# How children learn: Principles to underpin curriculum design
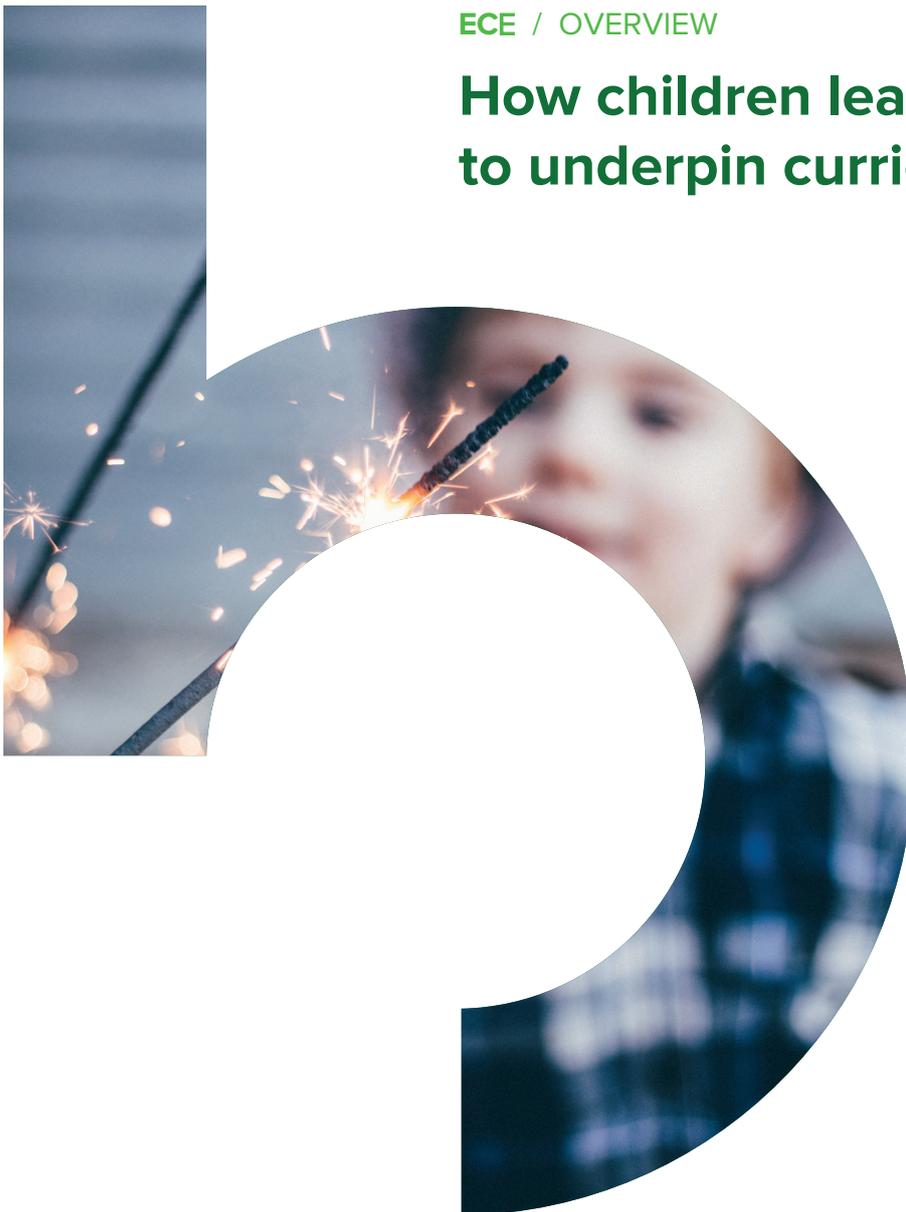
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## Summary

*Research suggests that many teaching strategies, such as direct instruction, child-initiated play, structured activities and engagement with older peers are effective for supporting children's development, but none are appropriate for all learning goals. For example, social competence is more likely to develop during play than direct instruction, but direct instruction might be more effective for building academic knowledge. Multiple teaching strategies are required to be used flexibly and adapted to meet individual children's specific needs, prior knowledge, and current level of understanding in relation to desired curriculum goals.*

*Research within the disciplines of neuroscience and cognitive psychology offer five broad principles to support optimal learning and brain development in the early years. These are:*

*1. Emphasise relationships and promote social interaction*

*2. Nurture children's wellbeing*

*3. Build on prior learning*

*4. Make learning authentic and meaningful*

*5. Develop children's capacities for learning to learn*

# Emphasise relationships and promote social interaction

Social interactions are extremely significant in children's learning in all areas. Children are social learners whose development occurs in the context of their interactions with other people and with their environment. Through meaningful interactions with caregivers that involve increasingly complex problem-solving and communication, children learn to think and to use language and other symbols to express experiences and ideas. Children's ability to make the most of learning opportunities in an early childhood setting are dependent to a great extent on their ability to trust and establish a secure bond with the teacher, as well as to negotiate successful relationships with peers.

The quality of the interactions between infants and their caregivers influences the child's future physical and mental health as well as their capacity to interact with others. Neuroscience demonstrates that infant brains are specially focused on receiving and understanding stimulation from other people: nurturing interactions with adults provide sensory stimuli that develop the neural pathways that are the foundation of many of the brain's core competencies, including language, cognition and coping strategies. Infants who are born into nurturing environments and experience positive sensory stimulation develop connections and responses that enable optimal development, health, wellbeing and competencies.

## What kind of relationships and interactions are best?

Research finds that quality relationships that are highly nurturing and interactions that are highly responsive as well as cognitively challenging are the greatest factor in increasing learning and development, supporting better outcomes in terms of children's peer relations, behaviour, dispositions for learning and later school achievement. Rich, two-sided and sustained conversations are related to healthy language development and later academic success.

## Responsive interactions

The most important pedagogical principle for effective early learning is responsiveness. Teachers' responsiveness to children's developmental level and characteristics is crucial to supporting their learning and development and has a huge effect on the way that neural connections are wired.

Responsive and sustained interactions with infants are found to build and strengthen the neural circuitry of the brain and develop communication, language, social and emotional skills, as well as contributing to the development of secure attachment relationships. Joint attention and joint action are important as they enable children to infer the relationships between objects, actions and words. This initial rapport with other people involves them in joint attitudes toward things in their environment, which strengthens their sense of connection – seeing the same things, doing the same things and sharing the same feelings about those things. Long-standing relationships between teachers and children enable the development of a shared common background of experiences to draw on in ongoing interactions, thereby promoting more effective interactions.

In high quality, responsive interactions, teachers are genuinely interested in the child's thoughts and actions: they listen, extend children's thoughts and knowledge, and co-construct meanings together through the process of knowledge sharing and exchange in order to develop 'sustained shared thinking' and intersubjectivity (joint attention and shared focus, understanding and purpose). Either the child or the teacher can initiate the interaction, but it is the response that can ensure a teaching and learning episode and a turn-by-turn conversational flow, characterised by a smooth flow of sequence of actions and words jointly constructed by the teacher and child.

When implementing responsive interactions, it is important to:

- **Ensure both teachers and children have plenty of time for interaction**. Join in and play and get down to a face to face level with children.

- **Demonstrate an emotionally warm, devoted and appreciating stance** towards children in order for strong emotional bonds, positive feelings and motivation for learning to develop. Use touch to communicate care and provide children with a sense of security, confidence and self-assurance as well as sensory stimulation.

- **Make overtures to children through comments that are in tune with their current focus of attention** to foster reciprocity

and intersubjectivity, then build on the children's activities, taking into account their interest, prior knowledge and skill level. A shared focus or intersubjectivity can be achieved through language, touch, physical actions or engaging with the emotions of an interaction.

- **With infants, focus on 'serve and return' interactions,** which involve acknowledging and responding to an infant or child's attempt to communicate in a way that continues the exchange. Learning to read infants' signals and respond appropriately helps an infant to feel understood and important, and to learn new skills over many repetitions. Notice where infants look and what they touch to find out their interests, and engage with them on those things. Engage infants in brief exchanges and reciprocal communication using vocalisations, gestures, expressions and movements.

- **Intently listen to children**, allowing children to initiate conversations. Select an aspect of a child's utterance to build upon by asking questions or providing further information. Promote reciprocity and children's active participation in exchanges by being responsive emotionally (maintaining eye contact, smiling) and linguistically (consistently responding to children's communications, recasting or expanding children's comments), and being interactive (slowing down, giving cues for the child to take another turn, and asking open-ended questions). This promotes children's sense of competence and self-determination.

## Cognitively enriching interactions

Children learn to think and to use language in the context of social relationships and interactions. Quality interactions are a factor in cognitive development and the attainment of knowledge. Children make greater progress when they experience quality verbal interactions with teachers, including open-ended questioning, sustained shared thinking, modelling of skills and behaviours, and formative feedback during activities. Successful interactions pull children in and along, so that effective learning is based upon a smooth and meaningful exchange. Power and status can influence the emotional flow of interactions, for example, if teachers are overly directive, or evoke negative emotions.

Language exposure is critical to nourishing and stimulating a child's brain. Both the quantity and quality of language experiences that children have are strongly linked to their cognitive and language development, social skills, and later academic performance. Teachers' use of a wide vocabulary, cognitively challenging conversations, and conversations that involve multiple reciprocal turns have been found to correlate with children's subsequent language and literacy development. Research finds that even short exchanges that are a minute or so long are a rich context for learning and teaching.

Teaching style is found to affect the amount of initiative children show in making comments or asking questions, as well as the number of words they use in each conversational turn. While questioning is valuable, there are negative effects associated with stringing many questions together. A higher frequency of questions from the teacher reduces the likelihood of children using initiative, elaborating or following up their response with additional and unrequested information, and is associated with shorter utterances overall. Children are more likely to give low-level replies, which means that increasing questions will not increase children's level or amount of reasoning, remembering or hypothesising.

When implementing cognitively enriching interactions, it is important to:

- **Make oral language development a priority** in your everyday interactions and activities. Use 'parentese' (higher intonation, careful enunciation, slower pace) with infants to gain their attention, and encourage imitation or response. Use your responses to children's utterances to scaffold more complex language, add linguistically and cognitively challenging input and offer vocabulary to accommodate new ideas. Use sophisticated and varied vocabulary in a way that children can understand your meaning, and use words or concepts in different contexts.

- **Seek to maintain conversation on a given topic.** Repeat children's responses to your questions, or include their words directly into a subsequent question, rather than offer an evaluative response, and pause to offer children opportunities to speak. Try to find a connection to the topic raised by the child, add new information that is contingent on the child's contribution, encourage them to clarify their meanings, and provide opportunities for the child to contribute their own knowledge. Use fewer 'controlling' moves, such as questions or monitoring and managing conversational turns.

- **Observe children's social interactions**, and work to facilitate positive peer relationships. For example, invite children to join the conversation, refer children to one another for information or help, and invite children to interact together. These strategies

have been found to increase the number of utterances children direct at their peers during play. Furthermore, positive relationships with peers are significant for children's social and emotional development.

- **Engage children in cognitively challenging conversations.** This could include: personal narratives; explanations; re-creating events; sharing opinions and ideas in pretend play; analysing experiences and different ways of doing things; and theorising about how things work. Give children information when they need it, but not too often as they may become passive, bored and disinterested.

- **Ask both low level and higher level questions**. Lower level questions elicit labels ('do you know what this is?'), descriptions ('what do these look like to you?') and recall ('what do these remind you of?'). High level, cognitively demanding questions provide opportunities for children to examine their previous concepts and understandings and encourage explaining, imagining, interpreting, predicting, and forming opinions. Avoid question sequences, repeating the same question until the children answer it, repeating children's answers, answering your own questions, whole group questioning and chorus answers.

# Nurture children's wellbeing

Cognitive, social, emotional and physical development are interdependent in the early years, so holistic approaches that bring together all four aspects are important. Emotions are highly significant in the functioning of the brain, and emotional processes affect all other neural processes. Fear and stress are found to reduce analytical capacity, whereas positive emotions open pathways within the brain. For older children, cognitive learning is greatly enhanced when children experience feelings of confidence, emotional devotion to a topic, and being carried away by or highly focused on a topic.

Nurturing interactions are particularly crucial to the learning process. The quality of emotional communication between infants and caregivers contributes to the child's wellbeing. In general, emotional security enables the self-regulation required for more effective engagement with learning opportunities. Positive and pro-social environments in which children experience close relationships with teachers, well-developed play scenarios with peers, and minimal disruptive behaviour are important because the social and emotional climate affects individual children's behaviour.  Research also finds that the quality of care in early childhood settings makes a difference to children's cortisol levels: high quality early childhood settings are associated with lower cortisol levels at the end of the day while low quality settings are associated with higher cortisol levels, with the most vulnerable children showing the highest levels of all.

When implementing strategies for nurturing wellbeing, it is important to:

- **Attend to children's needs for good nutrition, sleep, and physical exercise**, which are conducive to improved brain functioning. Ensure children have quality naps. Naps support children's learning by consolidating memories acquired earlier in the day.

- **Provide environments in which children feel safe and supported** by ensuring sensitive and responsive support from adults who can manage the cognitive, physical and emotional challenges that children experience.

- **Construct strong attachments with children** and act as a secure base from which the child can explore the setting. Be emotionally present (not just physically) and be prepared to offer help if needed (and just enough help for the child to do the task themselves). Enjoy children's adventures with them, and experience lots of genuine delight in the child. Develop trust through the provision of clear expectations and directions as well as positive consequences for appropriate behaviour.

- **Help children to organise their feelings** by accepting their feelings rather than seeking to change them, for example, 'I can see that you feel sad at the moment, you feel sad when mummy has to go'. Empathise with an infant or child using tone of voice, gesture and facial expression, and then slowly adjust to a calmer state.

- **Ensure that children experience the positive emotions associated with learning and gaining skills and understanding**. Research finds that the brain responds very well to the sense of illumination and enlightenment that comes with grasping new concepts, so plan for challenging activity that is just beyond, yet within reach of, children's current skills and understanding, and don't be afraid to introduce new concepts and skills.

# Build on prior learning

As new events and experiences occur, the brain identifies common patterns across these and prior events, creating schemas. Schemas are knowledge structures by which new information can be encoded. This means that learning takes place in the context of previous understanding and knowledge, and new understandings are built on top of existing understandings. Children learn about new information or new processes in the light of what they already understand and know, and it is impossible for them to understand, learn or remember something that is totally unfamiliar. Learning involves a gradual unfolding of understanding characterised by corrected errors, revised misconceptions and expanded ideas. Working theories are gradually revised as new evidence comes along, enabling the child to understand all kinds of phenomena in a new way.

Scaffolding is a specific teaching strategy that accommodates children's prior learning and skill level while using various teaching techniques to help the child reach a higher level of thinking or capacity in relation to an activity. For example, teachers can simply invite children to an activity if they have a high level of competence, or provide detailed questioning, instruction and guidance when the child is less competent in relation to the activity. As the child develops competence, the teacher can gradually withdraw their support. For example, to scaffold learning to sew with a needle, the teacher might demonstrate and describe the actions required, offer a sewing template with pre-cut holes, and start the child off by completing the first few stitches for them.

In order to scaffold children's learning, teachers need to provide challenge at the right level within the child's zone of proximal development. In the zone of proximal development, teachers support children at the cusp of what they are able to understand and do - in other words, with skills, dispositions or knowledge that are newly emerging, and that require some assistance or encouragement. This requires knowledge of the learning needed as well as of the child's capacities, understandings and needs in relation to it. The level of challenge is different for each child, changing with task and context.

When building on prior learning, it is important to:

- **Individualise learning** through guided knowledge construction. Respect what children already know and can do, and use these as the basis for them acquiring new knowledge.

- **Create opportunities to draw out and explore children's emergent understandings, ideas and working theories**, and use interactions to highlight links with (rather than simply provide) new concepts, knowledge and activities to extend those understandings. Children benefit from having teachers structure their experiences and point out the relevant similarities and differences.

- **Match the amount of support you offer to the skill level of the child**, and monitor their progress, ensuring you provide just enough but not too much support. Reflect on what you have seen the child do before, and how much help they are likely to need to successfully achieve their goals to determine what kind of interactions will help. If the child falters, provide more support, and decrease support to encourage more independent action as they become more competent. Embed newly learned skills into new contexts.

- **Use scaffolding to extend children in all areas of the curriculum**. For example, use children's observations about the world, such as the growth of a particular plant in the garden, to think about scientific explanations. However, avoid 'hijacking' the conversation for your own ends, instead expanding and extending on children's ideas within a supportive and warm environment in which you acknowledge and appreciate the child's efforts and understandings.

# Make learning authentic and meaningful

Children learn best through activities that they perceive as meaningful and useful. Drawing on and extending children's interests as a source of curriculum is especially important for early childhood teachers, as attention and self-regulation are still developing abilities. Children's interests are a source of intrinsic motivation, involving them in exploring and acquiring knowledge of their surrounding environment. Extensive and deep knowledge of an interest supports children to learn in rich detail, and leads to more effective neural connections than, for example, drill learning.

When creating authentic and meaningful contexts, it is important to:

- **Involve children in authentic and meaningful everyday tasks and authentic cultural contexts**, in which children can learn from being mutually engaged in activity alongside adults. Research shows that, when the content for learning abstract concepts involves objects and ideas familiar to children from their everyday life experiences, they are able to achieve greater success.

- **Notice and document children's emerging areas of interest** and expertise, and support children to become interested and knowledgeable in at least one topic, which is linked to children's propensity to ask questions and take initiative in conversations.

- **Offer a range of ways of engaging with learning**, as some children might be supported most effectively through narrative, and others through hands-on construction and creativity. Learning opportunities need to offer multiple points of entry for young children.

- **Don't underestimate children's capabilities in an area of interest**. When children accumulate a large amount of knowledge in an area of interest to them, they can perform at a level far exceeding expectations, including working with abstract categories and classification schemes and structures. Children who have developed a large store of knowledge about a particular topic are willing to explore and discuss their learning in very different ways. In some situations children can be more knowledgeable than teachers, and interactions focussed on knowledge-sharing are valuable contexts for children to practise explaining, using and defining specialist vocabulary.

# Develop children's capacities for learning to learn

Infants already observe, think and reason as they interact with the world, and children spontaneously develop strategies to help solve problems at an early age. Children can be taught learning strategies and metacognitive skills to help them monitor their thinking and learning, as well as developing theories about what learning is which affect their behaviour within situations where effortful learning is required. When children understand the learning process, they can be more motivated to continue with learning activities, rather than believing that they simply don't know or can't do it.

Mental tools or strategies include trial and error, developing analogies, or relating information and ideas. These are usually learnt from other people through the use of questioning, modelling and demonstrating. For example, children's invented stories improve after they have had storytelling modelled to them. Children who can use a broad range of learning strategies tend to be more successful in problem-solving, reading and text comprehension.

When implementing learning to learn, it is important to:

- **Specifically explain, and make explicit, learning goals** that you are pursuing for children. Comment when you observe those desired learning dispositions and goals in order to direct children's attention to this aspect of their learning and scaffold learning further in the direction of the goal. Model the actions and behaviours of an effective learner yourself, for example, by finding reference material when you are stuck with a drawing.

- **Aim to strengthen the learning dispositions identified as priorities for learning in your setting** by increasing their frequency, expanding the contexts in which they are used, and deepening their complexity. Orchestrate resources and activities to create an inviting environment for that particular learning goal or disposition. For example, if you are seeking to strengthen children's dispositions and abilities to collaborate with one another, choose activities and resources that make collaboration necessary and attractive.

- **Have conversations with children about their learning journeys** as you revisit and review children's portfolios and other documentation. Use phrases such as 'Remember when...?', 'you couldn't do this last week', 'this looks different', and 'how did you learn to do that?'. Emphasise the learning strategies (practising, planning, etc.) that were used. Encourage children to reflect on their learning and develop stories about themselves as learners. Support them to become aware that their intelligence is not fixed and they can grow skills and knowledge with practice, experience and effort.

- **Develop a learning language with a wide vocabulary**, including words such as 'practising', 'being resourceful', 'being an author/ scientist' and 'trying hard' and apply them to concrete examples of children's learning.

## Conclusion

Curricular programmes in early childhood can take many different forms and reflect local and unique priorities, but are likely to support children's learning more powerfully when underpinned by the principles of effective learning identified by research. These means curricular programmes should be focused on building on children's prior learning, promoting learning to learn, and offering authentic and meaningful learning opportunities, within a context focussed on children's wellbeing, positive relationships and interactions.

*Prepared for The Education Hub by Dr Vicki Hargraves*

## Further Reading

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