

Brain development and implications for practice

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Research on child development and early education has increased exponentially in recent decades. In fact, among the most exciting achievements in neuroscience in the past century are new insights into how the brain grows and functions during the earliest years of life. The Center on the Developing Child at Harvard University is leading the way in summarising and translating this research into practice for teachers and families. Their major conclusions from brain research include:

1. Early life experiences build the architecture of the brain.
2. Positive experiences in the early years – especially warm, responsive, caring, conversational relationships – literally grow babies' brains and lay the foundation for later learning.
3. Negative experiences such as prolonged stress, neglect, physical or sexual abuse, or exposure to violence can have dire and long-lasting effects on brain capabilities. Such prolonged negative experience in the absence of consistent adult support is called toxic stress.
4. Early intervention including intensive early education and comprehensive support services for families – the earlier and more intensive, the better – can ameliorate the negative effects and build resilience.

Resilience refers to a child's ability to overcome, adapt to, or minimise the damaging effects of adversity. The good news is that children's resilience can be built and that early childhood teachers have essential roles to play in this process. The most effective strategy for building resilience is the provision of a supportive relationship with at least one adult and that adult may be a teacher or caregiver.

Two vitally important capacities in children that contribute to their resilience are executive function and self-regulation. Both predict success in school and life. Executive function (EF), which has been called the "brain's air traffic control system", *refers to cognitive capacities* that enable children to remember, think flexibility, focus and shift attention, plan and think ahead (Center on the Developing Child, n.d.). Higher-order executive functions include problem-solving and reasoning. Self-regulation is defined as the ability to adapt or control behaviour, emotions, and thinking according to the demands of the situation, control impulses, and delay gratification – usually considered aspects of social-emotional development. At times, these terms are used interchangeably.

To promote resilience, teachers need to intentionally help children develop a sense of self-efficacy and provide opportunities to strengthen adaptive skills and self-regulatory capacities. No less important and effective is ensuring that children develop and maintain connections to faith, hope, and cultural traditions – obviously, a major goal and benefit of New Zealand's early childhood curriculum – *Te Whāriki: He Whāriki Mātauranga mō ngā Mokopuna o Aotearoa: Early Childhood Curriculum* (Ministry of Education, 2017). Following are some examples of effective strategies for promoting brain development, executive function, and self-regulation.

Provide serve and return experiences between adults and children

Serve and return refers to the back-and-forth interaction between an adult and a child, in which each response is contingent upon the response of the partner. When the baby serves – initiates the interaction – and the adult responds appropriately, the child's initiative and self-efficacy are supported and enhanced.

Teach emotional literacy

Children need a large vocabulary of emotion words to describe and regulate their feelings. Teachers can model and build vocabulary by describing their own emotions – “I’m disappointed because we can’t go outside today.” Children can make Tense and Relaxed books with drawings and descriptions of what they look like and how they feel when they are tense or relaxed.

Teach social skills

Like academic skills, children need to learn social skills. Teachers can engage children in group discussions on topics such as: Do you know how to make a friend? How would you invite a friend to play? What are some ways we can be kind to each other?

Teach social problem solving strategies

Have children role play or use puppets to answer questions such as: What is my problem, such as someone took my toy? What are some solutions? Help children generate many alternatives. The more solutions children identify the more effective they will be at solving their own problems. Then ask “What do you think would happen next?” Help them evaluate possible outcomes in advance. When social problems arise, remind them to try the solutions they generated.

Provide opportunities for meaningful socio-dramatic play with a theme, props, roles, rules, and language

Vygotsky contended that such high-level socio-dramatic play is the best way to develop self-regulation. When children play a scenario such as grocery store and take on a role such as cashier or customer, they have to regulate themselves (stay in their role), regulate someone else (other people must stay in their roles during interactions), and be regulated by someone else (i.e. give the cashier money). Such high-level pretend play is the only activity in which all three forms of regulation occur simultaneously.

Build on what children already know and use “wh” questions to call children’s attention to details

Building on children’s prior knowledge is one of the most effective teaching strategies for all learning. It promotes executive function because it relies on and deepens children’s memory capacity. A related strategy to promote EF is using questions such as Why? and What if?

Connect to children’s interests

Children are always more motivated to engage deeply in an experience if the content is interesting to them. Deep engagement is both a characteristic of self-regulation and EF, and a contributor to these important capacities.

Ask children what they remember and to reflect on their own memory processes

Specific demands for memory promote EF. For example, after a trip or visit from an expert or community member, ask the children to share what they remember, write a story or draw a picture of it. Reflecting on their memory is a metacognitive process - How did you remember that? What could you do to remember?

Engage children in planning and revisiting/reflecting on experience

Several effective early childhood curricula such as HighScope and Tools of the Mind involve children in planning their experiences in advance, then engaging in the experience, and afterward reviewing and thinking about what they did and what they learned.

Provide mindfulness exercises, yoga, deep breathing, and quiet places to relax and calm down

Each of these and many other examples are ways to help children self-regulate their biological responses to stress and tension. The physiological effects of stress are not only harmful to the body but interfere with learning. Positive relationships with adults and other children, executive functions, self-regulation, and language are foundational – domain-general – processes that apply across developmental areas and/or subject matter disciplines, underlie all learning, and predict school and life success. Domain-specific abilities such as alphabet knowledge, phonological awareness, or understanding number apply to one or a limited number of domains of knowledge such as literacy or mathematics. Both domain-general and domain-specific abilities are important. The key is to teach in such a way that achieving domain-specific skills doesn't undermine – but rather supports – the development of broader domain-general abilities.

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