left 2013, but I didn't note them down. I was going to but then all the stuff about the literacy and numeracy framework came in and took over everything. Now though you have refreshed my interest again and we will carry on noting schemas with the poster on the wall and the key cards. I will plan for them in the continuous and enhanced provision as you can see from this work with you they do use their schemas regularly in their free choice activities."

The NT answered,

"I do note them and I did try to plan for them after last time but as RT said the push is all literacy and numeracy now. However now I will plan for them, as working on this research with you has opened my eyes again as to how we can and should include them. Also I think we have shown how the different schemas can link to all areas of learning including the literacy and numeracy so we would have no excuse not to use schema as part of the planning."

The AP responded,

"I wasn't part of the original research but I have really enjoyed this work. I think what has really shocked me is how just by adding certain resources to the provision children will really show their schemas and then you can see and make links with the FP outcomes."

Here the practitioners have raised similar concerns over the need to include literacy and numeracy across all areas of learning. However as noted previously, prior research by Athey (2007) and Nutbrown (2011) have shown how schemas can actually support children's knowledge development in these areas. This was shown with Lewis when the addition of the twistable pens encourage him to mark make, supporting his writing development and David counting backwards using the counting frame. In both these instances the children used their schemas to develop their knowledge.

The follow on question from this asked the practitioners their thoughts on the ease of including schemas as part of FP pedagogy.

The NT stated that,

“We have shown that they (Schemas) link to all seven areas of learning” but added that, *“Before this research I still felt planning for them(schemas) was difficult to use as well as planning for the Literacy and Numeracy Framework and meeting other targets. However now I can see that we can make strong links between schemas and literacy and numeracy in the planning. I think now we have this ongoing toolkit and ideas to use for different schemas we can use this to plan for them and it should be fine. We need to educate all the other staff though on this too. I will try to support their schemas but the WG need to support us.”*

The RT replied that,

“Schemas should be in the Foundation Phase, and could easily be part of it. We have shown they can be used across all seven areas of learning”

The AP stated,

“Like I said before for me, it was knowing what resources and vocabulary to use to support schemas. The children really do engage more when you support their schemas. I think we can add schemas to our observations and planning sheets and then we can continue to observe them and continue to add to our resource bank and build up different resources to use with the different schemas. The poster and key ring cards have also been really useful I think.

These responses are interesting as the RT and the AP felt that schemas could be easily part of the planning in the FP. In contrast, although supportive, the NT still had some apprehensions about making sure the links to the Literacy and Numeracy Framework were there and that all staff were knowledgeable about schemas. Constable (2013) alludes to similar concerns when she writes that schemas may seem complex, perplexing and an added burden in a demanding classroom. However, she argues that providing activities that enthuse children and occupy them can in fact reduce the pressure and allow for more effective planning. This research has shown that children were enthused and engaged when carrying out activities that facilitated their schemas.

In addition, this research has shown that existing resources can be used to support a number of schemas (sand, water, playdough) and that knowing about schemas can allow adults to gain a better understanding the ways children *come to know* the world around them. As Carr and Kemmis noted, ‘Creating a culture of critical reflection enhances our educational potential, and provides practitioners with opportunities to deconstruct conventional [...] practices’(1986, p. 33). Therefore, spending time reflecting upon observed schemas and adopting schemas into current FP pedagogy could support children along the learning continuum, which underpins the ethos of the FP curriculum (WAG, 2008c). The AP alluded to the fact that the children

seemed more engaged when they were using their schemas in activities. This supports findings from research by Meade and Cubey (2008) who found that children had greater dispositions to learning when their schemas were supported in activities. Arnold (2013) also noted a connection between, 'children's 'involvement' in play and the exploration of schemas (p.2). Next, the practitioners were asked about linking schemas to resources and the learning environment the NT and AP responded.

The NT thought that,

"(Schemas) would influence the learning environment as we could add in resources that support a child's schema. I have to be honest and say I was not looking forward to trying to observe and support schemas as I felt it was another burden almost and we have such a lot of stuff to do already. However working on this research has made me realise that we could easily look at an activity we have provided, go to our resource bank we have been adding to and see how we could add appropriate resources to support schemas."

The AP answered by saying,

"We can add resources to the continuous and enhanced provision to support schemas. The children will use the resources on hand to support their schemas anyway, you saw that with Lewis and Oscar in the sand tray and Ellie with the dinosaur. So we have the resources in place so there wouldn't be any budget issues."

As with any FP classroom budgets are an issue and if practitioners needed to buy specific resources to support different schemas then this would be a concern. However, a deliberate aim of this research (as with the pilot study in Cycle One) was to show that children's schemas can be supported and developed using resources that were already part of the FP provision. Throughout the observations in chapter five, children were using resources to support their schemas that were readily available in the setting. This indicates that schemas can be supported in FP settings without additional resources being purchased. The continuous and enhanced provision in the setting already implicitly supported the children's schemas. However, the practitioners, now knowing about schemas, could explicitly add resources to the learning environment to support schemas and children's development of knowledge. This supports Atherton and Nutbrown who wrote 'Adults who come to understand the particular schematic interests of young children are better able to respond to children's *forms of thinking* in learning encounters' (2013, p.10).

The interview then moved onto the usefulness of the suite of resources to support including schemas in the planning.

The RT stated,

“I will add schemas to my enhanced planning when I start a topic and use the toolkit (resource bank) to help me.”

The AP also felt the suite of tools used to support schemas was useful and said that,

“The key ring cards and poster were good as they were a reference point to go to when I spotted a schema. Then I can use the resource bank to see what activities I can plan to support this schema.”

As Constable (2013) writes, a simple reminder of schemas can enable staff to make quick decisions about schemas being witnessed and how to support them.

The NT elaborated further in her response by stating,

“The discussions and analysis of the observations and photos we saw and noted during the research, with the links to the schemas levels and FP, will be good as we could use this in the planning meetings at a start and throughout a topic. We can use the poster and key cards initially to help us recognise a child’s schema or schemas and then see how activities can be planned and what resources we can use by going to our resource bank. Before I just assumed that if you had say six different types of schemas you would have to plan the activities six different ways to cover it. Now I can see from working with you that we can use different resources to support a range of schemas in the same activity or provision. It is almost like differentiation, which we do anyway. However, I do think we all need to all be aware of schemas as some staff who were not part of this research still try to dissuade children from using their schemas.”

Here the staff were supportive of supporting children’s schemas and were able to see how different resources could be added to the continuous and enhanced provision to nurture and nourish identified schemas. As discussed in the introduction the FP is an experiential curriculum where the learning is holistic and child-centred (WAG, 2008c). Arnold (2013) states that, schemas build upon what children can do and that in supportive environments children will explore and become masters of their own learning, again echoing the very ethos of the FP. Therefore, supporting and planning for children’s schemas in FP provision embraces a child-centred, experiential holistic approach.

However, practitioners were mindful that unless all staff were knowledgeable of schemas then children’s schemas could be constrained. This made the point of the importance of disseminating

information on schemas to all staff in the setting. The next part of the interview probed the concerns raised by the practitioners further by asking them to consider any barriers to incorporating schemas in the FP.

The AP replied that,

“I feel they need to be part of the FP but they need to be more widely promoted.”

The NT agreed by adding,

“They (schemas) are a vital part of child development but where is the training for staff in the FP? They [schemas] need to be included the documentation too.”

The RT went further by stating,

“They should be part of the FP and they could easily be part of it but the Welsh Government need to include schemas in the (FP) training otherwise people won’t bother.”

These responses echo the findings from practitioners in the pilot study and the responses given in the questionnaires from the wider FP stakeholders as detailed in chapter four. The two barriers were a lack of training on schemas and policy guidance from the Welsh Government (WG). Previous research (Athey 1990; 2007; Meade and Cubey 2008; Nutbrown 2011 and Atherton 2013) and this research has shown that children use their schemas to make sense of the world during their play. Therefore, the play-based FP curriculum should be able a curriculum that promotes and celebrates children’s identified schemas. However, as the responses from both the wider stakeholders and the staff involved in this research indicated, practitioners need guidance and training to nurture and nourish children’s schemas.

The staff were next asked to evaluate what they felt the research had brought to them and to the setting.

The RT responded that,

“I want to use schemas and I will make a note of children’s schemas in my observations and link these to my activities. We will be adding a section to our observation sheets to note schemas. However, we need the WG to allow us to teach the children through play and use the FP as it was intended, then we would have the time to use schemas properly to support the children. I am happy though that the research has shown they link to the curriculum and they support a child-centred, holistic, pedagogy, which is what the FP should be.”

The NT considered her response and said,

“I have enjoyed working with you and I can see that supporting children’s schemas does make a difference. I think what has been more important for me has been how the children will find different ways to use resources to accommodate their preferred schema. I will definitely think about the resources I use now and make a note of children’s preferred schemas- it is really their own unique way of discovering things. However we all need training as some practitioners may still tell a child off for mixing up the sand and water and it could be they are using their transporting schema but if there is no training how would practitioners know that?”

The AP added that,

“What I have found the most revealing was the differences in children’s engagement and enjoyment with activities when the children’s used their schemas in the provision. It showed us that we need to support schemas, as they are a way into developing our understanding of how children want and need to learn. We can use the obs, photos and our analysis to show the head teacher that we need to be supporting children through their schemas and it’s not complicated.”

From these responses, the practitioners had felt the research was worthwhile and had developed their knowledge and understanding of schemas. Being part of the research had enabled the practitioners to identify schemas and to see how to support children in using their schemas within the FP. This supports Herr and Anderson (2005); Basit (2010) and Newby’s (2014) concept of action research as producing knowledge that can be fed back into classroom practices.

The recurring themes that emerged from analysing the responses were that the FP practitioners recognised that children did use their schemas when they were playing in the continuous and enhanced provision. They could see how schemas could map across the FP areas of learning and support children in meeting FP outcomes. However, in congruence with the responses given by the FP stakeholders in chapter four, there was a concern over the lack of guidance and training available in Wales for supporting schemas. This led to the next part of the discussion where the practitioners and myself, considered potential outputs from this research and ways forward to disseminate information on schemas.

6:3 Dissemination of research findings and Ways forward:

The practitioners and I considered how the findings from this research could be disseminated not only to FP practitioners in the chosen setting, but also to a wider audience. The starting point for this was the recognition of the need for specific training and resources on identifying, supporting and understanding schemas. Training on schemas would allow practitioners another lens through which to view children. It would develop an understanding of how some children use schemas to

assimilate and accommodate knowledge through their lived experiences This supports Nutbrown who argued that practitioners needed to understand schemas, not just recognise them, in order to comprehend how children think (2011).

The practitioners felt that training could be provided in the form of 'In Service Training' (INSET) days for staff in the setting and 'Cluster' training days, where a number of schools in the local authority could come together and receive training on schemas. Here the practitioners would disseminate the findings from this research and they were happy to take the lead on this and had added it to the agenda for the next staff meeting for discussion. The practitioners also felt it was important to discuss the findings of this research with their FP support officer for the local authority when she next came into the setting. The support officer facilitated the regional FP network support meetings and a part of these meetings was dissemination of good FP practice (EAS, no date). Therefore, the practitioners decided to ask could they discuss the findings from this action research at the next meeting.

There was a discussion around the need for newly qualified teachers and Early Years practitioners to have a knowledge of schemas. One way to achieve this was to provide modules on schemas in undergraduate teaching on Early Years degrees and Initial Teacher Training degrees at the university where I, the researcher worked. There was also a discussion around disseminating these findings to wider FP stakeholders in response to the concerns raised in chapter four.

This led to a discussion on ways forward in terms of sharing the output from this research in the form of a working resource or toolkit that would support the recognition of children's schemas in the FP. Throughout the research, there was an ongoing analysis of and reflections upon the observations and photographs of the children. During these continuous reflections, links to FP outcomes and to FP areas of learning were noted (as evidenced in chapter five). This enabled an understanding to emerge of how schemas could be supported throughout the FP curriculum. This also built upon previous research into schemas by Nutbrown (2011), Atherton (2013) and Constable (2013) where links were made between children's schemas and the Early Years Foundation Stage (EYFS) in England.

As well as links to the FP outcomes and FP areas of learning for each of the schemas identified, examples were noted of resources that could be added to the continuous and enhanced provision to support different schemas. This was important as Athey (2007) maintained children will notice

features in the learning environment and are drawn towards those resources, which support their current schematic interests. There was also an inclusion of appropriate vocabulary to use with the children, which nurtured their schemas. This supported Atherton's findings when she stated that practitioners needed to engage in genuine and relevant talk with children while they play in order to understand their thinking. She termed this as a 'dialogue of conceptual correspondence' (2013, p.64). Finally, a consideration of further activities that could facilitate children's identified schemas were also noted. As Nutbrown (2011) stated identifying a schema is not enough, practitioners need to extend children's learning by providing further stimulating and interesting activities.

Therefore, by the end of the research a working toolkit or resource could help to support FP practitioners in facilitating children's schemas. The practitioners felt this was something they would continue to develop and work on as a team as new ideas and ways forward to support children's schemas became apparent. The practitioners also felt that this resource or toolkit could be taken to FP network meetings to share with wider FP stakeholders. I as the researcher also intend to use the toolkit with university colleagues as part of the research cognate groups within the Faculty of Education.

6:4 Summary:

This chapter has detailed the evaluation and dissemination of the findings (stage 4 of Mills and Butroyd's 2014 action research model) from this research into exploring children's schemas in the FP. It has also provided answers to the research questions detailed at the start of the chapter.

- Can children's schemas be observed in the Foundation Phase curriculum?
- Can Foundation Phase practitioners be supported to nurture and nourish children's schemas?
- Can nurturing and nourishing children's schemas support Foundation Phase outcomes?

The semi-structured interview and discussion has evaluated the research and proposed ways forward to disseminate the findings to a wider FP audience. The practitioners were supportive of including schemas as part of their pedagogy and were more confident in observing schemas and planning for them. The poster and key ring cards were deemed useful as a point of reference for recognising schemas. Practitioners felt the working toolkit or resource, with its links to FP outcomes and FP areas of learning, was supportive, and something they would

continue to develop and add to in the setting. This output from this research was a contribution to new knowledge, as there has not been any prior development of a toolkit or resource to support children's schemas in the FP curriculum. This resource also facilitated a new and different way to interpret children's actions, allowing the practitioners to shape their practice and provide an attuned accompaniment when working with the children in the setting (Atherton, 2013).

The final chapter in this thesis draws together the main findings from chapters four, five and six. It provides recommendations, details any limitations from the research undertaken in this study and contributions to knowledge

Chapter 7: Conclusions, Recommendations and Implications for Future Studies

7: 1 Introduction:

This concluding chapter reviews and reflects upon the key findings and conclusions from this study, the contribution to new knowledge, the limitations of the research and the recommendations and implications for future studies. This thesis started in chapter one, by acknowledging my interest in schemas and hence the rationale for this research. It set the research into context by charting the developing of the Welsh Foundation Phase (FP) and its underpinning ethos of a play-based pedagogy. This curriculum, unique to Wales, acknowledges children as active meaning-makers and constructors of their own knowledge and understanding. It advocates the need for supportive adults accompanying the children along a learning continuum from the ages of three to seven years (WAG, 2008c).

The literature review acknowledged the constructivist theorists Piaget and Vygotsky, who were considered as underpinning the ethos of the FP curriculum (WAG 2008b). Both the theories of Piaget (1969, 1972) and Vygotsky (1978) were critiqued and analysed. Piaget's theories of how children construct knowledge through assimilation and accommodation (1969, 1972) was debated alongside Vygotsky's theory of the more knowledgeable other required in supporting children in knowledge construction (1978). This was followed by research into schemas, starting with Piaget as the originator of schemas, followed by a review of the work of those who built upon his work (Athey, 1990, 2007; Meade and Cubey, 2008, Arnold *et al.*, 2010; Nutbrown, 2011 and Atherton, 2013).

Different definitions of schemas were considered, beginning with Piaget's 1962 definition, 'Schemas of action [are] co-ordinated systems of movements and perceptions, which constitute any elemental behaviour capable of being repeated and applied to new situations, e.g., *grasping, moving, shaking* an object' (p.274). This was followed by other definitions of schemas such as that of Neisser's who stated that schemas were 'A pattern of actions as well as a pattern for action' (1976, p.56) and Athey's (1990) definition, of schemas as being, 'a pattern of repeatable behaviour into which experiences are assimilated and gradually co-ordinated' (p37).

The literature review also considered the debates surrounding supporting children's learning through play-based curricula such as the FP. This was followed by comparing how other play-based curricula have nurtured and nourished children's schemas. Previous studies from Athey (2007), Nutbrown (2011) and Atherton (2013) were evidenced as well as discussing the importance of the adults' role in facilitating children schemas in extending and developing knowledge. Athey (2007) argued for adults to be in tune with the unique ways children had of *coming to know* and how their forms of thought (schemas) facilitated this. Atherton (2013) supported this by attesting the need for adults working with children to be attuned to their forms of thought, supported with a dialogue of 'conceptual correspondence' (p.64)

For some children, as research has shown, schemas are *their* unique ways of coming to know but a review of FP policy has indicated a lack of guidance in recognising and supporting children's schemas within the FP curriculum. This could be deemed a missed and wasted opportunity to support FP practitioners in embedding schemas in the play-based FP curriculum. Therefore, this research sought to address this by 'Exploring the role of schemas within the Welsh Foundation Phase curriculum.' This makes this thesis unique in the being the first to focus on exploring children's schemas in the Welsh FP and how the FP learning environment and adults can support children in their schematic pursuits. This thesis adopted an action research methodology, acknowledging the shared journey between me, as the researcher and the practitioners in the setting. There was a shared coming to know in how the children used their schemas in their everyday lived experiences. This led to an understanding of how children's schemas could be evidenced across all FP areas of learning and linked to relevant FP outcome; thus combining observing the children's actions through both a schematic lens and curriculum lens (WAG 2008c; Atherton 2013). It has shown how children evidence their schemas through both their dynamic actions and in their mark making (Athey 2007; Atherton 2013).

7:2 Key findings:

This research set out to answer the following research questions:

- What is Foundation Phase stakeholders' knowledge and understanding of schemas across South East Wales?
- Can children's schemas be observed in the Foundation Phase curriculum?

- Can Foundation Phase practitioners be supported to nurture and nourish children's schemas?
- Can nurturing and nourishing children's schemas support Foundation Phase outcomes?

These four research questions were explored through an action research model. The findings, alongside the findings from previous studies into children's schemas, adds to the growing knowledge base on how children use their schemas to develop knowledge and understanding.

In Action Research Cycle One (pilot study) undertaken in 2012-2013, findings showed that children were observed using their schemas in their free choice activities in both the continuous and enhanced provision (WAG, 2008c). The findings showed that children were using a range of schemas, based on Athey's typology of schemas (1990, 2007), to make sense of their lived experience in the setting. The children in Cycle One showed commonalities and continuities in their actions and this resonated with Athey's (1990) definition, of schemas as being, 'a pattern of repeatable behaviour into which experiences are assimilated and gradually co-ordinated' (p37).

FP practitioners' perceptions of schemas in the setting were also gathered in Cycle One, through questionnaires and semi-structured interviews. Findings indicated a lack of knowledge and understanding by FP practitioners about schemas. Practitioner responses indicated this was due to a lack of policy guidance and training available on schemas from the Welsh Government (WG). These findings were explored in more detail with a semi-structured interview with the Nursery and Reception practitioners at the end of Cycle One of the action research. Here, the practitioners reiterated they required more training and guidance in observing children's schemas and making links to the FP curriculum. This led therefore, to the second cycle of action research detailed in chapters four, five and six.

The Action Research Cycle Two took place between 2014 and 2015 and sought to answer and expand upon the findings generated from Cycle One. Newby (2014) defines action research as developing and implementing change by using research findings to shape action; Reason and Bradbury (2008, p.28) state, 'Action research calls for the engagement of people in collaborative research.' This research has supported the above definitions and concepts of action research by the researcher (me) working collaboratively alongside the practitioners throughout the research process and using the findings to adapt the pedagogy in the FP setting to support children's schemas.

The first key findings focuses on the questionnaire responses from the wider FP stakeholders.

Questionnaire Responses from wider FP stakeholders:

The start of Cycle Two of the action research was a gathering of data on FP stakeholders' knowledge and understanding of schemas across South East Wales. These findings were presented in chapter four and helped to **find** and **clarify** the focus for Cycle Two of the action research. In addition, these findings answered the research question:

- What is Foundation Phase stakeholders' knowledge and understanding of schemas across South East Wales?

Questionnaires were sent to a wide range of stakeholders, ninety-eight in total and eighty-seven completed questionnaires were returned. This questionnaire was amended from the one used in Cycle One to reflect the evaluations of the questionnaire design from the participants at the end of Cycle One. Here respondents included FP advisory teachers, FP classroom practitioners, FP additional practitioners and part time students studying for diplomas, Foundation degrees and Honour degrees in Early Years education. Responses indicated that knowledge of schemas and their use in FP settings was very limited. This was not surprising and very much echoed the findings from the Cycle One questionnaire. In addition, there is little training offered to FP stakeholders on schemas. Responses also implied that schemas would not become part of FP pedagogy without appropriate policy guidance or training being provided by the Welsh Government and local authorities. Athey (1990, 2007); Arnold *et al.* (2010); Nutbrown (2011) and Atherton (2013) agreed that the adult's role was vital in supporting children's schemas. Consequently, this lack of training and policy guidance for FP stakeholders in supporting schemas could be considered a missed opportunity in the FP curriculum.

Searching for Schemas-the implementation stage of Cycle Two of the Action Research:

The analysis of the questionnaires by the practitioners and myself led to the next stage of the action research cycle-the **implementation** (Mills& Butroyd, 2014). The practitioners stated that they needed more experience in observing children's schemas and experience in making links between schemas and FP areas of learning and outcomes. They wanted to develop a working knowledge and understanding of schemas and to explore how to support schemas through resources and activities in the continuous and enhanced provision. Building upon Cycle One, narrative observations and photographs were chosen as the data gathering methods adopted for

the implementation stage of Cycle Two of the action research. This answered the following research questions:

- Can children's schemas be observed in the Foundation Phase curriculum?
- Can Foundation Phase practitioners be supported to nurture and nourish children's schemas?
- Can nurturing and nourishing children's schemas support Foundation Phase outcomes?

Answers to these questions were through the narrative accounts of six children's schemas (Ellie, Amy, Harri, Oscar, Lewis and David) during their free choice activities over two school terms and were presented in Chapter five. These findings were generated from one FP setting in South East Wales and cannot therefore, be generalizable, but they present an original contribution to knowledge of how the FP curriculum can support children's schemas. This builds upon previous research studies into children's schemas (Athey, 2007; Meade and Cubey, 2008; Arnold *et al.*, 2010; Nutbrown, 2011 and Atherton, 2013).

Findings showed, as in Cycle One, children were exhibiting a range of schemas based on Athey's typology of schemas (1990, 2007). The observations and accompanying photographs evidenced how children used the learning environment, both indoors and outdoors to pursue their threads of thinking (Nutbrown, 2011). Children used their schemas in both their actions and mark making, with a connection revealed between their dynamic actions and subsequent marks (Athey, 2007; Meade and Cubey, 2008; Atherton, 2013). Deguara and Nutbrown (2017) stated that 'schemas often feature in young children's actions and drawings' (p.2) and this was evident throughout this study.

The observations and photographs were analysed schematically and provided evidence of the unique ways children pursued their threads of thinking in the FP classroom. Motor level actions, symbolic representations, functional dependency relationships and thought level representations were revealed, as the children pursued their schemas across the FP provision. This evidenced the children's thinking through their actions, speech and representations, providing a window into how they *come to know*. This reinforced Athey's understanding of schemas as, 'commonalities and continuities...in spontaneous thought and behaviour (2007, p.113).

Each observation was discussed, analysed and reflected upon by the practitioners and myself with links made to FP areas of learning and FP outcomes. This was an original contribution to

knowledge in this work as previous studies have focused on making links to the English Early Years Foundation Stage (EYFS) curriculum (Atherton, 2013 and Constable, 2013) but none have linked schemas to the Welsh FP curriculum. Viewed as full narrative accounts of how the children pursued their schemas within the FP curriculum, the observations and photographs illustrated how the children used the continuous and enhanced provision to match and nourish their threads or forms of thought (Nutbrown, 2011).

Subsequently this has enabled an understanding and knowledge of schemas to emerge. This has facilitated the practitioners in the setting to nurture and nourish schemas through both the continuous and enhanced provision (WAG, 2008c). Here, the adults working on the action research with me supported the children's schemas in developing their knowledge and understanding. This supported Atherton's assertion of the need of adults working alongside children to 'notice what is important to the child' (2014). Through their schematic pursuits, the children were able to assimilate new knowledge, leading to new accommodations of understanding. For example, Ellie (Enveloping and containing schema), developed an understanding of length and area when lining up cars to fill a given space and building a garage for her car. Amy (Dynamics Trajectories) investigated the physical properties of material and friction when she rubbed the ice to make it smaller. Similarly, Harri (Dynamic Trajectories) explored the properties of water and gravity when he poured water into the plastic tubing. Oscar (Connecting and Disconnecting) explored height when he connected the wooden blocks to make a rocket; Lewis explored his rotational schema through the properties of playdough and sand to make biscuits and popcorn. Finally, David (positioning and orientation schemas) investigated perspective viewpoints when he climbed on top of objects and hung upside-down inside the rope bridge.

These observations and photographs were discussed and reflected upon by the practitioners involved in the research, and led to resources being left out for the children to access repeatedly, thus allowing them to explore the materials freely and without interruption.

However, there were occasions where practitioners, not involved in the action research, still sought to constrain children's schemas. Therefore, this has reinforced the importance of all practitioners in the setting having an awareness of schemas and ways to support them. Bruce (2011) argues that you do not have to love a schema but adults should strive to find alternate

ways that are more acceptable for children to pursue their schemas. Otherwise, adults will not become 'attuned' to children's needs and ways of learning (Atherton, 2014).

Holiday, Harrison and McLeod (2009) asserted that children should be given boundless opportunities to share and express their thoughts. Therefore, all practitioners working with children need to have an understanding of schemas and recognise that, for some children, schemas are the window into their thinking.

This need for all FP practitioners in the setting to understand and recognise schemas was reiterated in the interviews with the practitioners at the end of the study as detailed in chapter six. Here the practitioners and myself, the researcher, evaluated the study and discussed ways of disseminating the findings at both a local level and a wider level. This was another contribution to knowledge as it had implications for shaping future practice for FP practitioners when accompanying children in their learning.

Interview with practitioners-evaluation and dissemination of findings of Cycle Two of the action research:

At the end of the research, a semi-structured interview was conducted with the three practitioners who worked with me, the researcher, throughout the study. This was detailed in chapter six and sought to evaluate the research and to consider ways forward to disseminate the research findings to a wider audience. Here, the practitioners agreed that being part of the research had facilitated them in recognising and supporting children's schemas. They were able to see how schemas could be planned for in the continuous and enhanced provision, using existing classroom resources, and how schemas could link to FP areas of learning and FP outcomes. They were aware of the intrinsic needs of the children to use their schemas and how the children were 'sensitised' to choose resources that nurtured and nourished their schemas (Nutbrown, 2011, p.145). They understood that a knowledge of schemas would facilitate them in planning activities and provision that would motivate the children to learn (Nutbrown, 2011).

However, they were mindful of the fact that on occasions, practitioners not part of the research, were still constraining schemas. This led to a discussion on ways forward to disseminate the research to ensure all FP were able to have knowledge and understanding of schemas.

Throughout the two terms the practitioners and myself noted down examples of resources that could nurtured and nourished different schemas. Supportive and conceptually attuned language that reinforced children's schemas was also noted (Atherton, 2014). These notes and reflections

became an ongoing output of this research and part of a suite of resources to facilitate FP practitioners in recognising and supporting schemas. Again, this was a new and original contribution to knowledge in exploring schemas in the Welsh FP curriculum.

This suite of tools was made available in the setting for all FP practitioners to access and there were discussions on using INSET days, Cluster days and FP network meetings to disseminate the research findings to a wider audience of FP practitioners. There was also a discussion on disseminating the results of this research to undergraduate Early Years students studying at university. This would allow a wider audience to gain knowledge and understanding of schemas in the FP curriculum.

The next section discusses the limitations of the research.

7:3 Limitations of the Research:

Limitations of the methodology:

For both the cycles of action research, the limitations of the research designs adopted have been discussed in the relevant chapters and will not be repeated in detail here. However, criticisms of action research is that the findings are specific to the setting or problem being studied and it is difficult to generalise the findings to a wider population (Mukherji and Albon, 2010). Nevertheless, researchers such as Athey (1990, 2007); Nutbrown (2011); Arnold *et al.* (2010) and Atherton (2013) have used one setting to gather data on children's schemas. This research has built upon these studies within a FP pedagogy and adds to a growing understanding of the importance of supporting and enabling children's schemas.

Limitations of the methods:

The qualitative data gathered through observations and photographs could be affected by subjective bias. In both the cycles of action research, the children's behaviours may have been affected by my presence. Attempts were made to overcome this by me being in the setting for a term before the observations occurred so the children were used to me being around. Also, on any occasions where the children engaged with me during the observations, they were friendly and relaxed, thus indicating they had accepted another person (other than the usual practitioners) observing them. This supports Atherton's research where the relationships

between her and the children being observed was, 'forged by gradual recognition and acceptance' ...becoming 'ones of familiarity and ease' (2013, p.28).

Subjective bias was address by the researcher and the practitioners discussing the observations and the photographs, depicting schemas, with each other. This is what Mason terms triangulation where other colleagues involved in the action research process offer a 'means of confirmation' (2002, p.246). However, it must be realised that during analysis observations are interpreted through the understanding, preferences and beliefs of the observer, albeit both the researcher and the practitioners in this case (Pring, 2004).

The questionnaires provided an indication of FP stakeholders' knowledge and understanding of schemas. However, these findings are from one geographical region of South Wales so further data would need to be gathered across the whole of Wales to determine practitioner knowledge and understanding of schemas in other parts of the country. Similarly, the semi-structured interviews that took place with the practitioners in both cycles of action research were from one FP setting and the opinions stated cannot be generalised to other FP practitioners. However, these findings add to the growing body of evidence on children's schemas and provide an insight into how children pursued their schemas within the FP curriculum.

Parents were not part of this study whereas in other studies on children's schemas (Athey, 1990, 2007; Arnold, *et al.*, 2010 and Atherton, 2013), parents have been part of the research. Nutbrown maintains that both parents and practitioners need to be involved in understanding how children learn (2011). Therefore a future study could work with parents in supporting children's schemas and forge links between home and FP settings.

7:4 Implications and Recommendations for future Practice:

Implications for practice:

The intentions of this research was to explore children's schemas within the FP curriculum. The data gathered have shown that some children do exhibit different types of schemas within the FP and these can be accommodated within current FP practice. This research has also shown that the FP learning environment and resources on offer allowed the children to pursue their schemas both indoors and outdoors during their free choice activities (Chapter three and five). This has shown that the FP can support schemas and that children will use their schemes even when the

practitioners are not actively focusing on them. The research has also evidenced how children use their schemas at different levels and links were made to FP outcomes and areas of learning. This has important implications for practice. If practitioners view children's actions through a schemas lens then this offers an alternative way of understanding of how children construct knowledge and understanding. This can allow practitioners to ensure that the learning environment on offer reflects and supports children's schemas and puts children at the centre of curriculum provision.

Implications for policy:

Currently there is limited knowledge and understanding of schemas by FP stakeholders due to lack of policy guidance and training by the Welsh Government (WG). This has meant that on occasions during this research, some practitioners (not directly involved in the action research) have tried to discourage children's schematic endeavours and this could lead to missed learning opportunities for the children. Nutbrown (2011) maintains there needs to be ongoing professional development for practitioners to ensure that the ways in which children come to know are recognised and supported. Therefore, one of the recommendations from this study would be for the WG to provide training and policy guidance on schemas. This could be included in the FP training modules that are already offered by local authorities across Wales. The toolkit or resource (output) from this research could support this.

Schemas could be included in policy guidance issued to FP settings and this is particularly timely as the curriculum in Wales is due to change based on the Donaldson report, 'Successful Futures' (2015). This curriculum change can be seen as not as threat to supporting children's schemas, but as an opportunity. As Nutbrown points out, 'Children's ways of learning do not change because national policies or the prescribed curriculum change' (2011, p128). With this new curriculum being piloted in 2019 for learners three to fourteen years old, there is real window of opportunity to embrace new ways of teaching and learning. Within this new curriculum, practitioners will be given more autonomy to decide how to deliver and shape the curriculum so schemas could be part of this curriculum change (Donaldson, 2015).

7:5 Contributions to knowledge:

The following section explains how this thesis provides contribution to knowledge. The first has been the detailed narratives of the six children, which have contributed to the understanding of

how the Foundation Phase curriculum can support, nurture and nourish children's schemas. This has provided an understanding of how the children used their schemas to construct their knowledge and understanding in the continuous and enhanced provision within the FP learning environment. This supports the underlying themes explored in the literature review of this thesis (chapter two) as that of children being active constructors of their knowledge and understanding within a social learning environment (WAG, 2008c). As detailed in chapter two, both the theories of Piaget and Vygotsky underpin the FP and this research has shown that children do construct their knowledge both on their own and with supportive others and that they use their schemas to facilitate this (Piaget, 1972; Vygotsky, 1978).

This thesis has contributed to the knowledge base on schemas, alongside other works such as those of Athey, (1990,2007); Meade and Cubey, (2008); Arnold *et al.* (2010); Nutbrown, (2011), Atherton,(2013) and Constable, (2013). However, evidence from stakeholders has indicated a lack of knowledge and understanding of children's schemas and a lack of policy guidance from the Welsh Government (see chapters 3 and 4). Therefore, the research has highlighted the need for training for FP stakeholders on recognising and supporting children's schemas. This has been addressed in the chosen setting by developing FP practitioner knowledge and understanding of schemas through the action research methodology adopted. This has provided new insights into children's thinking and their ways of coming to know the world around them. It has captured their ways of thinking, provided in-depth knowledge and understanding of particular schemas by the practitioners and myself, and supported the use of action research as an effective methodology to develop practitioner knowledge and understanding of schemas in the setting.

This research has linked children's schemas to FP outcomes and to the seven areas of learning. This builds upon research by Nutbrown (2011); Atherton (2013) and Constable (2013) who have made links between children's schemas and the Early Years Foundation Stage in England. However, this is a new contribution to knowledge as there has been no other research linking schema to FP outcomes and areas of learning and there has not been any other collaborative action research into children's schemas in Wales

Adopting an action research methodology has provided opportunities to reflect upon the observations and photographs of schemas in action, and led to the designing of a suite of resources to support practitioners in observing and planning for schemas. This has been another

original contribution to knowledge. Reflecting upon the study has also led to identified opportunities for schemas to become part of the new curriculum being implemented in 2019 in Wales, thus making this research timely. In addition, both the practitioners, and myself have identified potential ways to disseminate this knowledge of identifying and supporting children's schemas within the FP to a wider audience. This has included policy makers, early years practitioners and students studying on early years degrees across Wales. It is also the intention to disseminate these findings at research conferences and through the publication of articles and books. Therefore, the findings are useful in informing the development of current FP curriculum policy and practice and future policy development in the new proposed curriculum in 2019.

7:6 Further Research:

This research has focused on children aged three to five years in the lower FP and future research could focus on how children's schemas develop as they move throughout the FP curriculum. Therefore, one recommendation from this research would be a longitudinal study of children's schemas in the upper FP (aged five to seven years).

Secondly, as discussed under limitations, parents were not part of this research so any future studies could include parents. This could be another way to support children's development between settings and home. Part of the Welsh Government's agenda to raise standards in education is to get parents more involved in their children's education (WG, 2016). If practitioners were able to share children's schemas with parents then this could open a dialogue between parents and practitioners on the best ways to support children's learning and development. As Athey stated, 'Nothing gets under a parent's skin more quickly and more permanently than the illumination of his or her own child's behaviour. The effect of participation can be profound' (1990, p.66).

7:7 Final Thoughts:

To conclude, the aims of this study have been addressed. The research set out to capture, explore and investigate schemas in the FP curriculum. It has explored FP stakeholders' knowledge and understanding of schemas and has contributed original and new knowledge to previous research in this field. The development of an ongoing suite of resources in the setting has facilitated planning for schemas. Links have been made between schemas and FP areas of learning and FP outcomes. Finally, Wales is about to embark on another curriculum change with a new curriculum

being introduced in 2019. As this curriculum proposes to allow practitioners more autonomy, there is a real opportunity for policy makers and practitioners to incorporate schemas into their pedagogy thus making this research current, relevant, worthwhile and timely.

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Appendices:

Appendix 1: Parental information and 'opt out' consent letter



01/11/12

Dear Parents,

My name is Amanda Thomas and I am a lecturer in Early Years Education at the University of Glamorgan.

I am carrying out research into children's schemas and schematic play in the Foundation Phase. (Schemas are preferred play actions shown by children such as wrapping items up; moving toys from one place to another or repeatedly throwing things etc).

It is my intention to spend each Wednesday in the Nursery and Reception classes observing the children during both structured and unstructured play activities to see if they exhibit a preferred schema. Once a schema has been identified, I will work with the children in small and provide activities to extend this play choice.

I am also going to interview staff in the setting and ask them to complete questionnaires on schematic play.

Please note that no names of the children will be used, only information on their age and gender. If any photographs of the children are taken their faces will be blanked out. The school will also remain anonymous throughout the research and any features identifying the setting such as school logos on clothing or property will be blanked out. If at any time the children do not want to take part their decision will be respected immediately. If your child is chosen to be part of this research, you are welcome to view the observations and photographs of your child at any time in the research.

Mr. Berry and the Early Years staff have been approached and have given consent for the research to take place. The final work will be seen by staff at the university and stored in the university library and any photographs and examples of children's work and observation notes will be used in the appendices of the research project.

If you do not wish for your child to take part can you please let Mrs. Carter and/or Miss. Griffiths know and they will inform me and you can, also, withdraw your child at any time during the study. May I thank you in advance for your time.

Yours sincerely,

Amanda Thomas

Appendix 2: Ethical Consent for Pilot Study (Action Research Cycle One)

27/09/12

Amanda,

Everything looks fine to me, but can you provide me with a cleaned up copy of your proposal, getting rid of all the track changes and comments. It is so difficult to read and follow, with all those insertions. I think you would like a final 'reassurance' from me, and I am very happy to provide it – just give me a nice clean copy to work with!

Thanks,

Howard

Dr Howard Williamson CVO CBE FRSA FHEA
Professor of European Youth Policy
University of South Wales
Faculty of Business and Society
Treforest Campus
Pontypridd CF37 1DL
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Appendix 3: Pilot Questionnaire (Action Research Cycle One)

Staff Questionnaire:

- 1) Do you know what children's 'schemas' are?

- 2) If yes can you describe what the term 'schema' means to you?

- 3) Do you know of any types of schema?

- 4) If you have knowledge of 'schemas', have you seen any children displaying a type of schema?
(use child 'a' etc for confidentiality)

- 5) Do you note anything about Schemas in your child observations or assessments?

If yes- how do you record this?

- 6) Does your planning include any provision for schemas?

If yes how?

- 7) Do you think training is needed in this area of child development?

Have you ever received any training on schemas, either as a student or as a practitioner?

If yes please give details?

8) Do you think children's schemas should be included in planning activities and do you think this would help the child's development?

How would you include it?

How would it help development?

9) Finally do you think that the Foundation Phase curriculum is a perfect framework for children to develop and use their preferred schema and why?

Thank you for your time it is much appreciated.

Appendix 4: Transcript of the Semi Structured Interview with Nursery and Reception Staff (Cycle One of the Action Research)

July 2013

AT: Researcher

CC: Nursery Teacher

CG: Reception Teacher

Interview:

AT: What do you know about schemas; do you use them in your planning, through observation?

CC: *The only thing I knew about schemas before was Piaget's work on object schemas, but since you have come in I have now observed examples of schemas play in the continuous and enhanced provision. I have learnt that things you may deem as disruptive is actually an important part of their play. An example is when they move things from different areas and use resources in a different way to what you intended, it is important to make allowances for that and may be not be so prescriptive to the areas.*

CG: *Like CC schemas wasn't something I had ever considered but from the information you've given and chatted to me about, it is something we should consider in planning and when staff are observing children too.*

AT: From reviewing the questionnaires completed here in the setting, there does not seem to be any training or teaching given on schemas. However, in the EYFS in England, it is in their guidance and training is available. So do you think the Welsh Government are missing an opportunity here to put it in their guidance and training offered to Foundation Phase staff.

CG: *Yes I totally agree as we are dismissing patterns of behaviour that are really important stage of development for a child.*

CC: *I think as well when you are carrying out observations it gives you, makes you more astute, when you know about schemas and you can actually see it in practice once you had told us about it and we discussed the obs and photos with you. It fascinated me how schemas could be present*

in construction and writing and all areas so I think it is vital that we have training on it. If I'd been observing a child playing in the construction area I would have been focussing on the GMS and the FMS and their social skills but I wouldn't have, I wouldn't have noticed their repeated actions, the consistency of those things they were doing.

CG to CC: *You noticed a lot of schemas play in the construction area and you told me which I wouldn't have even looked at or considered.*

CC: *Training would be good because it would help us with what provision/resources to include in the enhanced provision but also I want to know more about how to move them forward, I want to know when I am observing a particular type of schemas play how can I take it forward to the next step. What other activities can I provide to support that schema and how it supports children in developing curriculum concepts and links to FP outcomes.*

AT: *So the more research and training in recognising and supporting schemas is vital and needed?*

CC: *Yes at the moment I can tell you what schematic play is but I need to know how to move them on. I feel I need to do more research on schemas myself, I need to spend time recognising schemas and then thinking of how I can support them in their free play choices.*

AT: *That's interesting- do you think all FP practitioners will be the same, not really having an understanding of schemas and how to support them?*

CG: *It has never been mentioned on any courses I've attended anywhere or in my PGCE.*

CG: *When I studied the old diploma in childcare schemas were only mentioned when we had to write an essay on Piaget, there was never any information of how they could be seen in practice or used to support a child's knowledge construction.*

AT: *Is there anything else you would like to add about schemas or the research so far?*

CG: *Not really just more research by ourselves as you have shown that the children are using them and the provision we offer is supporting them albeit implicitly. I think unless you have real experiences of schemas or know what you are looking for it is so easy to tell a child off for their behaviour. We need a suite of tools to support us and I think we need to tell other FP practitioners about schema too as they need to know these are the way some children need to make sense of the world and discover things .*

CC: *What has shocked me is that they use their schemas all the time once you recognise them and they use then all the different activities we put out for their free play. I think us, the local authority and the Welsh Government are doing children here a disservice by not supporting their schemas. They are going to us them anyway so we need to be able to tune into this and see how as we can plan for them and use them to support the concepts we are trying to get the children to understand. I want to do more work on schemas now and once you leave we will try and observe them and include them in our planning. I just don't want it to become too much more work to do though as we have the literacy and numeracy framework to plan for too.*

Appendix 5: Welsh Government Response



Llywodraeth Cymru
Welsh Government

Yr Adran Addysg a Sgiliau

Department for Education and Skills

Parc Cathays / Cathays Park

Caerdydd / Cardiff

CF10 3NQ

English Enquiry Line 0845 010 3300

Llinell Ymholiadau Cymraeg 0845 010 4400

Ref TO/HL/01700/13

Eich cyf/Your ref

Ein cyf/Our ref TO/HL/01700/13

Amanda Thomas

amanda.thomas@southwales.ac.uk

Dear Ms Thomas

Thank you for your for your e-mail dated 6 November to the Minister for Education and Skills regarding schemas in the Foundation Phase. I have been asked to reply.

The Foundation Phase is a holistic developmental curriculum based on the needs of the individual child to meet their stage of development. It is a play-based curriculum which places greater emphasis on experiential learning and use of the outdoors.

We recognise that children need time to play, reflect, repeat and talk to peers and adults.

We have produced and continue to develop our Foundation Phase National Training Pack for use by all local authorities to support their practitioner training programmes. Our training pack includes a module on Child Development, which refers to schemas and patterns of behaviour/developmental stages which children will reach at different times. The training resources used are ultimately a matter for individual authorities and schools, based on their own needs. However, through our Foundation Phase Grant, local authorities employ a Foundation Phase Training and Support Officer to provide a suitable training programme based on the training pack and incorporating locally identified needs. We have held events about the Foundation Phase Philosophy to support our practitioners. We have used speakers such as Galina Dolya who uses the Vygotskian Approach to Learning and Sally Featherstone who talked about psychological tools and schema that can be used to observe and plan in children's learning and development. We have also commissioned work to produce guidance on striking the right balance between child-initiated and adult-led learning. The document will focus on the importance of planning, organisation and the resources to achieve this balance.

Although schemas is not a term we widely use in the Foundation Phase, I hope this answers your question but should you need further information you can contact me directly on:

Ruth.Gittins@wales.gsi.gov.uk

Yours sincerely

Ruth Gittins

Early Years Team

Curriculum Division

Appendix 6: Parental Information Letter (Action Research Cycle Two)



University of
South Wales
Prifysgol
De Cymru

Information Sheet

Dear Parents,

My name is Amanda Thomas and I am a senior lecturer in Early Years Education at the University of South Wales.

I am currently studying for my PhD looking at children's schemas and schematic play in the Foundation Phase.

The title for my research is:

A study into children's schemas in the Foundation Phase.

Invitation for your child to participate in the study:

I would like to invite your child to take part in my research study. Before you decide you need to understand why the research is being done and what it would involve for you. Please take time to read the following information carefully. Ask questions if anything you read is not clear or would like more information (my contact details are at the end of this information sheet). Please take time to decide whether or not you would consent to your child taking part.

What are schemas?

Schemas or schematic play are repeated actions children may do when playing as a way of making sense of the world around them. My research will focus on observing how a child's preferred schemas can be supported in the Early Years Foundation phase curriculum. I will also be investigating whether planning for children using their preferred schemas leads to them having greater involvement with the activities.

I have attached an explanation sheet on schemas which explains them in more detail. This sheet also asks for you to complete a chart indicating if your child shows any evidence of one or more schemas at home. I would appreciate it if you could complete this for me and send it back to school along with the consent letter by **Friday January 23rd 2015**. This information will help me to gather information on the different types of schemas play being demonstrated by children aged 3-5 years.

Why have I been invited for my child to take part?

Schematic play is more commonly observed in children between the ages of 0-5 years. As your child is aged between 3-5 years and they attend a Foundation Phase setting they fit the criteria for this study. For the duration of my research, I intend to spend one day a week in the Nursery and Reception classes observing and photographing the children (who have had parental consent) whilst they are engaged in activities and noting any episodes of schemas. I will then work, alongside the teacher, with the children in small groups and provide activities to extend the observed schemas.

Does my child have to take part?

It is up to you to decide. I have described the study in this information sheet and I need you to sign a consent form to show you agree for your child to take part. You are free to withdraw your child at any time, without giving a reason.

What will happen if I agree to my child taking part?

If you agree for your child to take part then the study will last from January 2015 to July 2015. I will be in the classroom every Friday from 9am till 3pm and will be observing the children as part of their every day routine. Any observations and photographs I take will be completely confidential. No child's name will appear on the observation sheets and all photographs will be blurred or cropped for confidentiality. Any identifying features of the school setting will also be cropped out of any photos used.

The observations and photographs will form part of my final PhD thesis which will be seen by my supervisors and external examiners. The final thesis will be available in the University of South Wales library. However all identifying details will have been removed as detailed above.

You are welcome to see any observations I have written or photographs that I have taken regarding your child at any time throughout my research. All observational notes and photos will be stored on a password protected computer in a locked office at the University of South Wales.

Mrs. Witchell and the Early Years staff have been approached and have given consent for the research to take place.

My contact details are included in this information sheet.

What will I have to do?

If you agree to your child taking part in this research can you please?

- Complete the attached consent form confirming your child can take part and that you have read and understood this information letter

- Complete the attached schema explanation sheet

Both to be completed and returned to the Early Years staff by **Friday January 23rd 2015**

If you require any additional information please contact me on:

amanda.thomas@southwales.ac.uk or 01443 483373

Important things you need to know:

I will be observing the children in the classroom with the practitioner present at all times. Also, the children are used to being observed as part of the Foundation Phase curriculum, so my observations will be part of normal practice. In addition, I have 10 years previous experience as an Early Years teacher so I am used to carrying out observations and I have qualified teaching status and a full criminal bureau records check.

What are the possible benefits of taking part?

The information I get from this study will help to increase the understanding of schemas in the Foundation Phase, which in turn, I hope will benefit the learning experiences provided for your child.

What if there is a problem?

If you have a concern about any aspects of this research study or myself as the researcher please inform the class teacher in the 1st instance. In addition, you can contact my director of studies in the following way:

Dr. C. E. Jones on: Catherine.jones@southwales.ac.uk

Will my child taking part in the study be kept confidential?

All participants will remain confidential throughout this study. No children's names will be used throughout and all photos will be blurred or cropped to remove any identifying features of the child and setting.

Data gathered may also be used in conferences and research papers published in educational journals.

All data not used in this study will be destroyed by wiping electronic files and shredding paper copies as per University guidelines.

What will happen if I don't want my child to carry on with the study?

If you withdraw consent for your child to continue to be part of the study any data gathered (observations and photos) will be destroyed.

Further information and contact details:

General information on children's schemas can be found at:

<https://www.dorsetforyou.com/schemas>

Specific information about this research project can be found from myself: Amanda Thomas (amanda.thomas@southwales.ac.uk tel: 01443 483373) and Dr. Catherine Jones (catherine.jones@southwales.ac.uk)

Thank you for your time in reading this sheet,

Amanda Thomas

Appendix 7: Parental Consent letter (Action Research Cycle Two)



STUDY CONSENT FORM

Title of Project: **A study into children's schematic play in the Foundation Phase.**

Name of Researcher: **Amanda Thomas**

Name of supervisor: **Dr. CE Jones**

Please **(initial/tick)** all boxes

1. I confirm that I have read and understand the information letter) for the above study. I have had the opportunity to consider the information and understand how to contact the researcher for further information if needed.
2. I understand that my child's participation in the research is voluntary and that I am free to withdraw my child from the study at any time without giving any reason, without any consequence to myself.
3. I agree to my child's anonymised data being used in the study ,specific educational conference papers and subsequent articles that may appear in educational academic journals.

Name of Parent

Date

Signature

Appendix 8: Ethical Approval (Action Research Cycle Two):

Dear Amanda,

HNY! I am pleased to report that your application for the study entitled: "A study into children's schematic Play in the Foundation Phase "has now been ethically approved by the Faculty Ethics Sub Group, via Chair's action with immediate effect.

The following amendments have been made by the committee and documents reattached.

1) The info sheet has been revised slightly; changed the date in line with the consent Form (it was dated December 2105).

2) Please remove the first page of rhetoric from the consent form - this is advice to you, the researcher about designing a consent form.

If you have any queries please don't hesitate to get in touch. Best of luck with the research.

Jon

Jonathan Sinfield,

Research Governance Officer,

Research and Innovation Services (RISe) / Gwasanaethau Ymchwil ac Arloesedd (RISe),
Research and Business Development Office / Swyddfa Datblygu Busnes ac Ymchwil,
University of South Wales.

Appendix 9: Letter to accompany the questionnaire for the Cycle Two.



To whom it may concern,

My name is Amanda and I am a senior lecturer in Early Years Education at the University of South Wales. I am carrying out research into how children's schematic play can be used to support development across all 7 areas of the Foundation Phase curriculum. However as part of this research I need to find out practitioner knowledge on schemas and this is where I really need your help.

I have attached a quick questionnaire that will determine how much practitioners know or don't know about schemas and if you have ever received any training on schemas. All results are anonymous and I have been given ethical approval from the University for this part of my research. It is completely up to you if you wish to complete this questionnaire but it would really help my research if you could.

Therefore if you could spend a few moments completing this questionnaire I would really appreciate it. If you require any additional information I can be contacted using the details below.

Thank you again for your support,

Amanda Thomas

amanda.thomas@southwales.ac.uk Tel: 01443 483373

Appendix 10: FP Stakeholder Questionnaire- Cycle Two

Staff Questionnaire:

Schemas can be defined as:

patterns of repeated behaviour which children use to explore and express their developing ideas and thoughts through play and explorations. (Louis et al., 2008, p.11).

- 1) Using the definition above, how would you rate your current knowledge of schemas? Please circle the most appropriate number below:

1-none ; 2-unsure; 3-know a little; 4-good ;5-excellent

1 2 3 4 5

- 2) Using your given knowledge of schemas, how would **you** define them? (If no Knowledge or unsure go to Q8).

- 3) Have you ever received any training on schemas, either as a student or as a practitioner?

If yes please give details?

4) Do you know of any types of schema?

Please list them below:

5) Do you make a note of children's schemas in your child observations?

6) If yes- how do you record this?

7) Is this information used to inform your future planning?

8) Do you think children's schemas **should be** included in planning activities and how do you think this would help a child's development?

9) In regards to the Foundation Phase documentation – should there be more information on children's schemas and schematic play- please circle your answer from 1-5?

1= Not Enough

2= Unsure

3= Satisfactory

4= Good

5= Excellent

10) Do you think that a play-based curriculum such as the FP is a perfect vehicle for developing children's preferred schema/schematic play? Why?

Thank you for your time it is much appreciated.

Appendix 11: Post research Semi-Structured-interview questions with FP Practitioners (Cycle Two):

Q1: What are your initial thoughts and reflections on Cycle Two of this research?

Q2: Have you used schemas since the pilot study (Cycle One) in 2012-2013 and has being part of this study (Cycle Two) helped you to use schemas in your everyday practice?

Q3: What are your thoughts now on the ease of including schemas as part of FP pedagogy?

Q4: How do you feel about now being more aware of what resources you can use to support schemas and how the learning environment can also support schemas?

Q5: How usefulness do you think the suite of resources are in supporting you to observe schemas and include them in your FP planning?

Q6: What do you feel are the barriers to incorporating schemas in the FP?

Q7: How would you evaluate what the research had brought to you and to the setting?

Q8: Finally, how do you feel this research can be best disseminated to colleagues in the setting and to wider FP stakeholders?