Enhancing Brain Development and Cognitive Skills in Infants and Toddlers

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Infants and toddlers can be compared to scientists. Their constant quest for knowledge leads into a lifelong path of discovery and learning. Through the process of discovery, children are ordering, classifying and integrating experiences, which leads to the development of skills in concentration and problem solving and encourages exploration.

Current research on brain development suggests that there are crucial stages in a child's development, referred to as 'windows of opportunity', when specific learning and skill development occur (Simmons and Sheehan, 1997). This research suggests that both the environment and the adults impact on infants' and toddlers' brain development. Adults should be sensitive to the windows of opportunity, as they arise, and provide experiences that promote young children's development. Similarly, a stimulating and nurturing environment is crucial in fostering brain development. The impact of positive physical and emotional experiences on children's cognitive development cannot be ignored. As Smith (1995) states, "quality care is educational and quality education is caring." (p.5) When adults intimately know the infants and toddlers in their care and develop meaningful reciprocal interactions with them, they can provide experiences which enhance and support their physical, emotional and cognitive development. Vygotsky's co-constructivist theory in Fleer (1995) supports this research. This theory asserts that learning drives development and that sensitive and supportive interactions, between adults and children, are the foundation for quality learning. Early childhood programmes require adults who are sensitive to and knowledgeable about children's development and support infants and toddlers in their learning.

Through everyday experiences infants and toddlers are making sense of their world and, through play, are organising their thoughts in a purposeful and orderly way. Each experience builds on previous experiences and provides foundations for future learning. In the early years infants learn from what they see, hear, feel, smell and taste. As they grow older these experiences are transferred to thought patterns, where ideas begin to formulate.

The Far West Laboratory for Educational Research (1991), identifies six 'discovery' areas from which cognition skills in infants and toddlers are developed. Experiences that provide for these discoveries, with the support of sensitive and interested adults, allow children to engage in opportunities to develop cognitive skills. The six discovery areas are the use of tools, cause and effect, object permanence, understanding space, imitation and learning schemes. The researchers at Far West Laboratory believe that when adults see the discovery process in action, they will relate to children in a new way. The importance of the adults' role is emphasised, suggesting that an attitude of respect and appreciation of what children are doing is crucial. It is recommended that fostering a sense of discovery in infants and toddlers requires a rich, uncluttered environment, rotation of toys to provide variety, observation of children to ascertain which discoveries they are engaging in, allowing children to follow their own interests, allowing time for uninterrupted play and not to take over when helping children. The key is adults' sensitivity to children's learning processes, with children being encouraged by adult attention and interest in their play.

The Early Childhood Curriculum - *Te Whaariki: He Whaariki Matauranga mo nga Mokopuna o Aotearoa* (Ministry of Education, 1996) expresses a similar view. While not itemising specific 'discovery' areas, the authors refer to infants as "learning to anticipate events and to communicate her or his needs in a confusing world." (p.22) Infancy is described as a time when the most physical growth and developmental changes occur and infants need a strong sense of self-worth and identity to be able to become confident learners. Toddlers are described, in the document, as having "a desire for independence, knowledge, and an increasing control over everyday life", being "active and curious, determined to become competent and to make sense of happenings, objects, and ideas." (p.23) The curriculum document suggests that infant programmes are "neither a scaled-down three or four year old programme nor a baby-sitting arrangement." (p.22) The key to a quality infant programme is the provision of one-to-one responsive interactions; an adult who is consistently responsible for and available to each infant; individualised programmes that can adjust to the infant's own rhythms; a predictable, calm environment; and partnerships with parents.

When discussing toddlers, the curriculum document warns that they are "often caught between the specialised arrangements made for infants and the independence and business of programmes for young children." (Ministry of Education, 1996, p.23) It is suggested that specifically designed toddler programmes will lessen the tendency for toddlers to become bored or disruptive. These programmes should include a secure environment that provides both challenges and predictability; opportunities for

independent exploration; a flexible approach which accommodates spontaneity and allows toddlers to try to do things for themselves; and responsive and predictable adults who understand and accept toddlers' developmental swings and who will encourage cognitive and language development.

The four Te Whaariki Principles of *Empowerment, Holistic Development, Family and Community, and Relationships* are particularly relevant for infant toddler programmes. Clearly infants and toddlers thrive in a programme that enables them to develop independence, acknowledges all areas of their development, encourages involvement of the family and community, and fosters quality relationships. Te Whaariki promotes a holistic approach to children's learning and describes the responsibility of adults to acknowledge a child's well being and sense of belonging to be as important as communication and exploration in supporting them to develop to their full potential. However, when looking specifically at cognitive development, the Te Whaariki Strands of *Communication* and *Exploration* come to the fore. These Strands suggest that adults, working with infants, should respond positively to infants' gestures, expressions and early attempts at verbalisation and share a child's pleasure in discovery. The programme should provide opportunities for action games, finger plays, songs, and having fun with sounds; playthings that encourage pulling, pushing, fingering, mouthing, and grasping; a variety of material for infants to feel, mould, and explore; contrasts in colour and design, and objects that can be used as tools. For toddlers, programmes should include action games, listening games, and dancing; opportunities for simple games which feature a variety of symbols, shapes, sizes and colours; playthings that are flexible, challenging and predictable; and opportunities for active exploration. Adults working with toddlers, should support toddlers' early words and model new words and phrases; assist in developing skills in listening, observation, remembering, reflection, and decision-making; promote counting, positional language, and language of probability; and encourage them to name, think about, and talk about what they are doing.

The cognitive development of infants and toddlers is closely related to their physical and emotional development. When at home, infants and toddlers have access to one or two adults who are finely tuned into their needs and development. For infants and toddlers to thrive in all areas of their development, when attending an early childhood centre, the same close relationships must be developed. This requires adults, responsible for infants and toddlers in childcare, to form intimate relationships with children. The curriculum document Te Whaariki supports this view and specifically refers to the importance of delegating an assigned adult having responsibility for each

infant. A primary care-giving procedure enables this to occur. If an adult has sole responsibility for one or two children, he/she is able to become intimately familiar with their routines, needs, interests and strengths and can respond immediately and appropriately to the signals the children display. Primary care-giving enables infants and toddlers to become secure in the knowledge that their needs and desires will be met, thereby developing trusting and interactive relationships with those adults. Intimate attachments foster the child's sense of self-worth and identity. A sense of self-worth and identity encourages children to actively explore the world around them which, in turn, enhances cognitive development. A sense of security and positive self-esteem are fundamental in encouraging exploration and learning.

Newberger (1997) discusses this in terms of the environment, where positive interactions with caring adults are crucial in stimulating a child's brain. She asserts that "good prenatal care, loving attachments with adults and age-appropriate stimulation" make a profound difference to children's brain development (p.4.), and that "individual attention and responsible, sensitive care-giving" are critical for language and intellectual development. (p.6). Individual attention and responsible care-giving support a child to develop a sense of identity. When adults' responses to individual children complement their learning styles and support familiar routines and rituals, a child's individuality and identity are promoted. It is clear, then, that experiences that are supported by sensitive adults are the key to fostering cognitive development in infants and toddlers. A time when, in a busy childcare day, infants and adults are regularly and intimately involved with one another, is during care-giving routines. In infancy, a great deal of learning occurs during these routines. Care-giving activities should be seen, not only as routines, but as a valuable part of the learning programme. These routines can include games, songs and skill exercises to stimulate children's cognitive development.

Rather than specific activities being used to extend cognitive development, this paper advocates that infants and toddlers learn best from engaging in everyday play experiences, particularly if those experiences are selected by the child. An environment rich in resources and challenges, with knowledgeable and responsive adults, will encourage children to engage in exploration and discovery experiences and enhance the development of cognitive skills. However, planning everyday play activities which encourage trial and error, manipulation and repetition will further support cognitive development. A nearby adult can assist this learning through guidance, extension, praise and motivation. Cataldo (1983) agrees with the relevance of providing challenging play experiences which the child can self-select.

> Curiosity, insight, discovery learning, and problem-solving are encouraged for learning in the intellectual domain, especially when the child selects and pursues activities. Such play includes cognitive processes that guide the child into thinking about what is experienced…… A match between the child's own interest and ability and the activity at hand further enhances this learning. (p.5.)

Resources that are multilevel and multipurpose foster curiosity and discovery. Learning materials should be responsive to children's explorations and provide hands-on, firsthand experiences which promote discovery, problem-solving, modelling, and skills practice. Although expensive, commercial materials can provide cognitive developmental experiences, home-made resources can provide similar, and often multifunctional, experiences for children. For example a string of beads can offer experiences in understanding space, containment, early maths concepts such as counting and colour, as well as providing a dramatic play prop for toddlers. To encourage cognitive development, everything in the environment should be regarded as a learning resource.

Recent research on brain development has produced some astounding results (Newberger, 1997; Simmons and Sheehan, 1997; Nash, 1997; NAEYC, 1996). No longer are infants and toddlers seen as passive beings, with few cognitive skills. Experiments with the brain provide evidence that the brain is developing, at rapid speed, from birth and educational intervention is imperative if the brain is to be utilised to its full potential. This information supports educational theory and research on cognitive development in infants and toddlers. Vygotsky's theory in Fleer (1995), referred to as a socio-cultural theory. That states a challenging and nurturing environment enhances children's cognitive development but that this alone is not enough. It is the 'expert other', an adult or more experienced peer, that is fundamental in supporting children's learning. Bruner, in Fleer (1995), coined this support 'scaffolding'. Initially, the adult or 'expert other' models an activity. This is followed by the adult and child working on a task together. Finally, the child performs the task on his own. The adult does less and less and the child does more and more. It is, therefore, critical for the adult to know when to move the child through the process. Vygotsky also asserted that a child's social environment, such as cultural values, impact on his or her learning. Children internalise essential features of social behaviours which they use to guide their own behaviour.

Both the research and educational theories, cited in this paper, support the philosophical stance taken. The key elements that are important in supporting cognitive development in infants and toddlers are the provision of a stimulating, challenging environment, and knowledgeable and sensitive adults. Caring adults, while very important, are not sufficient to support the educational learning of infants and toddlers. Adults working with infants and toddlers should be knowledgeable about both child development and sound pedagogical practices. Children, attending early childhood centres, have the right to the best educational and care opportunities that we can provide. Knowledge, gained through training and professional development, enables adults to assess the learning needs and strengths of each child, from which they can provide timely educational intervention and appropriate experiences for children. Primary care-giving procedures meet infants' and toddlers' need for stability and familiarity. Through stable and familiar care-giving practices, children are able to predict regular routines, events and procedures, providing the beginnings of cognitive thought processes (Far West Laboratory, 1991). Consistency of are, provided through the primary care-giving process, allows relationships between care-givers and children to grow and thereby aids the development of a sense of security. Consistency of routines and peer groups foster rich exchanges between children, a sharing of interests and the beginnings of compromise (Far West Laboratory, 1991).

Educational experiences and resources can support the adults' educational intervention in children's learning. A richly resourced environment will stimulate infants' and toddlers' curiosity and encourage them to self-select activities and experiences that enhance their cognitive development. Children are not passive in their learning but active participants. Sensitively reacting to an individual child's own pace and style of learning and providing relevant, appropriate resources and activities will support the child to develop her/his full potential.

This paper has attempted to show, based on sound theory and research, that infants and toddlers are capable of developing cognitive skills from a very early age. Key components of cognitive development have been identified, with discussion on appropriate pedagogical practice. It is evident that a child's cognitive development is enhanced in an environment which consists of stimulating, challenging experiences and sensitive, knowledgeable adults. When infants and toddlers are secure in their environment and care-giving routines, they develop curiosity in the world around them. This curiosity encourages them to engage in exploration and discovery experiences, through which cognitive development is advanced. Infants and toddlers

learn best, when they are able to select experiences and resources that are part of their everyday play. Learning through the process of discovery, exploration and repetition enables infants and toddlers to make sense of the world around them. The accumulation of this knowledge develops their cognitive skills and confidence, leading to a clear sense of identity about who they are and what they are capable of. If early childhood education programmes are to provide infants and toddlers with a sound foundation for learning, educators need to be knowledgeable about the crucial periods of brain and learning development and provide appropriate learning experiences, through sensitive guidance, to maximise this development.

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