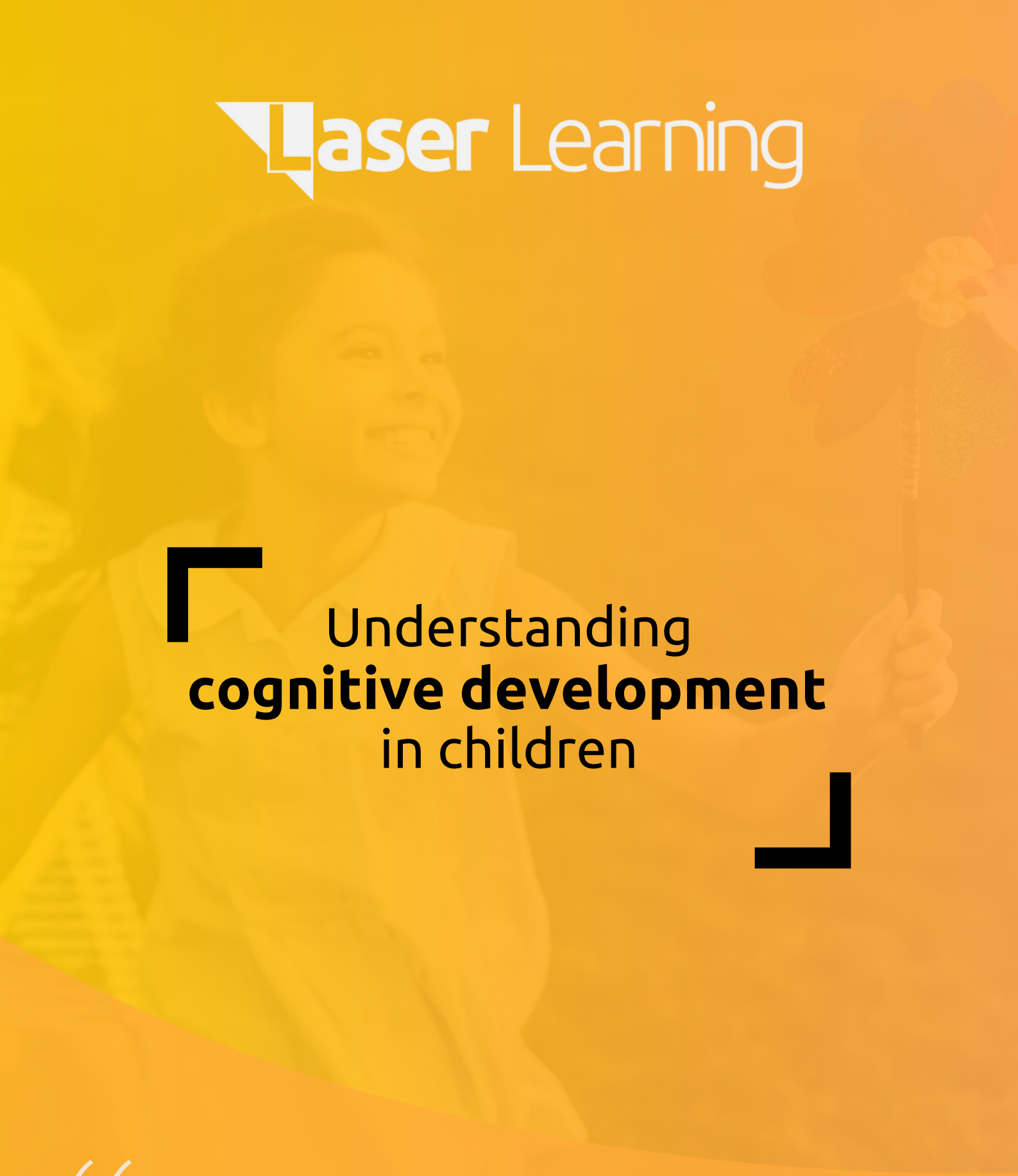
Laser Learning



Understanding **cognitive development** in children

An e-Book for childcare practitioners, educators, parents, and carers who want to understand and support cognitive development in children and young people.

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Cognitive development

Cognitive development is the process by which humans acquire, organise, and learn to use knowledge.

It is a branch of neuroscience, and much of the research on cognitive development in children focuses on thinking, developing knowledge, exploring, and solving problems.

It is widely recognised that early childhood is the most critical and sensitive time for brain development, including cognitive development. Synapses are strengthened and developed in the brain by the experiences a baby has, and become hard wired by repeated use. There is very rapid learning during early life experiences, and connections needed for many important, higher-level abilities (self-regulation, problem solving, and communication) are formed in the early years.

It is important to acknowledge that cognitive development continues through adolescence and adulthood. In fact, there is another rapid learning stage during adolescence and the thoughts, ideas, and concepts developed at this period of life are hugely influential on future character and personality formation.

'The basic architecture of the brain is constructed through an ongoing process that begins before birth and continues into adulthood. Early experiences affect the quality of that architecture by establishing either a sturdy or a fragile foundation for all of the learning, health and behaviour that follow.' - University of Harvard

Cognitive development

Thinking - processing and manipulating information. It is related to reasoning, decision making, and problem solving (Kashyap & Minda, 2016). Thinking skills do not commence at birth and develop gradually through childhood, with rapid development at around 2 years of age.

Knowledge - knowing something with familiarity gained through experience, education, or association. It is essential for speaking, reading, listening, and reasoning skills , and helps to facilitate critical thinking. It starts from birth as children begin to understand the world around them through their senses (Piaget, 1951).

Memory - remembering events and facts of everyday life (explicit memory), small amounts of information that can be held in mind and used in the execution of cognitive tasks (working memory), and information that is remembered unconsciously and unintentionally (implicit memory).

Cognitive development

Perceptual skills - as children develop, they learn to communicate by interacting with their environment and using their sensory and motor skills. When visual, tactile, and auditory skills are combined, they emerge as perceptual skills and these skills are used to to gauge spatial relationships, discriminate between figure and ground, and develop hand–eye coordination (Libertus & Hauf, 2017).

Problem solving - the process of achieving a goal by overcoming barriers. It is entwined with perceptual skills and memory. As children develop cognitively and gain language, the problem solving then transfers to abstract thinking and solving logical problems (Needham, Barrett, & Peterman, 2002).

DID YOU KNOW? Cognitive skills and ability are used in everyday life when processing information - e.g. decision making, recognition of faces, forgetting, and reasoning.

Cognitive milestones

Every child is unique and will develop in their own way and time, however, we can say that there is an expected pattern of development that can be observed over time.

Milestone	Description	Approx. age
Object permanence (early)	Follows an object until it is out of sight. Searches for a partially hidden object.	4–8 months
Object permanence	Will search for a completely hidden object.	9–12 months
Cause and effect	Begins to understand cause and effect in actions. Realises how to get a response.	9 months
Functional use of objects	Understands what objects are used for.	12–15 months
Play (Representational)	Can use dolls in a functional manner.	18 months
Play (Symbolic)	Can use an object symbolically to represent something else.	2–3 years
Skills (Pre-academic)	Knows letters, numbers, shapes, and colors and can count.	3–5 years
Thinking (Logical)	Understands conversation and multi-step problem solving. Understands others' perspectives.	6–12 years
Thinking (Abstract)	Abstract thinking, hypothesising, and drawing conclusions.	13 years+

Source: the Child Development Institute.

Sensory experiences

Sensory experiences happen all the time during daily life - eating, listening to music, holding hands, smelling freshly cut grass, etc. As we grow and develop, we learn how to process and use this information, and make vital links with both familiar and unfamiliar sensory experiences.

Neonates will have had few first-hand sensory experiences. Sensory development would have started in the womb as the child would have experienced the mother's voice, heard music, reacted to food the mother ate, felt the mother's touch as they stroked their stomach, or bathed. Once born, these sensory experiences become first hand and learning develops further. The neonate will respond to all sensory experiences and begin to communicate in response to the experiences. These experiences create vital brain connections, which will continue to strengthen in response to repetition; these connections in the brain are vital for learning and sensory experiences are where learning starts.

Sensory experiences

In the guidance document for the EYFS 'Development Matters', it is recognised that sensory experiences support younger babies to make connections with their environment and help toddlers to make connections with toys, objects, and a wider group of people. As children continue to develop, sensory experiences support them in making connections through repetition, such as pouring water from one container to another, and also to make connections between objects and ideas, such as a big dog, a muddy puddle, or putting on wellington boots for going out on a rainy day.

In practice, taking time to share with children how the soap on their hands feels and smells, or if the outside smells and appears different after rain can mindfully be embedded into your everyday practice. These sensory experiences can be used to introduce new vocabulary and meaning, and also to support the children in linking vocabulary with actions or skills; supporting them to understand and make sense of their immediate environment and the bigger world.

DID YOU KNOW? It is highly recommended that young children are exposed to a variety of sensory experiences in the first years of life, e.g. in skin to skin contact with parents soon after birth, sensory rich treasure baskets, and playing with a variety of materials.

Adolescence

The brain goes through a dramatic remodeling process in adolescence. Neural plasticity, which is the ability of neural networks in the brain to change through growth and reorganisation, facilitates the development of social cognitive skills (Huttenlocher, 1979).

Children are born with an excess of neurons and synaptic connections in the brain. Over time, the brain 'prunes' (gets rid of) weaker connections and the child adapts to the world they find themselves in. During adolescence, this happens again so the young person can focus on skills they are interested and good at.

Areas that often improve during adolescence are:

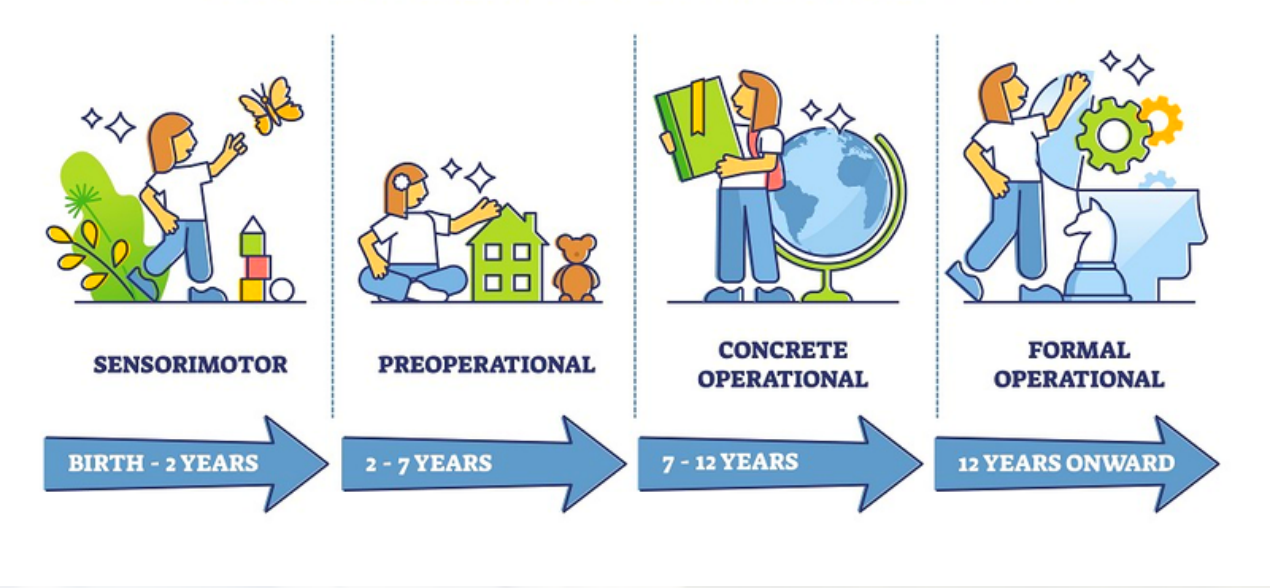
- Attention - selective and divided
- Memory - working and long-term
- Processing speed - levels out age 15
- Organisation - more aware of own thought processes
- Metacognition - thinking about thinking (planning ahead, consequences, and alternative explanations of events)

DID YOU KNOW? If a teenager experiences toxic stress, they get additional toxic stress-related synaptic pruning. Too much pruning can profoundly effect decision making, self-regulation, attention, emotional regulation, thoughts, and behaviour.

Jean Piaget

Jean Piaget is famous as a cognitive development theorist, researching the young brain and how children learn and think. Piaget studied children from early years to teens and used naturalistic observations (often of his own children).

Piaget believed that children thought and understood differently to adults, and pioneered the theory that children 'go through' 4 stages of cognitive development.



Piaget believed that all children would follow the stages in the same sequence and not miss out a stage, although some children might not achieve the latter stages at all. Piaget was mindful that children were individuals and the rate at which children progressed through the stages would vary immensely. Piaget also believed that the same sequence occurred in all children all over the world, irrespective of their culture and life.

Vygotsky and Bruner

Lev Vygotsky and Jerome Bruner researched cognitive development and both concluded that to extend learning there needs to be interaction and support from a 'more knowledgeable other'.

Lev Vygotsky was a leading theorist in cognitive development, he referred to the child's current level of development as the 'Zone of Actual Development' (ZAD) and believed that with support from a more knowledgeable peer or adult, they will develop cognitive skills; Vygotsky refers to this as the child's 'Zone of Proximal Development' (ZPD).

Jerome Bruner refers to a child being supported to achieve a skill as 'scaffolding'; once the child has achieved the skill, the scaffolding can be removed because he is competent at that skill. New scaffolding will have to be erected to support a new skill; the scaffolding is, of course, the support a parent / carer, or practitioner offers the child whilst they are practising the skills.

DID YOU KNOW? Scaffolding theory states that children need support and active help from their teachers and parents if they are going to become independent learners as they mature.

Albert Bandura

Bandura was a social cognitive psychologist renowned for his impact on social learning theory and the field of education. He believed that:

- Humans are active information processors
- There is a relationship between behaviour and consequences
- Observational learning could not occur unless cognitive processes were at work
- Learning would be exceedingly laborious, not to mention hazardous, if people had to rely solely on the effects of their own actions to inform them what to do
- Modelling (demonstrating a task) engages children and young people and encourages learning

Modelling and scaffolding are very useful strategies for teaching students, especially students with Special Educational Needs and Disabilities (SEND).

Responsive adults

A child's relationship and interactions with the adults in their life, especially their primary caregivers, are the most important influence on their brain development.

Babies invite adults to respond to them by crying, cooing, and smiling. Young children use more direct ways to get a response from an adult. Positive 'serve and return' interactions between child and adult are vital to healthy brain development. That is why it is important to talk, sing, read to, and play with children from birth.

If a child does not have regular, positive interactions with the adults in their early lives then they are likely to have weaker brain connections. Chronic or extreme adversity can interrupt normal brain development - a child who is repeatedly exposed to adversity, especially in their early years, may experience 'toxic stress', which is harmful to the brain as well as other organ systems.

DID YOU KNOW? Children placed shortly after birth into orphanages with conditions of severe neglect show dramatically decreased brain activity compared to children who were never institutionalised. - C.A. Nelson (2008); Marshall, Fox, & the BEIP Core Group (2004)

Responsive practitioners

The role of the practitioner in supporting cognitive development happens with, during, and alongside support for other areas of development. Each area of development is as important as the others. The brain may facilitate learning, but requires the other areas of development to complete the jigsaw.

By knowing a child well through positive interactions, and relationships with their family, you will be aware of the child's likes, dislikes, fears, and interests, and will know what the child can do and what they needs further support and experiences to achieve.

Supporting cognitive development often happens without us noticing and is easily embedded in our practice. Conversation, explanations, asking and answering questions, active listening, and showing interest in the child all support cognitive development.

'Children's back-and-forth interactions from an early age form the foundations for language and cognitive development. The number and quality of the conversations they have with adults and peers throughout the day in a language-rich environment is crucial.'

- Development Matters' by the Department for Education

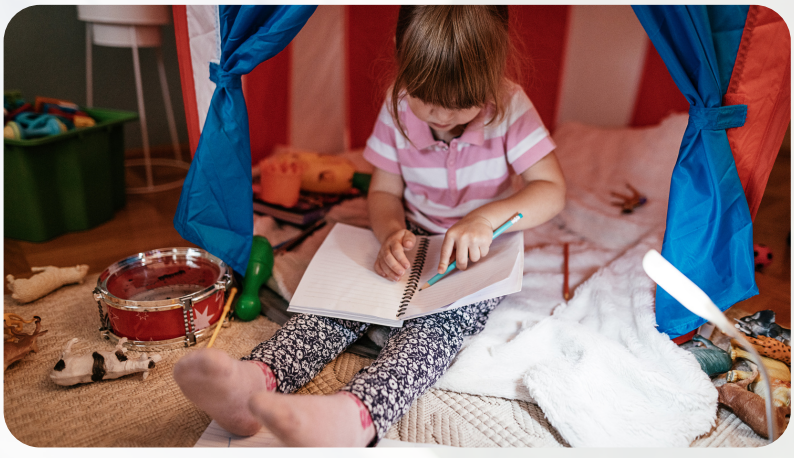
Enabling environments

Cognitive development requires enabling environments with different areas to facilitate different learning styles, such as creative, social, and sensory, and a broad range of activities to stimulate learning, exploration, and problem solving.

The Reggio Emilia approach is an educational philosophy based on the belief that we learn through making connections between things, concepts, and experiences.

This approach sees the environment as the 'third teacher' - the parent is the child's first teacher, practitioners and educators are second, and the environment is the third. The environment should allow adults and children to construct knowledge together.

The Regiio Emilia approach suggests adding an often overlooked space to classrooms - a space to be alone, which allows for children to relax and process new experiences.



Enabling environments

When looking at your space for learning, consider:

- Is it inviting and interesting?
- Is it accessible for all abilities in the group?
- Do children feel safe and secure?
- Is it flexible to accommodate children's changing interests and needs?
- Does it challenge children to experiment, take risks, problem-solve, and explore?
- When a child enters the space, do they know what materials they can find, the type of activity that might happen (loud, quiet, social, or solitary), the expectations for how to behave, and ways in which they can explore, learn, and have fun in the space?

Try looking at the space from the perspective of those who will be using it, and remember that learning areas should be set up to accommodate, facilitate, and challenge the children's thinking.