Child Development: Brain Building Course Book

CHILD DEVELOPMENT: BRAIN BUILDING COURSE BOOK

EarlyEdU Alliance

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Introduction

This course book is the companion text for the Child Development: Brain Building course that covers the latest research on brain and child development to give participants foundational knowledge in development progressions for children from birth to age 5. Through course readings, discussions, activities, and assignments, you will learn to identify children's **developmental trajectories**. An emphasis on brain development will provide a unique lens to apply in an early learning program as another tool to identify developmental progressions.

You will learn how to create early childhood environments that promote physical, language, social and emotional, and cognitive development. You will also explore the key role that individual differences and family and socio-cultural context plays in development and learn strategies to build relationships that support each child's individual development.

Course Topics

This course book will cover principles of child development across all developmental domains and will relate these domains to the Head Start Early Learning Outcomes Framework (HSELOF). The course will also emphasize the importance of understanding each child's development within the context of the child's environment and relationships.

Here is an overview of the course book topics:

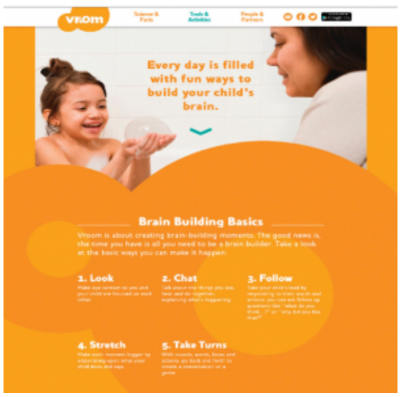
- Brain and physical development
- Language development
- Social and emotional development
- Cognitive development
- Child development and learning in context
- Child development in the context of family, community, and culture

Click on the following title to expand the + and read more:

About this course book

This course book uses Pressbooks technology to provide the content that is viewed online as a webbook. In this **webbook**, links to external sources are marked with and will open in a new browser tab.

Introduction to Vroom



This course and course book will reference a set of free resources called Vroom. These support young children's learning by promoting healthy brain development through meaningful interactions with parents and caregivers during everyday activities like meals, diaper changing, or walking to the park.

Vroom Resources

Vroom resources available in English and Spanish include apps, videos, infographics, and tip cards.

Vroom free app

The app which provides daily tips and also allows a search for tips based on where people are and what they might be doing with a child. The app was designed with parents in mind, but it can serve as a resource to anyone who is working with young children.

Brain Building Basics

Other Vroom educational resources include Brain Building Basics and The Brain Story infographics.

Video: Brain Building Basics (3:03)

This video shows how parents can foster the development of their children. Let's watch and listen for the five practices that adults can do to help young children's brains grow.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=1018#oembed-1

Watch Brain Building Basics from Vroom on YouTube.

Video Debrief

The video covers five brain-building practices: (click to toggle expand or collapse)

- Look
- Follow
- Chat
- Take turns
- Stretch

These are simple concepts for how to interact with children in a way that is building brains. Goals are to give parents and educators the confidence to use skills they already have and to use everyday interactions to support children's development.

Vroom Tips

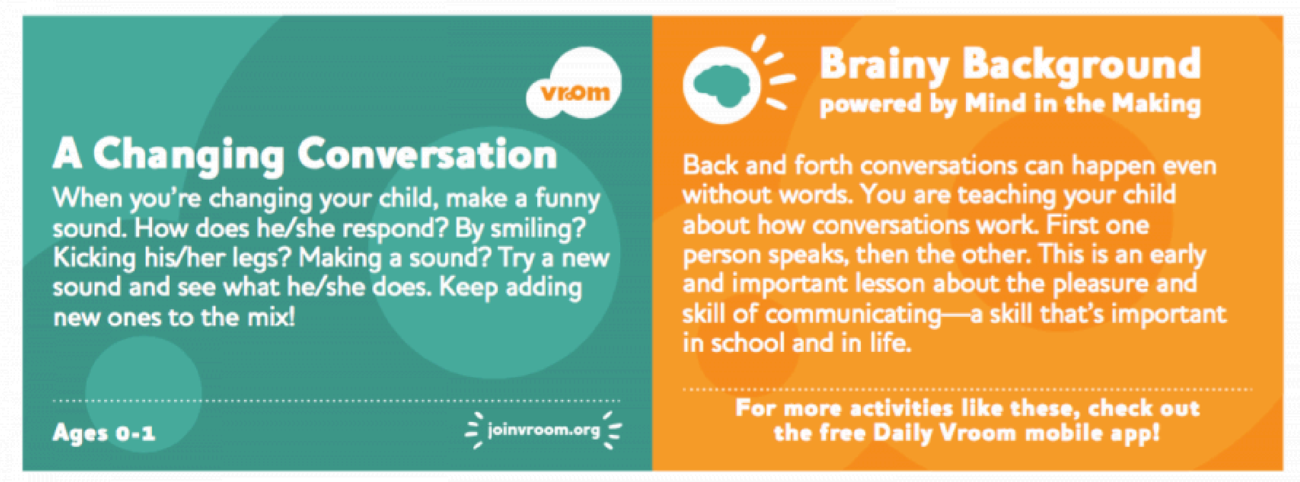
Throughout the course book, we will discuss different Vroom tips to apply what we are learning to ways we can support children's learning through everyday interactions. Each tip explains how to support children's learning during an everyday interaction, such as changing a diaper. Each tip also shares the science behind why the interaction helps support children's learning and development.

Vroom Cards

A link to the downloadable and printable cards is in the reference below and in the readings for the relevant lessons.

Vroom Tip: Changing Conversation

Tips correlate with specific periods in children's development. The intended age range is in the bottom left-hand corner of the tip card. This particular tip is suggested for children from birth to age 1.



View text-only alternative of this Vroom card

A Changing Conversation

When you're changing your child, make a funny sound. How does he/she respond? By smiling? Kicking his/her legs? Making a sound? Try a new sound and see what he/she does. Keep adding new ones to the mix!

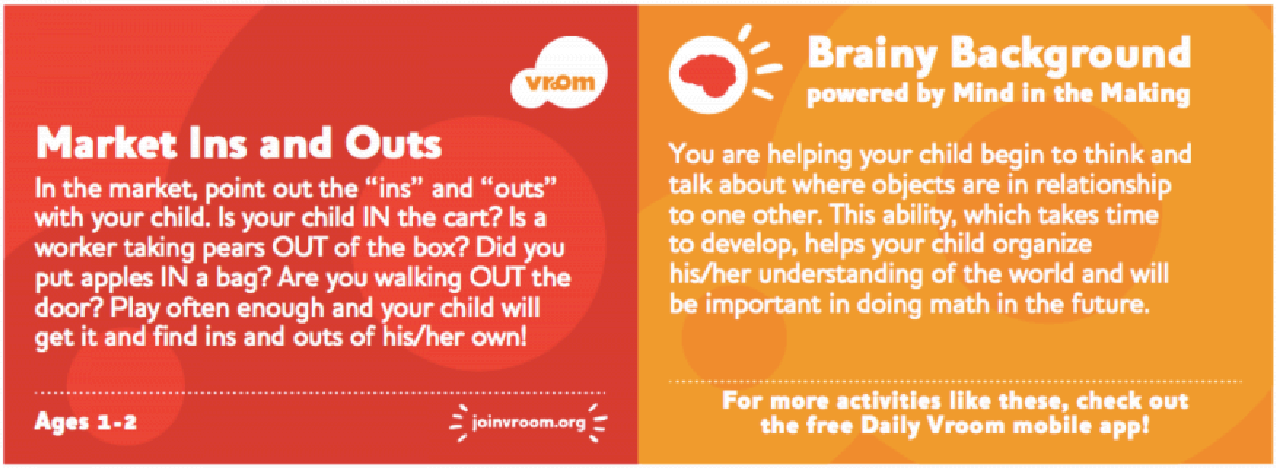
Ages 0-1

Brainy Background powered by Mind in the Making

Back and forth conversations can happen even without words. You are teaching your child about how conversations work. First one person speaks, then the other. This is an early and important lesson about the pleasure and skill of communicating—a skill that's important in school and in life.

Vroom Tip: Market Ins and Outs

This tip for children ages 1 to 2 years old has suggestions about how to help build early math skills.



View text-only alternative of this Vroom card

Market Ins and Outs

In the market, point out the "ins" and "outs" with your child. Is your child IN the card? Is a worker taking pears OUT of the box? Did you put apples IN a bag? Are you walking OUT the door? Play often enough and your child will get it and find ins and outs of his/her own!

Ages 1-2

Brainy Background powered by Mind in the Making

You are helping your child begin to think and talk about where objects are in relation to one another. This ability, which takes time to develop, helps your child organize his/her understanding of the world and will be important in doing math in the future.

Think of how you might adapt this tip to an early learning setting. One idea is: When children are playing, you can point out when they are climbing *in* a box, taking blocks *out* of a bucket, or putting toys *in* a cup.

Vroom Video Tip

Video: Texture Talk (1:43)

Now, we'll watch a short video about a Vroom tip.

Think about:

- How you might use this activity in your learning program
- Similar activities that might build the same skills

This video shows a tip in action. First, the narrator reads the tip. Then a parent uses the tip activity to interact with a child. Then, the narrator reads the Brainy Background behind the tip.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=1018#oembed-2

Watch Texture Talk from Vroom on YouTube.

Video Debrief

How can you use this and similar activities? (click to toggle expand or collapse)

One way to use the activity in an early learning environment is for children to feel fruits on a tray or in their lunch. Similar activities might be to have children:

- Feel fabrics and compare textures.
- Put their hand in a box that they can't see into to feel different objects and describe their textures.

Assignment: Brain-Building Tips

At the end of some lessons, you will complete a brain-building assignment.

The assignments will ask you to create brain-building tips that you or parents could use to help support young children's learning in a particular domain, such as language development.

- The goal of these assignments is to help you synthesize the information that you have learned in the course and apply it to everyday situations.
- It will also help you to think creatively about opportunities for learning.

References

Hamre, B. K., Downer, J. T., Jamil, F. M., & Pianta, R. C. (2012). Enhancing teachers' intentional use of effective interactions with children. In R. C. Pianta (Ed.), *Handbook of early childhood education* (pp. 507–532). New York, NY: The Guilford Press.

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Contributing Authors

This course book is the companion text for the Child Development: Brain Building online and in-person course published and distributed by EarlyEdU Alliance®. The content in the course would not be possible without the efforts of content authors who are specialists in the neuroscience, early childhood, and human learning. In particular, we wish to acknowledge the individual contributions from the University of Washington's Institute for Learning & Brain Sciences.

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1: Foundations of Child Development

In this lesson:

1-1 Head Start Early Learning Outcomes Framework

This section reviews the structure of the Head Start Early Learning Outcomes Framework (HSELOF) and the five central domains: Approaches to Learning, Social and Emotional Development, Language and Literacy, Cognition, and Perceptual, Motor, and Physical Development.

1-2 Child Development Frameworks

This section reviews some of the core issues in child development and present some of the most relevant theoretical models that continue to influence teaching practices and our understanding of child development.

1-3 Introduction to the Brain

This section introduces the basics of brain structure and how the brain works.

1-1 Head Start Early Learning Outcomes Framework

A – Introducing the ELOF

This section looks at the Head Start Early Learning Outcomes Framework (HSELOF), also sometimes called the ELOF, and its five central domains: Approaches to Learning; Social and Emotional Development; Language and Literacy; Cognition; and Perceptual, Motor, and Physical Development.

This is a guiding framework to help educators in all kinds of early learning settings learn about the skills, behavior, and knowledge to foster in all young children.

The Head Start Early Learning Outcomes Framework (HSELOF) is a resource that describes children's developmental progressions from birth to age 5. The framework will guide the activities in this course as you explore children's development across domains. One version of the framework is interactive. [Click to view the interactive framework.]

	CENTRAL DOMAINS				
	APPROACHES TO LEARNING	SOCIAL AND EMOTIONAL DEVELOPMENT	LANGUAGE AND LITERACY	COGNITION	PERCEPTUAL, MOTOR, AND PHYSICAL DEVELOPMENT
▲ INFANT/ TODDLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication	Cognition	Perceptual, Motor, and Physical Development
● PRESCHOOLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication	Mathematics Development	Perceptual, Motor, and Physical Development
			Literacy	Scientific Reasoning	

Image credit: Office of Head Start

The framework supports the learning and development of all children, including children who are dual language learners and those who have disabilities. It guides curriculum selection, implementation, and assessment and can be a tool for planning and assessing teaching and learning experiences and children's progress toward school readiness goals.

Framework Guiding Principles

The Head Start Early Learning Outcomes Framework, based on the latest research in child development, has a set of guiding principles. These are the exact words from the framework as referenced below:

- **Each child is unique and can succeed**. Children are individuals with different rates and paths of development. Each child is uniquely influenced by their prenatal environment, temperament, physiology, and life experiences. With the appropriate support, all children can be successful learners and achieve the skills, behaviors, and knowledge described in the Framework.
- **Learning occurs within the context of relationships**. Caring families, educators, and other adults matter in a young child's life. Responsive and supportive interactions with adults are essential to children's learning.
- **Families are children's first and most important caregivers, teachers, and advocates**. Families must be respected and supported as the primary influence in their child's early learning and education. Their knowledge, skills, and cultural backgrounds contribute to children's school readiness.
- **Children learn best when they are emotionally and physically safe and secure**. Nurturing, responsive, and consistent care helps create safe environments where children feel secure and valued. In these settings, children can engage fully in learning experiences.
- **Areas of development are integrated, and children learn many concepts and skills at the same time**. Any single skill, behavior, or ability may involve multiple areas of development. For example, as infants gain fine motor skills, they can manipulate objects in new ways and deepen their understanding of cause and effect. As preschoolers gain new verbal skills, they can better manage their emotions and form more complex friendships.
- **Teaching must be intentional and focused on how children learn and grow.** Children are active, engaged, and eager learners. Good teaching practices build on these intrinsic strengths by providing developmentally appropriate instruction and opportunities for exploration and meaningful play.
- **Every child has diverse strengths rooted in their family's culture, background, language, and beliefs**. Responsive and respectful learning environments welcome children from diverse cultural and linguistic backgrounds. Effective teaching practices and learning experiences build on the unique backgrounds and prior experiences of each child.

Video: The Head Start Early Learning Outcomes Framework (2:05)

This brief video introduces the framework and ways to use it to support children's development.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=5#h5p-43

Download the video transcript [PDF] from the Early Childhood Learning & Knowledge Center (ECLKC).

B – Domains of Development

Approaches to Learning

The Approaches to Learning domain focuses on the skills and behaviors that children use to learn about the world.

This domain includes four subdomains:

- Emotional and Behavioral Self-Regulation,
- Initiative and Curiosity,
- Creativity, and
- Cognitive Self-Regulation.

Children show behavior in this domain through their emotional reactions, their behavior choices, and their ability to focus attention. For example, the framework indicates that by 36 months, children will:

- Use strategies, such as seeking familiar adults or removing themselves from situations, to handle strong feelings and emotions. (Emotional and Behavioral Regulation subdomain)
- Maintain focus and attention on a simple task or activity for short periods of time. (Cognitive Self-Regulation subdomain)

Social and Emotional Development

The Social and Emotional Development domain focuses on children's abilities to create meaningful relationships with other people; to express, recognize, and manage their own emotions; and to respond to others' feelings.

This domain includes four subdomains:

- Relationships with Adults,
- Relationships with Other Children,
- Sense of Identity and Belonging, and

- Emotional Functioning.

Language and Literacy

The Language and Literacy domain focuses on children's developing abilities to listen, understand, and express themselves using language, and skills that lay the foundation for reading and writing.

The domain for infant and toddlers is Language and Communication with these subdomains: Attending and Understanding, Communicating and Speaking, Vocabulary, and Emergent Literacy.

In preschool, Language and Literacy are separate domains to reflect the differences in development in these areas. The Language and Communication subdomains for preschoolers are: Attending and Understanding, Communicating and Speaking, and Vocabulary. The Literacy domain has these subdomains: Phonological Awareness, Print and Alphabet Knowledge, Comprehension and Text Structure, and Writing.

This domain includes the skills needed to communicate effectively with others. Children's proficiency with language and literacy affects their learning across all domains over time.

Cognition (Birth to 3)

The Cognition domain focuses on the development of reasoning, memory, problem-solving, and thinking skills.

This domain has these subdomains for infants and toddlers:

- Exploration and Discovery,
- Memory,
- Reasoning and Problem-Solving,
- Emergent Mathematical Thinking, and
- Imitation and Symbolic Representation and Play.

Cognition (Ages 3 to 5)

For preschoolers, the Cognition domain becomes two: Mathematics Development and Scientific Reasoning. This reflects the increasingly complex and unique cognitive abilities of children ages 3 to 5.

Within Mathematical Development, the subdomains are:

- Counting and Cardinality,

- Operations and Algebraic Thinking,
- Measurement, and Geometry and Spatial Sense.

Within Scientific Reasoning, the subdomains are:

- Scientific Inquiry and
- Reasoning and Problem-Solving.

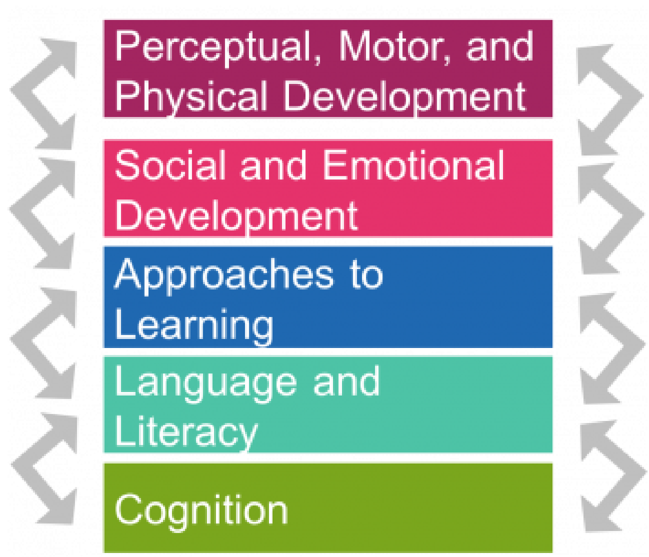
Perceptual, Motor, and Physical Development

The Perceptual, Motor, and Physical Development domain is key to children's development because these areas allow children to explore and learn in others. The domain includes three subdomains:

- Perception
- Gross Motor, Fine Motor
- Health Safety and Nutrition

Domains and Connections

Each domain connects to and influences the others.



For example, as preschoolers' working memory develops (part of Approaches to Learning), their ability to follow multiple-step instructions improves and their ability to learn complex math concepts (part of Cognition) increases. Or, as children develop their skills engaging in multi-turn conversations, their ability to describe social problems and suggest solutions to conflicts (part of Social and Emotional Development) also grows.

C – What You'll Learn in the Course

Course Sessions

This course book is the companion content to the online and in-person Child Development: Brain Building (CDBB) course. Sessions 3 through 11 will focus specifically on the five central developmental domains in the framework: Approaches to Learning, Social and Emotional Development, Language and Literacy, Cognition, and Perceptual, Motor and Physical Development. The framework shows the continuum of learning for infants, toddlers, and preschoolers and describes what skills, behaviors, and knowledge that you should support to help children grow.

Video: CDBB Course Structure (2:41)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=5#video-5-1

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U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start. (n.d.). *Head Start Early Learning Outcomes Framework: Ages Birth to Five.* [PDF]

U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start (n.d.). *Getting started with the Head Start Early Learning Outcomes Framework.* [PDF]

U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start. (n.d.). *Head Start Early Learning Outcomes Framework: Ages Birth to Five.* [Video]

Cite this resource:
EarlyEdU Alliance (Publisher). (2018). 1-1 Head start early learning outcomes framework. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

1-2 Child Development Frameworks

A – Developmental Concepts

Nature AND Nurture

The following quotation is a metaphorical description of how nature and nurture interact. It is attributed to Emeritus Professor of Psychology Charles Brewer of Furman University in Greenville, South Carolina.

> *"Heredity deals you the cards; environment plays them"*

Common concepts in learning about development are nature and nurture. *Nature* is inherited genetic characteristics and tendencies. *Nurture* refers to the environmental conditions that surround a person.

For example, *nature* is people's height, weight, and hair color. *Nurture* is actions, political views, and clothing designed for boys or girls.

One thing missing in the quotation is that the interaction between nature and nurture goes both ways—certain characteristics inherited through nature or genes and the way those genes or characteristics are expressed can change depending on children's environments.

Children's developmental outcomes evolve through the interaction between their genes and environment, not solely by one or the other.

Universality AND Diversity

When we think about development, we also need to think about the difference between universality and diversity.

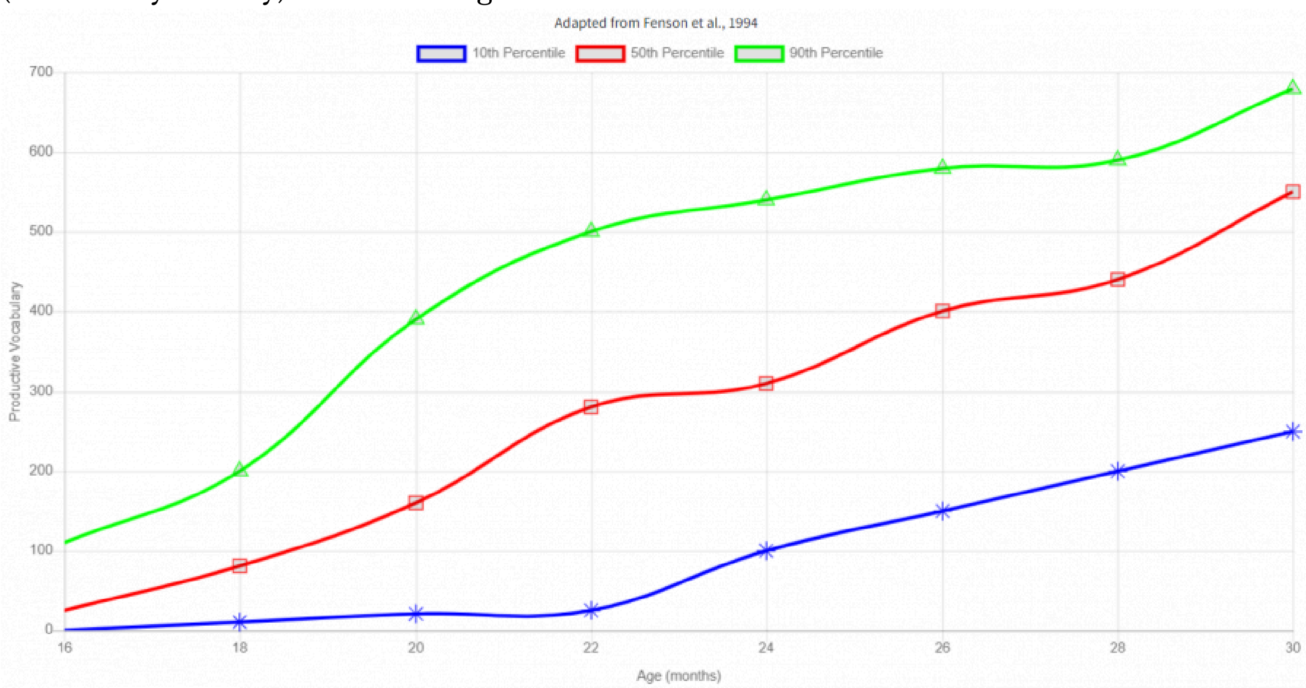
Universality describes developmental changes and sequences that occur in all humans. *Diversity* refers to developmental changes that are individual.

For example, what is *universal* is that most children learn to sit, walk, and run in that in order. Examples of *diversity* in development are that parents in hunter-gatherer families in Papua New Guinea carry infants until they can walk while parents in other cultures may put infants down and encourage them to crawl. In Papua New Guinea, carrying infants can protect them from predators in the wild. Children in Papua New Guinea develop walking skills at the same rate as infants who crawled in other cultures.

Individual Differences

Research on child development tends to look at group averages for skills, such as the age when children usually speak first words. Yet, children can develop very differently from one another.

For example, this graph shows the number of words in children's productive vocabularies (words they can say) at different ages.



The **blue line** * shows that children in the 10th percentile have almost 300 words in their vocabularies at 30 months old.

The **red line** □ shows that the average child says about 300 words by 24 months old and nearly 600 words by 30 months old.

In contrast, the **green line** △ shows that children in the 90th percentile have nearly 700 words in their productive vocabularies at 30 months old.

This means that children in the 90th percentile (700 words) have more than double the amount of words that children in the 10th percentile (300 words) do.

Developmental Milestones

Both nature and nurture can contribute to individual differences in development. For example, the development of a child who is born blind (genetics) can vary, depending on the way that the family adapts the home (environment).

It is important to understand when children are not reaching developmental milestones and could benefit from additional resources and services.

Centers for Disease Control, *Track Your Child's Developmental Milestones*

Knowledge of child development is essential to identification of atypical patterns of development. Resources like the Head Start Early Learning Outcomes Framework or those provided by the Centers for Disease Control and Prevention are useful to determine typical developmental stages at various ages.

In general, if you notice something atypical about a child's development, you should pay attention to patterns and take careful notes rather than jumping to conclusions. You can communicate with parents and other staff members to verify their observations and to work together to understand the child's development.

It is not your job to diagnose specific developmental issues but rather identify developmental patterns. You should invite parents to connect to early intervention or special education services so a professional can do a more detailed assessment based on the concerns. The earlier the identification of developmental delays, the greater the potential benefits of the services to the child and family.

B – Interconnected Development

Connecting skills

Children's development is fundamentally interconnected because skills connect to each other.

Even though this course will present the different domains of development as they are in the Head Start Early Learning Outcomes Framework, development in each of these domains connects to development in all other domains.

For example, this course focuses extensively on language development. However, research says that children learn language through social relationships (Social and Emotional Development). Language skills allow children to count (Cognition) and describe what they see

(Perceptual, Motor, and Physical Development). Language also allows children to learn rules to regulate their behavior (Approaches to Learning).

Video: Brushing Teeth Together (0:59)

This next video features preschoolers brushing their teeth together in an early learning setting. Think about these questions as you watch the video:

- What domains of development do you see?
- How do they connect?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=88#video-88-1

Video Debrief

What are some examples from the video of domains that are connected? (click to toggle expand or collapse)

Possible Answer

In this video, examples of connected developmental domains are:

- Perceptual, Motor, and Physical—hygiene, fine motor hand coordination, and grasping.
- Approaches to Learning—reminders of steps in the routine such as "What do we do next?"
- Social and Emotional—relationships with adults and other children, requesting help and answers from adults, engaging other children in brief moments of play while brushing teeth.

One example of connected development is language and motor skills. The children are listening to instructions to pick up and use their toothbrushes.

The Active Learner

It is important to note that children are active agents in their environment. They are not passive beings waiting to be taught. They are explorers and scientists who act on their world to learn.

In other words, children's environments *do* affect them, but the opposite is also true—children affect the environment.

For example, when young children babble, they are practicing making noises. They often imitate sounds that they hear other people make, and they will use babbling to elicit reactions from the adults around them.

Similarly, when children drop objects from their high chair, they are exploring their world: *Does the object make a noise when it falls? Can I still see it when it falls? Will someone pick it up and give it to me again?*

Child development is a complex process that is influenced by experience, culture, and individual differences.

Video: BABIES – Official Trailer (2:26)

This movie trailer features four infants from four different locations. As you watch the video, think about where you see these common developmental concepts:

- Nature and nurture
- Universality and diversity
- Individual differences
- Active learning

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=88#oembed-1

Watch BABIES – Official Trailer from Focus Features on YouTube.

Video Debrief

Where do you see these common developmental issues in the video? (click to toggle expand or collapse)

Possible Answer

Examples are:

- Nature and nurture: nature—differences in infants' skin colors and hair (nature) and in their interactions with animals (nurture)
- Universality and diversity—crawling (universal), laying on backs or being held (diverse)

- Individual differences—one infant appearing to stand well before the others
- Active learning—Interacting with their environment, grabbing on to the goats, or watching the water in the shower

C – Theories of Development

Many scientists and philosophers have developed theories of child development. Theories gain and lose popularity, so many theories have become outdated over time.

Three theorists who have made a big impact on the world of child development and whose theories are still used and cited in some capacity are: Jean Piaget, Lev Vygotsky, and Urie Bronfenbrenner.

Piaget


Jean Piaget in Ann Arbor

Jean Piaget believed that children construct their knowledge about the world by forming ideas, testing them, and refining their ideas based on their experiences.

Piaget's view of cognitive development in early childhood can be broadly characterized by four stages: sensorimotor, pre-operational, concrete operational, and formal operational.

Sensorimotor. According to Piaget, children are in the sensorimotor stage from birth to age 2. In this stage, children learn to coordinate their own actions with objects in the physical world. The biggest accomplishment in this stage is an understanding of object permanence, the idea that an object still exists even when a person can't see it.

Pre-operational. The second of Piaget's stages is the pre-operational stage, which lasts from age 2 through age 7. In this stage, children engage in symbolic play and learn to manipulate objects as symbols. Although they do not yet understand concrete logic, they use pretend play to practice using symbols. Piaget noted that children in this stage of cognitive development are egocentric and have a difficult time understanding that other people have different beliefs and opinions.

Concrete operational. Children are in the concrete operational stage from age 7 to about age 11. This stage is characterized by children's increasing ability to think logically, though children might still have trouble understanding abstract or hypothetical concepts.

Formal operational. Finally, children are in the formal operational stage from age 12, through puberty and into early adulthood, until age 20. In this stage, children become much more sophisticated in their ability to use logic and deductive reasoning.

Vygotsky

Image credit: The Vigotsky Project, distributed by [CC BY-SA 3.0 license]

Lev Vygotsky emphasized the importance of relationships and mentorship in children's learning and development.

He categorized children's knowledge in three circles:

- Things children are capable of doing by themselves (the inner circle).
- Things that children are not yet capable of doing (the outer circle).
- A middle zone of things that children can do or learn with help (the middle circle).

Vygotsky called the middle circle of things that children can do with help the **zone of proximal development** (ZPD). Older or more capable people can help children acquire new skills by pushing them beyond their natural boundaries into the zone of proximal development to expand their repertoire of knowledge.

Bronfenbrenner

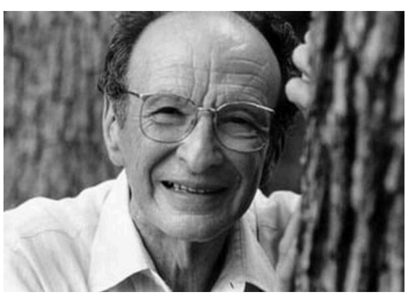


Image credit: BCTR Cornell, College of Human Ecology

Urie Bronfenbrenner recognized that children develop within the context of their environments and that interactions between children and their environment are bidirectional. That is, children act on their environments and environments shape children.

His theory, and others like his, also propose that people are not living in an isolated world but instead in a broad system of intimate relationships with family, school, community, and society.

It is important to remember that children develop within environments that include many contexts, interactions, and individuals, and that all of this is happening in the context of time.

As Bronfenbrenner indicates, the most important influential context on child development is the microsystem, which includes the child's family. Additional contexts influence the child and the family, directly and indirectly.

Interactive: Bronfenbrenner's Model

This is an interactive model; click on the plus signs to reveal more about each circle.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=88#h5p-1

Bronfenbrenner's model continues to influence education today as educators consider parent engagement in children's learning, schedule parent–teacher conferences, and make connections in communities.

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EarlyEdU Alliance (Publisher). (2018). 1-2 Child development frameworks. In *Child Develop-*

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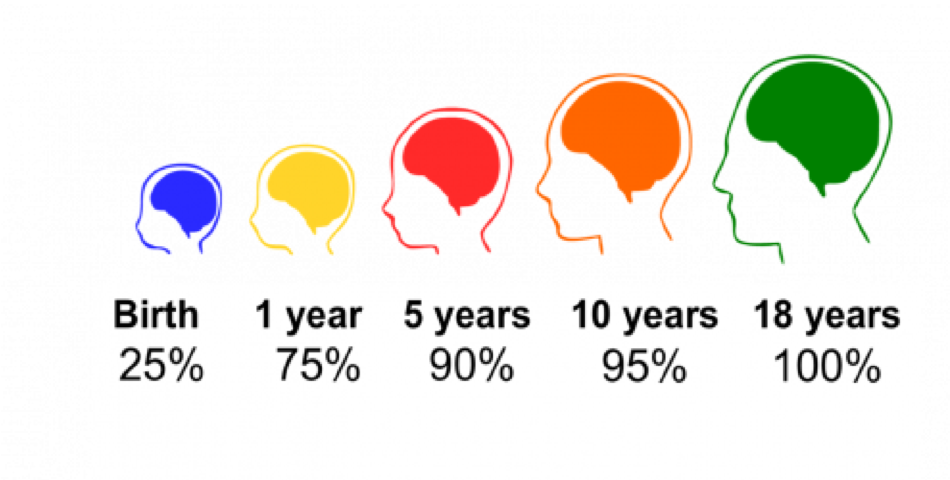
1-3 Introduction to the Brain

A – Brain Development

Children's brains grow faster in the first few months and years of life than they will at any other time.

At birth, infants' brains are about one-quarter the volume of adult brains. The rest of a newborn's tiny body is not even close to one-quarter of their adult size. If it were, the average newborn in North America would weigh about 40 pounds.



Children's brains continue to grow, and quickly. A recent study calculated the rate, or how fast, infant brains grow. By the end of their first year of life, children's brains are already 75 percent of adult size. By 5 years of age, they grow to about 90 percent of adult size.

An important thing to note is that while 5-year-olds' brains may be 90 percent of the size of adult brains, this does not mean that children's brains are 90 percent *finished* by age 5. A 5-year-old has much, much more to learn.

For example, when 4 to 5 years old, children can only *sometimes* control their impulses and still need support from adults. The parts of the brain that control impulses, like the pre-frontal cortex, still need more time and experience to develop. Scientists estimate that the brain doesn't finish developing until well into the third decade of life. But by 5 years of age, children have most of the raw materials, like brain cells or neurons that build the brain.

Children's brains are uniquely primed to learn from everyday experiences. At this stage, the brain is like a rough draft, ready for the experiences of life to continue shaping it into the specialized brain of an adult.

Session 2 will focus more on brain development in the first five years of life. But next will be a closer look at the brain and how it works.

Control and Communications Team

The brain is part of the nervous system. The nervous system is a bit like the body's control center and communications team.

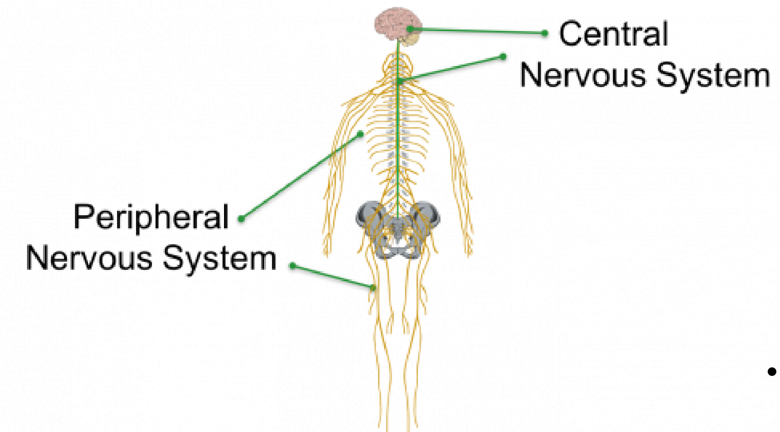


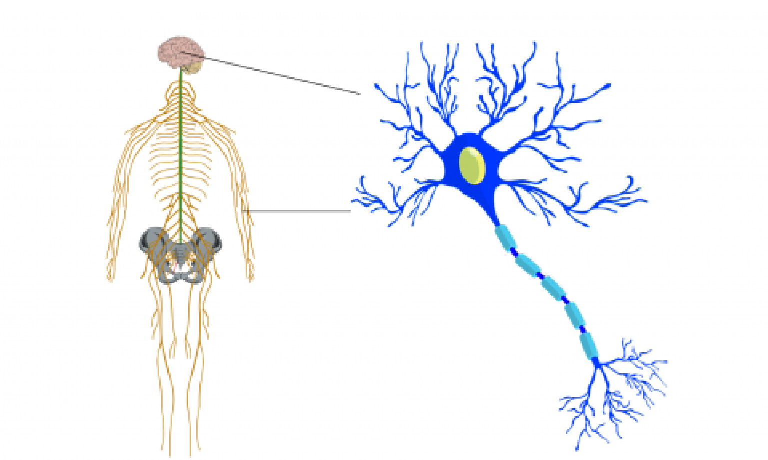
Image credit: EarlyEdU

The nervous system controls both your voluntary functions like thoughts and actions, as well as your body's involuntary functions like breathing and your heart beating.

The nervous system has two main parts:

- The central nervous system, which is made up of the brain and the spinal cord.
- The peripheral nervous system, which includes all of the nerves that carry messages to and from the brain to the rest of the body.

The Nervous System and Neurons



The nervous system is made up of neurons. Neurons are cells that have special features that allow them to quickly send messages throughout the body.

There are neurons in the brain—and a lot of them. The adult brain has about 86 billion neurons.

The neurons in our brains process information coming in from the body through the peripheral nervous system. From this information, neurons form our thoughts and direct our actions.

For example, if you see your friend in the grocery store, your brain processes the visual information. Several regions of the brain coordinate to recognize who this person is and to determine how you should react. The brain then directs the muscles in your arms and hand to wave and the muscles in your face to pull into a smile.

We also have neurons throughout the rest of our bodies. Some of these neurons sense the surrounding world—the sounds, smells, tastes, textures, touches, and temperatures—and translate these inputs into neural messages that travel to the brain.

Other neurons in the peripheral nervous system direct our muscles to contract, allowing our bodies to move and our heart to beat.

Interactive: Parts of a Neuron

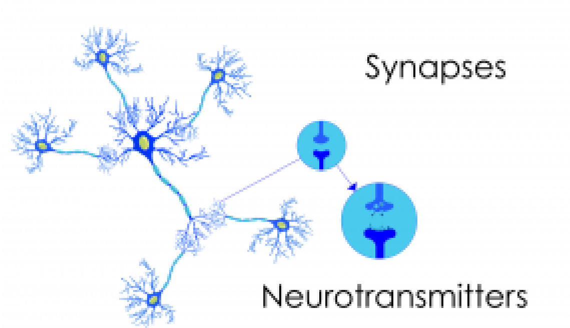
In this interactive, we look at some of the special features that enable neurons to send messages throughout the brain and body.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=90#h5p-3

A Network of Neurons

At this point, it is important to note that neurons never work alone; each neuron is part of a network of other neurons.

Neurons transfer signals to other neurons through structures called synapses. A signal neuron may make thousands of synapses with other neurons.



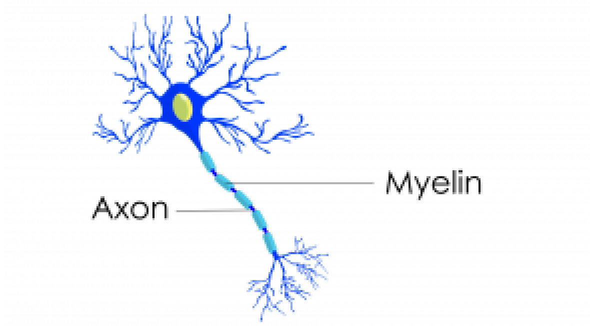
Once the signal reaches the end of the axon, it triggers the release of chemical messengers at the synapse. These chemical messengers are called *neurotransmitters*.

Neurotransmitters travel through the tiny space between neurons and dock in special receptors on the receiving neuron's synapse. This initiates a weak electrical signal in the dendrites of the receiving neuron and the process begins again.

When someone is talking about making connections in the brain, they are talking about synapses. When we learn new information, the number or structure of synapses changes in our brains as a result of repeated experiences.

Myelin

Many neurons have another feature that helps them to communicate information quickly. The name of this feature is *myelin*. Myelin is a fatty, insulating layer that wraps around axons. It helps electrical impulses to travel faster down the axon.



Here is an example: Have you ever grabbed a hot pan handle and then quickly let go a few seconds before you felt pain in your hand?

It turns out that the neurons that transmit the sensation of hot temperature to your brain have myelin on their axons, or are said to be *myelinated*. But the neurons that sense burning pain don't have myelin. So the pain sensation arrives at the brain just a bit after you let go of the hot pan handle.

The brain has many myelinated axons. This allows neurons to rapidly and efficiently communicate.

B – More Brain Anatomy

Gray and White Matter

This image shows the brain as a whole. The outer part of the brain is called the *cortex*. The cortex is densely packed with the cell bodies of neurons.

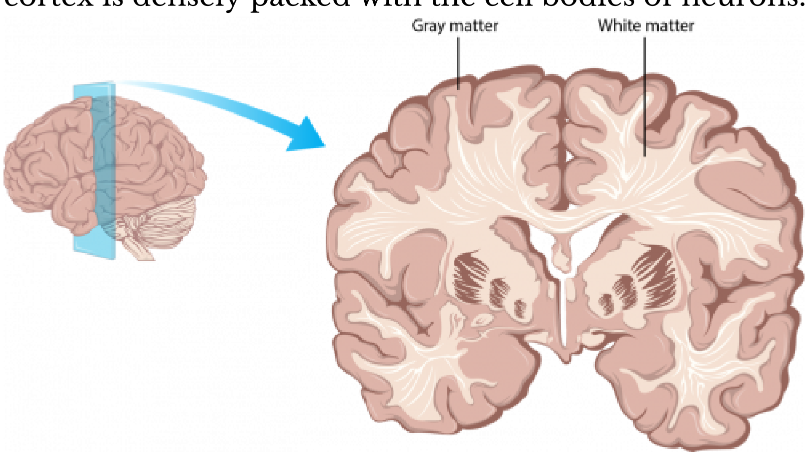


Image credit: EarlyEdU

The cortex is actually slightly pink in color, but this part of the brain is often called *gray matter*. It is called gray matter because this dense tissue appears gray in magnetic resonance imaging (MRI) brain scans. Session 2 will focus more on brain imaging.

Beneath the gray matter are bundles of myelinated axons. This is called *white matter*. The fatty myelin coating on these bundles of axons appears white in MRI scans.

Many axons bundle together to form what are called *fiber tracts*. These fiber tracts are like superhighways for information, connecting different regions of the brain together. These fiber tracts allow neural messages to travel quickly from region to region.

Brain Networks

Using a special type of magnetic resonance imaging (MRI) called *diffusion tensor imaging*, or DTI, scientists can examine where different fiber tracts are located in the brain.

This image shows a three-dimensional model of white matter fiber tracts in the brain. We are looking straight down at the top of the head.

When looking at this image, can you imagine what the brain looks like, even though we are only looking at the white matter fiber tracts?

These information superhighways carry neural impulses rapidly throughout the brain. Everyone uses all of their brain constantly, not just a certain part, or a certain percentage.

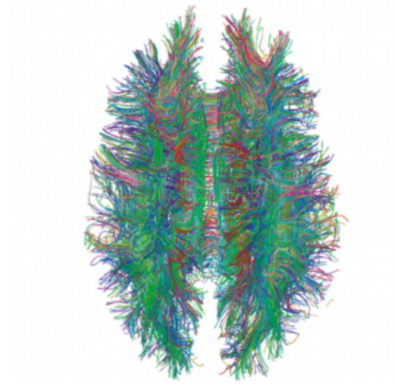
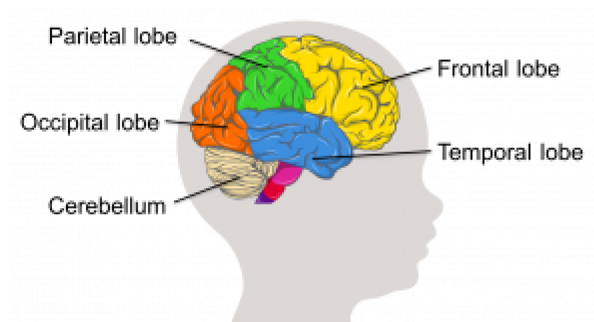


Image credit: By Xavier Gigandet et. al., distributed under a CC BY-2.5 license

Regions of the Brain

The brain has different functional and structural regions. These regions are called *lobes*. Each lobe is specialized for a particular set of tasks.

For example, the occipital lobe processes visual information. The frontal lobe is involved in reasoning and planning, the ability to control emotions, and motor control.



We use all of our brain constantly. Your brain works continuously, rapidly sending information between these different regions via fiber tracts and determining what you should say, do, and feel at any given moment.

Earlier, you imagined what the outer part of the brain looks like, just from seeing the underlying fiber tracts. Now, do the opposite: Looking at this illustration of the cortex, imagine what all of those fiber tracts that connect these different regions might look like.

C – The Working Brain

Brain Development and Learning

Our brains have a lot of different tasks to do. They take in information from our senses and process all of it simultaneously to make sense of the world. Based on all that input, our brains have to then coordinate how our bodies should respond.

This section covered some of the main regions in the brain and what their functions are. It also presented how neurons work to carry messages throughout our brains and bodies.

Throughout our lives, but especially as children, we train our brains to respond in different ways to different situations through the experiences that we have.

During the first few years of life, children's brains are developing, growing, and learning at an incredible rate.

Session 2 will talk more about brain development in the first five years of life.

Video: How the Brain Works (3:54)

This animation is called *How the Brain Works* and reviews the information you've learned about the brain.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=90#video-90-1

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2: Brain Development and Structure

In this lesson:

2-1 What is the Brain?

This section covesr the roles that the brain plays in people's everyday lives.

2-2 Stages of Brain Development

This section focuses on how the brain develops.

2-3 Tools We use to Study the Brain

This section looks at the different kinds of tools and ways that scientists use them to study the brain.

2-4 Biological Factors that Influence Brain Development

This section addresses biological factors that can influence how the brain develops in childhood.

2-1 What is the Brain?

A – How the Brain Works

Role of the Brain

We start off this topic with a discussion about what the brain is. We don't just use our brains for thinking and learning. The main role of the brain and nervous system is to create and direct behaviors. And it does this based on a perception of the world that it also creates.

Our brains and nervous systems create the world that we live in and experience everyday. Our brains are integral to who we are, and, as will become evident a bit later, each brain is unique to that person.

Our nervous systems perceive physical changes in the world, such as patterns of light and dark, sound waves, changes in pressure or temperature, and the presence of different types of molecules in food or air. Brains take in all of these many inputs and create a perception of the world based on those inputs.

Video: Whodunnit? (1:54)

This video is about a murder mystery. As you watch the video consider who you think committed the crime?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=253#oembed-1

Watch Whodunnit from VoicesOnCall on YouTube.

Video Debrief

During the video, a detective asks suspects some questions and names the murderer at the end. However, the true point of the video is as a demonstration of selective attention.

What is selective attention? (click to toggle expand/collapse)

At 55 seconds, the screen narrative asks the viewer: "Did you notice the 21 changes?"

The clip then plays again, but this time from behind the camera. This angle reveals the 21 scene changes that happened during the video, with changes that affect the victim, room decorations, and a large item in the back of the room.

You may want to watch the initial video again so that you can see that some of the changes are quite noticeable when you are looking for them.

You can thank your nervous system for the experiences you had or did not have as you were watching this video.

What we see, hear, feel, taste, or smell are all renderings of physical stimuli from the world created by our brains.

Two Noses, Two Perceptions

Images via Pixabay

The way the human nervous system perceives the world may be very different than say, the way a dog perceives the world. Human brains and bodies are specialized for different tasks.

For example, have you ever noticed a dog tracking a scent through the grass? Even if you tried very hard, do you think you would be able to trace, let alone detect that smell?

For you, that smell doesn't exist as part of your experience of the world. But for the dog, that smell is an integral part of its experience. And the dog will choose to take different actions based on the fact that the smell is part of its reality.

What we perceive, act on, and remember is a result both of what our nervous system is physically capable of responding to, as well as what we are paying attention to at the time.

As we talk about brain development, think about how people's brains shape the way that they perceive every moment of their lives and link to every facet of children's development.

B – Regions of the Brain

Multiple Zones

Let's take some time to review information about the regions of the brain.

The brain has different functional and structural regions. These regions are called *lobes*. Each lobe is specialized for a particular set of tasks.

We use all of our brains constantly. Your brain works continuously, rapidly sending information between these different regions, determining what you should say, do, and feel at any given moment.

Interactive: Regions of the Brain

This is an interactive element! Click on the plus signs to reveal more about the regions of the brain.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=253#h5p-7

Image credit: EarlyEdU

The Limbic System

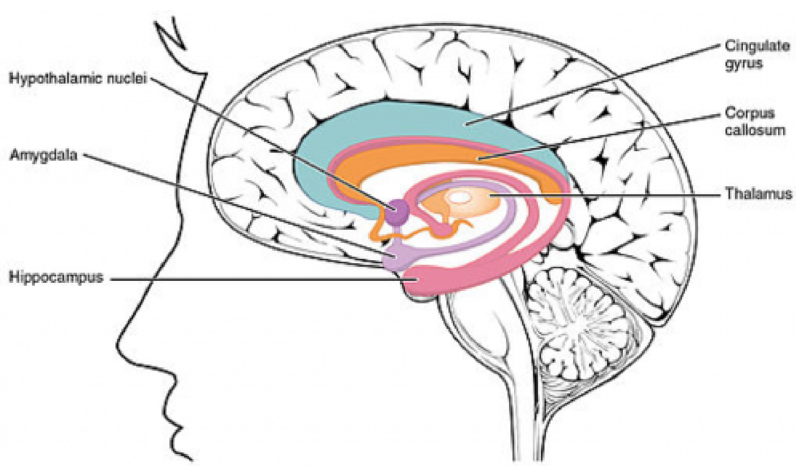

Image credit: OpenStax College, distributed by [CC BY 3.0 license]

So far, we've highlighted regions in the cerebral cortex and the cerebellum. But those aren't the only regions in the brain.

The limbic system is a network of structures located below the cerebral cortex and above the brain stem. These closely connected structures help regulate day-to-day behaviors and emotions. We will briefly discuss two limbic system structures that you have likely heard of—the hippocampus and the amygdala.

We briefly talked about the hippocampus when we discussed the temporal lobes. The hippocampus plays an important role in the formation of new memories. To do this, the hippocampus takes information from different regions of the brain and consolidates them into memory.

Think of a day that you remember vividly. Can you remember sounds, smells, and colors?

Your hippocampus helped to make sure that all this information, collected from different regions of the brain, is stored together in one memory.

You may have heard of the amygdala before. Often the amygdala's role in the brain is overly simplified and linked only with fear.

But the role of the amygdala is more complex than that. The amygdala helps us feel certain emotions and recognize them in others. The amygdala is particularly active during events in our lives that are important to our survival. This brain region helps us regulate our reactions to the presence of danger, rivals, food, or a particularly attractive mate.

Connecting Brain Regions

The last lesson pointed out bundles of axons called *fiber tracts* that connect the many regions of the brain. These information superhighways allow neural messages to travel quickly from region to region.

We use all of our brain constantly, not just a certain part, or a certain percentage. In any task that we do, we are using many regions of our brains, which are working and coordinating together.

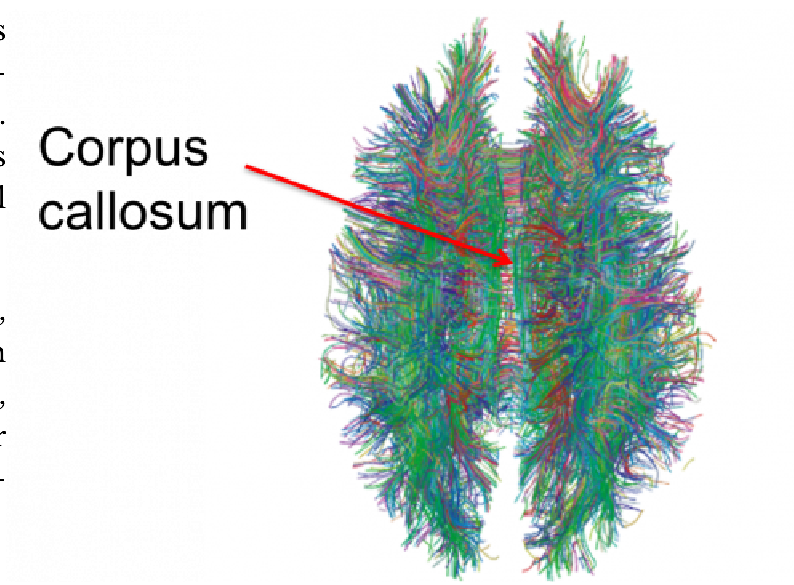

Image credit: Xavier Gigandet et al., distributed by

This image shows a three-dimensional model of many of the white matter fiber tracts in the brain. Last lesson, we learned that white matter is bundles of myelinated axons. This image is a view looking straight down at the top of the head.

A band of fibers connect the two sides or hemispheres of the brain. This area of fiber tracts is called the *corpus callosum*, and it allows the two sides of the brain to constantly interact.

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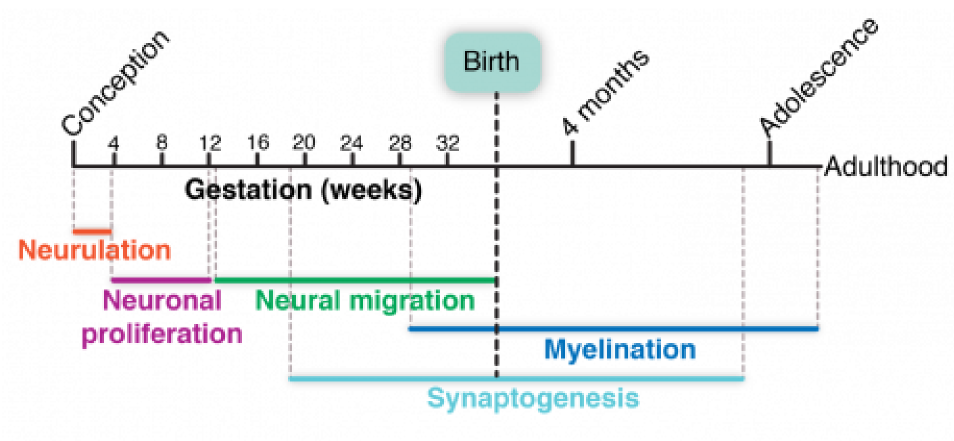
2-2 Stages of Brain Development

A – Stages of Brain Development

Brain development occurs over many stages. It begins soon after conception and continues to adulthood.

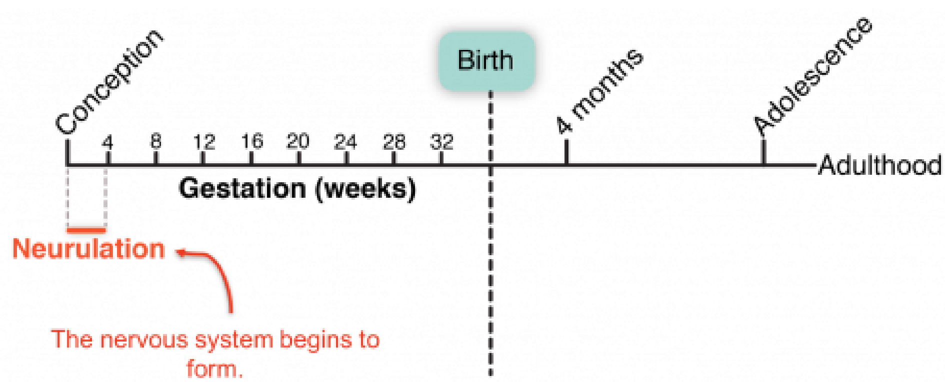


(Adapted from Giedd, 1999, p. 4)

Let's briefly highlight each step in brain development for a broad overview of the process.

Early Formation of Nervous System

Brain development begins long before birth. In fact, the first stage of brain development, the formation of the nervous system, begins within days of conception.



(Adapted from Giedd, 1999, p. 4)

As discussed in the last lesson, the nervous system is the body's communication's team.

Networks of neural connections form an information superhighway. Rapid communication between the body and brain drives every single motion, intention, and thought. It is this network that allows people to learn and adapt to their ever-changing surroundings.

This early formation of the nervous system is called *neurulation*.

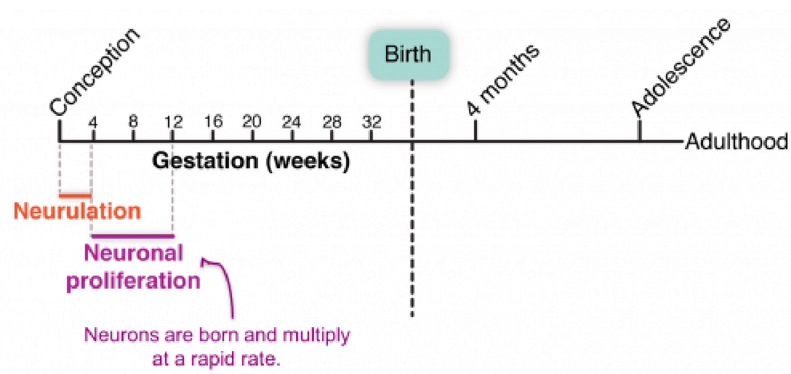
Knowing the term *neurulation* isn't that important, but what is important to know is that the nervous system begins to form before most women know that they are pregnant. The developing nervous system is very susceptible to recreational drugs. Recreational drugs are psychoactive, meaning they are used to alter one's mental state in a way that modifies emotions, perceptions, or feelings.

Psychoactive drugs change the way the nervous system communicates. When the nervous system is developing, these changes can cause the brain and the connections forming within the brain to develop in atypical ways. It is very important that women who are pregnant avoid recreational drugs and alcohol so that their baby's brains develop without the interference of psychoactive substances.

In fact, the Centers for Disease Control and Prevention, known as the CDC, recommends that even women who are trying to become pregnant, or could become pregnant, avoid drinking alcohol. This is because most women don't know they are pregnant for several weeks, and by that point the nervous system has already begun to form. The most recent estimate from the CDC is that up to one in 25 babies may have fetal alcohol spectrum disorder, which can lead to behavioral and intellectual disabilities.

From the earliest points in development, the brain is affected by its environment.

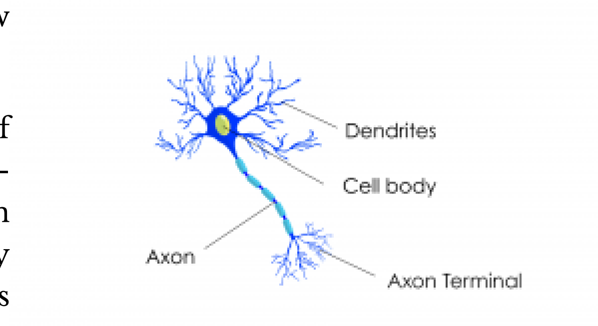
The Birth of Neurons



The next phase in brain development is the birth and rapid multiplication of neurons.

At birth, infants have many of the neurons that they will have as adults. Adult brains have about 86 billion neurons, so the developing brain has a lot of work to do as it generates billions of these specialized communication units.

Reviewing Neurons



Let's briefly review what neurons are and how they work.

In the last lesson, we learned that the network of neurons in our bodies act as our personal communications teams. The neurons in the brain process information coming in from the body through the peripheral nervous system. From this information, neurons form thoughts and direct actions.

Neurons receive signals from other neurons through a network of intake fibers called *dendrites*. These signals travel down the dendrites, in the form of weak electrical currents, until they reach the cell body.

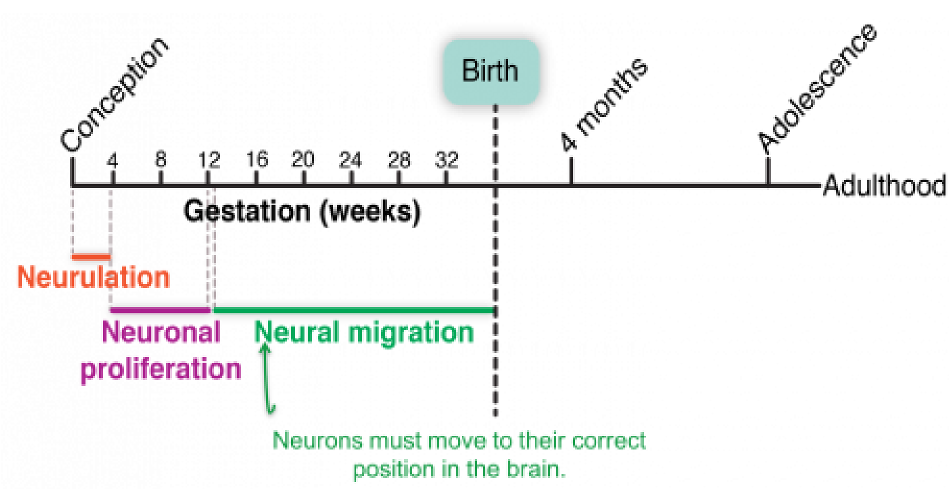
Once they reach the cell body, these signals, if they are strong enough, trigger the neuron to send or *fire* an electrical impulse.

This electrical impulse travels down the length of the neuron's axon, or output fiber.

Neurons transfer signals to other neurons through structures called *synapses*. A signal neuron may make thousands of synapses with other neurons.

This lesson will present more information on synapses later.

Neural Migration



Most neurons are born deep in the central part of the developing brain.

They then have to move, or migrate, to their final position. This process is driven by tides of chemical signals that help newborn neurons find the right place in the brain. Getting to the right place is no easy task.

The brain is a complicated structure with many different functional zones. Next, we will take a look at some of those regions.

B – Rapid Brain Growth

Rapid Brain Growth

An infant's brain grows at an incredible rate of about 1 percent a day, then slows slightly to 0.4 percent a day by the end of the first 3 months.

So far, we have mostly discussed brain development before birth. By the time a child is born, an infant's brain has all of the different regions that it will have as an adult and most of the neurons. But the brain still has a huge period of growth and development to go through.

A child's brain grows faster in the first few months and years of life than it will at any other time.

A recent study calculated the rate, or how fast, that infant brains grow. Researchers found that an infant's brain grows at an incredible rate of about 1 percent a day, then slows slightly to 0.4 percent a day by the end of the first 3 months.

During this period of rapid brain growth, a lot is happening in the brain. One very important part of brain development is the formation of communication points, or synapses between neurons.

Video: Colors on the Piano (0:58)

This next video is *Colors on the Piano.* The video is approximately 1 minute long.

As you watch the following video, think about which brain areas the child may be using.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=255#video-255-1

Video Debrief

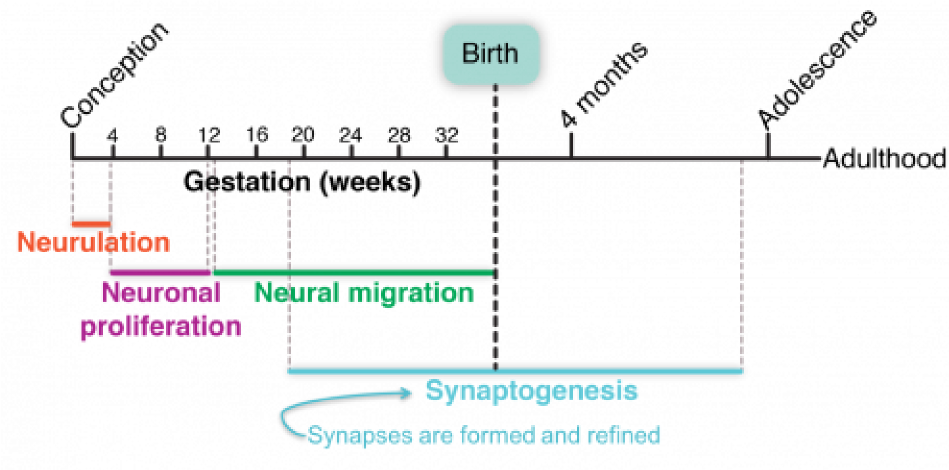
Which part of the child's brain regions do you think were active during the interaction on the video? (click to toggle expand or collapse)

Here are some of the regions of the brain we thought were active:

- Frontal lobe: planning what to do next, motor control
- Parietal lobe: sense of touch
- Occipital: vision

- Temporal lobe: learning language sounds
- Cerebellum: coordinating motor movements
- Limbic regions: remembering what to do with a piano

Process of Making Connections



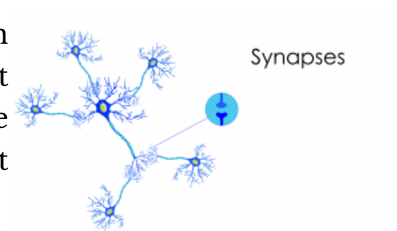
Neurons rely on synapses, or connection points between neurons, to communicate with each other.

The process of forming these connections, called *synaptogenesis,* extends from gestation to adolescence and even adulthood.

Next, we'll learn more about what synapses are, how they form, and how they can change over time.

Synapses

Previously, we talked about how neurons send messages down their axon, or output fiber, via weak electrical currents. What happens when that electrical current reaches the end of one neuron? How does one neuron share this message with the next neuron?



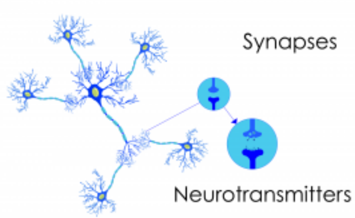
Messages move from one neuron to another across synapses. Synapses are similar to the point in a relay race where one runner passes the baton to the next runner. The runners themselves don't touch, but they come very close, transferring the message, or the baton, from one runner to the next.

The weak electrical currents can't cross through the tiny space between neurons. The message has to be translated into a different form. When the electrical current reaches a synapse at the end of the axon, it triggers the release of a burst of chemical messengers, or *neurotransmitters*. Neurotransmitters cross the tiny space between neurons, allowing the neural message to transfer from one neuron to the next.

Imagine the relay runners again. What if a runner threw a handful of confetti to the next runner instead of passing the baton? This is a little bit like what happens when the electrical impulse reaches the end of the axon. It triggers structures in the neurons to release a batch of chemical messengers.

These tiny chemical messengers sail through the space between neurons and dock in tiny receptor structures located on the receiving neuron. The receptor structures then translates this chemical message back into an electrical signal. And the electrical signal begins its journey down the dendrite toward the cell body.

Neurotransmitters



The brain has different types of neurotransmitters. This allows neurons to send specialized messages.

Most neurons release only one kind of neurotransmitter. In fact, many neurons are classified by the type of neurotransmitter they release. The two most common types of neurotransmitters transmit a signal that either increases the likelihood that the neuron will send a message of its own or decreases the likelihood.

Other neurons that release specialized neurotransmitters are only in certain brain regions. Some widely known specialized neurotransmitters are serotonin, dopamine, and epinephrine (also called adrenaline). While not the most common neurotransmitters in the brain, they do play a powerful role in modifying moods and regulating alertness.

Most drugs that people use to modulate moods change the effectiveness of neurotransmitters in the brain. This is the same for prescription drugs, such as anti-depressants, and recreational drugs, both legal, such as alcohol, and illegal, such as cocaine. All these drugs modulate neurotransmitter activity.

A child's developing brain is particularly sensitive to changes in neurotransmitter dosage. Drugs that increase or decrease the dose of certain neurotransmitters can actually change how networks of neurons are wired together and how they function. This is why warnings exist for women who are pregnant about taking drugs, especially alcohol, that modify certain neurotransmitters.

Trillions of Connections

Neurons have different jobs in the brain. Some connect to just a few other neurons, while others connect to thousands of other neurons. Typically, one neuron will make many connections to another neuron. Regardless of whether neurons connect to one or many neurons, the average neuron makes 7,000 synaptic connections.

We are born with many of the neurons we will ever have—about 86 billion. Imagine that each of those 86 billion neurons then has to make 7,000 connections with other neurons. That is an incredible amount of synaptic development that has to occur.

It is estimated that in the cortex alone there are about 20 billion neurons and that those 20 billion neurons make about a trillion synapses per cubic centimeter of cortex.

Although we are born with most of our neurons, our brains have not yet made all of those trillions and trillions of connections. This allows us to continuously learn new things and become experts at living our own lives.

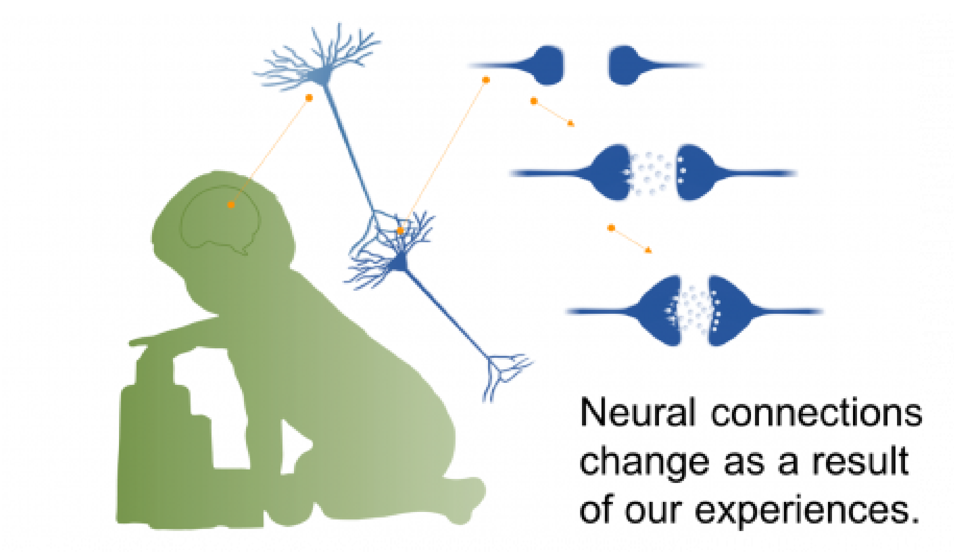
C – How Connections Develop

Synaptic development is sort of like a forest of young trees or saplings. All the trees are there, but they are small, and they haven't filled in all their branches.

Neurons grow in a similar way. As the trees, or neural connections, grow, they mature into a dense network of connections—the ecosystem of the brain.

And this is a good thing because the connections forming in our brains are the result of what we learn and the experiences that we have. When you learn something new, you are shaping the way neurons in the brain share information.

Experiences Shape Connections



To a certain extent, which connections form between neurons, and how strong those connections are, is based on our experiences. The developing brain is establishing networks of neurons that work together.

The more often you have an experience, the more the neurons involved in processing that experience begin to work in unison. Perhaps you have heard the phrase: *Cells that fire together,* *wire together*. The idea behind this quotation is that the more often a certain neural pathway is stimulated, the stronger that neural pathway becomes.

Connections and communications between neurons grow stronger by increasing the number of synapses or increasing the size of existing synapses.

When we learn something new, and we practice what we have learned, we are shaping how the neurons in our brain connect and communicate.

With so much to learn in the first few years of life, our brains are forming new connections at an incredible rate. Your work as an early childhood educator is quite literally shaping the architecture of brain.

Experience Expectant

Scientists William Greenough and James Black described the way the brain makes connections by lumping them into two main categories.

The first category they called *experience-expectant* synaptogenesis. This describes the process of forming connections in the brain based on the experiences that every typically developing child will be exposed to. For example, the visual parts of the brain *expect* or require exposure to light and pattern to form the correct connections in the brain. The brain is preprogrammed to collect this information and form the appropriate connections in the brain.

While exposure to these types of environmental input or experience is required for typical brain development, barring an extreme circumstance, every child will form these connections without intervention or need for extra stimulation.

Experience Dependent

Greenough and Black referred to the second category of connection building as *experience-dependent* synaptogenesis.

This process describes the connections that form in our brains as a result of the unique experiences that we have in our lives. For example, we all learn to speak different languages.

The more exposure that we have to a particular experience or set of experiences, the stronger the connections between neurons become.

This is true of both positive and negative experiences in our lives. And this process starts from birth. Our experiences as children shape the way our brains are connected and set the stage for the rest of our lives.

Neuroplasticity

The ability to change the way neurons in the brain connect and communicate is called *neu-*

roplasticity. Just as you can mold plastic, you can shape the way that neurons in your brain network.

We can't change all the connections in our brains. Some are fixed, but many others can be altered, at least to some degree, by the result of experiences. Scientists didn't always know that the brain could be shaped by experiences.

It wasn't until the 1960s that groundbreaking work by Dr. Marian Diamond and her colleagues, David Krech and Mark Rosenzweig, revealed that experiences can change the physical structure of the brain.

In their original experiments, Dr. Diamond and her colleagues looked at the brains of rats that either lived in cages that had lots of fun toys, like ladders, wheels, and balls, to keep them busy or lived in empty cages with nothing to do other than eat and drink.

The researchers found that the brains of rats that lived in cages with lots of opportunities to explore and be active were actually larger than those of the rats in the empty cages.

Dr. Diamond went on to discover that changes in experiences could lead to changes in the size of neurons and their number of connections.

Changes to Adult Brains

While the original studies on neuroplasticity involved rats, more recent studies have looked at how experiences can change the brains of humans as well, even adults.

One famous example of this is a study looking at the brains of taxi drivers in London, before widespread use of Global Positioning Systems (GPS) or smartphones.

Researchers used a brain imaging technique called magnetic resonance imaging to look at the size and shape of a region of the brain that is important for memory. Do you remember the name? This region is the hippocampus.

When the researchers looked at the hippocampus of taxi drivers, they found that a region of the hippocampus that is important for spatial memory was larger in the taxi drivers than in the brains of people who were not taxi drivers.

This indicates that even the adult brain has the capacity to make small changes to brain structures based on experiences and the demands of our everyday environments.

Video: My Love Affair with the Brain (6:07)

Listen for the information that Dr. Marian Diamond shares about the brain while you watch the next video.

To provide some information about the people making these world-changing discoveries, the *scientists*, we'll watch this video trailer to a documentary film about the life and work of

Dr. Marian Diamond. Dr. Diamond was a pioneer in the field of neuroplasticity. She died in the summer of 2017.

As you watch the video, consider:

- What did you hear Dr. Diamond say about the brain?
- How does this information apply to your interactions with children?
- How do you support children's brain development?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=255#oembed-1

Watch My Love Affair with the Brain from Bullfrog Films on YouTube.

Video Debrief

What are the implications for brain development? (click to toggle expand or collapse)

A couple points that Dr. Diamond made about the brain are:

- Diet, exercise, challenge, newness, and love can improve the brain.
- The brain is only 3 pounds, approximately.

The information in the video applies to everyday interactions with children because children are building neural connections and setting the foundation for years of learning.

You can support children's brain development with any activity that involves responsive, social, back-and-forth interactions, or guided exploration of new experiences.

D – Brain Connections Activity

In this activity, you will take a closer look at the process of forming connections between neurons.

Images of brain neurons

The drawings in the interactive below show what neurons in the brain look like at different stages. These are drawings of what just a few neurons in the brain look like over the course of the first few years of life.

The dark triangular-shaped spots are neuronal cell bodies. The thinner lines are the axons and dendrites that carry messages between neurons. Within the first five years of life, the density of the connections between neurons increases rapidly.

Interactive: Brain Connections by Age

In this activity, you'll see a series of images that show what neurons in the brain look like at different stages. Inside of the interactive, arrange them in a way that you think best shows how the brain develops from the newborn brain to the brain of a six-year-old. Once you are done, click on the Check button to see how well you did. Note that you can attempt this activity multiple times.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=255#h5p-32

Adapted by I-LABS from: LeRoy, CJ. The Postnatal Development of the Human Cerebral Cortex. Vol I- VIII Harvard University Press, Cambridge MA, Copyright 1939, 1975 by the President and Fellows of Harvard College.

Activity Debrief

Were you surprised that a 6-year-old's brain actually has fewer connections than a 4-year-old's?

Why it matters

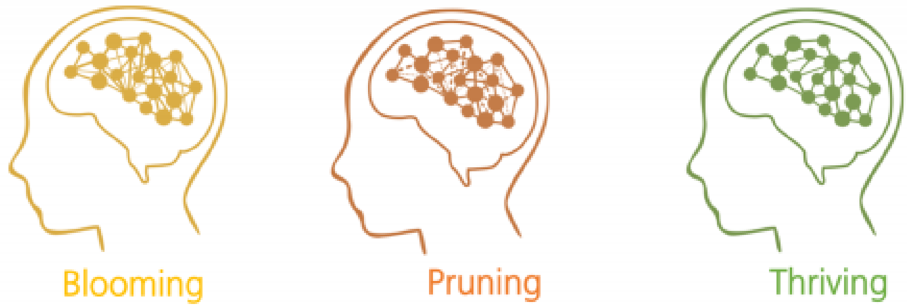
In the first five years of life, a child's brain makes more connections than it will ever need; the brain overproduces connections. At age 5, a child's brain has about two to three times the amount of connections that an adult's brain has.

After over-producing connections, the brain begins to refine which connections to keep and which to discard. This process of refining the number of connections between neurons is called *pruning*. This pruning process is incredibly important for healthy brain development.

E – Pruning Connections

Pruning connections results in a thriving brain.

The brain prunes synaptic connections by reducing the number of connections it has, keeping the frequently used connections and eliminating the infrequently used ones.



This process is a little bit like the process of caring for a blackberry bush. At first there is a period of rapid growth, when the brain is *blooming*. During this time, the brain makes many extra connections. These extra connections actually make the brain less efficient.

Just like after a period of rapid growth in the spring, a blackberry bush can become gangly, with too many branches going in all different directions.

After the period of blooming in the brain, connections are refined, or pruned, based on the experiences that we have. Connections that we need and use are kept. Connections that we don't need—ones that are actually making it more difficult for the brain to function—are removed.

The result of this process is a brain, or a blackberry bush, that is healthy and thriving. The branches, or connections, that are left are stronger and the brain is more efficient.

Throughout brain development, there are multiple periods of blooming and pruning. These bursts occur at different times and in different regions of the brain. Scientists think that these bursts of blooming and pruning align with sensitive periods in the brain. Sensitive periods are times when our brains are particularly open to new experiences and to learning.

Sensitive Periods for Language

The process of brain development is really the process of building the brain through experiences every day. Because the brain is developing so rapidly in the first few years of life, the experiences that people have as children are particularly influential.

The more often a child has an experience, positive or negative, the more likely that experience is to shape the connections forming in their brains.

Interactive: Critical Periods for Language

Use the image slider near the bottom of the interactive to explore this chart.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=255#h5p-6

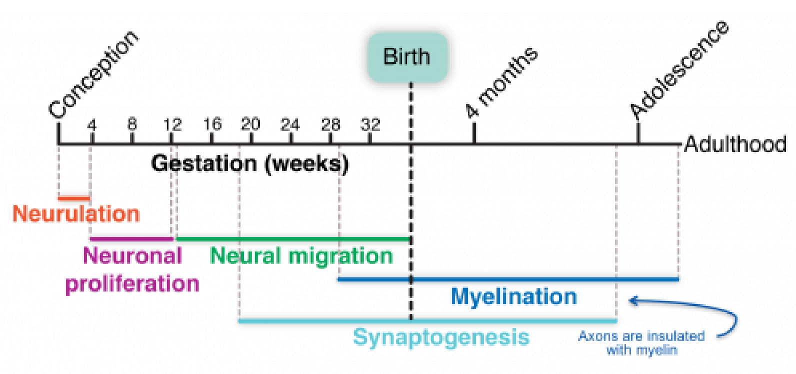
Reflection Point

Think about the kinds of experiences that children that you work with have on a daily basis. Consider these questions:

- What are children learning from those experiences?
- Would you change those experiences in any way to help support their learning?

F – Helping Neurons Communicate

Myelination

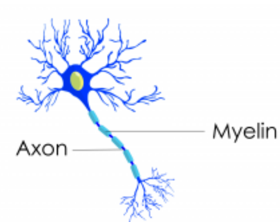


One final aspect of brain development to consider is the process of *myelination*. Myelination in the brain impacts how efficiently neurons communicate with each other.

Lesson 1 described *myelination* as the process by which neurons are coated in a fatty, insulating layer, called *myelin*, which wraps around axons. Myelin helps electrical impulses to travel faster down the axon.

Process Continues into Adulthood

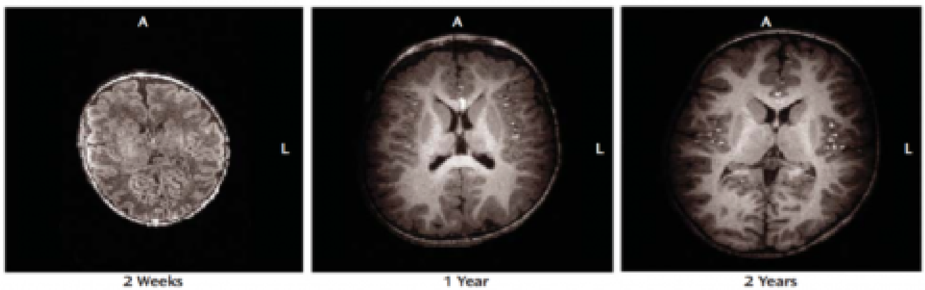
Myelination is a long process that extends from before birth to early adulthood. This process bookends the period of rapid development in the brain. It starts before birth and extends well into people's late 20s. Even as adults, biology and experiences continue to shape the physical structure of the brain.



When infants are born, few of their neurons are insulated with myelin. This means that their brains literally work slower than adult brains. Soon, the neurons begin to get their myelin coating, and the brain sends messages faster and faster.

The end result is that the brain works with much greater efficiency.

Significant Period for Myelination



Gilmore JH, Lin W, Gerig G. Fetal and neonatal brain development. Am J Psychiatry. 2006;163:2046.

The most significant period of myelination occurs between mid-gestation and the second year of life. During this period, the density of myelin coating in the brain increases rapidly.

Sensory regions of the brain myelinate first, and then motor pathways, followed by regions of the brain that are important for higher cognitive functions.

Myelination reaches the prefrontal cortex between 7 and 11 months. However, the density of white matter continues to increase across development. Again, white matter is bundles of myelinated axons.

This is in part why infants require such a high fat diet—their bodies need that fat content to produce myelin and insulate neurons throughout their brains and bodies.

Myelination and Development

Myelination and white matter development correlates with the development of important skills. For example, one study found that the development of working memory and reading ability is coordinated with the maturation of white matter.

Scientists think that the development of skills across childhood may correlate with the time period when regions of the brain finish myelinating.

Other studies have indicated that, similar to neural connections, the density of white matter in different regions of the brain can also be modulated by experience. For example, pianists who practiced extensively as children have greater density of white matter in certain regions of the brain that are important for playing piano.

Biology + Experience Builds Brains

Over the course of childhood, we build our brains. This massive construction project is the result of both our biology and our experiences.

Our biology provides the neurons and the mechanisms to connect them, and it defines the structure of the brain. Our brains look very similar to the naked eye. Yet, at the microscopic level, we can see how our experiences influence how our brains are wired. Our experiences guide which neural connections form, become more efficient, and which will be removed. Our brains become adapted, or specially wired, for the tasks that we ask of them.

This combination of biology and experience contributes to all aspects of children's development. During childhood, as children's brains are growing and maturing at an incredible rate, they are eager to learn. As important adults in their lives, we can support children's learning and brain development.

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2-3 Tools We Use to Study the Brain

A – Measuring Brain Activity—MRI

The human brain is a complicated structure that is very difficult to study. Scientists can't peer inside an infant's brain to see exactly what connections are forming, at least not yet. And even if they could, the billions of neurons, with trillions of microscopic connections, make this an extremely complex organ to study.

But scientists do have tools that allow them to get a glimpse into the developing brain by looking at its structure and function. These methods are called brain imaging techniques because they allow scientists to get a *picture* or image of what is happening in the brain.

No brain imaging tool can read people's minds. But such tools can show what parts of the brain are active as people do simple tasks.

Measuring Brain Structure

The main tool scientists use to look at brain structures is called *magnetic resonance imaging* or *MRI*, first introduced in Lesson 1. This technique allows scientists to take detailed pictures of the brain.

Unlike computerized axial tomography (CAT) scans that use x-rays, MRI is a non-invasive technique. MRIs use strong magnetic fields and radio waves to generate images of the brain like the one pictured on the left side of the screen.

When studying the development of the brain, researchers often ask the same child to come back for multiple scans as they grow. This allows researchers to see how the brain's structure develops over time.

A special kind of MRI, called *diffusion tensor imaging*, or *DTI*, allows researchers to look specifically at white matter tracts in the brain.

The result of a DTI experiment is pictured on the right. Remember that white matter tracts are bundles of myelinated axons that act as information super highways in the brain.

In studying development, this technique can be useful to track which parts of the brain are myelinating and when. Then, for example, these results can be compared to behavioral tests to see if children's developing abilities correlate with the refinement of white matter tracks in their brains.

B – Measuring Brain Activity—fMRI

MRI Suite Image by The B's via Flickr

A technique that is closely related to MRI, called *functional MRI*, or *fMRI*, is used to precisely pinpoint activity in the brain.

The technique fMRI works by measuring changes in the blood's oxygen level, which varies in response to which area of the brain is active. Active regions of the brain require more oxygen, so by measuring oxygen levels in the blood, scientists can pinpoint where activity is happening in the brain.

This technique gives a more precise location of brain activity and is particularly useful for studying the activity of regions that are deep within the brain, such as structures involved in reward pathways.

Because fMRI does not measure brain activity directly and instead measures a biological response to brain activity, the signal is delayed. This means that it is difficult to accurately measure the timing of brain responses. So while fMRI is good for figuring where brain activity is happening, it's not great for figuring out exactly when it is happening.

Brain activity changes rapidly, which can make it difficult for scientists to pinpoint exactly when different regions of the brain are active in response to which stimuli. For example, if scientists see brain activity in a specific area of the visual cortex when a person looks at a picture, it is hard to pinpoint if the brain activity occurred in response to the picture itself or something before or after the person saw the picture.

The physical constraints of the fMRI machine can also pose some challenges to researchers. For example, because the machines are so loud, it can be difficult to study the brain's response to sounds. Children and adults also must stay perfectly still for a session, which can last between 15 minutes and an hour, depending on the study.

C – Measuring Brain Activity—EEG

Another technique that scientists use to measure brain activity is called *electroencephalography,* or *EEG*.


Brain Study by Simon Fraser University – University Communication via Flickr

Unlike fMRI, which indirectly measures brain activity, EEG measures the electrical activity produced when many neurons in the brain fire together in sync. Finely tuned sensors stitched into a cap measure neural activity. Researchers place this cap over an adult or child's head.

Because this technique directly measures brain activity, it allows researchers to pinpoint exactly when regions of the brain respond. For example, with this technique, researchers can get a glimpse of what is happening in the brain when a child responds to a touch or hears a familiar voice.

While EEG is silent and does not require the child to sit completely still, it cannot precisely locate where activity is happening in the brain. It just provides information about a general region.

D – Measuring Brain Activity—MEG

A third technique that scientists use to image the brain is called *magnetoencephalography* or *MEG*.

Location and Intensity

With this machine, scientists can directly measure both the location and intensity of brain activity. Like EEG, MEG is silent, non-invasive and harmless. MEG is a useful tool for determining what parts of the brain are active as people do certain tasks, like reading or listening to foreign language sounds.

MEG works by detecting the weak magnetic field produced by the chatter of neurons firing in unison within the brain. This type of information helps scientists understand how different parts of the brain work together.

Similar to EEG, the MEG machine, pictured on the left, has hundreds of extremely sensitive sensors located within the dome above the seat.

Infants are free to move their head in the MEG machine. Their head motions are tracked with a special cap, pictured on the right, that allows scientists to align their brain activity with a map of brain structure after the imaging session is over.

Later in the course, you will learn about studies that use all of these techniques to help scientists better understand how our brains develop as we finely tune them through everyday experiences.

Reflection Point

Why is it useful to study the brain?
If you could ask anything about the brain, what would you want to know?

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2-4 Biological Factors that Influence Brain Development

A – Biological Factors

Two biological factors that influence children's brain development are: the interaction of a child's environment and their DNA through a mechanism called *epigenetics*, and the developmental disorder *autism*. We'll be talking more about this next.

Many factors influence children's brain development. As discussed already in this lesson, children's experiences shape how connections and networks of activity develop in the brain, and this in turn affects how children behave and respond to the world around them.

When children are constantly exposed to stress or neglect, these experiences shape how the brain develops. A common term for this type of stress is called *toxic stress*.

Although this lesson will not focus on toxic stress, it is important to know that it is a factor that influences children's brain development. Toxic stress will be a focus of Lesson 13.

Epigenetics

Until recently, scientists thought that very few environmental factors influenced the expression of genes inside our bodies.

But more recent scientific findings indicate that our experiences as children and the environments in which we grow up can and do influence the expression of genes inside our bodies. In addition, these changes can be inherited or passed along from one generation to the next.

Epigenetics is the field of study that looks at mechanisms that regulate the activity of our genes. Epigenetics may provide insights as to why the environments that we grow up in as children may have lasting effects on our brains and bodies.

The upcoming video will explain more about epigenetics. While watching the video, think about main themes.

Video: What is epigenetics? (5:03)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=259#oembed-1

Watch What is epigenetics from TED-Ed on YouTube.

Video Debrief

The important takeaway here is that not only can our earliest experiences affect how connections form in our brains, they can also affect how some of our genes are expressed throughout our lives, which can have long-term impacts on our health and behavior. In essence, some genes can be activated and others inhibited through epigenetic changes.

For example, researchers have found evidence of epigenetic changes to a protein connected to stress responses in the brains of people who were abused as children.

As early childhood educators, when you provide a supportive environment for all children and help children have access to healthy foods, rest, and exercise, you are helping children develop a healthy epigenome.

If you are interested in this topic, one of the readings for this lesson provides more detail:

Institute of Medicine (IOM) and National Research Council (NRC). (2015). The interaction of biology and the environment. In L. Allen & B. B. Kelly (Eds.), *Transforming the Workforce for Children Birth Through Age 8: A Unifying Foundation* (pp. 57–84). The National Academies Press. [Journal Chapter]

B – Autism Spectrum Disorder

Many of you are likely familiar with the term *autism*. Autism spectrum disorder (ASD) is a developmental disability based in the brain that begins early in development.

Children and adults with ASD can have significant social, communication, and behavioral challenges. Often, the way people with ASD interact with others, communicate, and behave is different from most other people. Even the way that children and adults with ASD learn can be different.

It is called a spectrum disorder because of the wide variety of experiences, talents, and challenges that people with ASD have. The cognitive abilities of people with ASD can range from gifted to severely challenged. Some people with ASD are unable to communicate verbally, while others have incredible vocabularies.

Almost all people with ASD struggle with social interactions, which can range from mild to severe. And this means that some people with ASD will need a lot of help in their daily lives, while others may not need as much.

The prevalence of ASD has increased in recent years. Doctors and scientist aren't sure why this is, but it may have to do with better screening and awareness of the disorder.

It is very important to know that vaccines do not cause ASD. There is no scientific or medical evidence to support this false claim.

In 2012, the Centers for Disease Control and Prevention estimated that the prevalence of ASD is about one in 68. This means that during your careers as early childhood educators, you are very likely to work with children with ASD.

ASD and the Brain

ASD is a developmental disorder that is based in the brain. Scientists have found that children and adolescents with ASD have too many synapses in the brain, and they think that this might have to do with a slowing, or incomplete process of pruning connections. These excess connections can greatly impact how the brain functions.

Scientists and doctors are still not sure what exactly causes ASD. They do know that it is has a strong genetic component. For up to 92 percent of identical twins, both have ASD, whereas only 10 percent of fraternal twins do.

While it is clear that ASD has a genetic component, that component is complex. Most cases of ASD cannot be linked to mutations in one gene or even several genetic risk factors.

This makes screening for ASD very challenging. Currently the only way to screen for ASD is through behavioral tests around the second year of life. Before that the signs and symptoms can be hard to see. But scientists think that the brain changes underlying ASD begin very early in life, perhaps even in the womb.

Children typically show ASD symptoms, such as difficulty making eye contact, after the age of 2, but signs of ASD symptoms can present themselves even in the first year of life.

Early Diagnosis and Intervention

A recent brain imaging study found that in the future, doctors may be able to use structural MRI scans to diagnose children at high risk for ASD even earlier.

The study found that by comparing brain scans of infants at high risk for developing ASD at 6 and 12 months to brain scans of infants not at high risk, researchers were able to predict which children would go on to later be diagnosed with ASD at a rate of 81 percent. This means that they were able to correctly predict 8 of the 10 children that would later be diagnosed with ASD.

Diagnosing ASD as early as possible is important. Another recent study found that early intervention can have long-lasting benefits.

In the study, parents of children with ASD between the ages of 2 and 4 received a year of training on how to more effectively interact with children with ASD. Six years after the training, the children in the study had better social communication, fewer repetitive behaviors (common in children with ASD), and fewer of the children were considered to have *severe autism*, when compared to children whose parents did not get the specialized training.

Video: The World of Autism PSA (1:00)

This video from Autism Speaks describes this complex syndrome. The video is approximately 1 minute long.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=259#oembed-2

Watch The World of Autism PSA from Autism Speaks on YouTube.

Reflection Point

Consider these questions:

- If you have worked with a child with autism, how was that experience? What did you do to support that child?
- Based on what we have learned about brain development and autism, why do you think early intervention is so important?

Early intervention is important because children's brains are most flexible and open to learning in the earliest years of life. It will be easiest for children to learn new ways to interact socially and learn new behavior patterns as a young child.

C – Developmental Milestones

Only a highly trained specialist can diagnose a child with autism. But as early childhood educators who spend many hours a day with children, carefully watching and taking note of children's development can help you to identify any areas of concern and possibly recommend that families seek help from a specialist.

If you see behavior that is concerning, or you think that a child may be at risk for developmental delays, including autism, you should talk with parents about your observations and concerns.

(Centers for Disease Control, n.d., [*Track Your Child's Developmental Milestones*].)

Providing a family with tools to monitor their child's development, such as this one from the Centers for Disease Control and Prevention, can be a way to support that family and child.

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3: Perceptual, Motor, and Physical Development

In this lesson:

3-1 Perception

This section covers the framework subdomain Perception (birth to age 3 only), including:

- Vision
- Audition (hearing)
- Object exploration
- Action guidance

We cover how infants in the first year of perceptual development become specialists in the dominant sights and sounds of their home environment.

3-2 Gross and Fine Motor Skills

This section covers the Head Start Early Learning Outcomes Framework subdomains Gross Motor and Fine Motor skill development.

3-3 Health, Safety, and Nutrition

This section covers the Head Start Early Learning Outcomes Framework subdomain Health, Safety, and Nutrition.

3-4 Brains and Bodies

This section covers the connection between our perceptual, motor, and physical development and our overall development in other domains.

3-1 Perception

A – Perception

Visual Development

At birth, vision is the least developed of the senses. The brain and eye structures needed for accurate vision are not yet developed.

Newborn visual acuity is very low—the world is very fuzzy and not particularly colorful to them. This is why infants prefer visual images with black and white patterns and high contrast.

But the structures that support visual perception grow very fast. By 2 months, infants can focus on objects as well as adults. By 6 months, they have around 20/80 vision. And by 4 years, they have full 20/20 vision.

Visual Sensitive Period

Visual development in the first 6 months of life is very important for later visual development. The first 6 months are called a *sensitive period.*

A sensitive period is a period when a child is more sensitive to specific experiences. During this period, those experiences can cause important changes in the child's development.

For example, infants born with cataracts in both eyes cannot see clearly due to the cloudiness of the cataracts blocking the lenses in their eyes. If infants born with cataracts receive corrective surgery between 4 and 6 months, they show improvement in all aspects of vision except for some aspects of face processing.

The first 4 months of life are considered a sensitive period for visual perception and face processing in particular. Children need visual experiences to provide input to the cerebral cortex during that time to develop accurate face processing later in life.

Face Processing

Face processing is particularly important for infants since it contributes to their ability to engage with their parents and other caregivers.

From birth, infants seek out patterned visual images in the environment, including faces. Even newborns prefer to look at facial images that are arranged right-side up rather than upside-down. Amazingly, scientists have found that, despite infants' low visual acuity, by 2 months of age, they recognize and prefer their own mother's face to that of another woman.

Perceptual Narrowing

The first 4 to 6 months are not only a sensitive period during which specific visual input supports the development of brain areas for later visual perception, but they are also a time during which children's visual perception is attuning to their local environment. This process is called *perceptual narrowing*.

Again, as newborns, infants perceive all faces similarly. However, by 2 months, infants have already developed a preference for their own mother's face over other women's faces.

By 3 to 6 months of age, this preference extends to members of their own race. (Note that is mostly the case for infants primarily exposed to a single race during this time.)

These infants are also better able to *discriminate* faces of members of their own race, than faces of members of other races. In other words, they can tell the difference between two people of their own race better than they can tell the difference between two members of an unfamiliar race.

Perceptual narrowing also occurs in other areas of development, such as auditory development.

Vroom Tip

Check out this Vroom tip to get more ideas about how to support visual development.

View text-only alternative of this Vroom card

Peek-a-Boo Box

Everyday items make great toys. Give your child an empty tissue box and a spoon. Let him/her see you put the spoon into the box. Does he/she watch? Shake the box. Reach in and take the spoon out. Giggle. Now it's your child's turn. Give him/her the spoon. What does he/she do?

Ages 1-2

Brainy Background powered by Mind in the Making

It's a simple game, yet your child is exploring a big idea: Objects and people still exist even when they are out of sight. Although it will take until you child is around two to really learn this, the practice is fun! Play this game often.

What do you think of this idea? Does this tip make sense in the context of an early learning program environment? And if not, how might you adapt the activity to better fit that environment?

B – Auditory Development

Like visual perception, auditory perception—or hearing—develops rapidly in the first year of life.

However, unlike visual perception, the development of auditory perception is already well underway when an infant is born. Newborn infants are able to hear and distinguish a variety of sounds. In fact, this responsiveness to sounds helps motivate very young infants to explore their environment.

Infants as young as 3 days old will turn to face the direction of a sound, prefer the sound of their mother's voice to other people's voices, and prefer the sound of their native language.

By 1 year, infants will have developed a sense of musical phrasing and the ability to distinguish different melodies and can recognize the same melody when it is played in different keys.

Auditory Sensitive Period

Much like visual perception, auditory perception also goes through a fine-tuning process of perceptual narrowing during a **sensitive period**. The sensitive period for auditory perception occurs around 6 to 12 months of age.

Before the perceptual narrowing occurs, infants are able to hear differences in sounds that adults in their culture cannot. For example, 6-month-olds can detect rhythmic disruptions in music from their own culture and that of other cultures, while adults who are not musically trained in another culture's musical rhythms are not able to do this.

And newborns can discriminate almost any speech sound in the world. Infants are born universal language learners and gradually attune their hearing to the language or languages they are most often exposed to.

Between 6 and 8 months, infants begin to tune in to the dominant language sounds in their environment and can no longer discriminate sounds in other languages.

By 12 months, babies are also no longer able to detect disruptions in foreign music rhythms, while their detection of disruptions in the dominant music in their environment remains.

Singing and Music

It appears that caregivers around the world take advantage of infants' skills in auditory perception. The presence of music in caregiving is considered universal, occurring in cultures across the globe.

Lullabies are the most common form of adult-child musical engagement and are readily distinguished from other forms of music by adults across cultures.

There are three components to lullabies that help to distinguish them from other forms of music:

- High pitch
- Slow tempo
- Warm tone

Singing has even been found to be more soothing to infants than mother's speech sounds and is very effective at affecting infants' arousal levels, both high and low.

C – Object Exploration, Reaching, and Grasping

Object Exploration

Perception is not just for passively taking in information from the world. Children also use their perceptual experiences to actively explore objects, including tactile (touch), taste, sight, and sound.

Through the mouth, the child will be able to taste, smell, and feel the texture and density of an object. In early infancy, infants primarily explore using their mouth. This action is called *mouthing*. Infants' arms and hands lack both the strength and the coordination to support substantive object exploration. Infants' mouths are one of their strongest and most reliable sensory organs at this point.

So while this may at times appear unsanitary or simply unappealing to adults, providing infants with safe spaces in which they can eagerly explore varied objects through their mouths is a great way to enrich their early childhood experiences.

Reaching

In particular, as infants' skill in reaching improves around 5 to 6 months of age, this frees up their vision for controlling other behaviors such as grasping. As children develop their ability to reach for an object with their arms and grasp it with their hands, they will shift from mouthing objects to exploring them using their eyes, ears, and fingers.

Scientists have studied this shift in visual control by switching off the lights when infants reach for an object. They then observe whether the infant continues to reach successfully or not. If the infant can reach successfully even when the lights are turned off, this suggests that the infant no longer relies on visual guidance when reaching for an object. Thus, this infant can now use visual input for other tasks, such as planning how to effectively grasp an object that it has reached for.

Grasping

Before 4 months, infants have a difficult time intentionally manipulating objects with their hands. They have difficulty letting go of objects when they want to. They are unable to pass an object from one hand to the other. They also have a hard time shaping their hands and orienting them in a way that would be effective to grasp objects. For example, they might reach for a large object with a small grasp opening.

By 4 to 5 months of age, infants have begun to develop a clumsy, but at least intentional and adjusted, fingers-to-palm grasp (called an *ulnar* grasp). They have also begun to develop the ability to pass an object from one hand to the other to see its different sides and more effectively explore its properties.

By 12 months, infants are able to use a more precise and coordinated grasp (called a *pincer* grasp) to effectively pick up and explore objects.

Reflection Point

Think an object that you think young children of different ages (from birth to age 5) would explore differently and describe how you think the children might explore the object and what they might discover. If you can't think of an object, consider one of these:

- block
- toothbrush
- ball

What perceptual abilities would a child at each age would use to explore the object? What are different properties of the object that a child at each age might discover?

View example. (Click to toggle expand or collapse.)

Someone could pick a toy block that makes sound when shaken. Children at earlier ages—for example, infants—might not discover the sound-making properties of the object, although they may learn about the block's plastic flavor and texture with their mouth. Older children might notice the weight of the block, the sound it can make, its color, or its shape.

D – Action Guidance

Although their roles shift throughout development, visual and auditory perception are both key components of how children guide their own actions, such as grasping, reaching, and whole body movements through space. This process is called *action guidance*.

For example, infants can use auditory cues to localize an object and visual cues to adjust the size and strength of their grasp for exploration. Infants are using their perceptual abilities (sight and sound) to guide their actions (adjusting size and strength of their grasp).

Children use their developing perceptual abilities for two primary components of action guidance:

- Object localization
- Object identification

Children can look for, listen for, or smell for an object to find out its location. Once they have the object, they can use a variety of senses to explore what that object is and how to handle it.

Body Movement

Children use their perceptual skills to orient their bodies in space to avoid obstacles or approach objects. As children develop, many of these skills become less reliant on visual or auditory perception and more on *proprioception*— one's perception of their movement and spatial orientation based on internal body cues. One of the most prominent forms of action guidance that perceptual skills contribute to is body movement.

For example, 3-year-olds use visual input to plan out how to place their legs on uneven ground, such as stairs. By 4 years, this dependency on visual input has significantly declined, and by adulthood, people no longer require visual input to plan out leg placement when going up or down stairs.

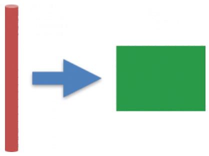
Object Tracking

Infants not only rely on visual and auditory cues for body movement but also to identify and track objects of interest.

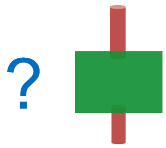
Before 4 months, if infants see two objects move together or touch, they have a hard time distinguishing them as two separate items.

By 4 months though, infants have begun to use features, such as shape, color, or pattern, to distinguish two touching objects. Infants are also initially very attracted to movement of any kind, especially when accompanied by interesting sounds.

One complication of object movement is when objects disappear completely or are partially behind other objects. If an object moves partially behind another object, it appears to break into two separate items.



For example, if a rod goes behind a short curtain (as pictured) and the top of the rod sticks out on top and the bottom sticks out on the bottom, it now looks like two shorter rods—one floating on top, the other on bottom.



Infants at first do not see these two rods as one rod, even if the objects move in parallel. But by 2 months of age, infants use those parallel movement cues to determine that the object is still one single object moving behind a screen.

Video: The Spinner Toy (2:08)

When you watch the following video, think about these questions:

- How do the two infants perceive this object? What does it look like, feel like, and sound like?
- What kinds of object exploration do you notice? Grasping, mouthing, reaching?
- How would you interact with infants using this object?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=23#video-23-1

Video Debrief

What did you notice in the video about the toy and the infant? (click to toggle expand or collapse)

Some things we noted are:

- The movement of the object, as well as its sound, captures the infants' attention. The top of the toy is also textured, which provides a tactile experience.
- The handle for the object also has a high contrast, with a white stem against the red of the top knob.
- The infants' use of grasping, reaching, and mouthing.

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3-2 Gross and Fine Motor Skills

A – Motor Development

Motor development is characterized in three ways:

- Embodied (constrained by the body's maturation)
- Embedded (constrained by the environment)
- Enculturated (constrained by what's acceptable or encouraged in an individual's culture)

One way to see the embodied effects of motor development is in the pattern of motor development, which can be characterized as *stepwise*, or not smooth. Motor development advances much like physical development. It's not on and off like a faucet. It advances more like a river, with ebbs and flows.

For example, a child doesn't begin to walk one day and then continue walking every moment. A child may take a few steps and then return to crawling, then try walking a few steps again the next day.

Physical development is also not a continuous growth curve. Growth happens in jumps and starts.

A child can grow three-quarters of an inch in one day. Imagine if you grew that fast. You'd eventually realize you had grown so much when you started hitting your head on everything, just like children do.

Let's review the three characteristics of motor development.

Embedded and Enculturated

A child who grows up in a home with a set of stairs will learn how to climb and descend stairs earlier than a child who does not have those experiences (embedded).Motor development is embedded and enculturated.

Children who grow up in a culture that practices early motor movements, such as holding infants upright, supported, while bouncing their feet on the ground, will begin to walk earlier than infants in a culture that does not provide motor enrichment (enculturated).

As long as they are physically able to, all children will eventually learn to climb stair-like structures. All children will eventually learn to walk. The age at which walking or other motor behaviors develop and the order in which different motor behaviors develop can vary widely depending on the environment in which children's development is embedded and the culture in which children live.

Embodied Development

Motor development is also intricately connected to perception. This is one way that development is embodied. It is constrained by your perceptual and physical abilities.

Infants are initially limited to lying face up or face down with little to no control about what they get to look at. If something interesting is in the corner of their vision, they can't move themselves to look at it. They have to cry and wait for an adult to place them in a suitable viewing position.

Learning to sit gives children a much better perspective on what is around them but still limits their ability to explore, since they can see the objects from afar but have no way to move toward them.

Learning to crawl or walk allows infants to not only see what they want to see but also to get different views and even reach and handle the objects.

Infants who are walking cover more distance than non-walkers (even fast crawlers). They can see more objects, and they are able to engage with more people since they can walk right up to them to get their attention.

In other words, children have a lot of intrinsic motivation to learn to move around their world effectively.

Visual Motivation

Some scientists believe that vision is one of the key motivators for children's engagement in exploration and motor practice.

They think this because they have found that children with congenital blindness are very delayed in developing manual actions such as reaching, despite actively responding to objects that make sounds.

Researchers take this as evidence that visual input is a strong motivator of reaching behaviors in infants.

Vroom Tip

Check out this Vroom tip to get more ideas about how to support motor development.

View text-only alternative of this Vroom card

Cup Tower

You don't need much to build fun things around the house. Grab a few cups and stack them into a tower and then show your child how fun it is to knock them all down. Hand the cups over and let him/her have a go. Take turns building all kinds of new towers!

Ages 2-3

Brainy Background powered by Mind in the Making

Supporting children as they explore and discover will help them become learners for life. This game also helps your child discover how the physical world around him/her works. Have a back and forth conversation about his/her discoveries!

What do you think of this idea? Does this tip make sense in the context of an early learning environment? And if not, how might educators adapt the activity to better fit that environment?

B – Gross Motor

Large Muscles

Muscle development and sociocultural factors both affect the trajectory of motor development.

How do children get from one state of motor development to the other in such a short period of time? They do this all while their internal and external worlds are constantly changing due to changes in body size and weight and a broadening range of perceptual abilities, such as vision and audition.

A lot of motor development is based on muscle development. If you have enough muscle to move a part of your body, you can do it. If you don't, you need to build more muscle, or at least a higher muscle-to-fat ratio.

But having the muscle is not necessarily enough. The age that different motor abilities develop varies greatly across the world. It is greatly affected by sociocultural factors.

For example, in some cultures, such as the West Indians of Jamaica, parents promote walking by standing infants in adults' laps and bouncing them on their feet. These children tend to walk considerably earlier than North American children, who are predominantly laid on their backs or on their bellies.

Crawling

Generally speaking, infants go from lying to rolling, to sitting, to standing, to walking. You may notice that crawling was not included in that list; crawling is not a necessary step in the development of gross motor movement This omission was intentional for two reasons:

- The act of crawling is highly variable across and within cultures. Dr. Myrtle McGraw put it best when she said, “No other neuromuscular function of the growing infant exhibits greater individual variations in pattern [than crawling].”
- Some individuals and some cultures skip crawling altogether. It is not a necessary stage in the development of locomotion. In fact, the West Indian infants of Jamaica often skip crawling altogether. And many cultures across the world carry their infants until they are able to walk on their own.

Some anthropologists have even proposed that crawling may be a novel invention of Western nations in which families had safe and clean floors to place children. In many other cultures and locations, it is simply unsafe or unsanitary to place infants on the ground face down.

Perhaps surprisingly, children who do go through a crawling phase prior to walking experience no benefit. In fact, children who skip crawling altogether may walk earlier than those who spend time crawling before they walk.

No benefit to crawling

You might be asking yourself how there is no benefit to crawling before walking. Surely children learn properties about movement across different types of ground and inclines that transfers to walking.

But actually, scientists have found that there is little to no transfer of learned information between crawling and walking. Infants appear to treat walking as a completely new action that has no relation to crawling.

When first learning to walk, even children who have previously crawled have to re-learn how to navigate ground with different heights, slopes, etc.

Standing

Another common, but not required, precursor to walking is standing.

The process of learning how to stand on one’s own can take months to develop and may sometimes even develop after walking has begun. Some children find it easier to stay upright while in motion than while static.

At about 7 months, children often begin to pull up on tables and chairs. In the beginning, they primarily use their hands and arms to lift themselves and will gradually learn to shift more and more weight to their feet.

During this time, they will often fall as many as 32 times per hour. So why do they do it? Remember, they do it to move more, see more, play more, and interact more.

C – Visual Cliff

Scientists have used the *visual cliff*, a fake drop-off, to demonstrate that children must first acquire experience in a new body position to react to depth cues accordingly. Scientists have studied how children learn to crawl and walk using the visual cliff.

The visual cliff is essentially a climbing area with a fake drop-off. Scientists started with a structure that has what appears to be a deep drop-off—it actually is covered by a clear, plastic cover to keep infants from injury. It appears, though, that if you walk off the edge, you will fall down a considerable height (for an infant).

What researchers found is that infants who have been crawling or walking for a while avoid the drop-off, while infants who have not been crawling for long go right over what would be a drop-off if not for the clear screen.

Fear of falling?

Originally, scientists described this avoidance as infants fearing the drop-off, but it has since been shown that infants are not in fact afraid of the drop-off at all. They show no negative emotions when encountering it.

Many infants in this situation will instead figure out alternative ways to get around the cliff, such as holding on to an edge around the clear area to skirt around it.

But just as mentioned previously, infants who avoid the drop-off when crawling, will not avoid the drop-off when walking until they've accrued experience in the walking posture.

Video: The Macroscope: Babies on the Brink **(5:31)**

Here is a short video about Dr. Karen Adolph's work using the visual cliff. Watch as she shows us how she has used the visual cliff to examine how infants learn how to move their bodies.

This video will help give you a better idea of what exactly a visual cliff is and how researchers can use it to study infants' and toddlers' gross motor development.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=25#oembed-1

Watch The Macroscope: Babies on the Brink from Science Friday on YouTube.

Video Debrief

Here are some of the important takeaways we took from the video about infants and physical drop-offs:

- Infants spent most of their time near the drop-off.
- Their faces were neutral or positive.
- Their approaches changed as they learned different ways to move. Eventually, as they perfected one type of movement, they could tell about as well as adults if a drop-off was safe to navigate.
- Once those same infants learned a new skill—perhaps a crawling infant learned to walk—they would walk right over the edge of the drop-off.
- They are learning to understand the relationship of their bodies and their environment.

D – Fine Motor

Small Muscles

Over the first year of life, as infants begin to be able to stabilize their bodies in ways like sitting and standing to free their hands for exploration, they start to develop fine motor skills, such as manual coordination and dexterity.

Two important manual exploration concepts are:

- *Grip aperture*: how wide you open your hand when reaching for an object
- *Hand orientation*: the position of your hand, palm, etc., relative to the object you are reaching for

Coordinating these two skills takes time, and children only begin to coordinate them effectively to reach objects by the age of 1 year.

This is important to note because many of the tool-use skills that adults try to encourage infants to do require this kind of coordination. Tool use takes many forms, such as hammering, turning, and pulling.

All these actions require specific hand orientation and grip-aperture planning to be effective.

Reaching and Posture

We've covered infants' ability to walk and grab an object, but what if they need to reach for an object?

It may appear as if reaching and grasping would develop together, but in fact, reaching requires not only being able to control your hand movement but also the ability to coordinate your hand movement with your body posture.

You have to be able to hold yourself up without your hands, and hold your body steady as you extend out your arm.

Studies in which infants' bodies were supported while they reached highlight this distinction. Scientists found that infants' reaching behavior actually develops before their ability to maintain their posture is fully developed. So they can actually extend their arm in a reaching action well before they can actually reach for an object without someone supporting their body.

Reaching and Muscles

Infants' reaching behaviors depend on muscle control and can often take time to develop precision. Infants' reaching path is at first very uncoordinated. The path is often up to four times longer than the distance needed to reach the object, usually taking twists and turns in random directions.

Some scientists believed that infants were correcting their reaching paths by visually guiding the reaching path, which caused the meandering in their reaches. Surprisingly, they found that the meandering occurs even if children cannot see their own reaching hands.

This suggests that infants are not correcting their reaches using visual guidance but instead have difficulty controlling their reaching arms.

Children's reaching behavior with their feet supports this idea. Infants presented with interesting toys from birth first show reaching behaviors with their feet rather than with their hands at as little as 2 months of age.

Physically, this makes sense. The hip joint is much less mobile than the shoulder joint, and leg muscles tend to be stronger than shoulder and arm muscles. Both these factors make it easier for infants to control the movement of extended legs than extended arms.

This evidence supports the idea that infants are able to reach at quite young ages but take a while to develop the motor control necessary to complete an arm reach.

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3-3 Health, Safety, and Nutrition

A – Health, Safety, and Nutrition

Key Areas

Three important parts of children's development in the subdomain Health, Safety, and Nutrition are:

- Independent self-care and hygiene practices, such as hand-washing.
- An understanding of safety, when things are safe and unsafe, and what to do if something is unsafe.
- An understanding of healthy and unhealthy foods and noticing and communicating when hungry or thirsty.

Health: Self-Care and Hygiene

By 5 years of age, children will be able to engage independently in self-care routines, such as handwashing or getting dressed.

- The development of independent self-care routines and hygiene begins around 8 months of age. At that time, some infants may begin to cooperate and even anticipate daily health routines, such as handwashing after eating or brushing teeth.
- Between 16 months and 3 years old, children will begin to take more control of their own health routines. They may try to wash their hands on their own or ask to clean their own nose. Children's ability to independently engage in self-care routines of this kind by 3 years of age is one of the Head Start Early Learning Outcomes Framework indicators.
- Between 3 and 4 years, children will not only engage in these behaviors independently but will also begin to understand and communicate the importance of them. For example, they may explain how brushing their teeth keeps their teeth healthy.
- And by 5 years old, a child should regularly engage in some self-care routines inde-

pendently, such as handwashing, tooth brushing, or getting dressed.

Safety: Safe and Unsafe

By 5 years of age, children will not only engage in basic safety practices, such as avoiding a hot stove, but will also alert others to dangers or seek out adult guidance in dangerous situations.

- Children begin developing an understanding of what is safe and unsafe and how to handle unsafe situations as early as 16 months old. At first, adults guide children in safety issues since they cannot know what the consequences of their behaviors are going to be without experiencing those negative consequences firsthand. By developing caring and responsive relationships, adults can encourage children to cooperate with them in unsafe situations, such as holding hands when walking through a parking lot or crossing the street.
- By 3 years old, however, children should have some understanding of common unsafe and safe behaviors. For instance, they should know that they shouldn't touch a hot stove or jump off a table.
- Between 3 and 5 years old, children will begin to follow safety practices on their own. For example, children at this age may sometimes remind the adults with them that they need to hold hands when crossing a street. Children may look to adults for guidance in more complex situations.
- By 5 years of age, children should be able to alert others to dangers and identify basic safety rules.

Nutrition

By 5 years of age, children will be able to identify and communicate their own states of hunger and thirst and will have begun to make the connection between nutrition and growth.

- Nutritional development begins a little after children begin to eat solid foods. Between 8 and 18 months, infants will often show interest in trying out new foods with new tastes, smells, and textures. Parents or early learning professionals can try varying spices in cooked foods to see what a child likes and should offer food items on more than one occasion. Infants may not enjoy a particular food when they first encounter it but realize that they love it in a second encounter.
- If offered regularly in a positive manner, most children will also begin to make nutritional food choices

between 16 months and 3 years.

- By 3 years, children will be able to express likes and dislikes about foods and communicate their hunger and thirst to adults.
- Between 3 and 5 years, children will begin to learn how nutrition plays a role in their own growth and development and can understand how eating a variety of foods will help them grow healthy.

Reflection Point

- What is a key skill to learn in each of these subdomains—Health, Safety, and Nutrition—and why?
- Pick one skill for each subdomain, and consider different ways that you could teach this skill to children.

B – Teaching Children about Health, Safety, and Nutrition

Modeling

Development in the areas of health, safety, and nutrition is heavily dependent on guidance and support from adults. One effective way to convey these ideas and promote development in this area is through adult modeling of healthy and safe behaviors.

Children of all ages love to learn by imitation. For example, even very young children will begin copying adults' phone actions by holding up a toy phone or other object and pretending to have a conversation with it.

Children can also learn about healthy and unhealthy, safe and unsafe, and hygienic practices through modeling. If parents and educators model these behaviors and explain what they are doing and why, children will naturally want to copy what the adults are doing.

For example, an adult washing their own hands after mealtime encourages children to do the same. An adult eating healthy foods in front of children encourages children to want to eat those foods as well.

Explaining

Another way that children learn about these kinds of concepts is through verbal explanations.

In one example, when 2-year-old children watched two blocks touch and cause a toy plane to turn on, they were confused about the cause-and-effect relationship between the touching blocks and the toy plane. When a researcher asked the children to "make the plane go," they didn't know what to do.

But when a researcher provided verbal explanation, as the child watched the blocks and the plane, by saying something like, "Look, the block touching the other block makes the plane go," even 2-year-old toddlers were easily able to then bring the blocks together to make the plane go when the researcher asked them to.

Similarly, when you tell children that they can't have an unhealthy food, explain how too much unhealthy food can hurt rather than help the body grow. This will help children make the connection between nutrition and growth.

Children benefit from verbal explanations well before they are able to produce language of that kind on their own.

Smoothing Transitions

Transitions make it particularly difficult for children to learn the concepts of health, safety, and nutrition and hinder their ability to adopt new behaviors.

For example, a child may want to keep playing instead of washing hands, or keep running instead of stopping at the parking lot or at the end of the sidewalk, or keep eating sweets instead of proteins and veggies at dinnertime.

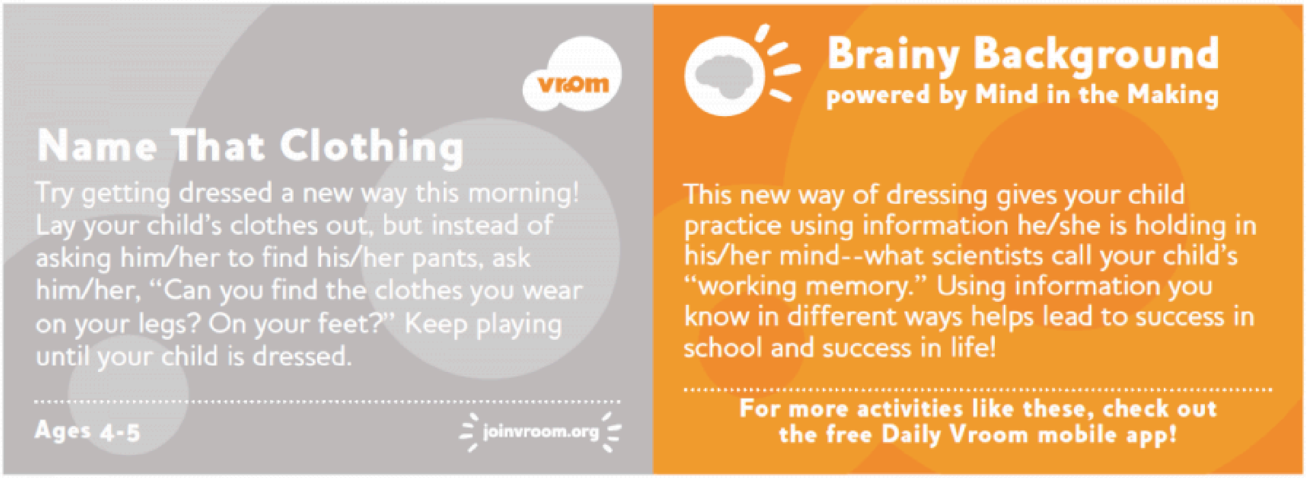
Making transitions easier can often help children develop in this subdomain. Some ways to make transitions easier are to:

- Individualize transitions as much as possible. Don't expect a group of eight toddlers to all do the same activities at the same time and at the same pace.
- Reduce waiting times. Toddlers are barely patient at the best of times. Try to fill any downtime between activities with a fun activity, such as singing a song or reading a book.
- Give advance notice and reminders before transitions. And try to give children options when possible, such as, "Do you want to wash your hands at the sink on the left or the sink on the right?"

For example, stagger children's handwashing in early learning programs so that the children who are waiting to wash their hands have something else to do. And give children a 2-minute reminder before their turn to wash hands.

Vroom Tip

Check out this Vroom tip to get more ideas about how to help children learn about health, safety, and nutrition.



View text-only alternative of this Vroom card

Name that Clothing

Try getting dressed in a new way this morning! Lay your child's clothes out, but instead of asking him/her to find his/her pants, ask him/her "Can you find the clothes you wear on your legs? On your feet?" Keep playing until your child is dressed.

Ages 4-5

Brainy Background powered by Mind in the Making

This new way of dressing gives your child practice using the information he/she is holding in his/her mind — what scientists call "working memory." Using information you know in different ways helps lead to success in school and success in life!

Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit?

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3-4 Brains and Bodies

A – Brains and Bodies

Cognition

Perceptual and motor development strongly affects development in other areas, such as cognition and social-emotional development.

Development doesn't happen in a vacuum, and, as mentioned earlier, motor development in particular is constrained by elements like the body in which it develops (embodied).

What scientists have recently begun to notice though, is how connected our cognition is to our physical and perceptual experiences.

Earlier in this lesson, we talked about sensitive periods during which experiences make a notable difference in how our development progresses. For example, if you don't:

- Hear language, you don't learn language.
- See patterns as an infant, it's hard to see faces later in life.
- See objects or colors, you don't know what they are later.

But there is much more to this connection. How we receive information and respond to it is greatly affected by our early motor experiences and development.

Scientists have even found that children's fine motor skills are better predictors of later math and reading scores than early math and reading scores alone.

The Zero to Three article (an assigned reading for this lesson) is a resource on how motor development is important to all areas of development. It covers some common questions (and answers) as well as ideas for activities to get children moving.

The Scientific Learning Blog (another assigned reading for this lesson) is a resource on the connection between motor development and areas of school readiness.

Plasticity

We've already mentioned one way that experiences can affect cognition: *plasticity*.

Plasticity is a description of how one can change their brain architecture and their cognition through experiences.

For example, even as adults we can:

- Distinguish the faces of people of other races if we practice.
- Hear and even understand new languages if we practice them.

Infants and children are even more plastic than adults are, meaning that experiences can greatly change how they see the world.

Earlier, we discussed the concept of perceptual narrowing, where experiences shape children's understandings of the world in ways that help them specialize their learning to their own environment and culture. What we didn't discuss is how that perceptual narrowing can be reversed through practice and exposure.

Scientists showed this by exposing 9-month-old, English-speaking infants to Mandarin Chinese-speaking adults. Through normal development, these infants would lose the ability to discriminate Mandarin Chinese sounds between 6 months and 1 year. But with only 12 sessions of exposure to a live Mandarin Chinese-speaking adult, these infants retained the ability to discriminate sounds in Mandarin Chinese.

Similar results have been found for other perceptual experiences, such as face recognition.

B – Experiences

First-Hand Experiences

Scientists have found that some motor and perceptual experiences accelerate cognitive development.

In the typical course of development, 3-month-old infants have not yet begun to perceive adults' reaching and grasping actions as goal-directed. In other words, if an adult reaches and grabs a teddy bear, are they trying to grab the teddy bear (goal-directed), or are they just moving their arm in that general area? Three-month-olds do not seem to understand the intention of picking up the teddy bear.

As an adult, if you watch someone pick the teddy bear over the cup multiple times, the next time they reach for something you'll be surprised if they reach for the cup rather than the teddy bear. But infants younger than 3 months don't find this surprising at all. They don't seem to realize that when people reach, they are usually reaching for a specific object and usually for a reason (i.e., because they like that object better).

However, scientists gave 3-month-olds reaching and grasping experiences that they did not encounter naturally by providing them with *sticky mittens*. These mittens were covered in hook-and-loop fabric. Scientists also gave the infants toys to pick up and manipulate. So these infants were able to reach for and pick up objects in a way that they would not naturally have been able to without the mittens.

After this experience, infants perceived adults' actions with similar mittens as goal-directed actions. This meant that infants would now expect adults with these mittens to reach consistently for one object over another.

This suggests that even limited first-hand experience can enhance infants' own understanding of others' actions in the world.

Video: Sticky Mittens (0:59)

You may be curious about what the sticky mittens training looks like. We will now watch a 1-minute video of an infant wearing sticky mittens.

You'll see that it's a simple intervention despite its powerful effects. Infants don't all of a sudden start intentionally moving objects around the way an adult would, but the information they gain still has strong effects on the way they perceive the world.

Note that this video has subtitles but no sound.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=29#oembed-1

Watch Sticky Mittens from Kennedy Krieger Institute on YouTube.

Culture and Cognition

Culture can also have effects on how children process cognitive information.

For example, when children are in cultures that read from left-to-right, they appear to have a linear spatial arrangement in mind that proceeds from left to right. Evidence supports this idea. When preschoolers were asked to count with their hands, they predominantly counted from left to right spatially.

Another example is math learning studies where children were taught counting and other math skills using a board game. If the board game was arranged linearly, children learned much more than if the board game was arranged in a circle.

It is important to remember that this is specific to the culture in which children are learning. If in children's culture, counting is presented in a circular fashion or reading and writing proceed from right-to-left, children's learning will be affected differently.

Some cognitive abilities directly link to spatial arrangements or body positions. Congruence between these relations and how adults teach or present information can help improve children's learning.

Motor Experiences and Cognition

In an even more direct connection between motor development and cognition, researchers tested 8-month-old infants on an object search task.

Researchers hid objects in containers and then rotated either the infant or the containers 180 degrees. Some of the infants were already crawling while others were not yet.

Scientists found that infants with more crawling experience were better at remembering object locations and finding hidden objects, especially if the infant was disoriented during the task by being turned 180 degrees.

Motor experiences can help infants develop new cognitive abilities, such as searching for hidden objects.

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4: Language Development: Birth to Age 3

In this lesson:

4-1 Language and the Brain

So, how do infants go about acquiring language? We first cover how the brain processes speech sounds and how scientists study language learning in the infant brain.

4-2 Steps Along the Way

Now that you know a little bit about how the infant brain plays a role in language learning, let's examine the developmental trajectory of language learning in the first three years.

4-3 Dual Language Learning and Development

At this point, we've primarily focused on how to learn a single language, but what happens when a child is exposed to and trying to learn more than one language? In this section, we cover how dual language learning affects development.

4-4 Supporting Language Development

In this section, we focus on how to support language development—including both language and early literacy—from birth to 3 years.

4-1 Language and the Brain

A – Communication

Communication is the act of sharing one's thoughts or information in some visible or audible form. It can take the form of verbal speech, physical gestures, or both together.

Take a moment to think of some of the different ways you communicate with both children and other adults. What do you do if they can't hear you? Or if they can't see you?

Types of Communication

- Non-verbal communication comes in many forms like pointing gestures or facial expressions.
- These non-verbal forms of expression are some of the earliest forms of communication that children engage in.
- However, you may be surprised to realize that even young infants engage in what is considered verbal expressions of communication, such as making cooing sounds when happy, and crying when distressed.
- Language itself is a specific form of expression that is marked by the use of words to communicate ideas in a structured way.

Basics of Language

Language is knowledge pulled from the external world. Children learn it from exposure to other people, society, and sets of rules.

There are three basic characteristics common to all language.

- Language is acquired, meaning that it is a learned skill. Children learn language from the people around them and their interactions with those people. Language is acquired from the outside in, meaning that children speak out loud before they can internalize language (i.e., think to themselves). Children who are not exposed to language—note that this is very rare—have a difficult time learning it later in life or are not able to learn it.

- Language is socially constructed. The society and culture in which a child lives will determine the meanings of words and when and where to use different words.
- Language is governed by a set of rules. The rules between different languages may differ but within a single language those rules will be more or less consistent. For example, in English you add *ed* to the end of a verb to mark that something happened in the past.

So, how do infants go about acquiring language? We will first cover how the brain processes speech sounds and how scientists study language learning in the infant brain.

Learning in the Womb

When infants are born, their brains are primed to learn language. From the start, infants begin learning the language or languages that surround them.

All around the world, typically developing children learn their native language effortlessly. Most children will learn to speak at least one language by the age of 3 or 4. But how are infants so good at learning language?

Starting in the last trimester, infants can hear their mothers' voices.

Scientists have been trying to understand how children learn language for decades. New science tells us that an infant's language learning begins very, very early. In fact, research shows that experience plays an important role even before children are born. Beginning in the third trimester of pregnancy, developing infants are able to hear the sound of their mother's voice from inside the womb.

This means that the baby can hear whatever language or languages the mother is speaking. Since the mother's body amplifies the sound for the baby, only the mother's voice is loud enough to be heard from inside the womb.

Recognizing Mother's Language

Are infants learning anything as they listen to the sound of their mother's voice? To find out, researchers played vowel sounds for newborn infants through special speakers. The vowel sounds were from their mother's home or native language and from a foreign, non-native language.

Researchers measured how many times the newborn infants sucked on a pacifier while they listened to the sounds. When the infant was more interested in a sound, they would suck on the pacifier faster than when the infant was less interested. Infants are naturally more interested in things they don't recognize.

The researchers found that infants sucked on the pacifier more when they heard the foreign language sounds. This indicates that infants didn't recognize the foreign language sounds but they did recognize the sounds of their mother's home language.

While infants are in the womb, they listen to their mother's voice and learn from it.

B – Experience Shapes Language

We just learned that infants are able to tell the difference between the sounds of their home language and foreign languages at birth.

For the first few months of life, infants can tell the difference between all of the sounds of all of the languages spoken worldwide. They are citizens of the world. But very quickly, children's experiences begin to shape what connections form in their brains as they learn language. By 10 to12 months of age, they are already becoming *native language specialists*.

In other words, they are getting better at telling the difference between sounds in their own language. At the same time, their ability to tell the difference between sounds that aren't used in their native language or languages is getting worse.

Interactive: Distinguishing Sounds

Use the slider interactive below to explore this graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=261#h5p-8

Reflection Point

Consider the question: What can we do to help very young children develop language skills? Make sure to consider activities for children who are learning a different language at home.

We will also discuss specific supports to use with children who are dual language learners later in the course, but this question can help us begin to focus on this topic.

Some additional questions might be:

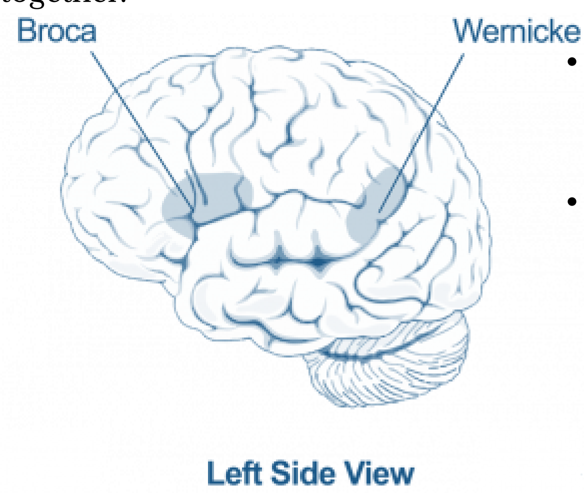
- What kinds of practice might children who are dual language learners need in particular?
- What kinds of connections do we want to promote with language learning activities?
- How can you build language learning into activities you already do every day?

C – Language Brain Areas

> Wernicke's area: Language perception and Broca's area: Language production

What is happening in the infant brain as they learn language?

While there are many regions of the brain that are important for language, we will focus on two regions of the brain that are important for speaking and how these regions begin to work together.

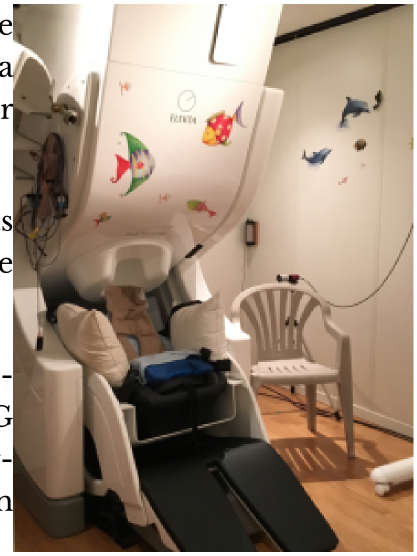


- **Wernicke's area** is important for language perception, or how we recognize particular sounds as language.
- **Broca's area** is important for language production, or how we produce speech sounds.

In the adult brain these regions closely coordinate with each other. As we listen to language and engage in conversations, these areas in our brains are actively working together and sharing information.

These regions also coordinate with hearing or auditory regions of the brain and motor parts of the brain, which are important for directing the muscles we use to speak.

Magnetoencephalography (MEG) Machine



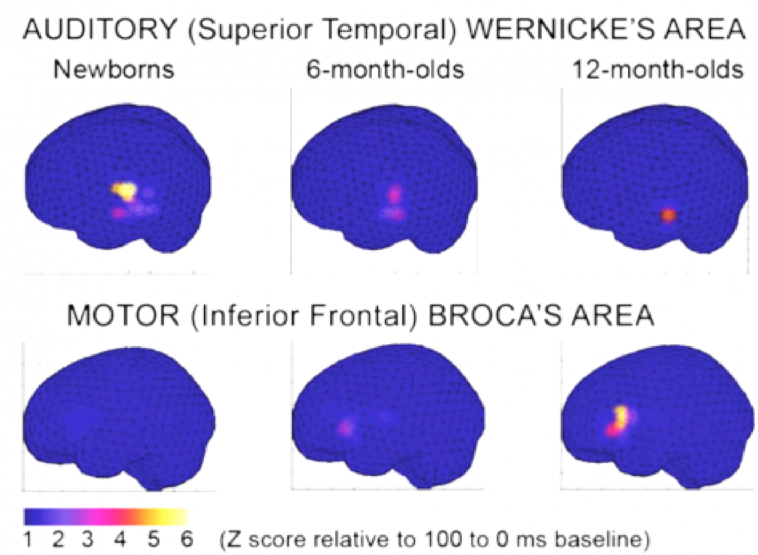
Scientists wanted to know if Wernicke's and Broca's areas were active when children learn language. To find out, they used a brain imaging tool called magnetoencephalography, or MEG for short.

MEG is harmless, noninvasive, and silent and provides scientists with a millisecond-by-millisecond reading of what parts of the brain are active during a specific time period.

In one MEG study, newborns, 6-month-olds, and 12-month-olds listened to speech sounds while they sat in the MEG machine. The MEG measured infants' brain activity in Wernicke's and Broca's areas while they listened to those speech sounds.

Activation of Language Brain Areas

The activity from all of the infants' brains in the study was averaged together and the averaged brain activity is pictured here on these blue model brains as pink and yellow regions.



(Kuh1, 2010; adapted from Imada et al., 2006)

First look at the top row of brains. You'll notice that all three brain models have brightly colored areas. This means researchers found that, while listening to language sounds, the region of the brain that is important for speech perception—Wernicke's area—was active in newborns, 6-month-olds, and 12-month olds.

Now look at the row of brains on the bottom. You'll notice that the leftmost brain model does not have any brightly colored areas, while the middle one has a lightly colored area and the one on the right has a very brightly colored area.

This set of results shows that in newborns (the leftmost brain models), the region important for speech production—Broca's area—isn't showing any activity. This makes sense. In newborns, the language perception and language production regions aren't yet coordinated.

Only six months later (the middle brain models), the language perception *and* production regions of the infant brain are active at the same time. This is just around the time that infants are learning to babble.

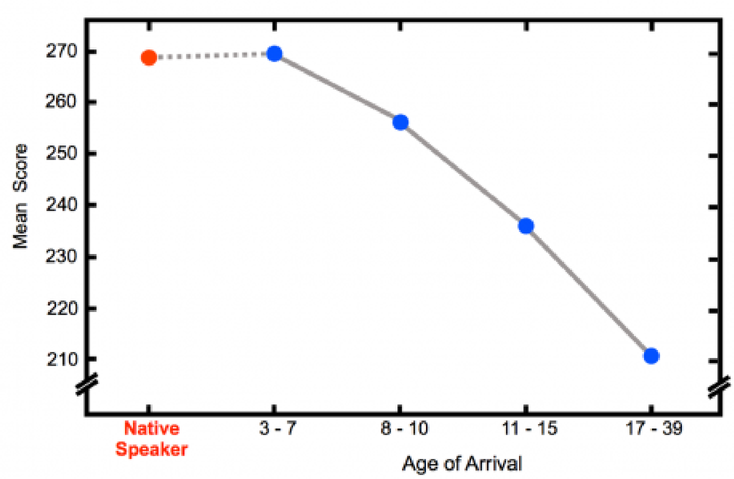
But the infants aren't actually babbling while they are in the MEG. They are just listening silently to language sounds. It is as if the infant brain is practicing while listening, trying to figure out how to produce all the sounds it hears every day. This pattern of brain activity suggests that the speaking and listening parts of the infant brain are beginning to work together. Over the past six months, connections between these two brain regions have grown. The connections have strengthened as the infants listened to language.

At 12 months (rightmost brain models), many infants are beginning to say their first words. By this age, simultaneous activity in both the production and perception areas of the brain is even stronger.

This coordinated brain activity is the result of both biology and experience. Early experiences with language are especially critical for infants. The infant brain is beginning to connect and coordinate these regions long before they utter their first word.

Sensitive Period

Children are incredibly good at learning language.



Remember this graph from Lesson 2? It describes the research findings of scientists who found that the older a person was when they started learning English, the worse they scored on the grammar test.

Again, this doesn't mean that we can't learn a second language as adults. We can always learn new things. It just means that it will be harder for us.

This is partly due to how our brains develop. When a child is young, connections form at a rapid rate, and the brain is particularly sensitive to new experiences.

But as we age, we stop making as many new connections between neurons. Our brains are less sensitive to the experiences we have in our everyday lives. While we can still learn new things as adults, we will likely have to try harder, or repeat the task more times than we would if we were learning the same thing as a child.

D – Practitioner Application

So what does this research mean for people who work with infants and toddlers every day?

- Children build their brains over the course of childhood.
- Connections form in their brains, and what they learn is a result of both their biology and their experiences.
- Children's brains are primed to learn language, and they often appear to be natural language learners.
- Even if children are not yet talking, they are listening to what others are saying and forming connections in the language regions of their brains.

We can help children by making sure that they have plenty of rich language experiences to support their learning. This is true whether a child is learning one language or more than one.

Talking a lot—for example, narrating what you are doing as you are changing a diaper or helping a child into their pajamas—is one of the best ways to support language growth. Singing songs and reading books are also excellent ways to provide children with rich language experiences. Even if a child is too young to understand the story, you can still point to pictures in a book, name them, and describe them. And being close to you during story time and listening to your voice will help them associate reading with being comfortable, safe, and enjoyable—setting the stage for later literacy.

We will circle back to other things that adults can do to help support language growth later in this lesson.

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4-2 Steps Along the Way

A – Language Development Journey

A lot happens in the first three years as children prepare to speak fluently. Language learning is not a single part of children's development. It is a journey with many steps along the way.

Somehow, children blast from listening to speech as newborns to cooing and babbling as older infants. They race from learning new words as toddlers to speaking in complex sentences as preschoolers.

In the Language and Literacy domain of the Head Start Early Learning Outcomes Framework, you can find a wealth of information about some key steps children take along their language developmental progression.

Language milestones are important, but it is *how* children develop these skills, the path that they take on their journey, that lays the path for later success. So how do children learn language, and what are the best ways to help children become strong language learners? Let's find out.

From Listening To Babbling

First, how do children go from listening to speech sounds to making speech sounds?

Infants begin by practicing the individual sounds and syllables of the language. In fact, infants make sounds right after birth. While most of what you might hear from an infant is crying, infants can also make other non-speech sounds.

These include sneezing and burping. Then, at 6 to 8 weeks of age, infants begin to coo, practicing long vowels like "ahhhh" and "oooooh."

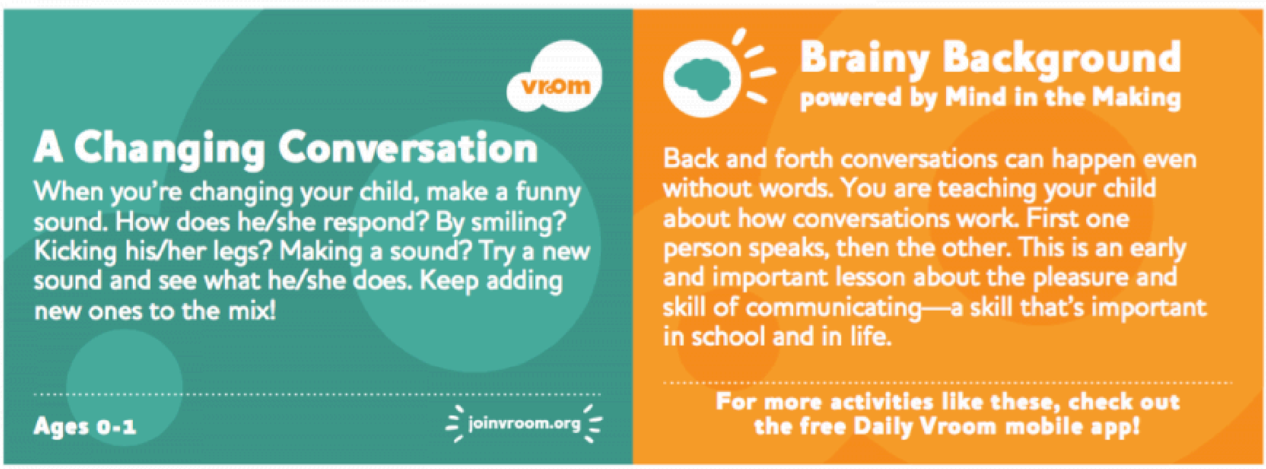
Around 6 to 9 months, infants begin to make a series of consonant-vowel sounds, sounds like “mamamama,” “dadadada,” or “babababa.” This kind of babbling allows children to practice making a variety of sounds.

Infants actually have to practice moving their tongues and mouths in the correct way. This helps them to produce the same speech sounds they have been listening to for months. Because listening to language is such a crucial aspect of language development, it is important to ensure children have ongoing, routine hearing screenings.

How much an infant babbles predicts the child’s later vocabulary ability. Infants who babble early and frequently say their first words sooner. They also have larger vocabularies when they begin kindergarten.

Vroom Tip

Check out this Vroom tip to get more ideas about how to boost children’s early language development.



View text-only alternative of this Vroom card

A Changing Conversation

When you’re changing your child, make a funny sound. How does he/she respond? By smiling? Kicking his/her legs? Making a sound? Try a new sound and see what he/she does. Keep adding new ones to the mix!

Ages 0-1

Brainy Background powered by Mind in the Making

Back and forth conversations can happen even without words. You are teaching your child about how conversations work. First one person speaks, then the other. This is an early and important lesson about the pleasure and skill of communicating–a skill that's important in school and in life.

Read the Vroom tip. Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?

B – Sounds and Language Patterns

Babbling

But it's not just a one-way path to language learning. Educators' and caregivers' responses to babies' babbles and coos are important too. In fact, responding to infants' babbling can actually help support their language development and even lead to larger vocabularies over time.

Research shows that when caregivers respond directly to children's babbles, rapid language learning takes place. In one study, caregivers were instructed to respond immediately to infants' babbling. Caregivers based their responses on the specific sounds of infants' babbling, and they responded using full vowels and full words.

The researchers found that when the caregivers responded to infants' babbles, the infants dramatically changed the way they were babbling. These infants began making new word sounds based on their caregiver's responses. These new sounds contained the same patterns that they heard their caregivers make when they responded to their babbling. For example, an infant might look to a caregiver while holding a small doll and say, "Ba!" The caregiver might say, "Oh yes, Mai, a doll! Look at that doll you have, what a nice doll." In response, Mai might change her babbling pattern to "A-da! A-da!"

Video: Conversations: Uh Oh **(0:28)**

Next we'll see a video example of what contingent responding to babbling sounds like in an early learning setting.

In this video, a toddler sits in a high chair eating and babbling while an educator responds to the child's babbles.

While watching, think about:

- How is this child building language skills?
- How is the educator supporting those skills?
- How do you respond to children's attempts to communicate with language?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=263#video-263-1

Video Debrief

What did you notice about the infant and educator?(click to toggle expand or collapse)

You may have noticed that:

- The infant is babbling in a back-and-forth way with the educator and making some of the same sounds as the educator.
- The educator is responding to the babbling as if the child is saying understandable words and is repeating some of the child's sounds.

Becoming a Communicative Partner

In early childhood, communication between educators and caregivers and children develops as children's language learning develops.

The communicative landscape gradually shifts from a mostly one-way relationship of the caregiver initiating communication with the infant to a two-way communication path as the child learns to become a communicative partner.

As we've described, infants start by being immersed in the communicative information provided by their caregivers and then slowly start to embark on their own communicative journey, adding more and more of their own voice to the mix.

Children as Conversational Partners

Let's take a closer look at how children become conversational partners. We can use the Head Start Early Learning Outcomes Framework to better understand what this development looks like:

- From birth to 8 months, children should participate in back-and-forth interactions, exchanging facial expressions and language sounds with familiar adults.
- From 9 to 18 months, children begin to initiate and participate in conversations by babbling and using gestures, such as pointing, or using words or signs. They also begin to understand the meaning of familiar caregivers' verbal and non-verbal communications and respond with facial expressions, gestures, words, or actions. And they begin to seek out language-based information, such as the meanings of new words or the names of different objects.
- By 36 months, children begin to use sentences of three or more words and ask and answer simple questions in conversation with others.

Early Vocabulary and Conversation

One way that children become more active communicative partners is by first establishing and then expanding their vocabulary. Children go from babbling to speaking their first word at around 10 to 15 months.

But learning new words is slow in the beginning. Infants say, on average, just over 30 words when they are 15 months old. These words are things that infants encounter on a daily basis, such as familiar people, favorite toys, and clothing. They can also be routines, such as *night-night*, or sound effects like *yum* or animal noises.

Children's vocabulary begins to increase rapidly around the time that that they have learned their first 50 words. This vocabulary spurt often happens sometime during the middle of a child's second year.

Near the beginning of their third year of life, you may notice that some children also exhibit a *spurt* in sentence length. In their third year, children's sentences grow from two-word requests and descriptions to longer sentences of four or more words that allow them to express more complicated ideas.

Reflection Point

Consider these questions:

- What are some factors that might help vocabulary growth?
- What might hinder it?

C – Vocabulary Growth

It is especially important to remember that **developmental trajectories** are individual and will often depend on many external factors.

Practicing Vocabulary

Different children learn new words at different rates, even after this vocabulary spurt. Sometimes, vocabulary-learning speed can be due to children's personalities. Children who participate in more conversations typically have a larger vocabulary than their peers. This is because they have simply had more practice talking and using new words to communicate their thoughts and feelings.

The Head Start Early Learning Outcomes Framework indicates that by 3 years of age, children should be able to demonstrate a vocabulary of at least 300 words in their home language.

Interactive: Vocabulary Growth

Use the slider below to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=263#h5p-10

Environmental Factors

It's not just personality that determines how fast children learn new words. The experiences that children have with language early in life play a very important role. The more that infants hear and interact with language early on, the more vocabulary words they will have later. One factor found to be linked to early language exposure is socioeconomic status, or SES. SES is an economic measure of a family's resources, including a family's income, education, and occupation. Children from low-SES families tend to have fewer opportunities to practice language skills, and their vocabularies are more likely to lag behind their more affluent peers.

Growing up in a low-SES family **does not cause** children to have lower vocabularies. Instead, children from low-SES families often have fewer opportunities to build language skills. For example, parents in low-SES families often have less free time after work. And many childcare centers that are less costly also have larger classroom sizes. This means that there are often fewer opportunities for
one-on-one interaction.

Interactive: Environmental Factors

Use the slider below to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=263#h5p-9

Data from this same study indicates that while infants from high-SES families hear an average of over 2000 words per hour, infants from low-SES families hear an average of 600 words per hour. By the age of 3, many children from low-SES families will have heard 30 million *fewer* words than children from high-SES families.

This study was conducted by Dr. Hart and Dr. Risley in 1995. Since then, the study has been replicated by other researchers, who have found similar relationships between the amount of language children are exposed to and the SES status of families.

However, new research continues to indicate that it is not just the number of words that matter. The quality of the language that children hear and engage in is very important. Children build their skills when language occurs in a meaningful context—when we talk to them and engage in back-and-forth interactions.

All parents, caregivers, and educators can provide children with high-quality language experiences, regardless of SES status. We will talk about what elements help bring quality to back-and-forth language-rich interactions a little later in the text.

D – How Children Learn Language

Word Mapping

How do children actually go about figuring out what different words mean and how to use them?

Infants learn new words by *mapping*, connecting the word that they hear to the thing that it refers to. Children follow other people's eye gaze and gestures to map words onto objects or events. When they hear a new label, they connect the label to what the adult is looking at or pointing to. For instance, if a parent or educator points to and looks at an object, then says, "apple," infants begin to map this word onto the object.

Word learning can be challenging for children. Imagine if you had to learn a whole set of vocabulary for a new language. One shortcut that children use to quickly learn the meanings of words is mutual exclusivity. *Mutual exclusivity* is the assumption that every object only has one label. Say a child is presented with a ball and one other object that they don't know the label for. If you say a label they don't know (i.e., the label for the object they don't know), they will assume that the new label refers to the unknown object, since they already know what a ball is.

Other Strategies

Mutual exclusivity, or assuming that every object only has one name, is not a particularly useful strategy for children who are dual language learners (DLLs). Can you guess why?

Children who are learning two languages must learn that objects can have more than one name. For example, *shoe* is also *zapato* in Spanish.

Instead of relying on mutual exclusivity, children who are dual language learners use other strategies to learn words. These strategies often require children to pay close attention to the different properties and structures of language. When children who are dual language learners have enhanced awareness of these language properties, this can help boost their language learning skills, making learning a third language much easier.

We will talk more about children who are learning more than one language later on.

Whether a child is learning one language or multiple languages, talking a lot with children, especially about topics that they are interested in, helps them build their vocabulary. Providing more information about an object while you and a child are engaged in joint attention with that object is an excellent language-learning opportunity.

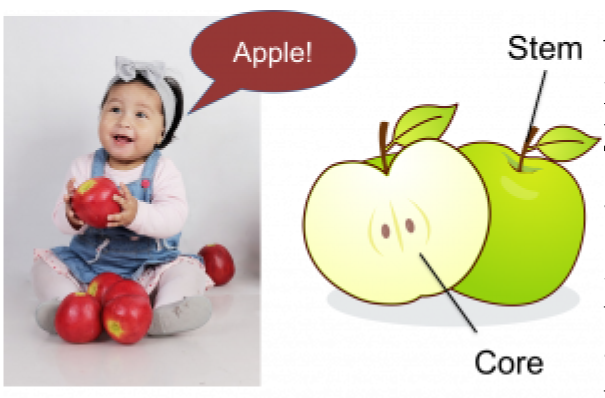
Overextension and Underextension

Children will also figure out the boundaries of a word's meaning by using it in ways that adults would not. They may use the word *ball* to describe any round-shaped object, like an apple, marble, or egg. Researchers call this *overextension.*

Or they might only say *ducky* when they see their yellow rubber duck at bath time. But they don't say *ducky* when they see another rubber duck or a live duck. This is called *underextension*.

These behaviors are normal. As children learn more about language and the world, they use words in a more adult-like manner.

Whole Object Bias



All these are strong strategies for word learning. However, they don't help children when objects have names, like *apple*, but they also have parts. These parts can have different names, like *stem* and *leaf* and *core*.

Research tells us that children begin associating words with whole objects during their second year of life. Children's tendency is to associate new words with whole objects, not their parts. This tendency to associate new words with whole objects continues well into the preschool years. This is a typical phase of language development.

As educators and caregivers, it can be helpful for us to know that this is a child's tendency as they are learning language. We can help children by acknowledging that they named the whole object correctly and then provide more information.

For example, saying, "Yes! That is an apple! Do you see how it hangs from its stem?" The child might repeat "apple!" And we can say, "Yes! An apple hanging from its stem!"

As children learn more about the world and become more familiar with objects, they eventually begin to learn that parts of objects can have different names.

Receptive Language Learning

Children as language learners are not just learning how to produce language but also how to understand it themselves. This is called *receptive language learning*. Children may even understand a word well before they are able to produce it accurately on their own.

From birth to around 9 months, infants will demonstrate their receptive understanding of language by looking to familiar objects when those objects are named, such as looking at a dog, when mom says, "doggy."

By the second year of life, 9 to 18 months, we see infants using both their looking behavior and pointing or other gestures to demonstrate their receptive understanding of language.

By the time children reach 3 years of age, the Head Start Early Learning Framework states that they should show understanding of common words used in daily activities, including most positional words, such as *up*, *under*, *on*, or *down*, and attend to new words in conversations.

Adults may sometimes make the assumption that if a child isn't saying a word, they don't really understand it. But that may often not be the case, so it is important to pay attention to children's receptive understanding of a word, as well as their ability to produce that word in their own speech.

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4-3 Dual Language Learning and Development

A – Learning More than One Language

At this point, we've primarily focused on how to learn a single language, but what happens when a child is exposed to and trying to learn more than one language?

Maybe at home the child speaks Spanish, while at school they speak English. Or maybe their extended family speaks only Mandarin, but their immediate family lives in the United States. How does learning more than one language, or dual language learning (DLL), affect language development?

What is Bilingualism?

Bilingualism is the ability to speak two or more languages. ***Bilingual*** and ***dual language learner*** (DLL) are both terms you may hear referencing children who speak more than one language.

In contrast, someone who speaks one language is called *monolingual*.

Children who are dual language learners are learning two or more languages at the same time, or learning a second language while continuing to develop their first or home language.

About 20 percent of people in the United States speak more than one language at home. Bilingualism is even more common around the world. Roughly two-thirds of the world's population knows more than one language.

People who are bilingual are diverse, learning languages at different ages and in different contexts.

Two Types

Proficiency and dominance in languages varies among children who are dual language learners.

Dual language learning can occur in a variety of ways.

Some children start learning two languages from birth. They are *simultaneous bilinguals*. Simultaneous bilingual speakers have two native languages.

Other children learn one language before they learn another one. They are *sequential bilinguals*.

B – Developing at Same Rate

Sometimes caregivers and educators are worried that children who are learning two languages will have language delays.

But research does not support this. Children who are learning two languages reach developmental milestones at the same pace as children learning only one language.

When thinking about language milestones, it is important to consider how many words children know in *each* of the languages they are learning. Research indicates that language growth in bilingual and monolingual children is very similar.

Dual Language Development

Regardless of how many languages they are learning, children usually say their first words around 1 year of age. A bilingual's first words may be in one or both languages. It depends on children's experiences with each language.

Bilingual vocabulary and grammar development show the same pattern as monolingual language development. Monolingual and bilingual children begin to combine words around 18 months. By 3 to 4 years of age, children produce more complex sentences.

Just like monolinguals, bilingual children show variability in the ages at which they reach each milestone. Simultaneous bilingual children may reach these milestones at the same time in both languages, while sequential bilingual children may reach milestones at staggered times—months or even years apart.

It is also important to consider that bilingual children have different language experiences at home. Depending on whether you work with simultaneous or sequential bilingual children, and the amount of each language they hear at home, you can expect to observe different language behaviors. For example, you might notice that the bilingual children you work with are more comfortable speaking one language than the other or that they switch between languages.

Regardless of these children's individual language experiences and **developmental trajectories**, you can support dual language learning in any early learning environment.

Quality Interactions from the Start

Whether children are learning one or more languages, it is important that they have high-quality language interactions with the adults in their lives. These interactions build a strong foundation for language learning. Knowing how to learn a language is a skill that helps children learn a second language.

Even if a child does not speak English well when they start in your program, this does not necessarily mean that they have a language delay. When a child has a strong foundation in their home or native language, they will likely be able to quickly learn a second language.

To build a strong foundation in their home language, educators can encourage parents to speak the language that they are most comfortable with and feel competent using. These interactions not only help children develop their first language, but they teach children what they need to do to learn any language.

Interactive: Language Developing Rates

Use the slider interactive below to explore this graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=265#h5p-12

Reflection Point

As we think about the intersection of language and culture, let's consider the importance of language to you and your community. Consider these questions:

- Why is bilingualism important?
- How do language and culture connect?

- What does your language—or languages—mean to you?
- Why is it so important for you and your community to maintain your home language?

C – Cognitive Benefits of Bilingualism

As we just discussed, for children who are dual language learners, learning both languages is incredibly important to their culture and identity.

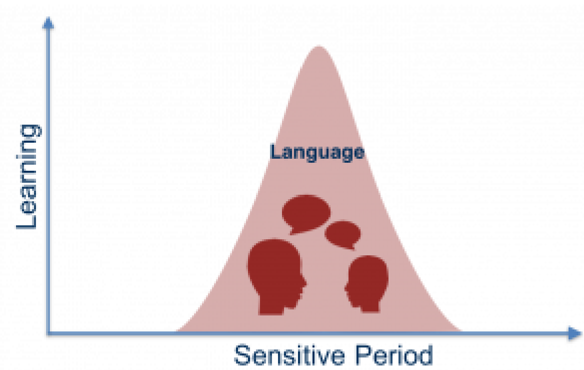
In addition to these benefits, there is more and more research indicating that knowing and learning more than one language has cognitive benefits as well, including mental flexibility and cognitive control. Both of these have to do with something we call *cognitive flexibility*. This is the ability of our brain to do things like quickly switch from one task to another, come up with creative solutions to problems, or multitask.

Children who are learning more than one language tend to be particularly good at doing these types of activities because they have a lot of practice switching between languages.

Sensitive Period for Language

Children who are learning two or more languages also get a boost in the length of time that their brain is particularly sensitive to learning language.

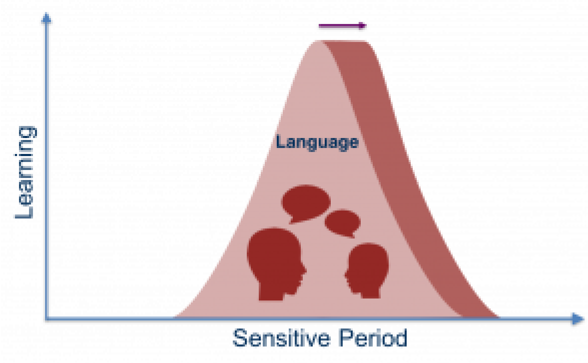
You might remember the sensitive period for early language learning that we discussed earlier. The *sensitive period* is the time in development when children's brains are especially ready to learn language.



You can see the sensitive period represented by this graph. The time under the peak of the curve is the core of the sensitive period. The ramp-up and the ramp-down represent the time leading into and the time leading out of the sensitive period.

Although monolingual and bilingual language development are similar in many ways, the time period in which sensitive periods occur for monolinguals and bilinguals is one of the few areas where we see some differences.

Bilingual Sensitive Period



It turns out that children who are learning two languages have a *longer* sensitive period for language learning than children who are learning just one.

It's important to note that this extended sensitive period is NOT a delay. It's actually an extension of time during which those children can learn a language more easily.

If you think about how the infant brain is using patterns to determine which sounds are important for a child's home language or languages, this extended sensitive period makes sense. This extra time allows children to accumulate all of the patterns they need to understand the languages they are learning.

Other than this extended sensitive period, children who are learning more than one language learn those languages in the same way that monolingual children learn a single language.

Interactive: Brain Specialization

Use the slider interactive below to explore this graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=265#h5p-11

D – Cognitive Flexibility

Code-Switching

You may notice that children who are dual language learners switch back and forth between their languages or mix languages within a sentence or phrase.

For example, a child who is a dual language learner of Spanish and English might say, "More leche" (more milk), or "I like to cantar y bailar every day" (I like to sing and dance every day).

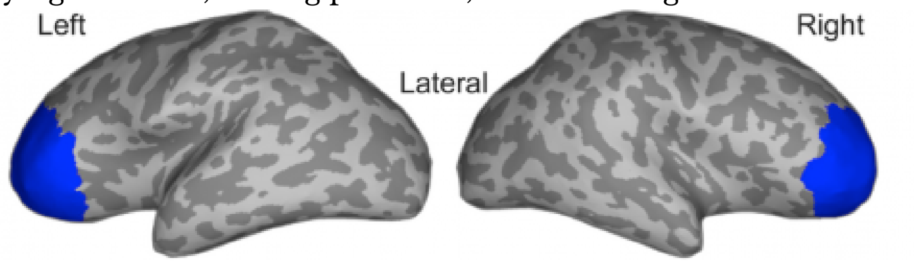
This is an example of the mental flexibility of children who are learning more than one language. This skill is called *code-switching*.

Code-switching is evidence that children are learning to decode multiple languages. It is a strategy that children use to negotiate or construct meaning within and across languages.

Activity in Prefrontal Cortex

Children who are dual language learners show increased activation in an area of the brain called the *pre-frontal cortex*.

The pre-frontal cortex is the area of the brain responsible for many important cognitive functions, like planning, paying attention, solving problems, and switching between tasks.



Ferjan-RamÍrez et al., 2016

This is an MEG brain map showing the right and left hemispheres of the brain. The portion highlighted in blue is the area of infants' brains that researchers measured as children heard the language stimuli. This is the pre-frontal cortex of the brain.

Activity in the pre-frontal cortex is associated with many important cognitive functions, such as the skills involved in mental flexibility and cognitive control, both of which have to do with cognitive flexibility. Again, this is the ability of our brains to quickly switch from one task to another, as well as multitask.

A growing number of studies suggest that being bilingual comes with increased cognitive flexibility.

Interactive: Cognitive Flexibility – Name the Color

To give you an idea of what cognitive flexibility feels like, play a name-the-color game. In the interactive below, you will see a series of words in different colors, like **BLUE**. As fast as you can, type the first letter of the color that corresponds with the actual color of the word, NOT the color the word represents. Try it out and good luck!

Click the black screen to see the instructions and begin. Or you can view the video alternative: Cognitive Flexibility Demo (1:40).

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=265#h5p-39

Activity Debrief

How well did you do? What did you notice?

This test is called the *Stroop Test*, and it's a common way that researchers measure cognitive flexibility in adults.

You might have noticed that at first, the written name of the color matched the color of text. At some point, though, the written name of the color was different than the color of the text. This probably made it much harder to say the name of the color of the word quickly.

Tests like the Stroop task demonstrate the brain's ability to switch between tasks. To be fast at the task, you have to ignore the word and focus on the color. This is hard to do since we are all so used to reading automatically.

Why it matters

Your brain has to inhibit its natural tendency to read, but focus on colors instead. Because people who are learning more than one language have natural practice at switching between languages, they tend to complete Stroop tasks more quickly and accurately than people who are monolinguals, showing their mental flexibility. However, practicing Stroop tasks and other mental flexibility games can allow anyone to improve their cognitive flexibility.

E – Supporting Dual Language Learners

There are several things you can do to support children who are learning more than one language:

- Talk with bilingual families to learn which languages children hear and speak at home.
- Create a welcoming environment for children who are dual language learners, include their home language when possible, and individualize support for them as you can.
- Use visuals to help children understand.

You should also assess development and learning of children learning more than one language by using all of their languages.

Finally, if you or your colleagues can provide bilingual experiences to children, you might read aloud to children in each of their languages. For example, you can read one book in English and another in Spanish. Reading aloud gives children more opportunities to become familiar with the sounds of language.

Educators who do not speak a child's home language can include culturally and linguistically appropriate materials when available.

Dual Language Learner Resources

If you are interested in more information about children who are learning more than one language or want more information on how to support children who are dual language learners, here are some resources to explore on the Office of Head Start's Early Childhood Learning & Knowledge Center website:

- U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start, National Center on Cultural and Linguistic Responsiveness. (n.d.). *Gathering and using language information that families share.* [PDF]
- U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start. (n.d.). *Culture & Language: Planned language approach.* [PDF]
- U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start. (n.d.). *Culture & Language: Dual language learners toolkit.* [Website]

Video: I Love Me (1:14)

Let's watch a video called *I Love Me* that features an early childhood educator working with a group of children, some of whom are dual language learners.

While you watch the next video, consider these questions:

- What does the educator do to help support the children's language development?
- What strategies does the educator use that could apply to a child who speaks a different language?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=265#video-265-1

Video Debrief

What did you notice about the educator? (click to toggle expand or collapse)

Here are some things we noticed:

- The educator uses language with the motions.
- She models the motions.
- She gestures to help the children identify their body parts.

Although the educator uses both English and Spanish, educators should use code switching in intentional ways instead of doing *simultaneous interpretation*, or alternating languages as they teach. One example might be when an educator reads one line of a book in one language then repeats it in another.

Section Summary

In this section we talked about how the brain is prepared to learn two languages at the same time.

- Bilingual language development is similar to monolingual language development. Children who are learning two languages reach developmental milestones at the same rate as children learning one language.
- Bilingualism is also associated with cognitive advantages, like greater cognitive flexibility.
- Whether children are learning one or more languages in the first years of life, we know it is important for them to have high-quality language interactions with the adults in their lives from the start. These interactions build children's brains and help to create a strong foundation for language learning.

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Cite this resource:
EarlyEdU Alliance (Publisher). (2018). 4-3 Dual language learning and development. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

4-4 Supporting Language Development

A – Best Way to Learn Language

Earlier, we talked about how, as children listen to the sounds of language, connections are rapidly forming between regions in their brain. But what type of experience with language is best? Infants hear language everywhere, from speakers on the radio to characters on television.

(Kuhl et al., 2003)

Remember that when infants are born, they are universal language learners. They are able to tell the difference between sounds in all of the languages spoken around the world.

But by age 1, children start to become native language specialists. They get much better at telling the difference between sounds in their own language and worse at telling the difference between sounds in foreign languages.

Researchers wanted to know how well English-learning 9-month-old infants could learn to tell the difference between sounds in a foreign language from different language sources. To do this, they compared how well English-learning 9-month-old infants learned foreign language sounds.

Infants came to the research lab for 12, 25-minute, language-learning sessions. Some of the infants spent all 12 sessions with a native Mandarin speaker. The Mandarin speaker read books, sang songs, and played with toys.

A second group of infants watched DVD recordings of the Mandarin speaker for 12 sessions.

A third group listened to audio recordings from the sessions.

All three groups were exposed to the same amount of language, but the types of experiences with the language were different.

Specialization in Languages

Use the slider interactive below to explore this graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=268#h5p-31

B – Interactions Drive Language Growth

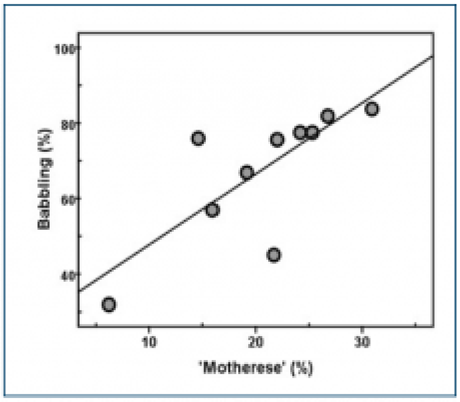
Research shows again and again that early interactions, especially those that include back-and-forth exchanges, are key to early language learning. These interactions allow adults to customize their responses to children's needs. This way, adults can follow a child's interests through conversation or play. These are also called *serve-and-return* interactions.

Children gain extra confidence to take part in communication when adults listen and respond. By doing this, you are reinforcing children's efforts to learn language.

These kinds of interactions can even begin long before the child is speaking. Let's look at several things that parents and educators can do to help language development during back-and-forth interactions.

Parentese

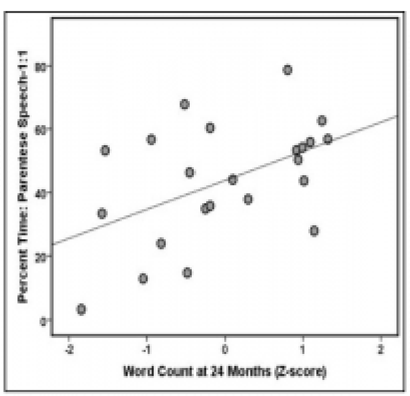
Parents and educators can talk to their child in *parentese*, or infant-directed speech. Listening to parentese can actually help infants learn. And they love to listen to it.



Infant-Directed Speech

Babbling

As the graph on the left shows, infants who heard more motherese, a similar concept to parentese, babbled more in infancy. Because babbling is essentially practice for later communication, this is an important step in language learning.



(Ramirez-Esparza et al., 2014)

Infant-Directed Speech at 1 Year

Vocabulary at 2 Years

Not only does parentese give children an opportunity to practice speaking, but it also helps children learn new words. As shown in the graph on the right, infants who hear more parentese at age 1 had a higher vocabulary word count at age 2.

How Infants Learn from Parentese

Back-and-forth exchanges with infants are a perfect time to use parentese. To use parentese, you use a sing-song, exaggerated tone of voice. It sounds something like: "Ahhh, how do those niiice, cleeeean, clooothes feeeel?"

Parentese is helpful in language growth because the syllables and vowel sounds are accentuated. This makes them easier for babies to recognize.

When you are first learning a language, it can be very difficult to hear when new words start and stop—they all blur together. But if someone speaks the language slowly and carefully, it is easier to tell when one word stops and the next begins.

Unlike simply speaking slowly and clearly, parentese not only exaggerates different words, but it also accentuates vowel sounds, which helps infants learn those sounds.

Any time is a good time to use parentese. Think about times in the day when you might have routine, one-on-one interactions with children. Perhaps during moments in the day, such as diapering or handwashing.

C – More Ways to Grow Language

Imitation

Another way to support early language development is to model language and communication for children. Infants learn from watching.

One of the most important ways that infants learn is *imitation*. Starting immediately after birth, infants can observe and imitate, or copy, facial expressions and gestures.

Later, infants use imitation to learn about objects, themselves, and other people. They learn the similarities and differences between themselves and others, just by watching. Children even use imitation to learn language. They do this by listening to and mimicking language sounds and lip movements.

Infants are most likely to learn through imitating a responsive adult, especially a caregiver who is able to use body language cues to understand children's feelings and needs.

Vroom Tip

Check out this Vroom tip to get more ideas about how to use imitation during everyday interactions with children.

View text-only alternative of this Vroom card

Sound Makers

When you're in the park, take turns with your child making different sounds with your voices, hands, and feet. Stomp really loud or clap your hands up high. When your child makes a sound, imitate it and then make a new one. How many different sounds can you two make?

Ages 1-2

Brainy Background powered by Mind in the Making

The "Sound Game" gives your child practice focusing and controlling his/her behavior. To copy your sound, your child has to pay attention and remember it. Waiting for his/her turn takes self control. Your child will need these thinking skills in school, work and life.

Read the Vroom tip. Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit? Gazes and Gestures

Gazes and Gestures

In addition to imitating our actions, infants are also looking for any clues we can give them about what we are trying to communicate. Two big clues are where we are looking and what we are pointing at.

Toward the end of their first year of life, infants begin to follow our gaze toward what we are looking at. They also begin to look where we are pointing and to use the pointing gesture themselves to communicate their own interests and desires. Following our gaze and looking where we are pointing helps infants to isolate and identify what it is that we are talking about.

And before they have the words for objects, pointing helps infants direct our attention to things that they want, are interested in, or need. Infants around the world use pointing as one of their early communication tools.

Looking and Pointing

In fact, research indicates that looking and pointing in infancy is linked to higher vocabularies in toddlerhood.

Infants were initially tested on gaze following and pointing at 10 to 11 months of age. Then researchers measured their spoken vocabulary size, or expressive vocabulary, at 10, 14, 18, 20, and 24 months.

Interactive: Looking and Pointing Boosts Language

Use the slider below to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=268#h5p-13

Sharing Attention

Why are gaze-following and pointing related to vocabulary?

When you show an infant an object, either by holding it or pointing to one further away, you are giving them a cue to pay attention. Infants use this cue to quickly figure out the names of the objects that you are talking about.

We can help infants develop their vocabulary by using these communication tools to engage them in joint attention. We can look at infants, catch their attention, and then deliberately look at an object we want to talk with them about. We can look between the object and the infant, shifting our gaze as we continue to engage. We can also point at objects, long before infants begin to point themselves.

Modeling these communication tools will not only help children focus on what we are talking about, but it will also help them learn to use these tools themselves as they continue to build their communication skills and vocabularies.

Remember that children who follow our gaze and where we point and then point themselves tend to have larger vocabularies.

The child on the left may focus on the educator and follow the educator's attention to see what they are doing. Here, the educator is planting a flower. They're now both focused on the same plant, as well as each other—this is *joint attention*.

Early childhood educators can use this opportunity to label objects and describe experiences to infants. This helps infants learn the meaning of those labeled objects and experiences.

During joint attention, infants connect words to objects and begin to build their vocabulary. Infants learn nouns—the names of objects and people—first. Sharing joint attention is the perfect time to help young infants begin to learn the names of things in their world.

D – Supporting Early Literacy

You might think that from birth to 3 years, children are too young to be developing literacy. But just like language learning begins with infants listening to sounds well before they learn words or language, literacy also begins much earlier, well before children are able to distinguish written words.

Connecting Language and Literacy

We will not discuss early literacy in great detail in this lesson, however here are a few ways that we can support the very early stages of literacy development:

- Repeat songs and stories so children can practice their own narrative and language skills by repeating the same songs and stories on their own.
- Provide children with books to touch, look at, and interact with to give them familiarity with books and written text. Modeling how to turn pages and pointing to the words and pictures in a book as you read will help children learn about reading skills, direction of text, and symbolic representation, or how words or pictures on a page can have meaning.

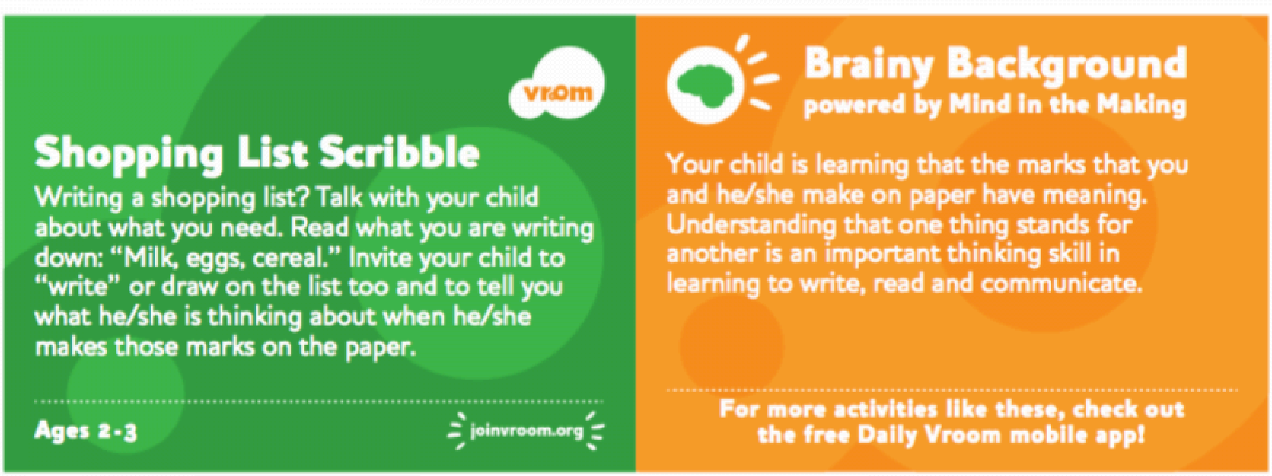
Just as children learn language best in back-and-forth interactions, so they learn literacy. Ask children questions about stories as you are reading to them. See if they can remember parts of the story on their own or maybe even come up with new adventures for familiar characters.

Finally, encourage children's fine motor skill development through practice with drawing, stencils, outlining, coloring, and other forms of drawing that require more and more control of the writing tool. This will help children develop control over their own marks and drawings.

Like language, the development of literacy skills also begins in early childhood. You can help support this development by reading and engaging children, even infants, during the reading process.

Vroom Tip

Check out this Vroom tip to get more ideas about how to support early literacy skills during everyday interactions with children.



View text-only alternative of this Vroom card

Shopping List Scribble

Writing a shopping list? Talk to your child about what you need. Read what you are writing down: "Milk, eggs, cereal." Invite your child to "write" or draw on the list too and to tell you what he/she is thinking about when he/she makes those marks on the paper.

Ages 2-3

Brainy Background powered by Mind in the Making

Your child is learning that the marks that you and he/she make on paper have meaning. Understanding that one thing stands for another is an important thinking skill in learning to write, read and communicate.

Read the Vroom tip. Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit?

Video: Early Essentials Webisode 9: Language Development (24:35)

This video has three examples of educators supporting language development:

- At an early learning program during diapering
- At an early learning environment during outside playtime
- During a home visit

As you watch the video, think about how the educators support language development.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=268#video-268-1

Download the Transcript.

Video Debrief

What did the educators talk about? (click to toggle expand or collapse)

We noticed that educators talked about:

- Responding to early attempts at language
- Matching infants' sounds
- Introducing young children to the environment around them, including words and books
- Talking, singing, playing, and reading books with children
- Labeling objects in the environment
- Narrating what children are doing and what adults are doing
- Finding out from families about children's home languages and family language goals for their child
- Including children's home languages in the early learning environment

The other main take-away here is that back-and-forth interactions that help build language can happen at any time. They can happen during routines, such as mealtime, handwashing or putting on jackets or boots. They can happen on the bus or during walks. The quality of interactions, rather than the quantity of interactions, is important.

Everyone has the tools needed to help a child develop language, no matter how busy life gets. These early, quality interactions and language exposure are essential to children's successful language learning.

Reflection Point

Language learning can happen anywhere and at any time. During your daily face-to-face interactions with children, think about including some of the language-learning ingredients that we just discussed.

- Can you add parentese to diapering or feeding?
- Could using imitation help a child learn words to describe emotions?
- If you want to talk to a child about an object, how could you use pointing and eye gaze to help the child discover what you are talking about?

- During times when you and a child are both looking at or playing with the same object, how could you boost language growth by making an effort to describe the object or an interaction that you are having?

Including some of these ingredients into your daily work with children can help turn everyday routines into language growth opportunities.

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5: Language Development: Ages 3 to 5

In this lesson:

5-1 Language and Communication

This section covers the preschool Language and Communication domain in the framework, including all three subdomains:

- Attending and Understanding
- Communicating and Speaking
- Vocabulary

5-2 Literacy

This section covers the preschool Literacy domain in the Head Start Early Learning Outcomes Framework. The four subdomains are:

- Phonological Awareness
- Print and Alphabet Knowledge
- Comprehension and Text Structure
- Writing

5-3 Let's Talk – Supporting Language and Literacy

This section covers ways that adults can support children's language and literacy development through language and conversations, including ways to:

- Use complex language in the early learning program.
- Build children's language skills through back-and-forth conversations.

- Identify opportunities to engage in conversations.
- Support grammar-learning through conversations.

5-4 Let's Play – Supporting Language and Literacy

This section covers ways that adults can support children's language and literacy development through play, including ways to:

- Build vocabulary through adult-supported play.
- Build narrative through playful storytelling.
- Create environments that support learning through play.

5-5 Let's Read – Supporting Language and Literacy

This section covers ways that adults can support children's language and literacy development through reading. It includes methods to:

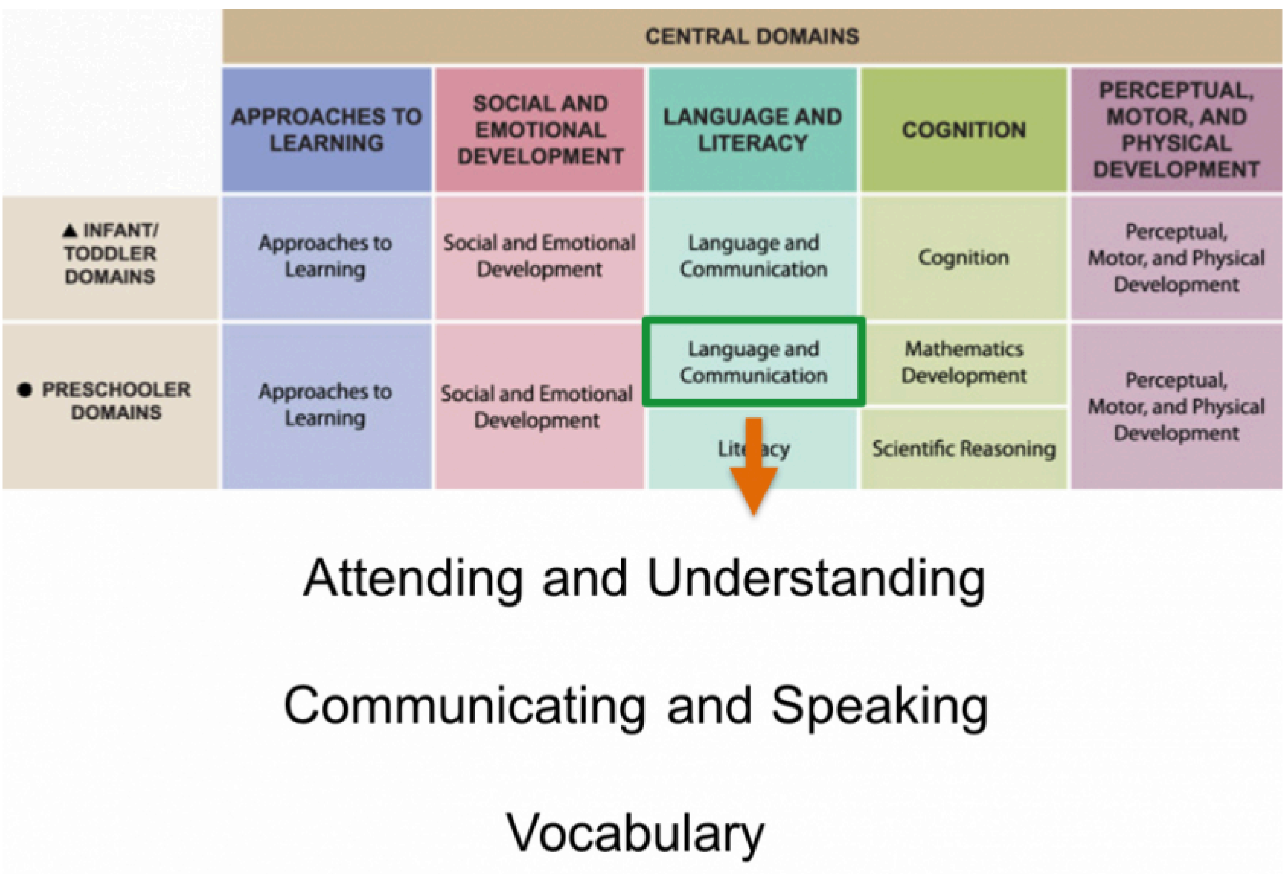
- Build vocabulary during reading sessions.
- Build children's print awareness.
- Engage children in conversations through dialogic reading.

5-1 Language and Communication

A – The Head Start Early Learning Outcomes Framework

The Head Start Early Learning Outcomes Framework (HSELOF) preschool Language and Literacy domain is divided into two sections: Language and Communication, and Literacy.

In this section, we will focus on language and communication. The Language and Communication domain includes the development of key language and communication skills, including attending to communication and language from others, using and following appropriate social and conversational rules, and understanding and using a wide variety of words.



For example, the developmental progression of the Attending and Understanding subdomain shows the growth from acknowledging, understanding, and responding to comments or questions to attending to multi-turn conversations, understanding complex statements, questions, and stories, and responding appropriately.

The Language and Communication domain encompasses three subdomains. As mentioned, one subdomain is Attending and Understanding. The other two are: Communicating and Speaking, and Vocabulary.

We will now cover language development within each of these subdomains.

Attending and Understanding

Between 3 and 5 years, children are able, for the first time, to attend to and understand more complex language, such as statements, questions, and stories that contain multiple phrases and ideas. Children also learn to follow and participate in multi-turn conversations—ones where a child and their conversation partner go back and forth several times.

During this time in development, children also gain skills in understanding and remembering multi-step instructions.

Developing Conversations

Between 3 and 4 years, children will begin to answer simple *who*, *what*, and *where* questions.

They also begin to understand and talk about events that happened in the past or future events. For example, a child might be able to talk about how they got to school that morning or understand that their aunt is going to pick them up at the end of the day.

Children at this age show an acknowledgement of comments or questions, using verbal or non-verbal signals or both.

Between 4 and 5 years, children's ability to understand and answer questions grows to include more complicated questions like: "How?" For example, they may say, "How do you make a block tower really tall?" or "How do you get ready to go outside when it is raining?"

Understanding Instructions

Children also are able to remember multi-step directions in order. For example, a 3-year-old child will probably not be able to remember a three- or even two-step set of instructions: "Wash your hands, then go get your dish for lunch."

But by 5 years, children can often recall two- or three-step directions or actions. Between 4 and 5 years, educators can begin to ask students to do simple two- to three-step actions.

Take a moment to think about how you might talk to a 3-year-old about getting ready to clean up and eat lunch, versus how you might talk to a 4-year-old about getting ready for lunch.

Developing Questions

During the first 5 years of life, children's question-asking behavior grows in complexity. Children not only ask more questions, but the type of questions they ask represents both their developing language and developing cognitive skills.

One example of the growing sophistication of children's questions is shown in the graph here. This study looked at what percentage of questions were stand-alone or isolated questions like "What is that?" and then "What is this?" versus questions that build on each other like "What is that?" and "What does it do?"

As the term suggests, *building* questions build on one another; each question relates to the information from the previous question.

In contrast, isolated questions stand alone. Think of a toddler asking, "What is that?" while pointing to a vacuum, and then asking again, "What is this?" while pointing to a picture of a turtle. Those questions do not relate to one another.

Older children will often ask streams of questions on the same topic or about the same object, such as "What is that?" while pointing to the vacuum, then "What does it do?" followed by "Why do we need to do that?"

Interactive: Developing Questions

This is an interactive! Use the slider in the interactive to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=270#h5p-16

Video: Rainbow Fish Activity (3:00)

During this period in development, children are developing their abilities to listen and pay attention to longer conversations that include multiple turns or rounds. And they can understand more complex statements, questions, and stories.

Let's watch this video, *Rainbow Fish Activity*, of an educator in an early learning program talking about a book that the group just read.

Think about these questions while you watch the next video:

- What do the children's responses tell us about their language development?
- How does the educator support their learning?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=270#video-270-1

Video Debrief

Here are some things that we noticed: (click to toggle expand or collapse)

- What do the children's responses tell us about their language development? Children are responding to questions with complex answers such as, "Octopus wants fish to share his scales," and they are reconstructing a story from memory.
- How does the educator support children's learning? One answer is with open-ended, prompting questions such as, "Then what happens?" followed by a response meant to encourage children's further responses. For example, if a child says, "Share" in response to "What happens next?" the educator might say, "Oh, share, yeah, what does the octopus want to share?"

B – Communicating and Speaking

The Communicating and Speaking subdomain includes skills that are important for sharing meaningful information.

Between 3 and 5 years, children develop some fairly sophisticated communication skills, such as varying how much information they give, depending on what they are talking about and whom they are talking with. They also show growth in their understanding and use of social rules and norms, including common conversational rules. And they are gaining skills in self-expression.

Communicating with Others

Between 3 and 4 years, children begin to describe what their needs are and to communicate them with enough information to get help from a variety of adults.

For example, at this age a child might ask for a snack in different ways depending on who they are talking to. At home, the child may just tell their mom that they are thirsty. In their early learning program, they might be more specific and ask their educator for a cup of water because they know from prior experience that water is what is available when they are thirsty between meals.

During this year in development, children also start to have longer back-and-forth exchanges in their conversations and begin to use the appropriate tone or volume of voice for the situation. They may know, for instance, that conversations outside can be loud, but conversations inside should be a little quieter.

Children can string together three to five words at this age. Their communication abilities allow them to be understood by familiar adults. However, adults who don't know the child well may still have trouble understanding what the child is saying.

Reflection Point

There is a huge amount of growth that happens in children's language, especially in how they use narratives during conversations.

Consider the two conversations below. One is with a 3-year-old, and the other is with a 4-year-old.

3-Year-Old

Child: You know what I was doing?

Adult: What?

Child: I was doing my work.

Adult: Your work?

Child: Like I do at home.

4-Year-Old

Child: I have two sisters, one with blonde hair like me'm
the other with long black hair. 'N the one with black hair,
when she was 4 like me, she cut her hair with scissors
that aren't for cutting hair. 'N now she has short hair.
What skills are children developing in these years that allow them to have longer conversations? Think about skills that might not necessarily directly link to language. Possible responses to this question include: Memory, vocabulary, and understanding of social cues.

Have you noticed similar growth in the children that you work with?

C – Becoming Conversationalists

Between the ages of 4 and 5, children grow and gain new skills in their conversational abilities. Notably, by the end of their fifth year, children are becoming sophisticated conversationalists, using skills like asking questions related to the conversation to continue the discussion.

Children of this age are also able to match the tone and volume of their conversational partner. And they have some idea about what types of conversation styles or information other people might need.

Adjusting Conversation

Multiple studies have explored children's ability to tailor the style of their conversation to their partner. For example, one study asked 4-year-old children to describe how a toy dumping station worked to two different audiences—their mother and a 2-year-old child.

The study found that 4-year-olds changed how they described the toy depending on who they were talking to. When the children were talking to adults, they used longer, more complex phrases. When they were talking to 2-year-olds, the children used strategies to get the toddler's attention like "Look!" and "Watch!"

This suggests that between 4 and 5, children are able to adjust the style of their speech and communication based on who they are talking to. In addition, this is the first time in a child's development that they will likely be able to communicate clearly enough that adults who are not familiar with them will be able to understand what they are saying.

Vroom Tip

Check out this Vroom tip to get more ideas about how to build communication skills with young children.

View text-only alternative of this Vroom card

Daily Recap

Turn bedtime into a reflection of your child's day. Ask your child if he/she got dressed or ate breakfast first. Tell what you remember too. If you want to be playful, switch the order— "you went outside and then you got dressed" and have your child correct you.

Ages 3-4

Brainy Background powered by Mind in the Making

Helping your child describe parts of his/her day helps build his/her communication skills.

Read the Vroom tip. Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit?

D – Vocabulary

The third of the three Language and Communication subdomains is Vocabulary. Between 3 and 5 years, children show a large increase in their vocabulary.

Throughout this period, children learn new words that help them describe more aspects of their experience in the world, such as actions, emotions, and ideas. While words describing actions, emotions, and ideas do appear at earlier points in their development, during this period children are using these types of words with more sophistication and in greater quantity.

By age 5, children will typically use two to three new words a day. In addition to learning and using new words, children are also developing their understanding and use of categories.

Learning Categories

As children learn new words during this period, they will often repeat words that adults say.

Between ages 4 and 5, children's language skills develop enough to ask adults what new words mean. And by age 5, children are able to use sophisticated context cues like grammar, with support, to guess a word's meaning.

During this period, children are also building their skills in understanding categories and relationships between words. For example, by age 5, children can sort things by category, like putting the toy shovel, garden hat, and plant in the gardening group. They are also able to give examples of things within categories, such as naming different types of fruits.

Children learn to identify characteristics across groups as well. For example, they may know that trees and flowers both are green and have leaves.

Between 4 and 5 years, children begin to use and understand antonyms for the first time, such as *warm* and *cold* or *bright* and *dark*, as well as synonyms like *warm* and *hot* or *large* and *huge*.

Learning Language Structure

Older children can also use what they know about the structure of language to figure out word meanings.

In one study, children saw a hand resting on some material in a bowl. To one group of children, the adult explained that this was a picture of *sibbing*. To another group, the adult said that this was a picture of *some sib*. To a third group of children, the adult explained that this was a picture of *a sib*.

Image via Pixabay

Do you think that the children had different definitions of *sib* based on what they heard? If you guessed yes, you are right.

The children who were told that this was a picture of *sibbing*, guessed that *sib* was an action, sort of like kneading. They knew that words ending in *ing* are often actions.

The children who heard that this was a picture of some *some sib* interpreted *sib* as a word for the material in the bowl. The children knew that *some* is often is used before a word and usually describes things that you can count or are hard to count. For example, we say that we have *some* dough not we have *a* dough.

What do you think the group of children who heard that this was a picture of *a sib* guessed the meaning of *sib* was? If you guessed the bowl, that's exactly what the children in the study guessed too. At this age, children know that *a* comes before a word and usually describes things that we can count. We would describe this picture as having one bowl in it.

Video: Hibernation (3:31)

This video of children learning a new word is called *Hibernation.* While watching the video, observe the educator and children. Then think about these questions:

- What tools did this educator use to help children learn the new vocabulary word?
- What would you do to help these children deepen their learning?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=270#video-270-2

Video Debrief

What tools did this educator use to help children learn the new vocabulary word, *hibernation*? (click to toggle expand or collapse)

Some possible answers are:

- Repetition
- Phonological awareness (sounding out the letters)
- Language structure cues (bears hibernate, hamsters hibernate), verb structure
- Images to engage the children

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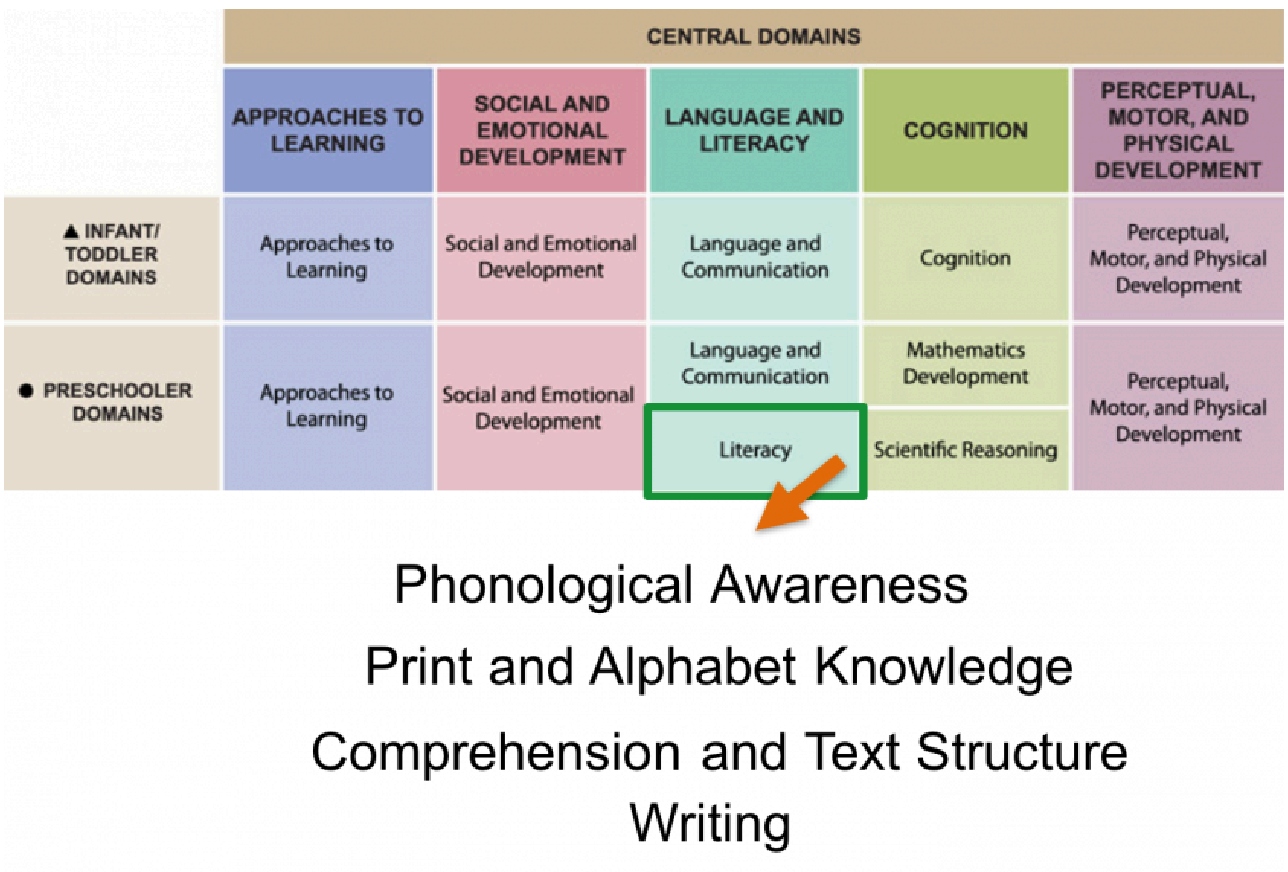
EarlyEdU Alliance (Publisher). (2018). 5-1 Language and communication. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

5-2 Literacy

A – Literacy

Head Start Early Learning Outcomes Framework

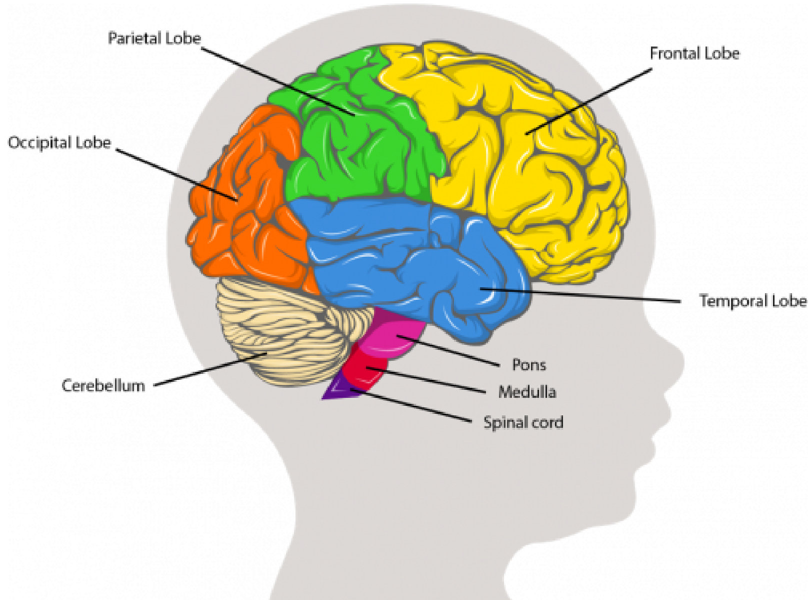


Now let's look at the second section within preschool Language and Literacy—the Literacy domain.

The Literacy domain includes the development of skills that are important for reading and writing, such as understanding that spoken language is composed of smaller segments of sound, being able to identify the letters and sounds of the alphabet, understanding narrative structure, and exhibiting emerging skills in writing letters and marks.

For example, the developmental progression of the Phonological Awareness subdomain shows the growth from imitating rhymes and alliteration to being able to identify which words rhyme and the ability to count syllables. The other three subdomains are: Print and Alphabet Knowledge, Comprehension and Text Structure, and Writing.

Reading and the Brain



Before we jump into Literacy development within each of the subdomains, we are going to spend a few minutes talking about the brain development that accompanies learning to read.

Reading is a complex task for the brain. Think about all the tasks that your brain has to do to recognize and read a word.

First our brains have to decode printed text. Information about the world comes in through our eyes and moves to visual areas of our brains, where we decode the complicated symbols and patterns.

Once our brains have recognized the symbols and patterns as a word, our brain has to match that image of a word to a sound—the sound that you hear internally when you read a word on a page. Then your brain has to figure out what this sound means. And this whole complex process happens in less than a second.

Children learn language through being surrounded by language and through everyday conversations with the people in their lives. While language skills develop over years of practice, it is a process that the brain is built to learn. Newborn babies are born ready to learn language.

Learning to read is different. Literacy skills, or the ability to decode written symbols and make meaning from them, are built on spoken language skills. Unlike language, the brain is not born to read. Learning to read takes years of tailored instruction and hours and hours of practice. Learning to read actually requires changing the wiring or connections between regions of our brains.

The brain has to combine visual, auditory, and language information in new ways. This takes years of practice. But just imagine all the new connections that are forming in children's brains as they learn to read.

Phonological Awareness

Now that we have a better understanding of the complicated task that all children face when learning to read, let's look at the different literacy skills that children are building between 3 and 5 years of age.

One important skill is *phonological awareness.* Phonological awareness describes children's ability to recognize the smaller units of sounds that make up spoken words.

These small units of sounds are called *phonemes*. We can combine phonemes to create syllables and words. Being able to understand and identify phonemes, the sounds that make up words, is an important pre-literacy skill.

As an example, let's use the word *dog*. What if a child is not able to hear or understand that the sounds /d/, /o/, and /g/ make up the word *dog*? It will likely be very challenging for that child to match those sounds to letters and then to combine the letters to form a word.

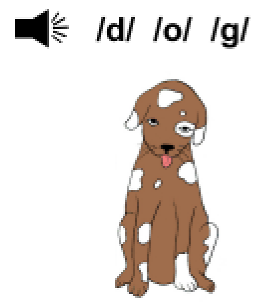
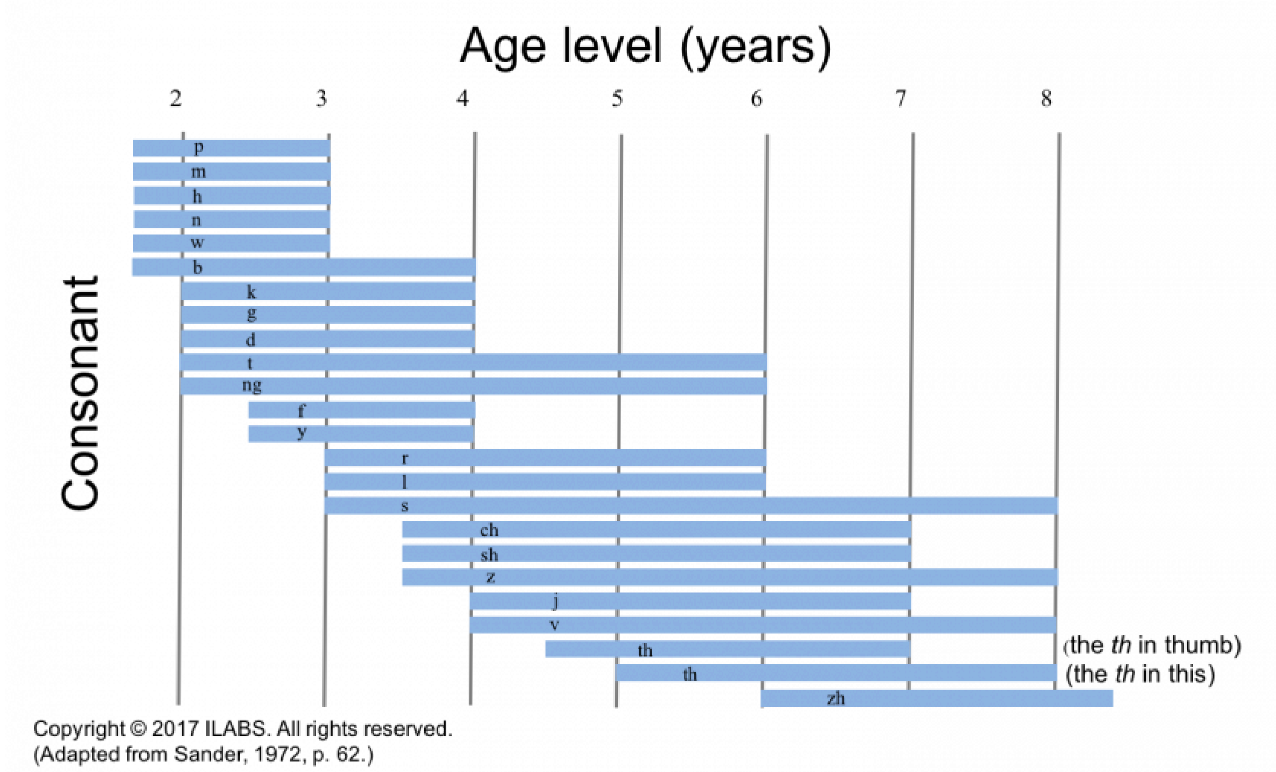


Image Credit: Head Start Center for Inclusion

Producing Consonants

Children may be able to tell the difference between different sounds before they are able to produce all of the sounds themselves correctly.

This chart shows the age at which children are typically able to *produce* different consonant sounds in the English language.

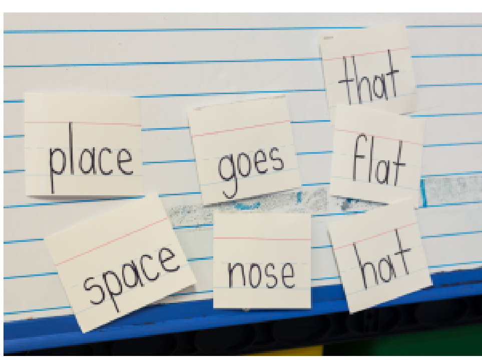


Consonants like /m/, / b/, and /p/ are relatively easy to produce, and children whose home language is English are able to make those sounds earlier in life. Note that some sounds are quite tricky and children typically aren't able to pronounce those consonants until they are older.

One classic example of this is called the *fis* phenomenon. In this example, a child calls his toy fish, *fis*, but when adults call his toy a *fis* he refuses to accept that this is the correct label for the toy. He will only accept the full *fish* label for the toy from an adult.

This indicates that even though the child may not be able to make the sound, they know what the sound should sound like and can tell the difference.

Rhyming



Between 3 and 4 years old, children show development of phonological awareness skills by imitating and enjoying rhymes and alliteration. With help, children may be able to figure out if two words rhyme or if they begin with the same letter.

Between 4 and 5 years, children's ability grows to pick two words that rhyme from a set of three. For example, they may be able to pick the two rhyming words from the list of: *bat*, *mat*, and *dog*.

And, they develop the ability to figure out what is wrong with some phrases and how to fix them. For example, they can decide what is wrong with *Twinkle twinkle little car* and a way to fix it by replacing *car* with *star*.

Children also gain skills in counting syllables and identifying sounds in words. Think back to our recent *dog* example. By the age of 5 years, children should be able to understand that the sounds /d/ /o/ and /g/ make up the word *dog*.

These skills set the foundation for later literacy development.

Video: Tapping Syllables **(1:40)**

Watch this video, called *Tapping Syllables*, of children clapping the syllables of their favorite characters.

While watching the next video, think about these questions:

- What tools is this educator using to help children learn?
- How does the educator help the children who are dual language learners in her class?
- What skills are children building that will help them learn to read?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=272#video-272-1

Video Debrief

What tools does the educator use to help all children and what skills are they building that will help them to read? (click to toggle expand or collapse)

Tools the educator uses are:

- Phonological awareness
- Dual language strategies
- Engaging children's interests
- Encouraging children's bodies to move (clapping)

To help the dual language learners in her class, the educator substitutes some words in Spanish to ensure that children understand them.

The children are building syllable and phonological awareness that will help them recognize the letters in words that make up the sounds they hear in their heads as they say words.

B – Print and Alphabet Knowledge

The Print and Alphabet Knowledge subdomain encompasses the skills that are important for understanding written language. For example, some of these are: understanding how print is used (its functions) and the ability to identify letters of the alphabet and to match or produce the sounds that go with each letter.

Between 3 and 4 years of age, children develop an awareness that text means something. They are able to tell the difference between pictures in a book and printed text, and they will ask questions about it such as, "What does this say?" or "Read this to me?"

They also begin to identify letters in the alphabet as a symbol system and are learning that letters correspond to sounds they know. For example, they may sing the *ABC* song and be able to recognize the letters in their name, or some of the more common letters.

Learning about Print

As we just discussed, children's print and alphabet skills grow between 4 and 5 years of age.

By age 5, most children should be able to name 18 uppercase and 15 lowercase letters and know sounds associated with several letters.

Throughout this period, children continue to develop a more nuanced understanding of print, including some knowledge that print has rules. For example, in English, we read from left to right. They also learn that words are made up of groups of letters.

And by age 5, children begin to practice reading by reciting simple memorized texts and they can identify single-syllable words from a story.

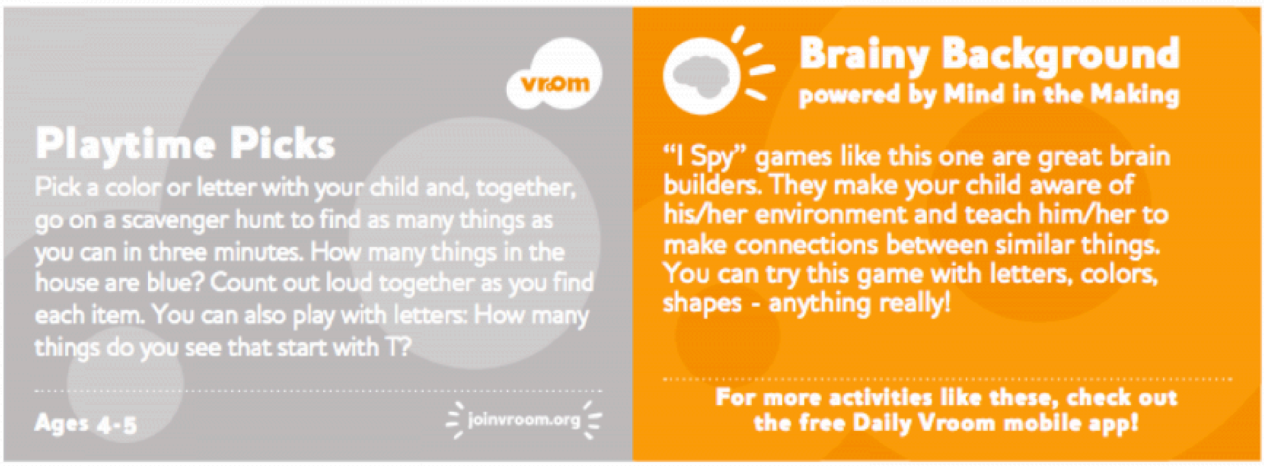
Interactive: Learning About Letters

Between the ages of 3 and 7, children learn to name, print, and produce letter sounds.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=272#h5p-14

Vroom Tip

Check out this Vroom tip to get more ideas about how to build alphabet knowledge with young children.



View text-only alternative of this Vroom card

Playtime Picks

Pick a color or letter with your child and, together, go on a scavenger hunt to find as many things as you can in three minutes. How many things in the house are blue? Count out loud together as you find each item. You can also play with letters: How many things do you see that start with the letter T?

Ages 4-5

Brainy Background powered by Mind in the Making

"I Spy" games like this one are great brain builders. They make your child aware of his/her environment and teach him/her to make connections between similar things. You can try this game with letters, colors, shapes – anything really!

Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit?

C – Comprehension and Text Structure

Between 3 and 4 years of age, children are also building their understanding of *narrative structure*, or how stories are built and told.

They begin to ask and answer questions about books that are read aloud. These skills fall under the subdomain Comprehension and Text Structure. These skills are built by listening to and acting out stories. As children listen to stories and answer questions about them, they learn to identify different narrative elements.

One way to help build children's understanding of narrative is for children to act out stories using pictures or props, which they are able to do between 3 and 4 years old. After listening to a story, children of this age may be able to retell one or two elements.

Children are also able to answer simple questions about the story and even ask questions of their own. Educators can support children in thinking about what might happen next or making predictions about the story they are reading.

Narrative Skill-Building

Between 4 and 5 years of age, children build their narrative skills. They are able to retell more key events (two to three) and are able to put those events in the right order.

Children's ability to create stories also emerges in this period, and by the time they are 5, they can tell personal stories or stories they made up that have two to three connected events. With support, they are also able to answer more and more complex questions about stories, including making predictions and explaining why or how something happened in a story.

By age 5, children are even able to guess what characters in the story might be feeling or what their intentions are based on. These complex skills involve other cognitive skills as well, including memory and problem solving, as well as social and emotional skills, like being able to recognize emotions in others.

Narrative Complexity

Children's narrative skills grow significantly during their preschool years. Research indicates that between 40 and 70 months (3 years, 4 months and 5 years, 10 months), children's narrative becomes more complex, more coherent, and more detailed. For example, children's narrative about the same event in their life becomes more elaborate and complex.

Researchers have investigated children's narrative development using several different measures.

Interactive: Narrative Complexity

This is an interactive! Use the slider in the interactive to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=272#h5p-17

While children's narrative is developing in all of these areas, children's use of evaluative, or interpretative, information is not as frequent as their use of orientating information or referential information about actions.

Vroom Tip

Check out this Vroom tip to get more ideas about how to build narrative skills and vocabulary with young children.

View text-only alternative of this Vroom card

Daily Do-Over

Bedtime is a great time to look back on all the fun you and your child packed into the day. So tonight, ask your child what his/her favorite parts of his/her day were – like stepping in a puddle or popping bubbles at bath time. Then share yours with your child – he/she will love hearing about your day!

Ages 4-5

Brainy Background powered by Mind in the Making

By reflecting on your day together, you are helping your child build his/her vocabulary and memory skills. And by sharing an event from your day you are giving your child a peek into the world of adults.

Does this tip make sense in the context of an early environment? And if not, how might you adapt the activity to better fit?

Writing

Writing is the final Literacy subdomain. During this period in development, children begin to use writing for many different purposes and use more and more complex marks.

Between 3 and 4 years of age, children's writing is mostly scribbling and drawing. They use their drawing and scribbling to share meaning and sometimes the drawings may contain forms that look similar to letters.

Between 4 and 5 years, children will increasingly use their drawing and scribbling to convey more complex meanings, including letters that also have meaning. This development is linked to their narrative skills that are also growing at this time, as we just discussed.

Children also show increasing interest in written text, such as wanting to copy words that they see written around them or trying out their spelling skills by perhaps getting the first letter in a word correct and filling the rest in with invented spelling.

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5-3 Let's Talk - Supporting Language and Literacy

A – Educator Language

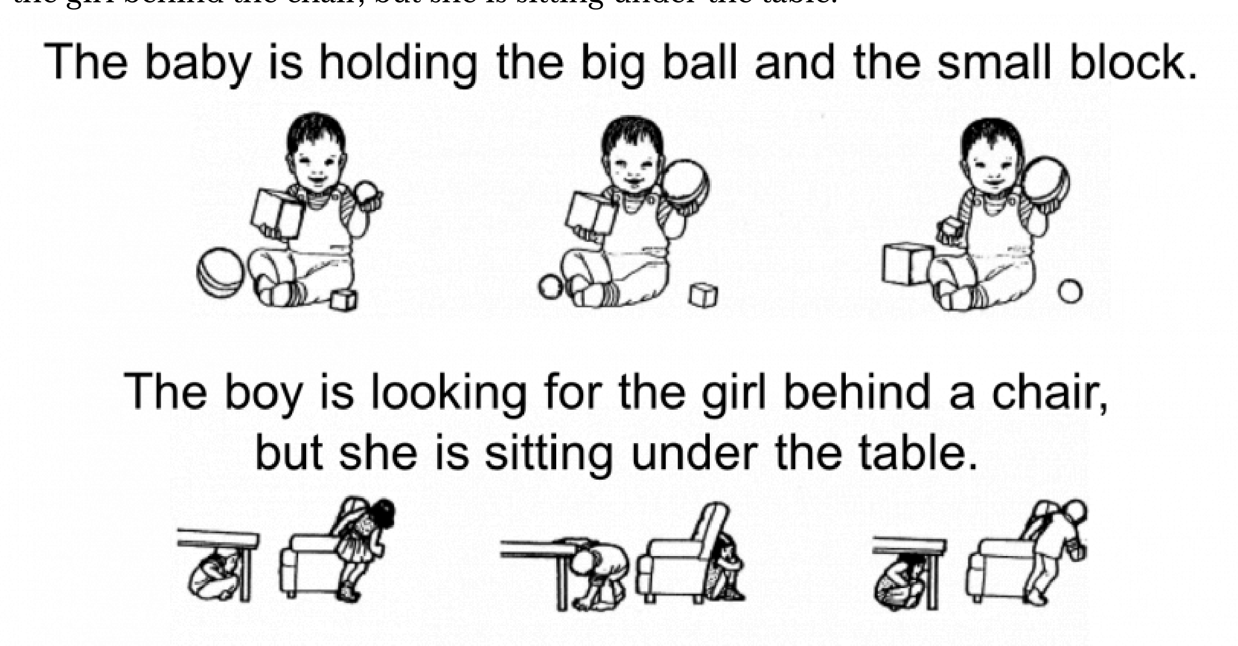
Supporting Language Development

As educators, what can we do to support children's language development?

Multiple studies have found that the more complex language educators use, the more complex language that children will learn to use as well. For example, one study explored whether children's understanding of syntax—the way words are put together to form phrases, clauses, or sentences—was related to how complex their early childhood educators' language was.

Children in the study looked at a series of three images and listened to an adult read a sentence. Then they were asked to pick which picture described the sentences.

Some sentences had varying numbers of noun phrases, such as "The baby is holding the big ball and the small block." Others were multi-clause sentences, such as "The boy is looking for the girl behind the chair, but she is sitting under the table."



To understand these two sentences, children have to understand the sentences' syntax. They have to know that the order of the words is important to the meanings of the sentences. The researchers also looked at the educators' syntax and measured how often the educators used complex sentences while they were teaching. They measured how often educators used sentences that had more than one clause. Again, one example of this is: "The boy is looking for the girl behind the chair, but she is sitting under the table."

They also measured the average number of noun phrases that educators used in a sentence. For example, the sentence "The baby is holding the big ball and the small block" has two noun phrases.

Each child did this activity twice, once at the beginning of the year and once at the end.

Interactive: Impact of Educator Language

This is an interactive! Use the slider in the interactive to explore the graph.

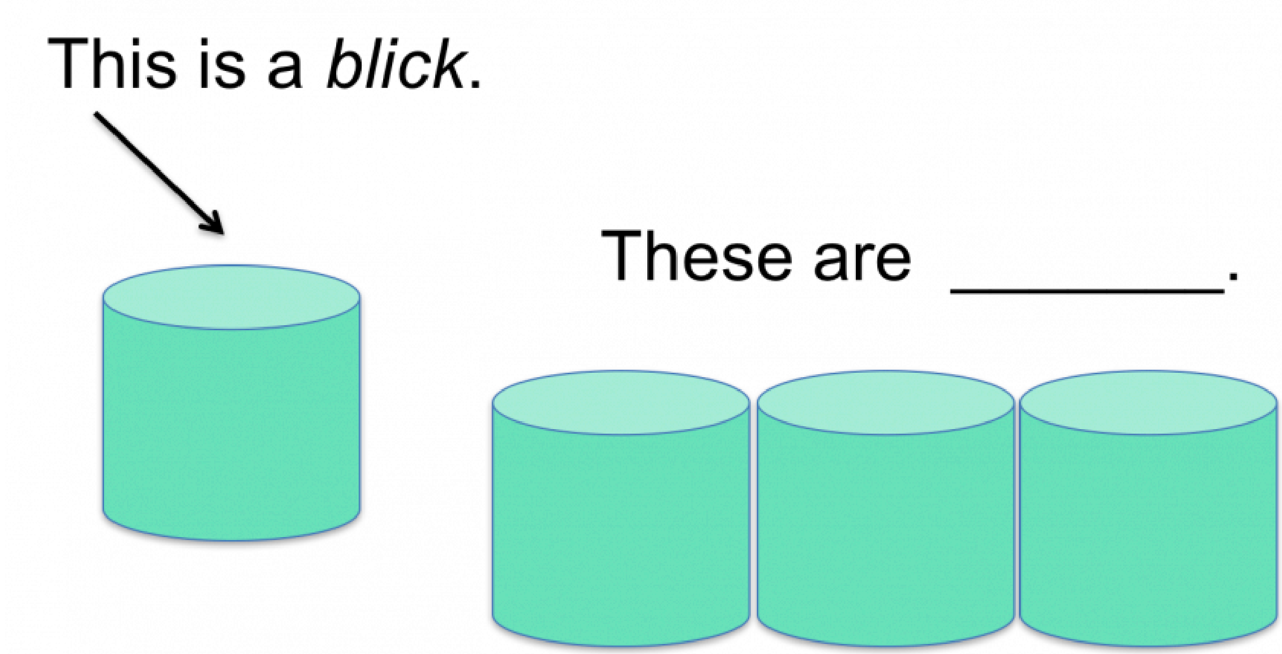
An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=274#h5p-18

Learning Grammar

As you might have noted in the previous study, understanding grammatical rules is key as children begin to string words together into sentences.

Since many grammatical rules can be difficult to learn, children initially make some errors. For example, a child might say, "Dad go," rather than "Dad is going." Proper verb forms and the parts of words that go on the ends of verbs, nouns, and adjectives are often missing from early sentences. For instance, in the last example the child used "go" rather than "going."

Studies show that children can learn the rules of grammar just from hearing these patterns. Scientists can use a simple game to test this. In the test, an adult shows a preschool-age child an unfamiliar object. This object has a made-up name, such as *blick*. The scientist then asks the child what the plural of *blick* is.



When asked, children say that the plural of *blick* is *blicks*, even though they have never heard this word before. They know that in English, we usually form plurals by adding *s* to the end of nouns. Children have heard other examples of plural words, which means they can generalize this knowledge to new words.

Because children are able to learn by hearing these patterns, the amount of speech that children hear, particularly complex sentences like we just discussed, is important. The more language children hear, the more their language abilities grow.

Note that while children are learning new grammatical rules, they will often make mistakes. These mistakes are signs that children are learning. They are practicing different rules that they have learned to see if other words follow those same rules.

As educators, we can support children's language development by providing the correct form of verbs. If a child says, "I rided in the car," we can say "Oh wow! You *rode* in the car! Who else rode in the car with you?" You don't have to correct the child explicitly by saying, "It's rode, not rided." Children will learn the verb when adults use the correct form in their natural response. After children hear the correct use a few times, they will start to use the correct grammatical form in sentences.

Children learn grammatical patterns by listening and through conversations with others. Engaging children in conversations and modeling the correct form of the word extends children's learning.

Elicitations and Extensions

We just talked about how conversations help support children as they learn grammar. Back-and-forth conversations are a powerful learning tool.

While children do learn a lot from listening, they also need to participate in back-and-forth conversations. It can be a challenge to engage with children in multi-turn conversations.

Two strategies to promote these back-and-forth conversations are *elicitations* and *extensions*:

- Elicitations are efforts, typically questions that the educator asks, that are meant to encourage children to talk. Open-ended questions, such as "How do you think the dog got outside?" are an example of elicitation.
- Extensions are efforts on the educator's part to follow children's lead by building on children's topics of conversation and providing more information or explanation. Extensions can help to keep a child engaged in conversation and to deepen their thinking and learning.

Let's look at these two examples. Both start with an elicitation—the educator asks a question to encourage a child to talk. The child, Shenay, responds "Making something." At this point the two conversations diverge.

Elicitation

Educator: Shenay, what are you working on? (elicitation)

Shenay: Making something

Educator: Making something?

Shenay: Yes.

Extension

Educator: Shenay, what are you working on? (elicitation)

Shenay: Making something

Educator: You're making something? Tell me about what you are making. (elicitation)

Shenay: A dog

Educator: You're making a dog with floppy ears! (extension)

Shenay: Yeah, I love my dog.

In the first example, the educator repeats Shenay's answer in the form of a question, and Shenay responds with "Yes."

In the second example, the educator makes an elicitation effort: "Tell me about what you are making." This time, Shenay provides more information—"A dog," she says. This gives the educator an opportunity to extend the conversation. She adds, “You’re making a dog with floppy ears.” Shenay, still engaged, says, “Yeah, I love my dog.”

At this point, the educator might take the opportunity to extend again.

Research indicates that educators’ use of elicitations and extensions in back-and-forth conversations with children is positively associated with children’s vocabulary growth.

B – Predictor of Future Skills

Children’s language experience in preschool predicts their language and literacy skills in kindergarten and elementary school.

For example, in one study, researchers recorded educators in preschool programs during these times of the day: large group, book reading, small group, meals, and free play. The educators in the study wore small backpacks with a tape recorder that recorded what they were saying.

The researchers followed up with the children in the study and assessed their language and literacy skills in kindergarten and again in fourth grade. They found that early childhood educators’ use of strategies to extend conversations correlated positively with children’s narrative production, emergent literacy, and receptive vocabulary in kindergarten and their reading comprehension, receptive vocabulary, and word recognition in fourth grade.

In other words, when educators use strategies like extension or elicitation, they support children’s future language and literacy skill development.

The study also found that higher proportions of more sophisticated vocabulary words used by educators correlated with higher levels of emergent literacy and receptive vocabulary in kindergarten and receptive vocabulary, reading comprehension, and word recognition in fourth grade.

Finding Time to Talk

We’ve learned that children’s understanding of complex language correlates with how much complex language they are exposed to in preschool. And that back-and-forth conversations, where educators use elicitations and extensions, helps to promote vocabulary growth.

But with so much going on in the early learning environment, finding opportunities to engage in high-quality, back-and-forth conversations can be a challenge.

Mealtime and center time are key times in the day to work on children's language development. Children are often in smaller groups during these times, and research indicates that children are more likely to engage in conversation when they are in smaller groups.

Children spend an estimated 30 percent of the day in free-choice center activities. Free-choice centers provide opportunities to have back-and-forth conversations that focus on topics that children are interested in.

But research indicates that, during center time, educators are the ones talking for about 80 percent of the time. Often the educator is the one who picks the topic of conversation, and many of the exchanges involve the educator commenting on the child's actions.

This means that children don't always have the chance to build their language skills through back-and-forth conversations.

There are several things that educators can do to support children's language development and engage children in more meaningful, back-and-forth conversations.

During center time, educators can ask open-ended questions about children's creations, or their play, and encourage children to propose explanations. Strategies like these help educators engage children in deeper thought.

C- Language Development Scenario

> Applying what we know about language development

Read the scenario below and think about how you can support children's language development through conversation.

> Willow and Kai were playing with the miniature farm. They were moving around the plastic animals and making animal sounds.
>
> "We want blankets," Willow said, making the horse jump up and down.
>
> "Nope," said Kai. "You don't need blankets. You are just a horse. You have fur!"
>
> Letitia, the educator in their early learning program, overhead the conversation and said, "Willow, why do you think the horse needs a blanket?"
>
> "Because he's cold!" Willow said.
>
> "Oh, you think it is cold in the barn?" the educator asked.
>
> "Uh huh," Willow said, pretending to shiver.

"Oh, I see," Letitia said. "Kai, how does the farmer feel about the horse wanting a blanket?"

Kai paused. Then he said, "He is mad! He doesn't think horses need blankets!"

Letitia said, "Are you remembering the story we read the other day? The farmer was mad. Remember, he was furious? Do you remember what that means?"

Both children shook their heads.

"That means he was really, really angry," Letitia said. "Have either of you been furious before?"

Kai said, "I have!"

"When was that, Kai?" the educator asked.

"When my little brother knocked down my tower," Kai said, scowling.

"That is a great example, Kai," Letitia said. "That would make me furious too. So in the story, the farmer was furious at the horses for wanting blankets."

Adapted from: Whorrall, J., & Cabell, S. Q. (2016). Supporting children's oral language development in the preschool classroom. Early Childhood Education Journal, 44(4), 335–341.

Reflection Point

- What does this educator do to support children's language development?
- What challenges do you have in finding time to have these types of conversations?
- What ideas do you have for including more of these kinds of conversations with children?

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5-4 Let's Play - Supporting Language and Literacy

A – Playing to Support Language and Literacy

So far we have talked a lot about how back-and-forth conversations support children's language development.

Language development doesn't happen only during center time, circle time, or meal time. Play time also provides children with a rich environment for language growth.

Many types of play support language development. For example, during symbolic play, or make-believe play and storytelling, children develop representational skills.

Each time children pretend to be captains of a ship, they must draw on their own mental representation of a ship captain: what they do, what they look like, and what instruments they might use.

In many ways, symbolic pretend play and literacy share similar mental processes. Both require children to use stand-ins for known items. For example, using a banana as a phone to call dad is much like realizing that the sound of the word *phone* and the letters *p-h-o-n-e* are meant to represent the idea of a phone as well.

Through play, children also learn new words from parents, peers, and educators and begin to develop their oral language skills, moving from simple, two-word statements to telling whole stories.

Eventually, children use playtime to develop their overall narrative skills. Children learn to tell more and more complex, imaginative stories—both in cooperation with others and on their own.

Dramatic free play offers many opportunities to build language skills, like figuring out how to ask for things, describing things, and directing play.

Providing culturally significant props, rhymes, and games for children to explore during play encourages adults and children to engage in meaningful and culturally inclusive interactions.

Building Vocabulary

Guided play, where children direct the play but an adult joins in, can also be a powerful learning tool.

When play is child-driven, whether children are playing on their own or with the support of an adult, they are engaged. This is because children are able to play in the way that they are most interested in at the time. As mentioned in the previous slide, play often is make-believe or fantastical.

Researchers wanted to know if following a story session with an adult-supported play session would help children learn new vocabulary words. In the study, groups of children listened to stories from one of two learning themes: A realistic theme—farming and cooking—or a fantastical theme, such as dragons and castles.

Each book contained 10 new words that the educator that day was focusing on. To teach the target words, educators defined the word, used the word in a sentence, and, when possible, demonstrated what the word meant using gestures.

Here is an example from the study. One of the target words in the fantastical theme was *emerge*. The text in the book read: "A little dragon with smoke coming from his nose emerged from the egg." Immediately after this sentence, the educator defined the word for the children: "The little dragon came out of the egg; he emerged from it. See how Grog is emerging from the egg?""

Once the educator finished the story, they went over all of the words, using the pictures in the book and making hand gestures when possible. For example, an educator might say,

”’And who is this (pointing to picture in book)? Yes, that is Grog, the little dragon who just emerged from the egg. Can you use your hands and help me act out what he did?” The educator might cover one hand with the other then poke one finger through. “He emerged from the egg.”

Next we’ll talk about the adult-supported play that followed the book-reading.

Vocabulary and Play with Adults

After the reading session, children had 10 minutes to play with a set of replica toys featured in the book, either on their own or in a supported play session with an adult.

In the supported play sessions, adults encouraged children to act out sections of the book or asked open-ended questions about their play. While they were playing, the educator used each new word three times and defined each word once.

The researchers in the study found that children learned more of the new words when they played in the adult-supported play session than when they played on their own.

In the next part of the study, the researchers wanted to know if the children learned more from the realistic theme or the fantastical one. They found that the children who listened to a story and played with the fantastical themed toys showed more improvement in their productive knowledge of the new words, or their ability to describe what the word meant than those who heard a realistically themed story and played with realistically themed toys.

For example, to measure this, the adult might ask, “What are weeds?” or “Do you know what the word *weeds* means?”

While we don’t know for sure why the children in this study learned more from the fantastical themed reading and play session, the researchers think it might be because children have to do more cognitive processing when they are learning words in a fantastical context. They have to imagine a world that they have never experienced, and think about what the world might be like.

It is possible that when they learn new words in this context, they are thinking and engaging with the words more deeply. This suggests that using guided play and adding fantastical themes to classrooms can be helpful as children learn new words.

B- Storytelling

Another way to support children's language and literacy learning in a playful way is through storytelling.

A recent study examined whether including storytelling and story-acting practice as a regular component of preschool curriculum could help build key school readiness skills like creativity, communicating and speaking, emergent literacy, and emotional functioning.

While pretend play and storytelling are different, they both have narrative elements. Active, child-driven storytelling and story-acting can be an opportunity for playful learning.

In this study, children in Head Start preschool programs were given the opportunity to dictate a story to an educator during free choice time. The choice to tell a story was completely voluntary and child-driven.

As the child told the story, the educator wrote it down exactly as the child said, occasionally asking questions like: "What happened next?" or "Is that the end?"

Later in the day, the educator read the story aloud, while the child author acted it out with other children of their choosing. Story sessions happened about twice a week for the duration of the school year.

At the end of the year, researchers found differences in the children who were in storytelling and acting environments compared to those who were in environments that did not participate in storytelling or acting.

Children in the storytelling classrooms had improved oral language skills, including narrative comprehension, emergent literacy skills (including print and word awareness), social competence (including greater self-inhibition and reduced play disruption), and pretend abilities.

Through participating in regular opportunities to create, narrate, and act out stories, children gained school readiness skills across domains.

Creating Play Environments

Providing supported storytelling and story-acting opportunities in your program can be a way to build language and literacy skills.

You can also encourage language and literacy development through open-ended questions about play activities. Asking children to describe and explain what they are doing helps them build their language and literacy skills.

Supporting play environments for language and literacy can also include setting up dramatic play areas with props, such as elements found in fairy tales or other favorite books, to promote telling and retelling of stories.

Placing labels on objects in dramatic play areas also helps build vocabulary and reading skills. By adding labels to novel items, you can draw attention to new vocabulary. You can also encourage the use of that vocabulary by including those pieces in familiar play activities.

Labeling items in multiple languages is also one way to support children who are dual language learners—and dual language learning among *all* children in your program.

Reflection Point

Consider these questions:

- Play can be a powerful learning tool. Why do you think that might be true?
- How could you include playful learning strategies in your work supporting children's language and literacy development?

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5-5 Let's Read - Supporting Language and Literacy

A – Book Reading

So far we have talked about how conversations and guided play can help support children's language and literacy development.

Reading to and with children is also an essential learning tool. Reading aloud to children supports language and literacy development at all stages of children's development.

One of the benefits of reading is that it exposes children to a rich variety of words that might not be present in typical, everyday conversations. For example, remember the study in which children were learning about the word *emerge*? This is not a word that we, as adults, tend to use in everyday speech.

Interactive: Educator Engagement

This is an interactive! Use the slider in the interactive to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=280#h5p-19

B – Building Print Awareness

During this time in development, in addition to building their vocabulary, children are also working on building print awareness skills, such as understanding that text means something and can be used in different ways at different times.

Researchers wanted to know if book reading could also be used to build children's print awareness skills. To find out, they worked with educators and preschool children in Head Start programs.

The researchers gave some educators strategies to explicitly point out and reference text during shared book reading. They helped these educators think about how to support children's learning in four different ways:

- **Print meaning**. One example is that children understand the relation between meaning and print. To support this an educator might say, "Here are the penguin's words. He says, 'thank you'."
- **Book and Print Organization.** An example is that children know that reading occurs from the top of the page to the bottom of the page. To support this an educator might say, "This is the top of the page. This is where I begin reading."
- **Letters.** One example is that children know that letters are symbols used in written language. To support this an educator might say, "Do you see a letter that is in your own name?"
- **Words.** One aspect is that children can identify some written words in familiar contexts. To support this an educator might say, "This word is *the*. This word is in this book all the time, can you help me find it?"

During reading sessions, educators were trained to ask both verbal questions about print (e.g., "Do you know this letter?") and to make nonverbal references to the print, such as tracking the print with their finger during shared reading.

One year later, the researchers returned to measure how much the children had learned. Children who were in environments where the educators used these techniques frequently during shared reading had higher word reading, spelling, and comprehension outcomes than children in classrooms where educators were not trained on these techniques.

The researchers returned again the next year, and they found that two years later the children who were in classrooms where educators used these techniques often still had higher word, reading, spelling, and comprehension outcomes.

This suggests that including print referencing techniques in shared reading with children helps support children's reading, spelling, and comprehension for years to come.

Dialogic Reading

Reading to children is a powerful way to support children's language and literacy development.

So far we've talked about ways to support children's learning during book reading by referencing print in books and highlighting new vocabulary words through back-and-forth interactions.

Another technique that educators can use to support children's learning during reading is called *dialogic reading*. During dialogic reading, educators try to engage children in a conversation or dialogue about what they are reading so that children have opportunities to learn new concepts and words, practice using their words, and form longer phases and sentences.

In some ways, educators help children become tellers of the story, giving the child an active role during reading.

Researchers have come up with the acronym CROWD, which can help educators think of prompts that engage children in a conversation during dialogic reading.

Let's go through the strategies together. These are examples from one of the class readings, *Using Mariposa, Mariposa (Butterfly, Butterfly) to Promote Dialogic Reading*:

- **C—Completion questions:** "Five little monkeys jumping on the _____." The child fills in *bed* to use a new word and participate in completing the thought.
- **R—Recall questions:** "What happens after the wolf huffs and puffs?" The child recalls the story, putting it into their own words.
- **O—Open-ended questions:** "Tell me what is happening in this picture." The child practices putting their own thoughts into words.
- **W—*Wh* questions (who, what, why, when, where):** "What is that? Why is that happening?" At many different levels, children can put their thoughts into words.
- **D—Distancing questions:** "What happened when we made your birthday cake?" Children remember past events and relate them to the present and future.

Once educators have asked a question, it is then helpful to follow the child's lead. Comment on what children say and wait, ask another question and wait, or respond by adding a little more to the conversation and wait. It can be very hard to wait after you ask a question. But remember that sometimes waiting even a little bit extra will encourage the child to start talking.

Using these techniques and incorporating dialogic reading into teaching practice promotes children's language and literacy development. This technique supports all learners, including children with disabilities and children who are dual language learners.

Reflection Point

Consider these questions thinking about personal experiences and teaching strategies you use while reading with children.

- How do you use book reading time in your program right now?
- What elements might you add to help further support children's learning?

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6: Social and Emotional Development: Birth to Age 3

In this lesson:

6-1 Early Social and Emotional Development: Relationships

This section covers two of the four subdomains in the framework's infant and toddler Social and Emotional Development domain:

- Relationships with Adults
- Relationships with Other Children

6-2 Early Social and Emotional Development: Emotions and Identity

This section covers these two subdomains in the infant and toddler Social and Emotional Development domain in the Head Start Early Learning Outcomes Framework:

- Emotional Functioning
- Sense of Identity and Belonging

6-3 Supporting Early Social and Emotional Development

This section covers ways that adults can support children's early social and emotional development, including:

- Responsiveness: sensitivity and synchrony
- Modeling: behavioral actions and reactions
- Emotion language exposure: Increasing children's emotional vocabulary

6-1 Early Social and Emotional Development: Relationships

A – Relationships

Two of the four Social and Emotional Development subdomains describe children's development of relationships with other people. These are:

- Relationships with Adults
- Relationships with Other Children

The two areas of relationship building are separate because children do not develop relationships with other children in the same way that they develop relationships with adults.

Relationships with adults start early and have a significant impact on infant's mental health and growth.

Relationships with other children, such as siblings and peers, tend to develop later and become much more important as children move into increasingly social environments, such as early learning programs or kindergarten.

Relationships with Adults

Just as we learned about language development, social learning requires back-and-forth interactions between children and adults. And as in language development, children start out as passive infants, primarily taking in social information and gradually developing into social partners that both give and receive social information.

We will learn about the different kinds of social relationships that children build with adults as infants and toddlers. First, we will cover the general progression of child-adult relationships.

Then we will discuss two particular forms that the child-adult relationship can take. One form of relationship that occurs in infancy is called *attachment*. The attachment relationship is between children and their familiar caregivers, not just their parents. The other form of relationship that occurs is called *social referencing*. As infants get older and move into the toddlerhood stage, they begin to establish relationships with adults as resources in their environment. They will reference adults as sources of social information. This type of relationship most often occurs with familiar adults, but can include unfamiliar adults as well.

Early Infancy: Birth to 8 Months

While infants between birth and 8 months are primarily passive receivers of social information, they can control their social environment through attention-getting behaviors and withdrawal from negative social events.

One way scientists investigate infants' emerging social competence in early infancy is by using what is called the *still-face interaction*. During the still-face interaction, parents are instructed to maintain a neutral expression while facing their child and to refrain from responding to their child in any way.

Studies using the still-face interaction have found that infants as young as 2 months are sensitive to disruptions in their caregiver's responsiveness.

Moreover, the still-face interaction shows that infants do take some control of their social environment.

During the still-face interaction, infants will often smile or cry in an attempt to re-engage the adult and eventually will turn away from the adult as a withdrawal response to a caregiver's lack of communication. This withdrawal behavior is found across cultures: Chinese, Canadian, and American.

Video: Connecting with Babies (2:37)

Zero To Three's *Connecting with Babies* video shows an infant's reaction in the still-face interaction. As you watch this next video, consider:

- What is infant mental health?
- How much does it affect later development?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=282#oembed-1

Watch Connecting with Babies from ZEROTOTHREE on Vimeo.

Video Debrief

What is infant mental health? (click to toggle expand or collapse)

"Infant-early mental health, sometime referred to as social and emotional health, is the developing capacity of the child from birth to 5 years to form close and secure adult and peer relationships; experience, manage, and express a full range of emotions; and explore the environment and learn . . ." (Zero To Three, 2016)

Here are some facts from Zero To Three about the effects of infant mental health on later development:

- **Infants do have traumatic experiences.** It is estimated that between 9.5 percent and 14.2 percent of children from birth to 5 years of age experience an emotional or behavioral disturbance.
- **Early adverse events can lead to mental health problems in infancy and toddlerhood.** Symptoms of depression and anxiety, post-traumatic stress disorder, autism spectrum disorder, and other mental health issues can begin to manifest in infancy and toddlerhood.
- **Early mental health issues can have lasting effects on development and adult mental health.** Research has shown that the emergence of early onset emotional and behavioral problems in young children is related to a variety of health and behavior problems in adolescence, not to mention juvenile delinquency and school dropout.

Reflection Point

Consider these questions:

- What are reasons that parents or families might not want to talk about their mental health or their children's? What is one way to address concerns?
- How can you begin a conversation about a child's or family's mental health?
- Name one mental health resource for families.

B – General Progression

Infants' development of social relationships with adults begins passively, moves to sharing experiences, and eventually leads to children emerging as initiators of social interactions, such as getting others to smile or comforting a distressed adult.

Between 8 and 10 months, infants begin to try to show adults when they find something like a toy fun or exciting. They begin to display a behavior called *anticipatory smiling*.

In anticipatory smiling, infants smile at an object and then turn to their caregiver while still smiling. The idea is that the child expects the adult to also smile in response. This is similar to when older children and adults turn to each other to confirm how great something is.

For example, imagine that you found a really cool new object, you might say, "Wow, this is really cool." and then turn to your friend to see if they share the same sentiment. This is essentially what infants are trying to do with anticipatory smiling.

By 9 months, infants don't just react to or try to share emotional exchanges, but they also begin to initiate positive emotional exchanges.

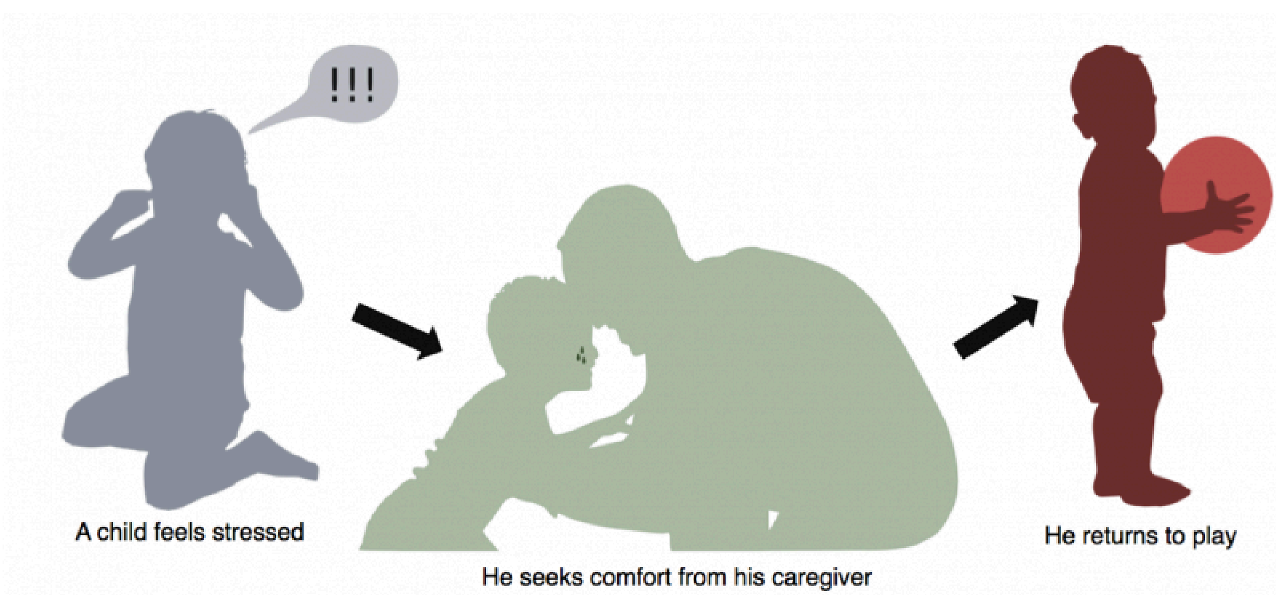
By the end of the first year, infants use smiles as an intentional social signal.

And by 2-and-a-half years old, children will even attempt to comfort adults by handing a cold adult a blanket or hugging a distressed adult.

Attachment

Infants often develop attachment relationships with their caregivers early in infancy. This can manifest as attachment behaviors, such as separation anxiety in toddlerhood. These behaviors tend to subside as children's social understanding develops.

Attachment is a bond we have with special people or objects in our lives. Attachment can occur with both people and inanimate objects, such as *lovies,* teddy bears, or other treasured items.



Children will form separate attachment relationships with each adult in their lives.

Bowlby's 1969 model of attachment is the most widely accepted view of attachment today. Bowlby believed in an evolutionary approach to attachment, noting how attachment relationships increase a child's probability of surviving.

Essentially the idea is that children are predisposed to form attachment relationships in infancy. Infants have built-in attention-getting functions, such as crying, that capture adult attention. Adults then provide caring behaviors to reduce infants' attention-getting activity. The caring behaviors are positive, which motivate the child to stay close to the caregiver. This is turn means that the child will be safer. So children who do this are more likely to successfully reach adulthood.

Because of these strong social bonds, between 6 months and 2 years, infants and toddlers may develop attachment behaviors, such as separation anxiety.

Separation anxiety is when infants or children are upset by their caregiver's departure.

These behaviors are a child's attempt to get the caregiver to stay with them or come back. Note, however, that these behaviors do not always develop or occur. The occurrence depends both on the situation and the child's temperament. Some children are less inclined to be anxious or concerned and even anxious children may find some situations less anxiety-provoking.

Behaviors like separation anxiety begin to subside around 3 years of age when children begins to understand some of the factors that influence a caregiver's comings and goings. This is when children begin to negotiate instead.

Features of Attachment

Attachment relationships have four main features:

First, they provide the child with a sense of security. When the caregiver is present, the child feels safe and has the confidence to explore their environment. They don't feel as secure when the caregiver isn't present.

Children also see their caregivers as a safe haven. When children feel unsure in situations, they will turn to caregiver for comfort and safety.

Another feature of attachment relationships is called *proximity maintenance*. Since children rely on their caregiver for comfort when they feel unsure or threatened, they try to remain close to them. Staying close maximizes the caregiver's availability to respond to them at all times.

Finally, attachments are characterized by separation distress. This means that toddlers often experience distress and anxiety when an attachment figure leaves.

Measuring Attachment

There are multiple ways that scientists investigate attachment relationships, often called attachment styles. The most classic test is called the Strange Situation test.

Another test for attachment style is called the Q-Sort test. The Q-sort test is able to evaluate attachment in a much wider age-range (1 to 4 years) than the Strange Situation test and in some ways better reflects everyday life for the caregiver and infant relationship, since it relies on home observations.

However, the Q-Sort test does not discriminate between different types of insecure attachments and is quite time-consuming, since it requires several hours of observation time and then more time spent sorting the observed behaviors.

In the Strange Situation test, experts observe the reaction of an infant to various different situations:

- In a new space with a familiar caregiver (a playroom)
- To an unfamiliar person with the familiar caregiver still present
- To an unfamiliar person (trying to comfort the child) with the familiar caregiver absent
- To the familiar caregiver after an absence
- To the absence of all adults (alone in the playroom)
- To the return of the unfamiliar caregiver (trying to comfort again)
- To the return of the familiar caregiver

Researchers observe each of these situations for the combinations of the child's approach and avoidance reactions.

There are a variety of different attachment types, the most common form of attachment in the U.S. is called: *secure attachment.* It is generally characterized by a child's use of their familiar caregiver as a secure base for exploration, distress at their absence, and comfort with their return.

However, the exact behaviors exhibited must be observed by a trained individual to be evaluated for attachment type.

Note that while attachment behaviors may seem obvious when we summarize them in this way, it takes a lot of training and experience to be able to classify children's attachment style.

Attachment Behaviors

Researchers have identified three broad attachment behaviors that children use: secure, insecure-avoidant, and insecure-resistant.

A child who is securely attached to their caregiver tends to explore freely when that caregiver is present. When the caregiver leaves, she is upset, and when the caregiver returns she is happy.

A child with an insecure-avoidant attachment style won't explore as freely as a secure child and is wary of strangers even when a caregiver is present. When the caregiver leaves, the child is often highly distressed and does not calm easily when the caregiver returns.

A child with an insecure-resistant attachment style does not play freely even when a caregiver is present. When the caregiver leaves, she is not distressed at all and shows no change in emotion when the caregiver returns.

While researchers may classify children's attachment behaviors as falling into a particular style or category, it's important to remember that security of attachment is a continuum.

A child also has multiple attachment relationships, and each one can be different. For instance, a child may be securely attached to one caregiver and insecurely attached to another. Children adjust their attachment behavior in response to the caregiving they receive. These behaviors can actually help children adapt to their environment.

For example, insecure attachment behavior, like avoidance, may help a child adapt to a stressful environment. Imagine children whose parents punish or reject them when they cry. The children might withdraw from their parents to avoid crying and angering them.

It may sound like some of these behaviors are easily identifiable. However, it takes a lot of specialized training to fully identify attachment behavior. If you have concerns about a relationship between a caregiver and child, discuss those concerns with a professional.

C – Cultural Specificity

In addition, the prevalence of different attachment types varies by culture. For example, while in the U.S., the predominant attachment type is secure attachment, in Germany, independence in children is highly valued and thus infants are encouraged not to cling to their caregivers.

Because of this cultural difference, the prevalence of the insecure, avoidant attachment type is much higher in German children.

Note that this does not mean that German children are exhibiting unhealthy or maladaptive attachment types. In fact, they are doing the opposite. They are exhibiting the exact social behaviors that are valued in their culture.

In contrast, Japanese babies rarely show avoidant attachment behaviors but do show resistant attachment behaviors. Scientists have suggested that this could be due to infants' constant proximity to their mothers or primary caregivers. Separation from their caregiver may be associated with increased levels of stress as compared to those of children from different cultures.

Social Referencing

As children begin to develop a wider variety of relationships with both familiar and unfamiliar adults and to recognize social cues from the people around them, they begin to realize the utility of their caregivers for more than just comfort. Between 8 and 10 months, children begin to consult with adults as social resources.

This is called s*ocial referencing*. Social referencing is when children use another person's emotional signals to evaluate the safety and security of their surroundings, guide their own actions, or gather information.

Scientists have found that a caregiver's emotional expression will influence whether a 1-year-old engages in new or unfamiliar activities. For example, 1-year-olds were more fearful and avoidant of a stranger after observing their mother behave fearful or wary of the stranger.

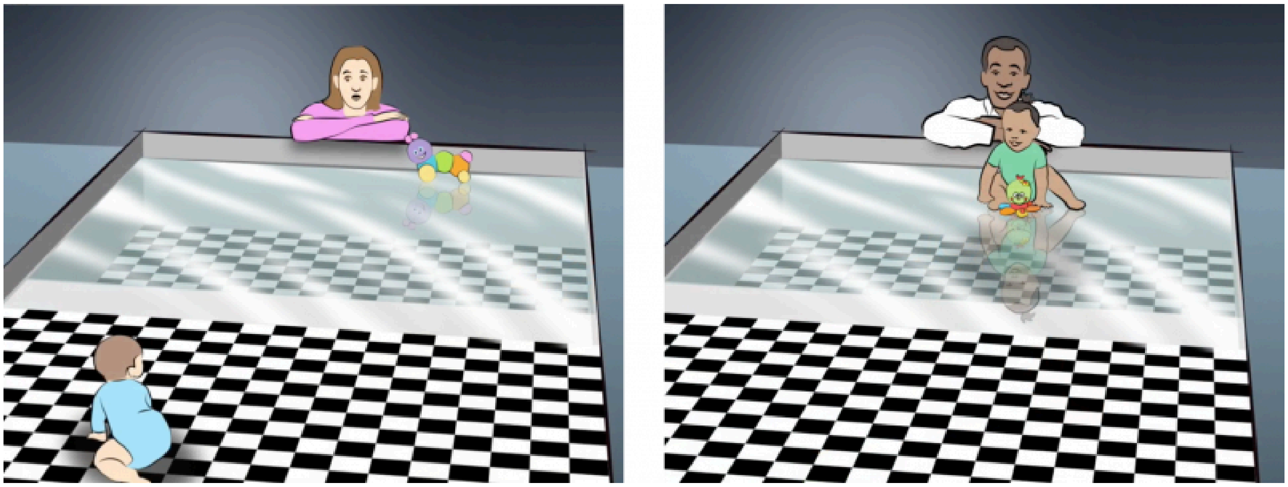
Social referencing doesn't just apply to people either. In another study, 1-year-olds played less with an ambiguous toy if their mother was inattentive and did not provide social cues about the toy or the playroom.

Visual Cliff Test

Recently, researchers have used a test called the *visual cliff* to study infants' social referencing.

In this test, the child is placed on a table with a checkered pattern. Next to the infant appears to be a drop-off that is about 3 feet high, but in actuality the infant is on a piece of plexiglass that extends across the visual cliff. Crawling across the platform is safe, even though it looks scary.

In the study, researchers placed an appealing toy on the opposite side of the platform. Infants would need to crawl across the perceived *cliff* to reach it. Their caregivers also stood on the opposite side of the platform with different expressions. Then, they observed whether infants crossed the platform.



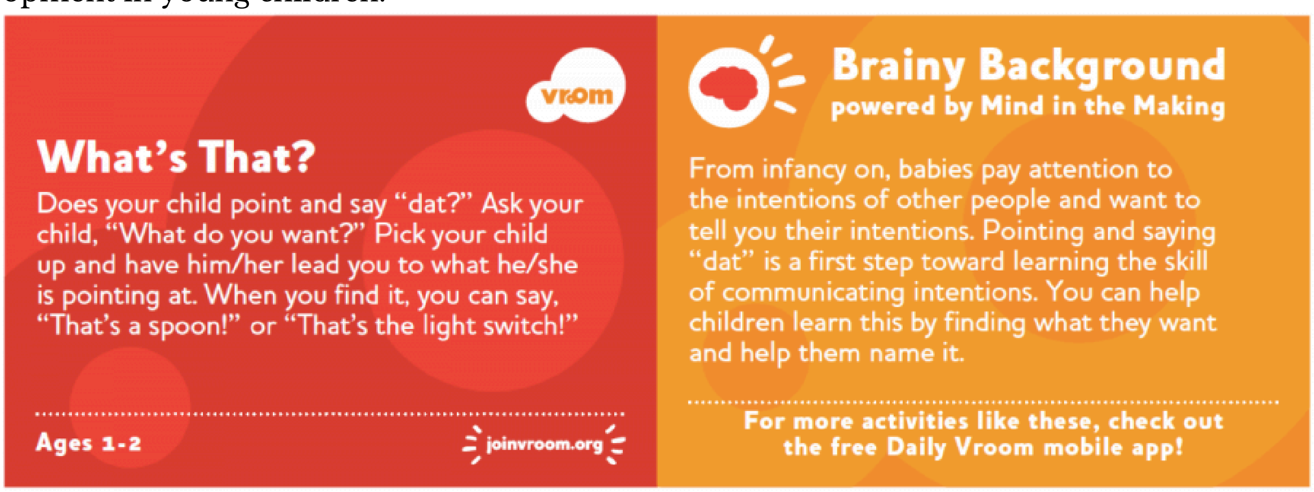
On the left we see a picture of a mother with a fearful, worried expression. As a result, this child does not cross the platform to get the toy.

On the right, we see a father with an encouraging, enthusiastic expression. Reading this positive cue from the father, the infant felt safe and confident in crawling across the platform to get the toy.

Caregivers' expressions influence children's behavior. This is true of all of children's attachment figures, including educators.

Vroom Tip

Check out this Vroom tip to get more ideas about how to support social and emotional development in young children.



View text-only alternative of this Vroom card

What's That

Does your child point and say "dat?" Ask your child, "What do you want?" Pick your child up and have him/her lead you to what he/she is pointing at. When you find it, you can say "That's a spoon!" or "That's a light switch!"

Ages 1-2

Brainy Background powered by Mind in the Making

From infancy on, babies pay attention to the intentions of other people and want to tell you their intentions. Pointing and saying "dat" is a first step toward learning the skill of communicating intentions. You can help children learn this by finding what they want and help them name it.

Read the Vroom tip. Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?

D – Relationships with Other Children

Throughout early childhood, children develop the ability to play and build friendships with other children through parallel play, cooperative play, and turn-taking or pretend play.

Before age 2, children play alone, showing only occasional engagement with other children. As the framework subdomain of relationships with other children notes, by 1-and-a-half years, children start playing next to other children with similar toys or materials. This is called *parallel play*.

Cooperative Play

By the time children are 2 to 3 years old, their social skills will drastically change. The subdomain on relationships with other children states that by 3 years, most children will join in play with other children by sometimes taking turns or doing joint activities with a common goal, such as building block structures with others or pretending to eat together.

During this time, children are working on skills like taking turns, and their pretend play is becoming more complex.

Play in early childhood gives children experience with building friendships. Conflicts that arise during play are opportunities for learning and practicing social problem-solving skills.

Video: Peer-to-Peer Relationships (58:48)

We'll listen to a 20-minute interview with early childhood education consultant Donna Wittmer in part of a Teacher Time infant and toddler webinar. The interview starts around 17 minutes and 20 seconds in the nearly one hour long webinar.

The rest of the webinar is also a relevant resource, plus the webinar viewer guide.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=282#video-282-1

Download the transcript.

Video Debrief

What did you hear about the progression of young children's relationship skills?

(click to toggle expand or collapse)

We took away that young children:

- Develop relationships with other children much earlier than many people realize.
- Six-month-old children prefer to look at photos of infants who are a similar age.
- Older infants may try to comfort another child.
- Once children are 1 year old, peer relationships typically blossom and become more interactive with actions, such as imitation and movement, which have shared meaning.
- At about 30 months, children are becoming even more social.

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6-2 Early Social and Emotional Development: Emotions and Identity

A – Emotions and Identity

The remaining two of the four social and emotional subdomains describe children's development of emotions and their own identity:

- Emotional Functioning
- Sense of Identity and Belonging

The subdomain Emotional Functioning describes the development of children's ability to both express and interpret emotions. These are key skills for social development, including relationship building.

The subdomain Sense of Identity and Belonging describes the development of children's self-awareness—who they are and what they can do.

Emotional Functioning

Scientists define *emotion* as readiness to establish, maintain, or change your relation to the environment on a matter of importance to you. This definition is based on what is considered to be the function of emotion, which is to motivate behavior to attain personal goals.

Researchers have identified six universal emotions that older children and adults express:

- Happiness
- Sadness
- Anger
- Fear
- Surprise
- Disgust

These emotions are expressed using many different social signals, such as facial expressions, tone of voice, and body posture and gestures. The facial expressions associated with these emotions are universally recognized across cultures.

Children begin to learn about emotions at birth through back-and-forth interactions with their caregivers. A caregiver smiles and his baby smiles back. A child pouts with her bottom lip to let her mother know she is upset, and the mother acts accordingly.

Young infants are limited in their ability to control their environment. One way they are able to regulate their emotions is by approaching or avoiding situations. Before a child can move, they can turn their head away from scary or unpleasant situations or close their eyes—these are both demonstrations of avoidance.

Once they can crawl or walk, they can begin to physically remove themselves or back away from unpleasant situations or even physically draw nearer to or point toward pleasant ones.

As children engage in more and more complex back-and-forth interactions and are able to engage the environment on their own terms, their emotional understanding grows.

Emotional Expression

Initially, infants are quite limited in their emotional expressions.

Between 6 and 10 weeks of age, infants begin to demonstrate what is called a *social smile*—a smile in response to a caregiver's expressions or actions. Prior to this time, infants sometimes smile, but it is widely recognized that these out-of-context smiles are the product of reflexes. Interestingly, the development of the social smile parallels that of face processing, a perceptual skill.

Face processing develops within the first 2 months of life and continues to improve throughout the first year of life. During these first 2 months is when that the social smile also begins to occur. And some researchers believe that infants' increasing ability to distinguish internal caregivers' facial characteristics, such as the configuration of their mouth and eyes, helps them develop a social response (social smile) to their caregivers' expressions.

Laughter develops at about 3 to 4 months.

This is then followed by a rise in fears around 6 months. This rise in fears is actually helpful, since it keeps exploring babies safe. Infants' fearfulness during uncomfortable or ambiguous situations motivates them to use adults as their secure base.

As children develop their motor abilities, they naturally will try to take more control of their environment. As they gain control, they may need to defend themselves or overcome obstacles more often.

The expression of anger during this time increases, and researchers consider this an adaptive response. Anger at this age can help children to defend themselves or overcome obstacles.

Recognition of Emotions

Recognition of emotions develops at the same time as the expression of emotions.

While very young infants will often cry in response to another infant's cries, they are not necessarily understanding the cry as an expression of emotion. Rather, they find the crying unpleasant and react to it by crying themselves, just as they would react to any unpleasant situation.

Scientists have found evidence that between 5 and 7 months infants show some recognition of adult emotional expressions. In one study, 7-month-old infants simultaneously saw two videos of an adult making an emotional expression. In each video the adult made a different emotional expression. While they watched the two videos, infants also heard a single verbal emotional expression that matched only one of the two videos. Infants in this study were able to tell the difference between happy, interested, sad, and angry emotional expressions.

The ability to recognize others' emotions and understand them is a key step in the developmental of empathy and sympathy.

B – Cultural Effects

Emotional expression and recognition within a specific culture is governed by a set of emotional display rules that are greatly affected by socio-cultural differences.

During their second year of life, children can use emotions that are not directly communicated to them to learn about rules in their family, society and culture. Children are learning all the time simply by observing and listening to the people around them.

One thing children learn by watching and noticing the responses of adults is the set of rules about where and when it is appropriate to express emotions. These rules are called: *emotional display rules.*

Those rules, and thus the expressions of emotion, can differ considerably between different cultures and social groups. For example, researchers found that even within the same country, children's early emotion socialization experiences differed greatly.

Scientists observed the interactions between 119 Nepali children and adults. They found that depending on which socio-cultural group the children belonged to, they learned very different sets of emotional display rules.

To encourage children in the indigenous population of Tamang people in Nepal to be socially graceful, adults showed disapproval of children's expressions of anger and reasoned with the children who expressed shame.

In contrast, children in the Brahmin caste of Nepalese people were ignored if they expressed shame and were reasoned with if they expressed anger.

These differences reflect the different goals of each socio-cultural group.

Emotional Regulation

Between birth and 3 years of age, children begin to develop skills and strategies to regulate their own emotions with the guidance of caregivers, such as using language or distraction strategies.

Emotional self-regulation in early childhood consists primarily of the development of strategies to adjust one's emotional state to a comfortable level.

Emotional self-regulation develops with guidance of caregivers.

Between 1 and 1½ years of age children begin to show the emergence of self-regulation with the growing awareness of caregiver wishes and expectations.

By age 2, children are beginning to use language to identify and control their feelings.

It is also around this time that children begin to be able to delay their own gratification, a major step toward self-control and self-regulation. Between 1½ and 3 years of age, this skill increases through the learning of strategies, such as distraction techniques: paying attention to something else to distract yourself from the desirable object while you wait.

However, emotional regulation continues to develop throughout childhood (and even into adulthood).

At the end of this lesson, we will discuss some methods for helping young children build emotion regulation skills.

Vroom Tip

Check out this Vroom tip to get more ideas about how to support social and emotional development in young children.

View text-only alternative of this Vroom card

Food Favorites

As you go food shopping, point out some favorite foods to your child to see if he/she likes them, "I love yogurt, do you?" Then invite your child to point out a favorite food. Tell him/her if you like it. Play back and forth as you move down the aisles.

Ages 2-3

Brainy Background powered by Mind in the Making

This game is teaching your child that people have different likes and dislikes. The ability to think what someone else might feel differently about something he/she does will help your child form better relationships with others and learn from them.

Read the Vroom tip. Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?

C – Sense of Identity and Belonging

Children discover who they are through the development of self-awareness, self-identity, and self-confidence.

The Head Start Early Learning Outcomes Framework subdomain of Sense of Identity and Belonging includes the development of at least three developmental skills:

- Self-awareness: the awareness of the self as separate and different from others.
- Self-identity: the development of knowledge of a set of attributes and abilities that define who one is.
- Self-confidence: the positive evaluation of one's own abilities.

In the first year of life, infants and caregivers are discovering together who the infant is. It is important to let infants express themselves and to create a responsive environment.

Self-Awareness

Even very young infants have an implicit sense of self-awareness. Infants react less to their own touch than to the touch of others or to their own image than to an image of another person.

However, infants have not yet developed an explicit sense of self. When presented with a mirror showing a dot on their face, they reach for the dot on the mirror rather than on their own face.

In contrast, in the middle of the second year, toddlers begin to develop awareness of the self as separate and different from others. Around 20 months, toddlers begin to show signs of self-recognition: identification of the self as a physically unique being.

Toddlers observing a dot on their face in a mirror will touch the dot on their own face rather than the mirror itself. They also begin to use personal pronouns, such as *I, me,* and *us.*

It is also during this time that self-conscious emotions begin to develop such as guilt and pride.

Body Self-Awareness

Scientists asked 16- and 21-month-olds to push a toy cart to their mothers to study children's self-awareness of their own body.

What the children didn't know beforehand was that when they went to push the cart, it was rigged so that they would step on a mat connected to the cart. Their own body weight would prevent the cart from moving. To complete the task, they would have to move their body off the mat first to be able to move the cart forward.

Children who were 21 months old performed significantly better than 16-month-olds on this task, but that could just be because they had more walking and moving experience. So scientists compared this performance to children's performance on a second task that did not involve moving one's own body.

In this second task, another group of 16- and 21-month-olds was asked to push the same cart to their mothers, but this time a paint can was placed on the mat that prevented the cart from moving. In this case, scientists found no difference in performance between the two age groups.

The fact that there was a difference in performance when children had to move their own bodies out of the way, but there was no difference in performance when children had to move an object out of the way, suggests that 21-month-olds' bodily sense of self-awareness is more developed than that of 16-month-olds in a way that makes it easier for them to navigate their environment.

Video: The Baby Human – Shopping Cart Study (2:45)

We'll watch the video *The Baby Human – Shopping Cart Study,* which shows children participating in the shopping cart study.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=284#oembed-1

Watch The Baby Human – Shopping Cart Study from D. Martin on YouTube.

Scale Errors

Another way that toddlers demonstrate their developing sense of self is in *scale errors.* A scale error is when a child tries to fit into objects they don't physically fit into or tries to do things that their body size makes impossible.

In another body awareness study, this time investigating children's scale error, researchers first presented children with appropriately sized toys—a large toy car they could get in and out of, a slide to slide down, and a chair to sit in.

Next, the children went to a new room that only contained miniature objects. Some of these objects were exact miniature replicas of the large objects the children had just played with.

Children around 20 months of age tried to play with the miniature objects the same way they had played with the large objects, trying to squeeze their foot in the small car after opening its tiny door, trying to slide down the slide by sitting on the whole object, or trying to sit in the tiny chair.

By about 2 years of age, children no longer committed these scale errors. Instead, when presented with the miniature toys, they played with them as they would other toys, pushing the miniature car around on the floor or using their hand to *slide* down the slide.

Thus, it appears that around 20 months of age, children develop a new sense of awareness about their own body and how their body can interact with the world.

Video: The Baby Human – Scale Error (2:34)

Now, we'll watch a video called *The Baby Human – Scale Error*, which shows children participating in a study investigating scale error. Around 20 months of age, children develop a new sense of awareness about their own body that allows them to make better decisions about which actions are possible and which are not.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=284#oembed-2

Watch The Baby Human – Scale Error from D. Martin on YouTube.

D – Self-Possession

Another form of self-awareness is the development of self-possessiveness by claiming something is: "Mine!"

While most parents and many educators likely will find this new development of self-awareness frustrating at times, it may help to know that it's not only a sign of developing self-awareness but also a sign of self-assertion that, if confirmed, can help children build a stronger sense of self.

Being able to assert their own space and boundaries is a way for children to explore what their boundaries are and how they can communicate them clearly to others.

This is also where that adaptive expression of anger comes into play for many children. Once a boundary is established, it must also be defended, and expressions of anger are a way for children who don't yet have a large emotional vocabulary to defend those boundaries.

As adults, we can encourage what children are trying to do while also guiding them toward more positive social behaviors. This is how adults teach children socio-cultural emotional display rules.

It is therefore important to be aware of children's cultural backgrounds and to discuss behaviors with parents and families to get a better sense of the children's environments.

To encourage positive relations between peers when one child claims something as their own, an adult can confirm the assertion by saying, "Yes, that is yours," and then encourage positive behavior by saying, "But in 5 minutes, would you give someone else a turn?"

Self-Confidence

The development of self-confidence begins in infancy with the formation of trusting and loving relationships with caregivers, and it builds with increasing situations where children feel a sense of accomplishment.

Infants that trust that they have secure connections with their caregivers are more likely to feel free to explore the world. They trust that if something goes wrong or they need help, those caregivers will be there for them.

Beyond building trust, providing children with positive feedback helps them build a sense of accomplishment that supports their developing self-confidence. When children think "I can do it," their self-esteem and self-confidence grows.

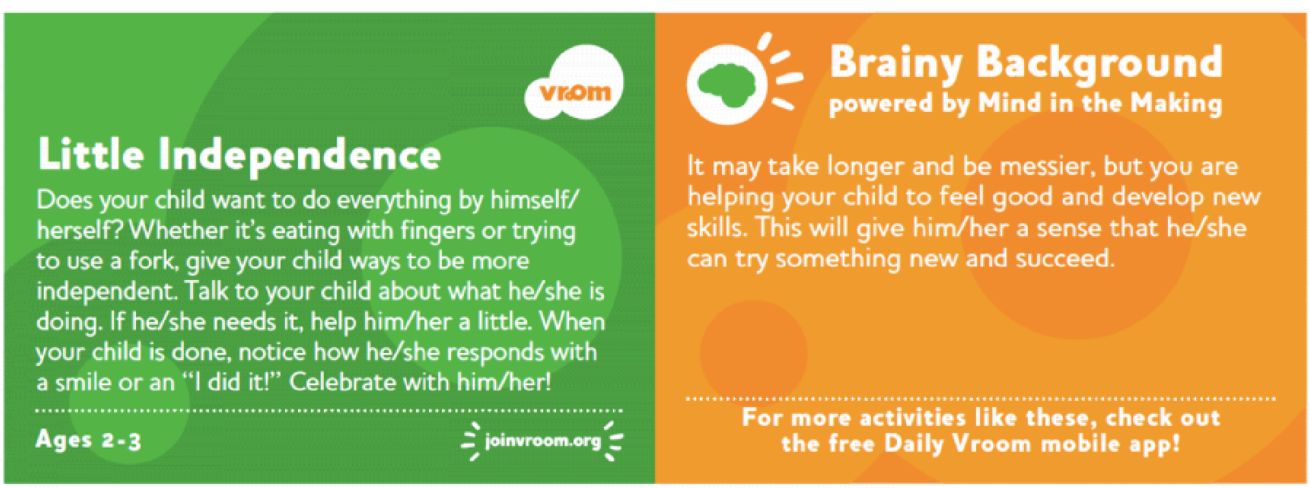
Another way to help children build a sense of accomplishment is to let them accomplish things. This may sound obvious, but this can be hard for some adults. A sense of accomplishment is not based on solving a problem but on children believing that they can solve problems on their own.

Caregivers and educators can provide support while children solve problems but avoiding handling them for children. For example, if an infant is struggling to place a block in a shape sorter maybe suggest that they move it around or that they look at the openings some more rather than pointing to the correct opening or placing the block in for them.

Between 18 and 30 months, toddlers begin to develop a categorical self-classification, such as *baby* or *strong*, based on perceptual attributes or behaviors. By age 3, self-conscious emotions develop and are linked to self-evaluation.

Vroom Tip

Check out this Vroom tip to get more ideas about how to help children build their self-confidence.



View text-only alternative of this Vroom card

Little Independence

Does your child want to do everything himself/herself? Whether it's eating with fingers or trying to use a fork, give your child ways to be more to be independent. Talk to your child about what he/she is doing. If he/she needs it, help him/her a little. When you child is done, notice how he/she responds with a smile or an "I did it!" Celebrate with him/her!

Ages 2-3

Brainy Background powered by Mind in the Making

It may take longer and be messier, but you are helping your child to feel good and develop new skills. This will give him/her a sense that he/she can try something new and succeed.

Read the Vroom tip. Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?

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6-3 Supporting Early Social and Emotional Development

There are many ways to support young children's early social and emotional development. For this section, we will focus on supports offered in three areas:

- Responsiveness and contingency (how you respond to the child)
- Modeling (actions and interventions)
- Emotion language exposure (recognizing and labeling emotions in oneself and others)

A – Responsiveness

Ensuring responsiveness in children's relationships with adults is one of the best ways to support children's developing social and emotional skills, and it also supports their development overall.

As mentioned earlier, when children have trusting and loving relationships with caregivers, they can use those adults as secure bases for exploration and references for ambiguous or uncomfortable situations. Secure relationships with caregivers can even help to reduce any negative impacts from other aspects of children's environments.

Responsiveness is more than just meeting a child's needs. For infants, sensitive, synchronous relationships that are consistent are the best for establishing secure attachments and emotional development. But what does sensitive caregiving involve?

In Western cultures, one of the earliest ways that caregivers can show sensitive care to infants is through a form of communication called *interactional synchrony*. When interactions have synchrony, both partners share a mutual focus. They mirror each other's emotions. They also respond to each other's cues in a reciprocal and rhythmic manner.

For example, sharing positive emotions, such as mutual smiles and laughter, or responding to an infant's cries or negative emotions, create synchrony.

Testing Interactional Synchrony

Maintaining a positive emotional expression alone is not enough to establish a secure adult-child relationship. When responsiveness is disrupted, children notice and are unsettled by the lack of connection between them and their caregiver.

In fact, researchers have tested the idea of synchrony and responsiveness using the still-face interaction that we learned about earlier in this lesson.

Infants who were 2, 4, and 6 months old participated in various still-face interactions. Sometimes the mother was instructed to keep a neutral face, as in the original still-face interaction, but other times she was used a happy or sad face during the still-face part of the interaction.

By 4 months, infants were upset by the still-face interaction regardless of what kind of face the mother presented. The disruption of responsiveness and synchrony between them and their mother upset them no matter what.

Even when the mother held a positive facial expression with a static happy face, infants still responded negatively to the lack of responsiveness.

Consistency

To establish a responsive relationship, a caregiver, educator, or parent must first recognize an infant's signals.

Then they must determine what those signals mean and reliably respond to them. It's okay if a caregiver misinterprets or misses an infant's cue. Keep in mind that all caregivers are inconsistent and unresponsive sometimes. Yet most infants establish a loving bond with a parent or main caregiver.

The key is for the caregiver to make adjustments to increase consistent care during future interactions. Consistency is important not only in times of distress but also during play. This helps the child feel comfortable and secure.

When a caregiver is inconsistent, it's hard for the child to know whether or how the caregiver will respond.

Expectations

Researchers have found a strong relationship between early attachment and future outcomes.

Researchers believe that attachment relates to future outcomes because attachment shapes children's earliest expectations and assumptions about how relationships work.

Attachment relationships are the first relationships children form; if their attachment figure is warm and responsive to their needs, children will come to expect that other people also will be warm and responsive.

If you learn that others respond to you, you may be more likely to see yourself as loved and worthy of that love. Over time, this leads to more confident, well-adjusted children who believe they deserve attention and care.

Positive Outcomes

Generally, infants who have secure attachment relationships have better outcomes. Infants who have less secure relationships tend to have less positive outcomes. But the link between attachment behaviors and outcomes does not determine a child's destiny. Plenty of children who are insecurely attached at an early age grow up to be well-adjusted adults.

Infants who have a history of secure relationships go on to have strong relationships with others. They have better relationships with peers and educators. They have a better understanding of emotions. They are more confident and have more complex beliefs about their abilities, traits, and values. They show more motivation to achieve in school.

They also tend to show fewer negative traits. For example, they have lower levels of anxiety, depression, and social withdrawal. They are also less likely to show aggressive behavior.

B – Modeling

Adult-child relationships also model appropriate behavior from an early age. An emotionally available adult demonstrates how to regulate and express emotions in an acceptable way. This helps children develop positive relationships with others and demonstrates how to address conflict in a productive way.

Researchers have found a significant link between parents' own empathy and emotional expressiveness and children's empathy.

Parents who show more empathy and are more likely to express their own emotions pass along valuable emotion information to their children who are then better able to develop their own emotional responses.

How to Study Modeling

Children are also gathering social and emotional information from watching the interactions between people around them.

In one study, researchers found that by the time they're 18 months old, children can read other people's emotions just by watching. The study involves a child watches a social interaction between two adults and uses that information to change their own behavior.

In the study, a woman showed a young child that dropping a bead necklace into a cup makes an interesting noise.

Then another woman comes into the room. When she watches the bead-cup toy, she yells that it's "aggravating" and "so annoying." You can see here that the infant is watching this interaction with a worried look.

Finally, the infant is given a chance to play with the toys. Both women stay in the room, including the one who yelled about the bead-cup game being "annoying" and "aggravating."

In usual circumstances, the child would happily imitate the bead-cup game. And in fact, in another version of this study the aggravated woman leaves the room and children do imitate the bead-cup game. But when the aggravated woman remains in the room, the child is much less likely to play with the toys.

This suggests that children are learning from overhearing the interaction between the two women. Note that when the aggravated woman displayed her aggravation, it was only directed at the other woman, not the child.

It's also interesting to note that children are able to pick up on mere tone. Most 18-month-old children do not have words like "aggravating" or "annoying" in their vocabularies. In this study, they're picking up on social cues like the tone of voice that the aggravated woman was using, or the expressions on two women's faces.

Children learn not just through direct interactions with adults, but also from overhearing or watching the social interactions between adults. Modeling can therefore occur both when interacting directly with children and also when interacting with other adults in the presence of children.

Using Modeling to Direct Behavior

How an adult behaves can really affect how children respond to a situation. In the image below, you can see an educator using a child's natural tendency to imitate to walk them through an emotion-regulation exercise.

This knowledge about how effective modeling is suggests that before teaching a child something new, entering a family's home during a visit, or introducing a child to a new toy or food, it can be helpful to think about how you want to shape their expectations.

They may not copy you the first time, but given how much children look to adults for cues, it can point them in the direction you want them to go.

This is also a great conversation to bring to other caregivers, such as parents. It's impossible to set the perfect example all the time, but being mindful about what you're saying and doing around children can go a long way.

C – Emotion Language Exposure

The more adults label and explain emotion positively with preschoolers, the better developed their emotional understanding. This is called *emotional scaffolding*.

This is the case with many concepts in life. Take color, for example. In Japan, the term *mizu* is used for what people in the U.S. would call *light blue*.

This is similar to the way that people in the U.S. use the term *magenta* instead of *purplish-red*. For people who are Japanese, *mizu* is as different from blue as green is from blue. It is not a shade of blue.

When someone from the U.S. sees one person wearing a light blue shirt and another person wearing a dark blue shirt, they may think, "What a nice blue shirt" for both people and not really think about the difference between the two shirts. But they wouldn't say the same thing for one person wearing a purple shirt and another wearing a magenta shirt.

The same can be applied to emotions. Let's say you lumped anger and sadness and guilt into one word: *unpleasant*. If you saw someone express anger, you might think that "someone is feeling unpleasant." And if you saw someone else expressing sadness, you would again think that "someone is feeling unpleasant." You might find it hard to distinguish between the two and respond to them differently.

Providing infants and toddlers with language to categorize different emotions in their own culture helps them recognize when different emotions are being expressed and that there may be different responses to those different emotions.

Emotion Language and Regulation

Research has shown that parents who talk about emotions more frequently and explain emotional experiences tend to have children with more elaborate and accurate understandings of emotions.

Language development provides children with a new way to understand and express how they feel. Rather than crying or throwing a toy, children can use language to share emotions such as, "I feel sad," or "I feel mad."

Remember that children develop recognition of different emotions at different times. Trying to teach a child younger than 20 months about self-conscious emotions such as guilt is difficult because they do not yet have an established sense of self.

Being aware of children's growing sense of identity will help you tailor emotion vocabulary materials to a child's self-awareness. When teaching young infants and toddlers, starting with the six universal emotions we discussed earlier is effective.

Later in childhood, you can build on that vocabulary and children's growing sense of identity to work on more self-conscious emotions.

Video: Help Me Calm Down! (41:33)

We'll watch Dr. Gail Joseph, director of EarlyEdU Alliance and Cultivate Learning and associate professor at the University of Washington, talk with host Kristin Ainslie about emotional regulation during a Teacher Time webinar. The full video, *Help Me Calm Down! Teaching Children How to Cope With Their Big Emotions*, is 41 minutes, 33 seconds long. Start watching at about 4:50 (based on the timing) and stop at about 21:30.

In a later section of the webinar, educators use different emotional regulation techniques with children. A discussion guide for the video is also available.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=286#video-286-1

Download the transcript.

Video Debrief

Here's what we saw about strategies they heard to help children with strong emotions. (click to toggle expand or collapse)

Some strategies that participants might identify to help children with self-regulation:

- Teaching vocabulary about emotions and using a relaxation thermometer
- Taking deep breaths
- Teaching the method: Smell the flower, blow out the candle

Reflection Point

Consider these questions:

- What are three ways to support children's early social and emotional development?
- What are two strategies you already use to teach children emotion vocabulary?
- What are two new ways that you could support children's emotion literacy and regulation?

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7: Social and Emotional Development: Ages 3 to 5

In this lesson:

7-1 Preschool Social and Emotional Development

This section covers the preschool Social and Emotional Development domain in the Head Start Early Learning Outcomes Framework.

7-2 Social and Emotional Development and School Readiness

This section covers school readiness and its relationship to the four subdomains of the Head Start Early Learning Outcomes Framework Social and Emotional Development domain for preschoolers.

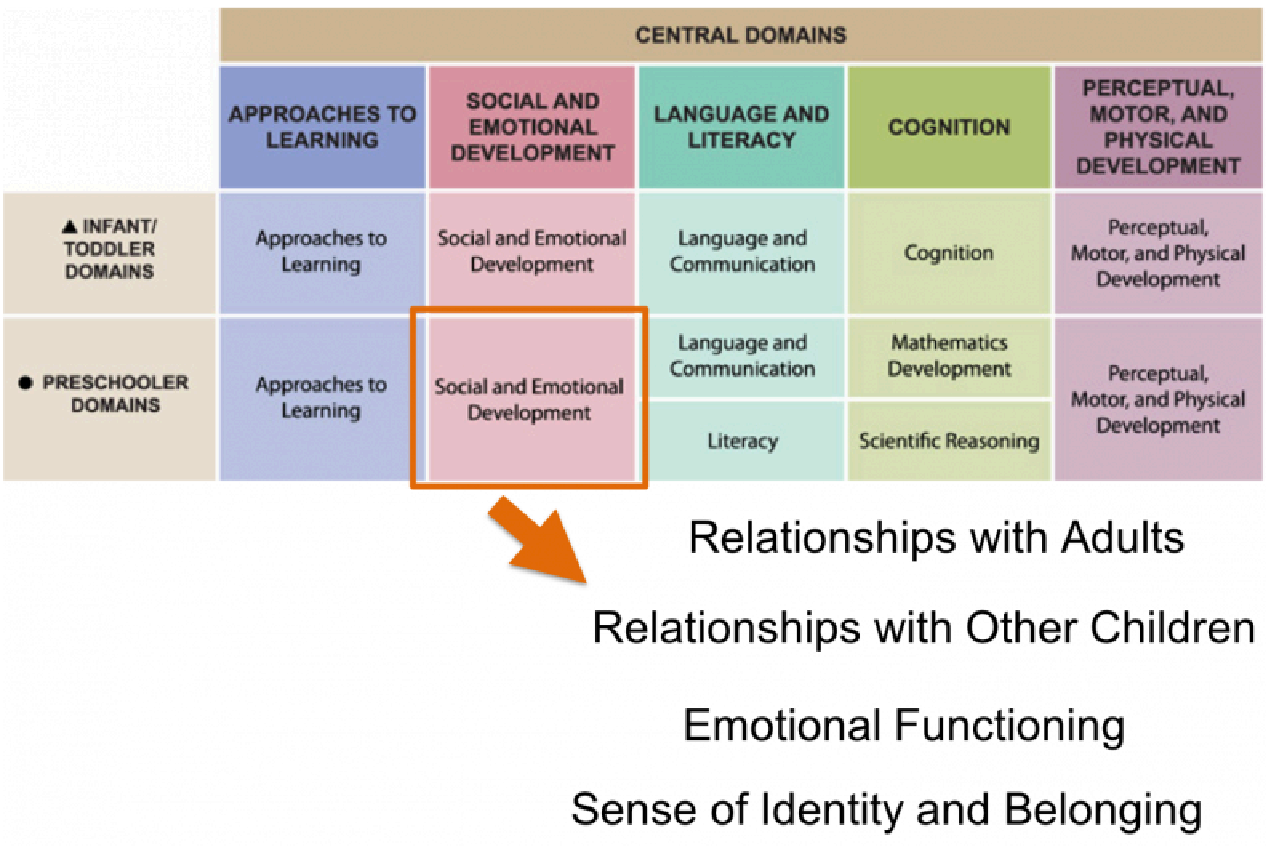
7-3 Supporting Preschooler Social and Emotional Development

This section covers ways that adults can support preschoolers' social and emotional development.

7-1 Preschool Social and Emotional Development

A – Social and Emotional Development Domain

Head Start Early Learning Outcomes Framework



The framework's preschool Social and Emotional Development domain includes the same four subdomains as for infants and toddlers:

- Relationships with Adults
- Relationships with Other Children
- Emotional Functioning
- Sense of Identity and Belonging

However, the balance between the subdomains is substantially different for preschoolers than it was for younger children.

Remember, the focus in infant and toddler development is on relationships with adults and developing the ability to distinguish oneself from other people. Preschoolers are expanding on those skills by developing lasting relationships with other children and establishing their own social identity.

So even though the preschool subdomains for Social and Emotional Development have the same names as those for younger children, the content of those subdomains is significantly different.

The preschooler subdomains also include the development of more mature social skills, such as:

- Offering support and making empathic statements to other children and adults.
- Developing friendships with other children.
- Asking for adult permission before doing something of which children are unsure.

B – Relationships with Adults

Prosocial Engagement

The first subdomain focuses on children's developing relationships with adults.

As infants and toddlers, children may be upset by the expression of negative emotions in others, but it isn't until later in the second year or early in the third year of life that children regularly take action to alleviate those negative emotions in others.

Voluntary actions that benefit others are called *prosocial behaviors*, such as helping, comforting, and sharing. Prosocial behaviors may seem routine and automatic to us as adults, but for children they require solving a complex puzzle of social information.

First, the child has to recognize that another person is experiencing a negative emotion based on a need, a distressing situation, or a desire. Then, they have to figure out what behavior might be effective at alleviating the other person's need, desire, or distress. Finally, they have to motivate themselves to perform the prosocial act.

Children as young as 2 years old have begun to perform prosocial acts in response to the obvious needs of an adult. For example, an adult may drop a puzzle piece and need help picking it up. And they can do this even if the adult never directly requests help.

By 3 to 4 years of age, children consistently respond with prosocial behaviors to another person's obvious emotional distress. For example, an adult may hurt themselves or feel sad when a toy breaks.

Interestingly, however, 3- to 4-year-old children are more likely to engage in prosocial behavior when they can respond to another person's distress with an action, such as fixing a broken toy, than when they have to provide purely emotional comfort, such as a hug when a person is hurt.

The one context in which even 4-year-old children still struggle is in figuring out when another person desires something but does not ask for it directly. For example, if someone gives a child a bowl full of strawberries and an adult an empty bowl, that child is unlikely to think of sharing their strawberries with the adult unless the adult explicitly asks for strawberries from the child's bowl.

Admittedly, this is a complex concept to figure out. But it is important to note that even preschool-age children might not distribute resources spontaneously unless prompted to by a request. And this is not necessarily a failure of sharing or kindness but in fact an inability to read the social cues expressed by another person about desire or to note inequalities on their own.

Social Norms

Preschoolers are also beginning to notice *social norms* or the way things are usually done in their society and culture.

Just as infants and toddlers reference adults for social information—remember the visual cliff social referencing study with infants—preschoolers reference adults for information about social norms.

In fact, scientists have found that even children as young as 3 years old will assume that an action is normative (or the usual way of doing things) even when an adult doesn't give them any obvious social cues that this is the case.

Instead, children appear to use an adult's intentions as the primary sign of whether an action is being done in the usual manner or not. For example, if an adult looks like they recognize an object and know exactly what to do with it, children will assume that this is the way to use this object. If instead an adult looks like they have no idea what the new object is and plays around with it first before deciding what to do with it, children do not assume that this is necessarily the way to use this object.

Children will make these normative assumptions about adult actions and behaviors even when the adult never looks at the child or in any way directs their behavior toward the child.

Trusting Adults

Preschoolers also are expanding their circle of trust and sources of information. They will use information from unfamiliar adults over familiar ones, depending on their respective reliability and accuracy.

Scientists studied this by asking 3-, 4-, and 5-year-olds questions about information provided either by a familiar educator or an unfamiliar one. Initially, all children regardless of age, preferred to use information from the familiar educator over information from the unfamiliar educator, just as infants and toddlers do.

Children then watched as both educators named a set of objects familiar to the children. The unfamiliar educator always named the objects correctly, while the familiar educator never did.

After watching the unfamiliar educator consistently succeed and the familiar educator consistently fail to provide accurate information, 4- and 5-year-olds were less likely to trust subsequent information provided by the familiar educator.

This means that even though the 4- and 5-year-olds generally preferred the familiar educator, they were able to evaluate the educator's accuracy and change their reliance on the familiar educator's information for future questions.

Notably, 3-year-olds were not affected by the familiar educator's inaccuracies. They continued to prefer the information from the familiar adult over that of the unfamiliar adult.

The ability to combine familiarity and reliability when evaluating adults as sources of information appears to develop around 3 to 4 years of age.

Video: From Feelings to Friendships (5:32)

This video *From Feelings to Friendships: Nurturing Healthy Social-Emotional Development in the Early Years* covers adult-infant relationships and then peer-to-peer relationships, including empathy and social expectations. It helps to bridge the connection between relationships with adults and relationships with children.

As you watch this video, consider:

- How do children communicate their needs?
- How do you soothe children who are crying?
- What do you do to help children express emotions appropriately?

- How do you help children you work with develop empathy?

These discussion questions are adapted from the Zero To Three tip sheet, *Magic of Everyday Moments: From Feelings to Friendships*, that accompanies the video *From Feelings to Friendships: Nurturing Health Social-Emotional Development in the Early Years.*

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=288#oembed-1

Watch From Feelings to Friendships from ZEROTOTHREE on Vimeo.

C – Relationships with Other Children

Friendships

By the time children have reached preschool age, they find their peer groups more interesting than the adults in their lives. The second Social and Emotional Development subdomain, Relationships with Other Children, characterizes children's development in this area.

Children can form rudimentary friendships starting in the second year of life, but those relationships are increasingly more complex as children mature in the preschool years. Initially, friendships primarily consist of a preference for a particular individual and eventually develop into reciprocal social relationships.

Preschoolers are more likely to forgive transgressions committed by established friends than those committed by other individuals. And the relationships they build with their peers, even in early childhood, can help protect children against developmentally disruptive factors in their lives. For example, peer social relationships can be a source of emotional security for some children. Social and emotional competence is key to the formation of these relationships, both at the group and individual levels.

But how do children go about establishing friendships? First, children need to develop the ability to regulate their own gaze to visually engage another individual and to use clear communicative gestures and words. These skills are particularly important when a child is in a group setting and miscommunications can easily occur.

Emotion regulation and action inhibition are also key components to the development of friendships. These allow children to not only understand others' personal boundaries and to keep calm despite a friend's distress but to also respect those boundaries and provide emotional support when possible.

Social Strategies

Preschoolers begin to use their new social and emotional skills to develop strategies for engaging social partners. For example, they begin to demonstrate spontaneous sharing and improved turn-taking skills.

Children who are 3 to 5 years old are also developing the ability to keep track of social history. They are more likely to share with individuals with whom they collaborated or shared with successfully in the past.

They can then use this history to select social strategies when engaging with others. Over the course of the preschool years, scientists find that children are increasingly more selective in how, when, and with whom they share resources.

But it takes two people to share, and scientists conducted an interesting study investigating the other side of the sharing equation: what children expect other people's sharing behavior to look like. They asked 3-, 4-, and 5-year-old children about sharing between two characters and what they found was that children at all ages expected both characters to share with each other when sharing bore no cost to either character.

When the sharing was costly, 5-year-olds demonstrated a clear preference for sharing with friends rather than peers they disliked.

Three-year-olds, on the other hand, seemed to expect everyone to share with everyone else regardless of the cost or who the other person was.

In addition, 5-year-old children appeared to adhere to the old adage of "do unto others as you would have them do unto you." Their expectations of others' sharing behavior matched their own sharing behavior on an individual level, while 3- and 4-year-old children did not show the same consistency between their own sharing behavior and their expectations of others' sharing behaviors on an individual level.

The picture that emerges is that by 3 years, children have strong prosocial expectations for behavior between people. As children mature, they are more selective in their expectations. By 5 years, children have different expectations for friends than they do for others.

Video: Kids Talk: Making Friends (0:49)

This video is Sesame Street's *Kids Talk: Making Friends*. In this video, pairs of children of various ages in preschool and early school years talk about what friendship means to them.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=288#oembed-2

Watch Kids Talk: Making Friends from Sesame Street on YouTube.

Video Debrief

After watching the video, consider these questions:

- What does friendship mean to you?
- What does friendship mean to the children with whom you work? How do they form friendships?
- How might you encourage children's friendships?

These questions are meant to inspire you to explore you own concepts of friendship and what that means to children.

D – More Relationships with Other Children

Social Problem-Solving

Between the ages of 3 and 5, preschoolers develop the complex communication skills necessary to establish cooperative interactions with other children, such as the creation of joint goals.

Social problem-solving is another aspect of social and emotional development that blossoms in the preschool years. Children at this age are increasingly able to predict other people's future behavior. For example, 4-year-olds know that an angry child might hit someone and that a happy child is more likely to share.

Preschoolers will also come up with ways to reduce other's distress, such as hugging. These are all components of social problem-solving.

Social problem-solving works best when a child is able to note when a social problem has occurred, clearly and calmly express their own emotions, and seek a resolution.

Researchers agree that cooperative social interactions that require social problem-solving are essential to both social and cognitive development. They have proposed that one of the critical components of cooperative social interactions is establishing joint engagement in a task. When working together, children have to figure out joint goals, the steps needed to achieve those goals, and resolve any ensuing social conflicts.

These steps require mature communication skills. Children have to begin to understand each other's intentions and beliefs and have to be able to flexibly adapt to another person's behavior. Preschoolers are beginning to do this in increasingly complex situations.

However, social problem-solving is still a challenging area of development for most preschool-age children. The difficulty of the task in particular can greatly affect the social learning benefits that children experience when completing a cooperative task and tackling social problem-solving.

When scientists compared 5-year-olds' cooperative interactions when solving an easy puzzle together to their interactions when solving a hard puzzle together, they found that children were more cooperative, more successful, and more engaged when working together on the easy task than on the hard task.

It appears that on harder tasks, young children have a difficult time establishing joint goals. In addition, it is important to consider that when a social problem is too emotionally stressful, it can adversely affect children's learning in that situation.

Social Play

One context in which children greatly benefit and excel at social problem-solving is pretend play. Pretend play is found to increase in both frequency and complexity between 3 and 5 years of age across cultures.

Children's ability to demonstrate cooperative problem-solving during pretend play surpasses their ability to do so in more traditional experimental, cooperative problem-solving tasks.

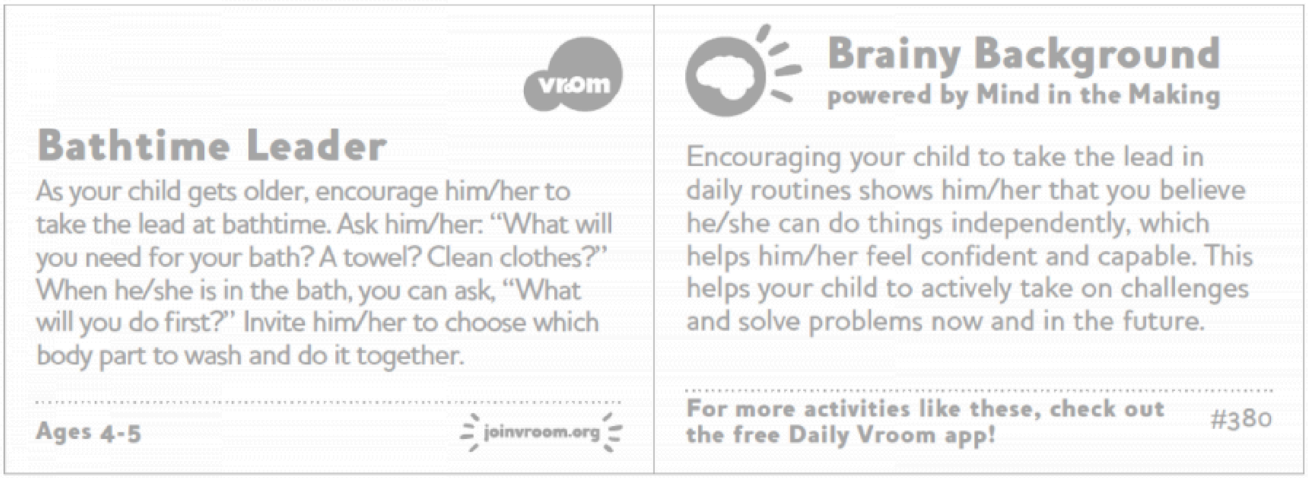
This may be the case because of the unique characteristics of play interactions. Play interactions are, by definition, familiar, safe, comfortable, and highly motivating. In contrast, experimental cooperative tasks are often novel, unfamiliar, and not usually as highly motivating.

Encouraging children's cooperative pretend play and creating environments that promote these social interactions are ways to increase children's opportunities for social development.

Vroom Tip

Check out this Vroom tip to get more ideas about how to help build children's social and emotional development.

Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?



View text-only alternative of this Vroom card

Bathtime Leader

As your child gets older, encourage him/her to take the lead at bathtime. Ask him/her: "What will you need for your bath? A towel? Clean clothes?" When he/she is in the bath, you can ask, "What will you do first?" Invite him/her to choose which body part to wash and do it together.

Ages 4-5

Brainy Background powered by Mind in the Making

Encouraging your child to take the lead in daily routines shows him/her that you believe he/she can do things independently, which helps him/her feel confident and capable. This helps your child to actively take on challenges and solve problems now and in the future.

E – Emotional Functioning

Emotional Literacy

Children's ability to regulate and express emotions becomes more and more critical to their social and emotional development as they mature.

Emotional literacy is a key component of children's developing emotional competence. By labeling emotions, children can enhance their emotion recognition, application of emotion-regulation strategies, and social problem-solving skills.

However, children do not automatically label their own or other's emotion and can often confuse emotional terms. Adults can help children by encouraging them to label emotions with words and by showing them how to use emotion vocabulary in context.

It is also during this time that children begin to conform to emotional display rules and may even enforce them in others.

Emotional literacy, like other areas of language development, grows exponentially during this time. By the end of the third year of life, most children are able to use words for emotions, such as *loving*, *mean*, and *surprised*. By the time they are 5 years old, their emotional vocabulary may have grown into the hundreds.

Theory of Mind

By 5 years of age, children begin to describe how other people feel and have begun to develop self-conscious emotions, such as shame and pride.

Being able to recognize others' emotions as different from one's own and understanding self-conscious emotions requires an understanding of theory of mind: the understanding that other people can have feelings, emotions, and beliefs separate from our own.

While this is still a very active field of investigation for developmental psychologists, scientists agree that by 3 years of age most children have begun to develop a theory of mind and the ability to take others' perspectives. And by the time children are 5 years old, they will spontaneously recognize emotions in other people and attempt to explain them.

The development of theory of mind is critical to social and emotional development. Being able to acknowledge and empathize with another person's emotions is crucial for the development of empathy. When children understand the emotion that another person is experiencing, they can apply their own experiences to connect and provide support to that person.

Following Eye Gaze

Between 3 and 5 years, children develop an understanding of theory of mind, or the idea that others have beliefs and desires different from their own. One way scientists believe that children develop theory of mind is by using other people's eye gaze to determine what they are thinking.

If you offer someone pretzels or peanuts and they stare at the bowl of pretzels, you would probably think that they want the pretzels more than the peanuts. We know that by preschool, children can also use other people's eye gaze to figure out what they want.

There is even evidence that infants, who are better at gaze-following at 10-and-a-half months, might also be better at figuring out what other people are thinking at 4-and-a-half years of age.

In one study investigating preschoolers' understanding of eye gaze, 4-year-olds were able to name which of two objects a child wanted based on a picture of the child's eye gaze alone. Three-year-olds were not yet able to consistently predict the child's desire based on what the child was looking at.

For this reason, it's important to remember that while 3-year-olds have made leaps and bounds in their development of emotion language, their ability to apply that language to other people's experiences is still growing.

In addition, the development of these abilities does not happen in one, single instance. From what scientists have found, children do not have a single *aha moment* in which the concept of theory of mind clicks.

Instead, scientists find that some time in their third year, children begin to reason using theory of mind in some instances, and that as they develop this ability, children begin to use it correctly more and more often.

Emotional Regulation

By 5 years of age, children have developed a set of self-regulation strategies and have learned to apply them in a variety of situations.

These strategies help adjust our emotional state to a comfortable level. For example, some common emotion-regulation strategies are breathing deeply to calm down after an injury or sitting down and counting to 10 when feeling overwhelmed.

Emotion-regulation develops along with brain areas active in executive functioning and with the help and guidance of caregivers and educators.

One effective way to help children regulate their own emotions is to follow three steps:

- Acceptance of emotion
- Recognition of emotion
- Resolution of emotion

The child must first accept that it's okay to feel the emotion. Believing that an emotion is not acceptable can sometimes make an intensely emotional situation even worse.

Second, recognizing what emotion you are experiencing helps you figure out what the best strategy for resolution might be. If you're feeling angry, smiling and thinking of something funny might not be as effective as when you're feeling sad.

Another strategy that some children employ is called taking a *self-distanced perspective.* The idea behind this strategy is to create distance from yourself to help reduce the impact of the emotional response enough to think clearly about a resolution.

In one study on self-distanced perspective taking, scientists found that 5-year-olds, but not 3-year-olds, benefited from taking a self-distanced perspective on an executive-function task through third-person self-talk as well as taking the perspective of an exemplar other, for example, Batman, through role play.

This makes sense in the context of theory of mind development. To create distance from oneself, one must first have a sense of self and other internal mental worlds. As children's understanding of theory of mind develops, they are better able to step outside of their own mental world as well.

F – Sense of Identity and Belonging

Self-Perception

The fourth Social and Emotional Development preschooler subdomain is Sense of Identity and Belonging. Part of children's development in this subdomain is the development of their self-identity.

From 3 to 5, children begin to classify themselves and others based on visible attributes (like gender, race, and age), good and bad, and competency. They have begun to construct their own personal narrative and will often want to share their stories with you.

The development of self-identity can vary across cultures.

One way this can be studied is through children's drawings of themselves and their families. Scientists compared the self and family portraits of children from a less individualistic culture, Cameroon, and a more individualistic culture, Germany.

Cameroonian preschool children drew themselves significantly smaller than German children of the same age in both their own self-portraits and in their family portraits. German children even drew themselves differently when alone versus in the family portrait. They drew themselves with a larger head in their self-portrait than in their family portrait, while Cameroonian children tended to draw themselves at the same size in both drawings.

Similar differences in self-portrait sizes have been found between other cultures as well.

Vroom Tip

Check out this Vroom tip to get more ideas about how to help build children's social and emotional development.

What do you think of the idea? Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?

View text-only alternative of this Vroom card

Thankful Tidbits

At bedtime, take turns with your child listing off things you're thankful for. Here's an easy one to start with: "I'm thankful for you!" Then, help your child think of something he/she is thankful to have in his/her life. See how many times you can go back and forth.

Ages 4-5

Brainy Background powered by Mind in the Making

Every back and forth conversation builds your child's brain. After he/she says something, repeat it back in complete sentences. And did you know that paying attention to what's positive in your life has been shown to lead to more happiness and satisfaction? For both of you!

Group Structure

In constructing their own identity, children look at the group structure of the social world for information about themselves. Children develop not only a sense of themselves but also of how they fit into the social group structure.

Children are aware of group-based differences, such as race, and look to educators, parents, and books to learn about what those groups mean. In the preschool years, children begin to recognize their own race and racial group. Group identities can affect children's sense of self-worth and self-confidence. Children will use information from those around them to figure out how they should be treated and how to treat others.

This often can be a difficult or uncomfortable area of development for caregivers and educators to navigate. But research on racism and racist thinking in young children shows that talking about race early and often actually decreases children's racist thoughts.

One of the most famous studies on children's thoughts about race was conducted in the 1940s and is called the *doll test*. In this study, children were asked about various positive and negative trait labels, such as *smart*, *funny*, *mean*, and *dumb*. When asked which doll the traits described, both black *and* white children were more likely to attribute positive traits with the white doll and negative traits with the black doll. These results now have been replicated time and time again, even in modern-day studies.

Children also will use race in social situations to make judgments about others. It is important to keep in mind that children are still trying to make sense of the world and are using the cues from those around them to do so.

Educators can help encourage children's social identity development by using comments on personal differences to teach children. For example, if a child comments that another child's skin is "dirty," they can say, "Your skin is lighter and theirs is darker, but you're both clean."

Acknowledging differences and giving children a way to talk about them productively is one way to help combat racism and racist thinking.

Building Self-Confidence

One of the most important and lasting aspects of early identity development is that of self-confidence.

If day-to-day events seem to occur randomly, it can cause children a lot of anxiety. If life doesn't make sense, it may feel too scary to fully explore. When children know what to expect, they are free to play, grow, and learn.

Part of constructing self-confidence is feeling that you have some control over your own environment. This is one reason why children may sometimes appear to have specific desires or needs. They are attempting to exert some control over their environment. Validating children's desires and ability to control the environment within reasonable limits is a great way to help support their self-confidence.

If a child wants to put their toy on the left side of the table, rather than the right side, it may not seem important to you. But your confirmation that they can do this can mean a lot to the child. It means that their opinions matter, that you will respect them, and that they can exert some control over how their world is structured.

Imagine if you had someone making all the decisions for you, putting things in places that didn't make sense to you or didn't look right to you. You would probably get fed up and irritated with them pretty quickly.

Engaging children in the construction of their environment can help them feel that they have a sense of mastery and can help them construct their self-confidence. For example, letting children pick which table to put flowers on or where the crayons should go can help children not only feel more in control of their own environment but also demonstrates to them that you respect their opinions and models how to ask others for input in social interactions.

Reflection Point

Think about preschool children's social and emotional development and how to encourage it. Pick one of the four subdomains in the Head Start Early Learning Outcomes Framework Social and Emotional domain for preschoolers:

- Relationships with Adults

- Relationships with Other Children
- Emotional Functioning
- Sense of Identity and Belonging

Now, recall a recent experience with a child that you think demonstrates learning in the subdomain you picked.

What would a future experience in which you could encourage a child's learning in that subdomain look like?

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EarlyEdU Alliance (Publisher). (2018). 7-1 Preschool social and emotional development. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

7-2 Social and Emotional Development and School Readiness

A – School Readiness

7 Essential Skills

The seminal publication *Heart Start: The Emotional Foundations of School Readiness*, by the organization Zero To Three, identifies seven essential school readiness skills:

- Confidence
- Curiosity
- Intentionality
- Self-control
- Relatedness (being able to engage with others based on a sense of understanding)
- Capacity to communicate
- Cooperativeness

These skills fall under the umbrella of five developmental areas:

- Self-control
- Self-confidence
- Thinking skills
- Language and literacy
- Relationship-building

At least two of those areas fall within the domain of Social and Emotional Development. The related skills that we've covered in this session so far are: confidence, self-control, relatedness, communication (not just language, also social cues), and cooperativeness.

School readiness begins at birth with the relationships that infants establish with adults. Those relationships are echoed in children's relationships and social strategies with other children. These relationships help children to learn about themselves and gain both self-control and self-confidence as they learn more and more social skills.

Video: School Readiness (4:30)

This video *School Readiness* covers the key characteristics of school readiness and how adult and peer relationships are connected to children's school readiness.

While watching the video, think about:

- Key skills that children need for school readiness.
- What parents and educators can do to encourage school readiness skills.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=290#oembed-1

Watch School Readiness from ZEROTOTHREE on Vimeo.

Video Debrief

What did you hear about key readiness skills? (click to toggle expand or collapse)

Possible Answers

You may have heard that key readiness skills are:

- Language and literacy skills
- Thinking skills
- Social and emotional development

To encourage children to develop these skills, parents and educators can:

- Share books and stories with children.
- Sing with children.
- Have back-and-forth conversations.
- Narrate what they are doing.
- Teach vocabulary.
- Count objects.
- Model self-regulation.

- Point out skills.
- Encourage children to persist.

Reflection Point

Think about three areas you think are important for school readiness. You may identify any of the three characteristics identified in the last video—language and literacy skills, thinking skills, or social and emotional development–or other ideas based on personal experiences.

What are the reasons for your choices and experiences you've had encouraging children to develop skills in these areas?

B – Developing Skills

Relationships with Adults

Children develop models of how they expect to be treated and how to treat others through their early childhood interactions with educators and parents. These relationship models can affect their future relationships with educators and other adults in formal school settings.

Children's relationships with adults are key to school readiness. Through positive and trusting relationships with adults, children learn many critical social and emotional skills, such as:

- Self-control: Learn to follow rules and social norms from watching and engaging with adults.
- Language and literacy: Learn language and literacy from engaged adults.
- Thinking Skills: Learn how to solve problems from scaffolding and modeling by adults.

From birth, children are learning how people will treat them and how they should treat others initially through their interactions with caregiving adults. These relationships form models from which children build their own future relationships.

If caregiving adults are compassionate, caring, and attentive, children will learn to expect to be treated with care, compassion, and attention, and also to treat others in the same way.

Relationships with Other Children

As children mature, their relationships with other children will play a larger role in their educational success. Children who are accepted by their social group feel supported and confident. Those who do not may suffer from depression and other mental health issues that will also adversely affect their ability to learn.

Learning how to solve social problems with their peers also teaches children valuable thinking skills. Social problem-solving can easily be viewed through the same lens as cognitive problem-solving. Social problem-solving requires the same:

- Observational skills (the need to identify that a social problem is occurring by noting another person's emotional state as well as one's own emotional state).
- Questioning, theory-building, and predicting of others' emotional states.
- Exploration or reflection on the effectiveness of one's social strategies or actions.

Therefore social problem-solving is associated with similar thinking skills as cognitive problem-solving. Moreover, children who have more prosocial skills tend to be better accepted by their peers and to have lower levels of stress. All of these aspects will help them learn more and retain information longer than children lacking those skills.

Recent studies have confirmed this association between social skill development and cognitive development. For example, a recent study of Head Start children showed that those who scored higher on assessments of prosocial competence were, later on in the year, assessed to be among the most *cognitively ready* for school.

C – Emotional Functioning

Understanding others' perspectives and being able to regulate one's own responses are key factors in building relationships with both adults and other children.

Eye gaze is one important way that children do this. Through the development of eye gaze understanding, children build the skills to observe other people's desires or intentions. For example, even if someone doesn't say they want your ball, if they look sad and keep staring at the ball you're holding, it's very likely that what they are sad about is not having the ball to play with.

This then helps children begin to recognize how to engage in prosocial activity, such as sharing the ball with the sad child or finding another ball for the child to play with.

The development of **theory of mind** takes this a step further by giving children the ability to form theories about the social world. For example, maybe you give the sad child the ball, but that doesn't make them happy. You think, maybe the child wanted to play with me with the ball? Maybe I should kick the ball to the sad child instead.

Without a theory of mind, it is difficult to construct theories as to why another person is responding socially in different ways and to then determine prosocial actions that correspond to their emotional state.

And of course, **emotion regulation** and **emotional literacy** are key to these abilities as well. Without emotion regulation, children can be overwhelmed by their own emotions to a degree that hinders them from thinking through social problems to come up with solutions.

Emotional literacy helps children with emotion regulation by identifying their own emotions and picking target strategies to regulate those emotions. Emotional literacy also helps with social problem-solving by, for instance, identifying that the other child is sad, rather than mad, frustrated, or any other negative valence emotion.

Putting these all together, children who develop the skills within the subdomain of Emotional Functioning by the time they enter school have a catalogue of tools to navigate the complex social world of a formal school environment, such as new class rules and routines, different social groups (and typically, larger class sizes), and new teachers and administrators.

Sense of Identity and Belonging

Self-confidence is yet another important factor in school readiness.

Children who are more self-confident also are more likely to take on challenges, overcome frustrations, and act pro-socially toward others.

This is a very active area of developmental research. One of the leading researchers on the intersection of self-confidence and children's school readiness is Dr. Carol Dweck at Stanford University.

Dr. Dweck pioneered research on how different styles of praise can affect children's learning perspectives and their likelihood of academic success.

Video: The Growth Mindset **(11:42)**

Next, watch a video of Dr. Dweck's presentation *The Growth Mindset* at the Stanford University Bing Nursery Research Symposium in 2016.

Another option would be to watch Dr. Dweck's talk on TED instead. It covers similar content. *The Power of Believing You Can Improve* is available here: The power of believing that you can improve | Carol Dweck.

While viewing the video, consider the answers to these questions:

- What is the difference between a growth mindset and a fixed mindset?
- When do children begin to be affected by their mindset?
- What three things does Dr. Dweck say we can do to change a child's mindset?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=290#oembed-2

Watch The Growth Mindset from Bing Nursery School, Standford on YouTube.

Video Debrief

What is the difference between a growth mindset and a fixed mindset?(click to toggle expand or collapse)

Possible Answer

- A growth mindset is the belief that talents and abilities can grow through hard work and practice, for example, thinking that you need to practice math more to get better at it. A fixed mindset is the belief that talents and abilities are what they are and that no amount of work will change them, for example, thinking that you are simply *not good at math*.

When do children begin to be affected by their mindset? (click to toggle expand or collapse)

Possible Answer

- Dr. Dweck and her colleagues found that children as young as toddlers are affected by differences in the mindset reflected by adults' behaviors.

What three things does Dr. Dweck say we can do to change a child's mindset? (click to toggle expand or collapse)

Possible Answer

- Praise the process.
- React to failure as if it were a learning opportunity.
- View challenges as fun and positive (the fabulous struggle).

Reflection Point

Reflect on your perspective. Do you tend to have a fixed or growth mindset about your talents and abilities?

Think about a scenario where a child is struggling with a challenge. List statements you could use as:

- Process praise
- Failure as a learning opportunity
- The fabulous struggle (challenge as fun and positive)

These points focus on the approaches that Dr. Dweck talked about in the video.

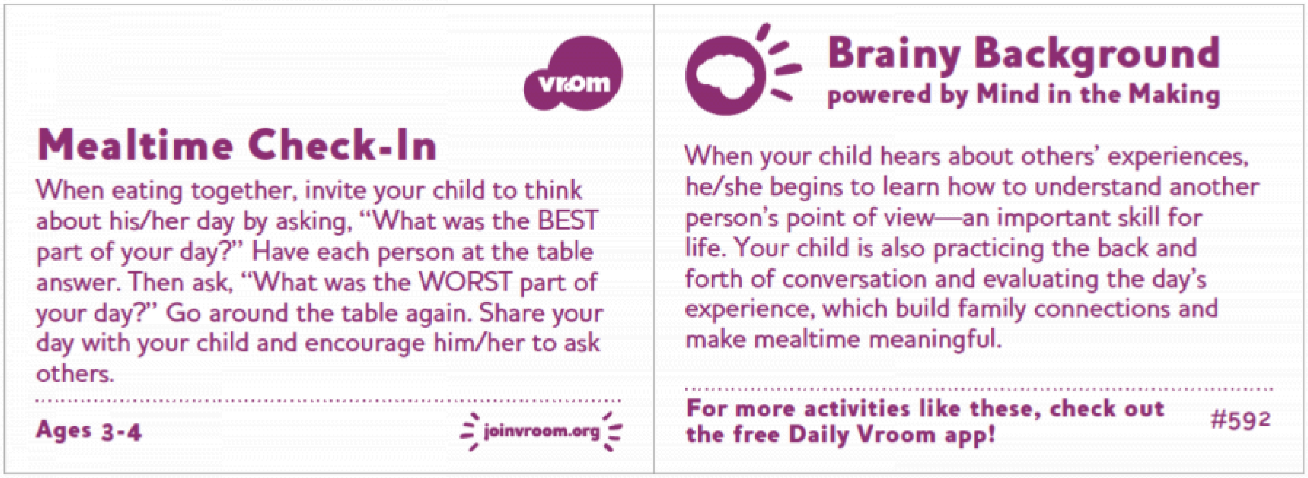
D – Supporting Social and Emotional Development

Mealtime Check-In

Vroom Tip

Check out this Vroom tip to get more ideas about how to support children's social and emotional development.

What do you think of the idea? Does it make sense it the context of an early learning environment? And if not, how might you adapt the activity to better fit it?


Mealtime Check-In

When eating together, invite your child to think about his/her day by asking, "What was the BEST part of your day?" Have each person at the table answer. Then ask, "What was the WORST part of your day?" Go around the table again. Share your day with your child and encourage him/her to ask others.

Ages 3-4

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Brainy Background
powered by Mind in the Making

When your child hears about others' experiences, he/she begins to learn how to understand another person's point of view—an important skill for life. Your child is also practicing the back and forth of conversation and evaluating the day's experience, which build family connections and make mealtime meaningful.

For more activities like these, check out the free Daily Vroom app!

#592

View text-only alternative of this Vroom card

Mealtime Check-In

When eating together, invite your child to think about his/her day by asking, "What was the BEST part of your day? Have each person at the table answer. Then ask, "What was the WORST part of your day?" Go around the table again. Share your day with your child and encourage him/her to ask others.

Ages 3-4

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When your child hears about others' experiences, he/she begins to learn how to understand another person's point of view—an important skill for life. your child is also practicing the back and forth of conversation and evaluating the day's experience, which build family connections and make mealtime meaningful.

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7-3 Supporting Preschooler Social and Emotional Development

A – Supporting Early Development

Much like the subdomain headings, many of the same supports that were effective for infant and toddler social and emotional development continue to be effective for preschoolers. They just begin to look different. These are:

- Responsiveness and contingency (how you, as an adult, respond to the child)
- Modeling (actions and interventions)
- Emotional literacy (recognizing and labeling emotions in others and oneself)

However, we will add one area of support. That is *play*.

As mentioned earlier in this session, pretend play in preschoolers is a fertile environment for the development of social and emotional skills.

We'll now cover examples of support for preschoolers' social and emotional development in each of these areas.

Responsiveness

Responsiveness is a critical way in which caregiving adults can teach children social and emotional skills. There is good evidence that young children who have warm relationships and secure attachments to their parents are more likely to be empathic and prosocial.

One way in which they might do this is by noticing and copying the behavior of adults to whom they feel a close connection.

It is important to remember that all caregiving adults play a role.

In one German study, preschoolers' social and emotional adjustment was measured along with their interactions with their fathers. And researchers found that fathers' sensitive, challenging play with preschoolers predicted favorable emotional and social adjustment.

By responding to preschoolers' cues compassionately and sensitively, you are teaching them both that their voice matters and that it is important to treat others in this way.

Children who are neglected are much more likely to neglect others in turn. They have learned that this is the way others should be treated.

Even one safe, responsive relationship can help provide children with a different social model to use in their own relationships.

Modeling Behavior

Modeling relationships with other people also is important for social and emotional development. Preschool children are looking to the adults in their lives for information about social rules and models for how to interact with others.

Everyone experiences negative emotions sometimes. Preschoolers are watching you, as an adult, intently to find out how to deal with those negative emotions. Consider these questions:

- How does the adult react when they break something they didn't mean to break?
- How does the adult react when their friend looks sad or someone gets hurt?

Watching adults in these situations gives children an idea of what they can do as well. Have you ever noticed a child copy someone's unique reactions to a situation? For example, if a child's parent often says, "Oh goodness," when something goes wrong, you may often hear the same phrase from the child when they are frustrated or someone is sad.

For example, in one study, researchers found that children pay attention to how their parents resolve conflict. If parents were able to resolve their conflict with a compromise, children actually felt positive emotions after the negative emotional event.

Scaffolding Social Problem-Solving

Scaffolding is another way that adults can help children build social skills. Remember that despite their developmental leaps and bounds, preschoolers are still building their social skill toolbox.

If you see a child navigating a social problem, maybe the child accidentally broke a friend's tower and is experiencing difficult emotions, it might be a good time to step in and make some suggestions. Ask the child if it was an accident or if they mean to do it. And if it was an accident, prompt them to figure out a solution: "Hmm… What could you do to help your friend feel better?"

See if the child can come up with an idea, and if not, offer a couple possibilities. In the future, the child can draw from this experience and try the same solutions when new social problems occur.

Emotional Literacy

Adults can also scaffold children's emotional literacy. The more that adults label and explain emotions with preschoolers, the better developed their emotional understanding is.

For preschoolers, expanding their overall vocabulary, books on emotions, and emotion-labeling activities are ways to support children's emotional literacy. Playing games, such as emotion charades, is an engaging way to do this in an early learning environment. Either the educator, or the children themselves, depending on their age, can show an emotional expression and see if the other children can guess what emotion they are expressing. Or, children can draw pictures of people with different emotions and then talk about what each emotion feels like or times when they felt those emotions.

Another way to expand children's emotion literacy is for adults to label their own emotions when they occur. If you trip and fall, you could explain that you feel, embarrassed, hurt, angry, or sad. And then you can also explain what might make you feel better—a hug, an ice pack, a song, or any number of solutions. This will help children see in which contexts different emotions occur so that they can better recognize those same emotions in themselves.

There are also songs and videos of characters feeling different emotions that, when combined with adult engagement, can help children learn more about emotional literacy. Any activity that helps children expand their emotion vocabulary and categorize different kinds of emotions will help support their emotional literacy.

B – Social Benefits of Play

Play offers a myriad of opportunities for children to practice social skills and communication, build relationships, and to try things out in a safe, protected way.

Children learn from playing with other people about how to take turns and how to manage and express emotions. Many children use pretend play with their toys to explore social situations. Emotion talk can be particularly rich during this kind of pretend play. This contributes to children's emotional understanding and the development of positive relations with their peers.

When preschool-age children engage in dramatic play, they also learn how to take others' perspectives and practice communicating thoughts and feelings. Through these activities, differences of opinion or planning will arise. These provide moments when children learn how solve social problems.

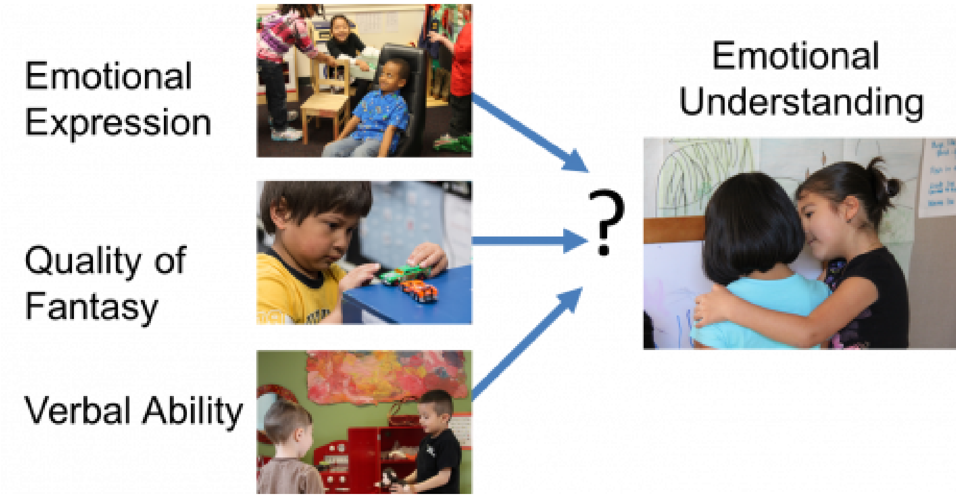
A variety of social skills develop from these interactions:

- Children can use words to describe others' feelings.
- They can take turns.
- They can demonstrate control over their actions.
- They can demonstrate prosocial behaviors.
- They can resolve conflicts.

Several studies have even shown that toddlers and preschoolers who demonstrated prosocial attitudes and behaviors during play were more likely to make new friends, be accepted by their peers, and form secure relationships with educators. This, in turn, is predictive of later achievement.

Researchers have even found a high correlation between children's ability to create fantasy during play and their emotional understanding.

Building Emotional Understanding



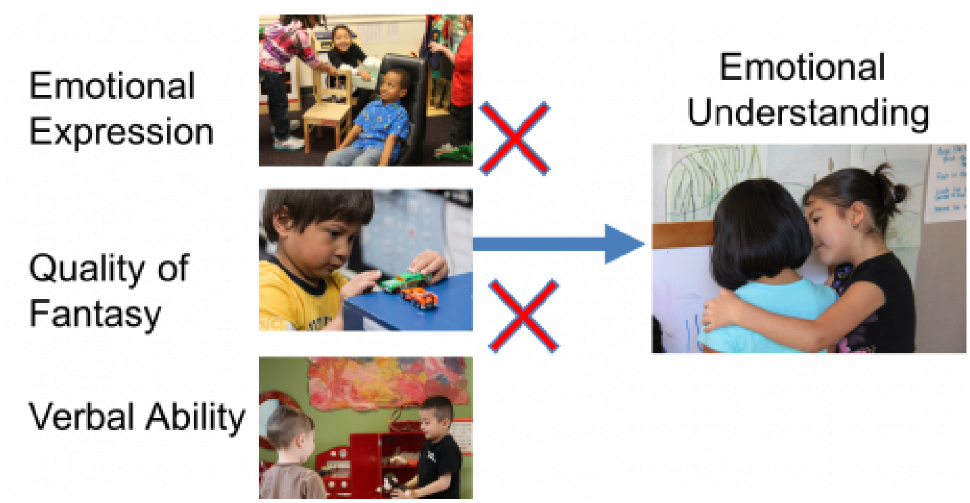
In one study, children were asked to play on their own with two puppets and some blocks any way they wanted to for 5 minutes. Children's fantasy play during this time was evaluated for two elements:

- Their emotional expression with the toys
- The quality of their fantasy play, or how elaborate, organized and imaginative their fantasy play was

In a second part of the study, children's verbal ability was assessed.

Finally, the children were interviewed by a researcher and asked about their emotion understanding. The researchers wanted to know which of the children's skills were most strongly linked to their emotional understanding. Was it the quality of their fantasy play, their emotional expression during play, or their verbal ability?

Play and Emotional Understanding



Researchers found that a child's emotional understanding was most strongly linked to the quality of their play, rather than their verbal ability or emotional expression.

This means that even if a child isn't able to verbally produce words about emotions or isn't motivated to express emotions during playtime with their toys, that child might still have a high level of emotional understanding. It also means that the quality of play during an activity is a better window into a child's emotional development than either verbal ability or expression of emotional content during play.

This is important to note, because as adults we often use verbal ability as a way of assessing a child's competence on a particular topic. In the case of emotional understanding, research suggests that this may not be the best measure to use.

Play to Support Development

One way to support development through play is to provide materials that encourage social play. Providing cooperative play materials, such as tea sets, costumes for role-play, train sets, or turn-taking games are ways of encouraging children to socialize during playtime.

Sometimes, children may need help with prosocial engagement. For example, two children could be focused on pouring and drinking tea. Another child is nearby but not yet part of the game. You could ask if there is any food to go along with their tea or if someone could bake something to go along with their tea.

You can also model and facilitate open-ended discussion of social knowledge by asking questions about preferences, likes, and dislikes. For example, you could ask the children if the tea tastes good or if it's too cold or hot. Disagreements during play can be an opportunity to support children in learning the first steps to thinking of others' perspectives.

Modeling how to do this by verbalizing what another child might be feeling, and talking children through the process can help support their learning.

Emotion Regulation Strategies

Another way to support children's social and emotional development is to help them develop strategies for emotion regulation.

Next, you'll watch two videos with two different ways to support children's emotion regulation.

As you watch the following videos, consider:

- What are the pros and the cons of each approach to supporting emotion regulation?
- Which methods do you prefer and why?

Video: Helping Toddlers Regulate Emotions (4:53)

This Yale Center for Emotional Intelligence video focuses on helping toddlers regulate their emotions using the RULER method. RULER is an acronym that stands for recognizing, understanding, labeling, expressing, and regulating emotions.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=292#oembed-1

Watch Helping Toddlers Regulate Emotions from Yale University on YouTube.

Video: 6 Tips To Help Your Children Control Their Emotions (2:40)

UCLA Health's *6 Tips to Help Your Children Control Their Emotions* video is on helping toddlers regulate their emotions.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=292#oembed-2

Watch 6 Tips to Help Your Children Control Their Emotions from UCLA Health on YouTube.

The two videos you just watched present a variety of ways to support children's emotion regulation.

After watching the videos, think about the following questions:

- What are the pros and cons of each method?
- Which methods do you prefer and why?

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8: Cognitive Development: Birth to Age 3

In this lesson:

8-1 Early Cognitive Development

This sections covers the infant and toddler Cognition domain, including all five subdomains.

8-2 Early STEM Learning

This section covers STEM learning and its relationship to the five subdomains of the infant and toddler Cognition domain.

8-3 Supporting Early Cognitive Development

This section covers ways that adults can support children's early cognitive development, including ways to:

- Design a supportive learning environment.
- Provide social support.
- Plan learning experiences.

8-1 Early Cognitive Development

A – Early Cognitive Skills

	CENTRAL DOMAINS				
	APPROACHES TO LEARNING	SOCIAL AND EMOTIONAL DEVELOPMENT	LANGUAGE AND LITERACY	COGNITION	PERCEPTUAL, MOTOR, AND PHYSICAL DEVELOPMENT
▲ INFANT/ TODDLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication	Cognition	Perceptual, Motor, and Physical Development
● PRESCHOOLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication	Mathematics Development	Perceptual, Motor, and Physical Development
			Literacy	Scientific Reasoning	

The infant and toddler Cognition domain of the Head Start Early Learning Outcomes Framework includes the development of early cognitive skills, such as:

- Using active exploration
- Understanding causal relationships
- Planning solutions to problems

For example, the developmental progression of the Exploration and Discovery subdomain shows children's growth from using senses and actions to examine objects, to acting intentionally to achieve a goal, and finally to observing and experimenting with how things work.

The Cognition domain encompasses five subdomains. As mentioned, one is Exploration and Discovery. The other four are:

- Memory
- Reasoning and Problem-Solving
- Emergent Mathematical Thinking
- Imitation and Symbolic Representation and Play

Exploration and Discovery

Let's discuss one of the five Cognition subdomains, Exploration and Discovery. Exploration and discovery is at the heart of theory building and testing.

Children have an incredible amount to learn in the first few years of life. Children are natural scientists. They learn from observations, predictions, and exploration.

Children are constantly building theories about the world. A theory is a guess or possible explanation for something. It's how children learn about everything, from relationships to language to scientific ideas like gravity.

Children can then test those theories by making observations or designing interventions to see what happens. For example, infants may have a theory that when they drop a toy they're holding in their hands, it will fall to the ground. They may then experiment with dropping different objects to the ground and may even try doing so from different heights. When children encounter contradictions to their theories, they can update their theories. In this case, if they were to try to drop a helium balloon, they might reason that not all objects fall when dropped.

Skill Progression

As children develop their exploration and discovery skills, they move from exploring objects with their senses to testing theories about those objects' causal relations in the world. They do this through active exploration of the world, which is a large part of what children are doing when they play.

Play for infants and toddlers involves a lot of sensory activity because their brains are fine-tuning many of the sensory regions. Toys that have interesting sensory features, such as bright colors or varied textures, offer opportunities for sensory play.

Infants are actively exploring the environment, at first sucking, then grabbing or dropping objects, and eventually intentionally testing objects' properties, such as whether they float or sink or whether they are magnetic or not.

With object exploration, young children are also starting to learn about cause-and-effect relations.

Infants are constantly engaging in exploration and discovery, so much so that you may have missed when this is occurring. Let's watch a quick video example of infant exploration in action.

Video: Milestones in Action (0:09)

This short video clip from the Centers for Disease Control and Prevention (CDC) shows a 1-year-old exploring an object. The video is 9 seconds long.

While watching the video, think about the following questions:

- What was the child exploring and what did they discover?
- Is this a behavior you've seen before?
- What important skills is this infant demonstrating?
- What could you do to encourage this kind of behavior in future interactions?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=294#video-294-1

Watch Milestones in Action from CDC.gov.

Video Debrief

What did you observe about exploration and discovery? (click to toggle expand or collapse)

Consider the following possible answers:

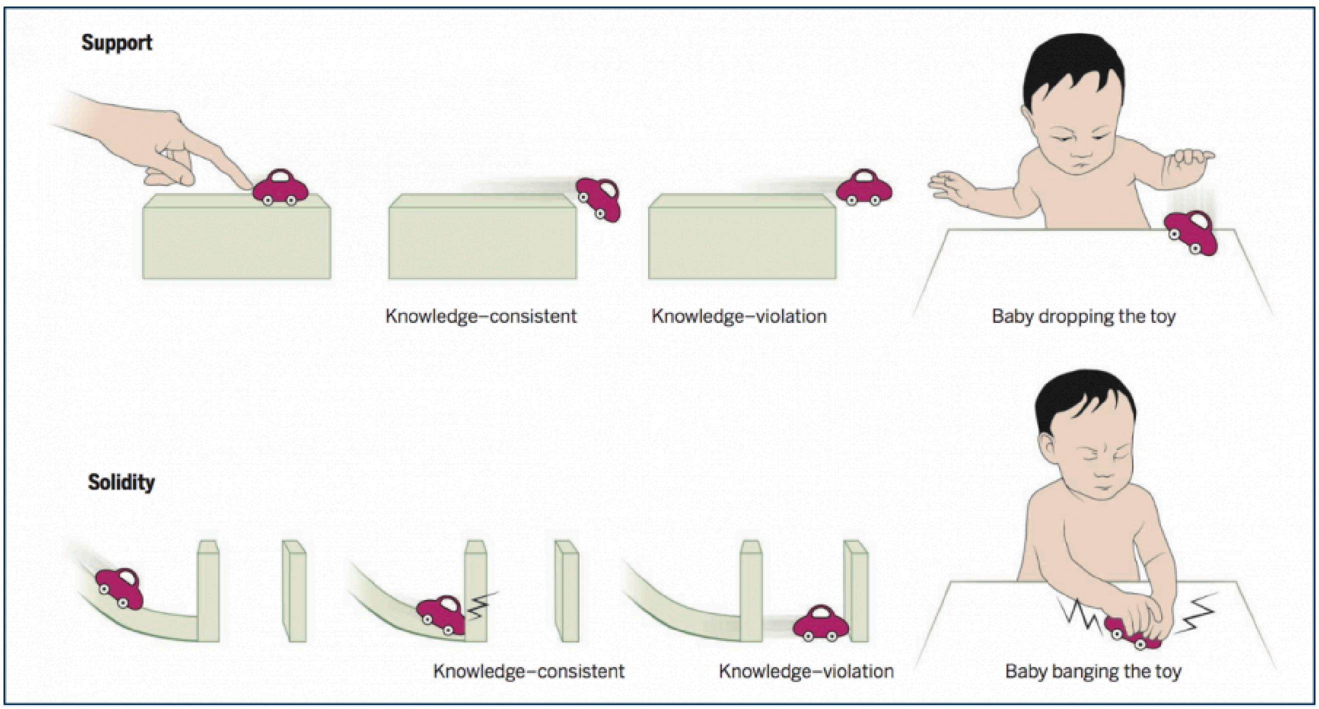
- What was the child exploring and what did they discover? The child was exploring two plastic cups and discovered that banging them together made a noise.
- Is this a behavior you've seen before? Think about your personal experiences.
- Describe the important skills this infant is demonstrating. The child is exploring the characteristics of objects and causal relationships. The child is also building physical skills in bringing the objects together to touch one another.
- What could you do to encourage this kind of behavior in future interactions? To help build children's theory of the world, which at this point could be, "When I bang things, they make a certain sound," you can give infants objects with varying sensory experiences. These could be ones that make different sounds when banged together or ones that when banged together make no sound at all (soft toys).

Using Observations

Researchers have studied infant exploration and found that even young infants don't play with objects at random. They direct their exploration based on the information they have observed.

For example, 1-year-old children learn physical rules through observation and experimentation. When they see something that violates typical physical rules, they are more likely to explore it.

In one study, researchers showed young children a simple scene: a toy car rolling on a surface. Some children saw a toy car that was pushed off the side of a table then hover in mid air—something a car clearly could not do. Others saw a toy car rolling down a ramp and going through a solid barrier—also impossible.



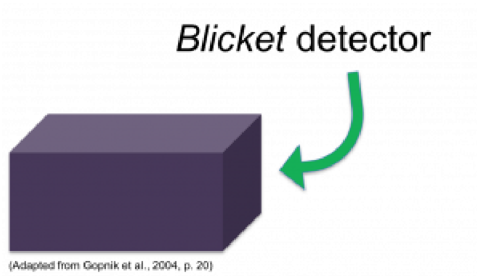
(Schulz, 2015)

When these children had a chance to play with these mysterious cars, they tended to direct their exploration toward specific features. Those who saw the car hover in mid air tended to drop the car, whereas those who saw the car go through the barrier tended to bang it against the table.

B – Understanding Causal Relationships

Cause and Effect

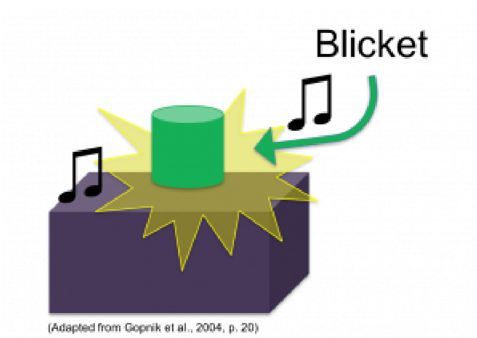
Cause-and-Effect Blicket Detector



As children develop, their ability to recognize complicated cause-and-effect relationships improves. By the time children reach toddlerhood, they have a surprisingly sophisticated understanding of causes, or of things that make other things happen, such as buttons that make machines light up and play a sound.

One way researchers have tested this is through a contraption they call a *blicket detector.*

What is a Blicket?



There are many variations of the blicket study. In almost all versions, the blicket detector is a small wooden or metal platform that lights up or plays music when a blicket is on top.

Blickets themselves can be anything researchers imagine. Usually they are blocks of different colors or shapes. The blickets do not have magic powers to *activate* the machine. The experimenter secretly pushes a button to make the machine turn on.

From a child's perspective, it seems like certain objects really must have properties that make the toy light up or play music.

After seeing a variety of toys placed on the blicket detector and watching whether they activate the machine, children need to determine what is or is not a blicket.

Interactive: Blicket Detector

This is an interactive! Drag and drop the red and blue blocks on the black blicket detector to discover which block is the blicket.

Note: You may have to click on the black area to see the instructions and begin the simulation.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=294#h5p-38

Activity Debrief

By observing which objects make the blicket detector work, children make sophisticated guesses about what is and isn't a blicket. It turns out they do not even need to see that one specific toy makes the blicket detector go. They can use their observations to reason about it.

Which block is the Blicket?

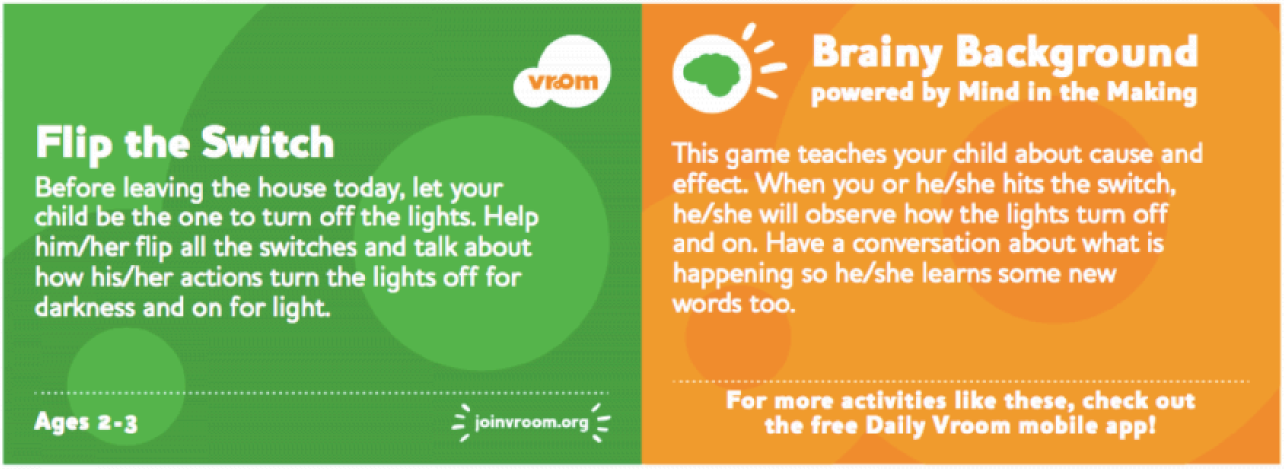
Why it matters

The cognitive skills included in this subdomain are particularly important for infants and toddlers. It is one of their main mechanisms for understanding the world. Infants and toddlers have to use this kind of reasoning to figure out many things in their early lives. They have to look for patterns of cause and effect and learn from them. Toddlers can reason about simple causal relations, meaning that they can make judgments about the cause-and- effect relationship between an object and a machine even if they have never seen that object interact with the machine on its own.

Vroom Tip

Check out this Vroom tip to get more ideas about how to help build children's cognitive development in the area of cause-and-effect relationships.

Does this tip make sense in the context of an early learning environment? If not, how might you adapt the activity to better fit that environment?



View text-only alternative of this Vroom card

Flip the Switch

Before leaving the house today, let your child be the one to turn off the lights. Help him/her flip all the switches and talk about how his/her actions turn the lights off for darkness and on for light.

Ages 2-3

Brainy Background powered by Mind in the Making

This game teaches your child about cause and effect. When you or he/she hits the switch, he/she will observe how the lights turn off and on. have a conversation about what is happening so he/hse learns some new word too.

C – Memory Development

The development of memory is critical to many domains. Memory is at the heart of learning. If you can't remember something, then you can't learn and grow cognitively.

You may think that since you don't remember anything from when you were a baby, that infants and toddlers have little or no memory capacity. However, researchers have shown that infants as young as 6 months can retain learned actions, such as kicking to get a mobile to move, for up to 2 weeks and sometimes longer, depending on the training.

Brain Structures

As children age, the brain structures supporting their memory development grow and mature. They become able to support longer and longer memory retention. Between the ages of 2 and 18 months, children go from not remembering learned information from the week before to remembering something learned more than 12 weeks prior. That's 3 months, or one-sixth of their current lifespan. That would be like remembering something specific you learned up to a decade ago (depending on your age).

As children get older, their memory also gets better so that they are able to retain information for longer and longer periods of time.

Interactive: Deferred Imitation

This is an interactive! Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=294#h5p-21

Have you ever noticed children repeating actions that you only did once in your program? Imitation is a powerful tool for learning in early childhood and one that educators have used for centuries to pass information to future generations.

In the early learning environment, an educator can use imitation to demonstrate new actions on an object, even with infants as young as 9 months old. Repeating those demonstrations more often for younger infants will help them retain that learning longer.

Skills with Memory Maturation

As children's memory grows and matures, they will be able to adopt new skills, such as:

- Recognizing when objects and people are familiar versus new.
- Knowing that an object is still there, even when it is hidden. (This supports later symbolic learning.)
- Remembering daily routines.

Directing Attention

To recognize that something is new, you first must remember what you've already seen or experienced. Researchers have shown in a visual recognition task that children as young as 1 year old begin to retain memories of at least three to four previously viewed items.

This ability helps them to remember what they have and have not seen before and to notice changes in their environment. This, in turn, can help them direct their attention and their exploration to new objects or places. It also helps them to recognize familiar and unfamiliar people, which helps them track people and behaviors as part of their social development.

Object Permanence

Memory is also key to children's spatial learning and understanding the stability of people and objects. This ability is commonly referred to as *object permanence:* Even when you don't see things, they are still there and have not just disappeared.

One of the easiest ways to test children's object permanence is to hide something in front of them and observe their searching behaviors. When you hide a favorite toy in front of infants, they will turn around and appear completely uninterested, as if the object has just disappeared and doesn't exist anymore. They won't bother searching for it at all.

As children get older, they will begin to search for the object and get better and better at finding it. Before 4 to 8 months, infants abide by the *out of sight, out of mind* principle and generally won't search for an object even if it is only partially hidden.

Between 4 and 8 months, most infants will start to look for an object if it is partially covered. Between 8 months and 1 year, most infants will begin to search for and retrieve a completely covered object.

Between 18 months and 2 years, most children have reached full object permanence and will search for a hidden object, even if the object is hidden under multiple covers.

Planning Actions

Another way that children's developing memory helps their overall cognitive development is in their ability to plan future actions.

This is especially evident in how children learn to be able to remember the steps of daily routines, such as the process of getting to school or coming home. They are able to predict what is coming next and understand how they can prepare for it. This is one of the reasons that building stable routines into children's daily schedules can help support their cognitive development. It allows them to practice their ability to remember and predict future events.

For example, children may prepare to leave the house by putting on socks, then shoes, then a coat, or get ready to go to bed by first brushing teeth, then reading a book, then turning off the light. As children get older, they can use their memory of the routine to take an active role in those daily activities.

Narrating the steps in daily routines, both before they occur and while they occur, as well as using visual aids with schedules, will help reinforce those routines. It can be especially helpful for children who are dual language learners to keep track of routines as they occur.

Past and Future – Encouraging Learning

Consider this example scenario to courage learning in an ELOF subdomain:

- Subdomain: Memory
- Past: You could describe a child needing help with the morning snack routine of washing hands, finding a seat, putting their plate in the dish bin, and then washing hands again. After a couple months, the child remembered all the steps of the routine on their own.
- Future: You could then consider how to help children learn the routine faster by:
  - Using visual aids to list the steps in the snack routine in pictures.
  - Reviewing the steps with the children each morning before snack time.
  - Announcing transitions during each step of the routine while referring to the visual representation.

Reflection Point

Pick one of two Cognition subdomains from the Head Start Early Learning Outcomes Framework:

- Exploration and Discovery
- Memory

Recall an experience with a child that demonstrates learning in that subdomain. Envision an experience in which you could encourage children's learning in that subdomain.

D – Reasoning and Problem-Solving

Reasoning and problem solving in infants and even toddlers may seem even more far-fetched than memory or discovery, but in fact, from birth to age 3, children are engaging in many reasoning and problem-solving activities.

For example, look at the photo here. The child appears to be trying to figure out how to wind up the tape measure. This activity includes a number of reasoning and problem-solving behaviors.

Increasing Strategies

Children learn to try a variety of problem-solving strategies and to begin planning solutions. For example, the child in the photo above might:

- Try to turn the knob different directions.
- Ask a nearby adult for help.
- Use a trial-and-error approach, such as trying to push the tape back in the slot or to pull it out further.

These are different problem-solving strategies that children may develop between birth and age 3, as described in the goals for Reasoning and Problem-Solving in the Head Start Early Learning Outcomes Framework. As children get older and the goals get more complex, they will build more problem-solving strategies to deal with new and more complicated problems that might arise.

Future Planning

Infants as young as 10 months even show signs of future planning. They do this in their motor movements.

One study found that if adults asked 10-month-olds to pick up a toy and throw it, the infants would approach the toy with their hand differently than if they were asked to pick up the same toy and fit it into a tube. This shows that by the time the infants were reaching for the toy, they were already planning their next action with that toy.

However, young infants are limited in their ability to plan future actions. As children get older, you can see their future planning and problem-solving change.

A second study took an interesting approach. Researchers presented infants with a spoon with which to eat, but they handed it to them from the wrong side. For example, if you are right-handed, it's easier to grab a spoon if someone hands it to you with the handle on your right-hand side. If someone hands it to you with the handle on the left-hand side, you have to first grab it with your left hand and then move the spoon around to orient it properly for gripping with your right hand.

This second study presented 9-, 14-, and 19-month-olds with the spoon handle on the wrong side and found some striking differences in how infants planned to grip the spoon.

Interactive: Corrections after Gripping Spoon

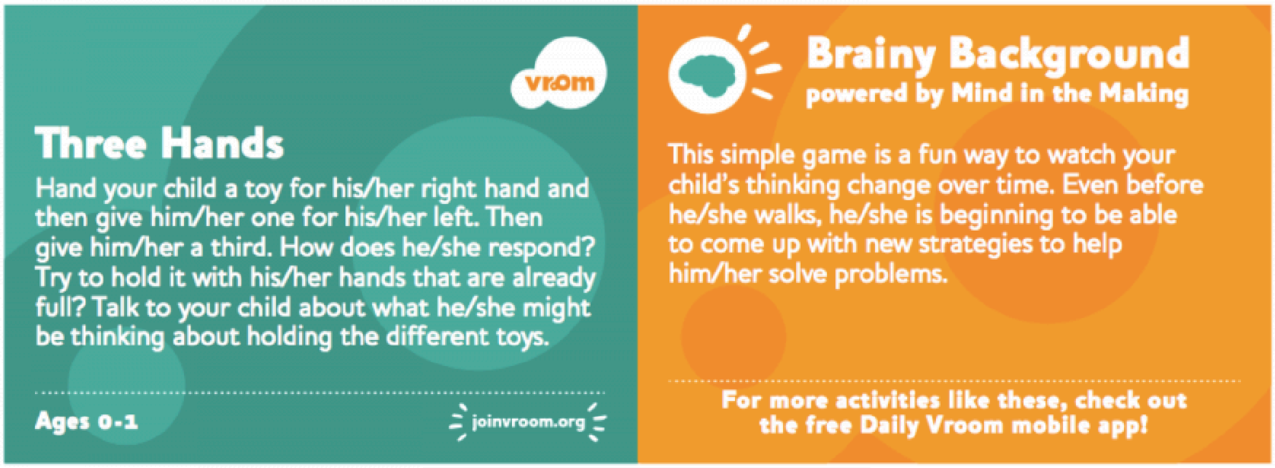
This is an interactive! Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=294#h5p-20

Vroom Tip

Check out this Vroom tip to get more ideas about how to help build children's cognitive development in the area of reasoning and problem-solving skills.

Does this tip make sense in the context of an early learning environment? If not, how might you adapt the activity to better fit that environment?



View text-only alternative of this Vroom card

Three Hands

Hand your child a toy for his/her right hand and then give him/her one for his/her left. Then give him/her a third. How does he/she respond? Try to hold it with his her hands that are already full? Talk to your child about what he/she might be thinking about holding the different toys.

Ages 0-1

Brainy Background powered by Mind in the Making

This simple game is a fun way to watch your child's thinking change over time. Even before he/she walks, he/she is beginning to be able to come up with new strategies to help him/her solve problems.

E – Emergent Mathematical Thinking

Development of Mathematical Thinking

The fourth Cognition subdomain is Emergent Mathematical Thinking. Math is important for any number of cognitive tasks, and the development of mathematical thinking begins much earlier than had been previously thought.

As early as 5 months of age, infants can represent very small numbers (*1* and *2*) and appear to understand at least the basic concept of increasing numbers of objects.

Interactive: Expectations about Numbers

This is an interactive! Use the slider to explore the infographic.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=294#h5p-22

This suggests that infants as young as 5 months have expectations about stability and number count for at least up to two objects. However, infants are limited in their number abilities. They did not notice anything surprising when they watched the same process with a *2 + 2* model, where two puppets were initially on stage then researchers placed two more behind the screen.

Developing Cognitive Skills

Mathematical thinking is not just about understanding numbers. The Emergent Mathematical Thinking subdomain also includes a number of other developing cognitive skills, such as:

- Understanding comparison of quantity, such as *more than* or *less than*.
- Solving puzzles, meaning a basic understanding of shape and size and of relationships between multiple shapes.
- Sorting, or understanding that objects (and even people) have attributes that both differ and overlap; noticing those similarities and differences; and using them to create sets of objects.

Understanding Small Numbers

Another study explored infants' mathematical thinking about small numbers using the math concept of quantity comparison, or judging more-than or less-than relationships.

Infants between 10 and 12 months watched someone place crackers in two different bowls. The number of crackers in each bowl differed. One always had more crackers than the other. Infants then could crawl to the bowl of crackers of their choice.

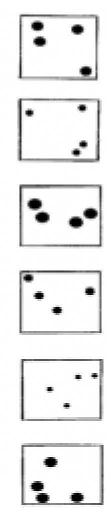
The study found that both 10- and 12-month-olds were good at choosing the bowl with the larger number of crackers when the amounts were relatively small, such as one versus two or two versus three.

When the numbers increased, for example three versus four or two versus four, both 10- and 12-month-olds didn't seem to notice any differences in quantity.

Larger Sets

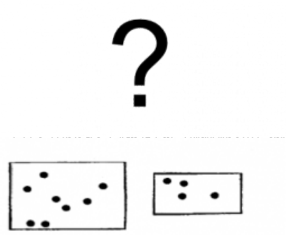
Although recognizing the number of a larger set objects, such as the difference between three and four crackers or two and four crackers, is challenging for infants, when the numbers get large enough, infants actually start to perform well again.

For example, 6-month-old infants first saw a number of different images of four dots until they got bored of seeing four dots. This is *habituation*, when an infant no longer reacts or is interested in something after multiple exposures to it.



(Xu, 2003)

At this point, researchers showed infants two images, one with four dots and one with eight dots. If infants were able to tell the difference in the number of dots, they should be interested in the eight-dot image and not the four-dot image. If they couldn't tell the difference, they should treat the two images the same.



(Xu, 2003)

Six-month-olds reliably looked to the new, eight-dot image, which means that they could tell the difference between those with eight dots and those with the familiar four dots.

They could even do this with eight and 16-dot images. However, they did not notice a difference when the number of dots between the images was too close together, such as when the researchers tried images with eight and 12 dots. Infants could tell the difference between large sets of objects as long as the two quantities were different enough from each other.

As you can see, while infants have limitations, they are already starting to perceive and react to differences in number and quantity. Conversing with infants and toddlers about quantity and number can enrich their cognitive development in this area. Even if an infant doesn't know how to say numbers yet, or even talk at all, they are still paying attention to number and quantity information.

Video: Everyday Fun with Measurement (3:00)

The Zero To Three video *Everyday Fun with Measurement: Let's Talk About Math* shows infants engaging in emergent mathematical thinking. The video shows children from birth to 5 years and focuses on older children in that age range during the last minute.

While you watch the video, think about these questions:

- What beginning measurement skills are young children developing?
- How are adults fostering their learning?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=294#oembed-1

Watch Everyday Fun with Measurement from ZEROTOTHREE on Vimeo.

Video Debrief

What did you notice that children were learning about? (click to toggle expand or collapse)

Possible Answer

You may respond that young children are learning about:

- Distance
- Comparisons, such as size and length
- Concepts like *full* and *empty*
- Non-standard and standard measuring tools

You may say that adults can help foster children's learning by:

- Using simple measurement words like *big, small, fast, slow*
- Playing games like *Fill and Dump*
- Encouraging sorting by size
- Helping cook and do household tasks

Demonstrating Math Skills

Other ways that children demonstrate their developing mathematical thinking between birth and age 3 is through their play with objects.

As they get older, they begin to notice more object attributes or features, usually starting with obvious ones like shape and color, and eventually develop a sense for nonobvious attributes, such as sound and texture or size and weight. Once children begin to notice these attributes, they also start to practice sorting objects based on them, creating sets of common objects and differing ones.

Similarly, children's ability to play with and solve puzzles also increases with their increased awareness of objects' attributes. Solving a puzzle requires noticing the respective shapes of two objects and considering whether they would fit together.

F – Imitation and Symbolic Representation and Play

Practicing Real-World Events and Actions

Through imitation, symbolic representation, and play, children learn about how the world works. They can practice real-world events and actions and use their knowledge to experiment directly on the world.

Copying What Adults Do

From birth, infants can and will try to copy the acts that they see adults performing. Children can imitate adults in many ways during their first year of life. Even newborns show some rudimentary form of imitation, imitating those actions that they are capable of re-enacting, such as sticking out their tongue. Children can also use vocal imitation to learn new words and sounds. As they get older, they can copy adult body movements and actions on objects.

Imitating Effective Actions

Children don't just imitate every action they notice. One study found that children are more likely to imitate actions that are always effective than ones that work only some of the time.

For example, 18-month-olds would be more likely to imitate an adult pushing a button to turn on a light if that action always results in the light turning on.

In the study, 18-month-olds watched an adult perform a task that either always worked or only worked some of the time.

- When it always worked, 75 percent of the children imitated the action.
- When it worked only sometimes, 31 percent imitated the action.

Symbolic Representation

Pretending that objects are something else is one way that children begin to develop their symbolic representation. Between ages 1 and 2, children start to pretend with objects. This is characteristic of *symbolic representation*. They use one object to stand in for or symbolically represent another object.

For example, the child in this picture is pretending to drive a train on blocks that are standing in for train tracks.

This kind of symbolic representation is important for later development of symbolic reasoning, which is important for many other developing skills, such as language and math.

Re-Enacting Daily Activities

Children during this time in development also will begin to use play to re-enact daily activities, such as feeding their doll or teddy bear.

Some children might even use this kind of play to act out stressful events. This helps them process those events and work through them in a safe environment. It also supports their social-emotional development and problem-solving skills.

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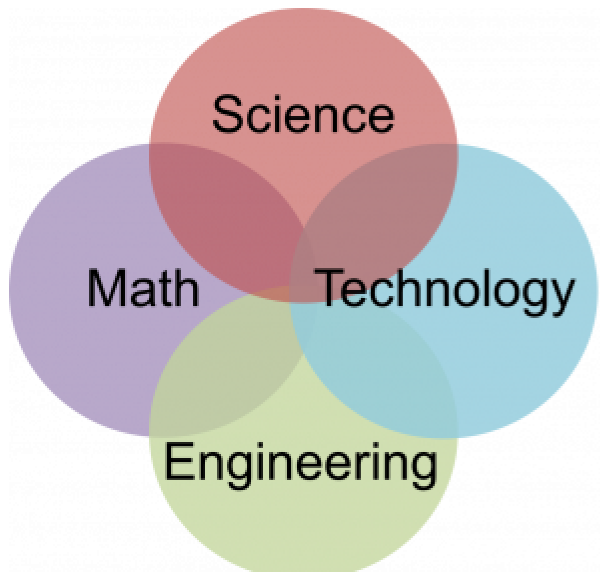
8-2 Early STEM Learning

A – STEM

STEM is an umbrella term, referring to a group of subjects: science, technology, engineering, and math. The term started with the National Science Foundation. A new version of this acronym, STEAM, also includes an A for the arts, but we will be focusing here on STEM.



The subjects in STEM have a common approach and focus. They all require gathering and using evidence to create knowledge or solve problems. This approach emphasizes exploring, asking questions, observing, and then acting on those observations. By asking guiding questions and providing space for exploration and discovery, educators can help foster STEM learning for all children.

Head Start Early Learning Outcomes Framework connections include:

- STEM topics touch multiple domains in the framework.
- The Approaches to Learning domain includes executive function skills that are crucial to STEM exploration, such as initiative and curiosity, creativity, and cognitive self-regulation.
- By using both language and non-verbal communication to express interest and talk about what they observe, children are using skills found in the Language and Communication domain.
- The Cognition domain is especially relevant to STEM skill-building. All of its subdomains have core STEM skills.

STEM Experts

All children are STEM experts. Observing the world, making predictions, doing experiments, creating, solving problems—these are all skills that children use to understand and operate in their world from a very young age. To learn, grow, and thrive, children have to be able to observe patterns in the world, run simple experiments, learn from the results, and develop creative solutions.

Imagine an infant crawling. The child is noticing the feel of the flooring on their hands, focusing on balancing their core as they move their arms and legs, and planning their trajectory across the floor.

STEM Skill-Building

Now imagine young children in the snow. In this picture, children are learning that snow can be slick and they can slide down a hill of it on top of a smooth object.

Children in snow may notice their feet sinking in. They may notice that if they drag their feet they can make two lines. They may try to catch snowflakes and touch them or take handfuls of fallen snow. They may notice temperature when they find out the air feels cold.

Practicing Key Skills

Image credits: EarlyEdU

Here a child is building with wooden blocks. They are beginning to understand concepts like geometry, spatial relationships, balance, and symmetry.

Look at the children concentrating on the ground. They are observing something there, practicing a key skill for science exploration.

Children naturally use STEM as a tool to understand the world. They observe, note patterns, experiment, and form theories. Children don't know they are doing it, and we may not always notice, but they are.

We'll now cover how development within the Cognition subdomains relates to STEM learning.

Video: Let's Talk about Stem: Everyday Fun with Science (4:19)

The video, *Let's Talk about Stem: Everyday Fun with Science,* shows children from birth to age 5 doing STEM activities during different stages of development. It also introduces some terms used later in the session. It is 4 minutes, 19 seconds long.

While you watch the video, consider the following questions:

- How are young children developing STEM skills?
- What are ways you can foster children's skills in these areas?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=296#oembed-1

Watch Let's Talk about Stem video from ZERO TO THREE on Vimeo

Video Debrief

How are children developing STEM skills? (click to toggle expand or collapse)

Possible Answer

You may consider that young children are developing STEM skills by:

- Making predictions
- Testing hypotheses
- Repeating tests
- Observing
- Exploring
- Testing cause and effect
- Explaining their thinking

And educators can foster these skills by:

- Letting the child lead the activity and follow their interests
- Asking open-ended questions
- Describing what the child is doing and discovering
- Making observations
- Pointing out patterns

B – STEM and Cognition

Science

Image credits: EarlyEdU

Children (and scientists) try to figure out just how the world works by engaging in a series of steps called the *scientific method.* The scientific method includes observing, forming questions, making predictions, designing and carrying out experiments, and discussing.

Children find patterns and build theories to explain what they see and collect *data* to test those theories. Toddlers make footprints by walking through a puddle. They may form a theory, based on their observation of their footprints, that the way they walk changes the size and shape of the prints. They then test their theory by hopping on one foot or walking on their toes to see if the prints change.

Science is about asking questions and trying to figure out how things work. You don't need microscopes or test tubes to do science. Exploring, making observations, asking questions, developing predictions, and discussing the results are key science skills that will set the foundation for a lifetime of exploration and discovery.

Science in the Cognition Domain

Since science is all about inquiry, any of children's developing skills that help them gather more information are going to be important for science learning.

At least two subdomains of the Cognition domain in the Head Start Early Learning Outcomes Framework are particularly relevant to science:

- Exploration and Discovery
- Memory

Exploration and Discovery is all about inquiry. It is about exploring the world, asking questions, forming answers, and then testing those answers to see if you need to make modifications. This is essentially the scientific method. And it comes naturally to children.

The other subdomain that is particularly relevant is Memory. As we covered earlier, the Memory subdomain includes children's developing ability to remember whether they have seen or heard something before and to notice changes in familiar objects or scenes. These skills are critical to the observation part of science. To come up with theories about the world, you first have to be able to observe the world and remember what you have seen. To update your theories at a later point, you need to remember what you saw before and notice how things might be different now.

Understanding how children's cognitive development connects to learning in different STEM areas helps educators to develop effective learning activities.

Technology

Children today grow up with technology all around them. Many children are familiar with digital technology, such as cell phones and tablets. Yet, these technologies don't allow children to see the underlying cause and effect.

Some of the most important technology is simple, such as pulleys, wheels, levers, scissors, and ramps. These are the technologies of play.

These simpler technologies allow children to understand how tools help us accomplish tasks. Children can see causes and effects. One example is that adding wheels below a large object makes it easier to move.

Technology in the Cognition Domain

Multiple areas of the Cognition domain are relevant to technology, including:

- The Exploration and Discovery subdomain includes object exploration, which leads children to discover object properties and is necessary for discovering how to both use tools effectively and to choose the most appropriate tool for a task.
- The Reasoning and Problem-Solving subdomain explicitly includes the development of tool-use as a problem-solving strategy. This is one of the goals of development during this period.
- Emergent Mathematical Thinking includes the development of spatial awareness, which also applies to understanding how a tool can work to help complete a task. If you don't know that to get something out of reach, you need an object long enough to reach it, you are going to have a very hard time finding the right tool for the task.

Some of the materials that children use as they explore technology include scissors and zippers, light switches and flashlights, computers and tablets, phones and batteries, wheels and gears, robots, cameras, and even paper airplanes.

Engineering

Engineering is about applying science, math, and technology to solve problems. It consists of designing and building.

When children design and build block structures or railroad tracks, they are acting as engineers. When they construct a fort of snow, pillows, or cardboard, they are solving structural problems like engineers. When they figure out how to pile sticks and rocks to block a stream of water or how objects fit together, they are engineering.

Learning about the characteristics of building materials, like mud and sand, also relates to engineering.

Engineering in the Cognition Domain

At least three areas of the Cognition domain are relevant to engineering:

- Memory
- Reasoning and Problem-Solving
- Emergent Mathematical Thinking

The Memory subdomain includes the development of memory for routines or multi-step processes. This is important for planning future actions, which is necessary for engineering. To build things effectively, it is best to plan what you are going to do before you build.

The Reasoning And Problem-Solving subdomain specifically includes the development of planning solutions to problems. Problems are always arising in engineering tasks and being able to examine a problem and plan a solution is very important to success on engineering tasks.

The Emergent Mathematical Thinking subdomain includes spatial awareness, which is not only important for tool-use and choice but also for figuring out how to engineer or build those tools in the first place. Spatial knowledge is important for many areas of cognitive development.

Math

Any time a child compares amounts (more, less) or sizes (big, little), notices a sequence, plays hopscotch, estimates a distance, or counts, that child is using math.

A child may say: “She has more than I do!” or “That’s too big to fit!” or “1…2…3…go!” That child is using math.

Infants and toddlers learn early math concepts like geometry and spatial relationships when they explore new objects with their hands and mouths. Adults can support math learning with the language they use. Words like *over* and *under* or *in* and *out* teach spatial concepts.

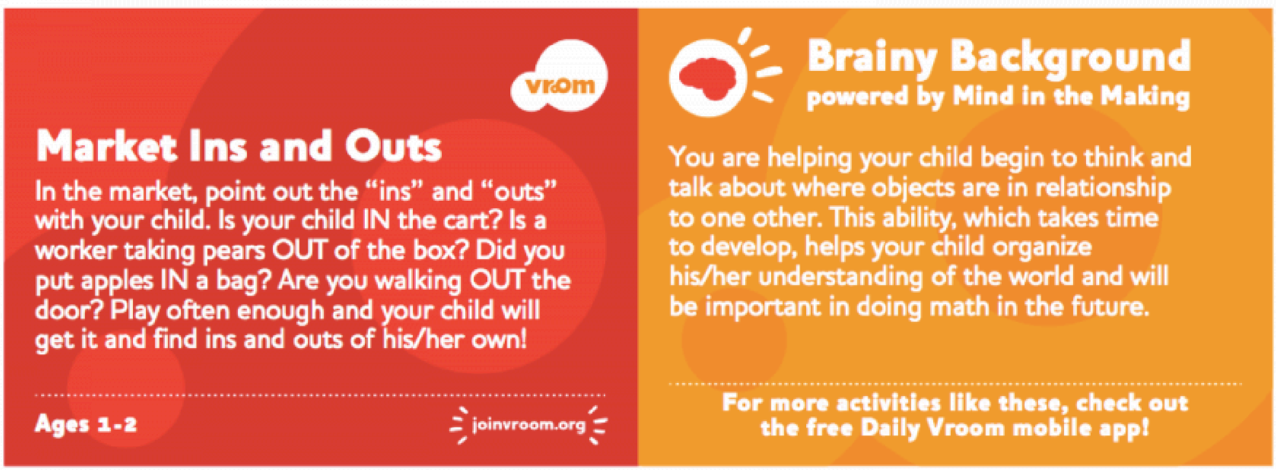
Math in the Cognition Domain

The primary area of the Cognition domain that is relevant to math learning is Emergent Mathematical Thinking.

Vroom Tip

Check out this Vroom tip to get more ideas about how to help build children's early math skills.

Does this tip make sense in the context of an early learning environment? If not, how might you adapt the activity to better fit that environment?



View text-only alternative of this Vroom card

Market Ins and Outs

In the market, point out the "ins" and "outs" with your child. Is your child IN the cart? Is a worker taking pears OUT of the box? Did you put apples IN a bag? Are you walking OUT the door? Play often enough and your child will get it and find ins and out of his/her own!

Ages 1-2

Brainy Background powered by Mind in the Making

You are helping your child begin to think and talk about where objects are in relationship to one another. This ability, which takes time to develop, helps your child organize his/her understanding of the world and will be important in doing math in the future.

References

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8-3 Supporting Early Cognitive Development

A – Early Cognitive Development

There are many ways to support young children's early cognitive development. In this section of the session, we focus on supports in three main areas:

- Designing learning environments (materials, spaces, tools)
- Providing social support (positive and responsive interactions and modeling)
- Planning learning experiences (interactive, theme-based activities)

Image credits: EarlyEdU

Learning Environment: Materials

In thinking about materials to support science learning, consider materials that are:

- Open-ended, meaning they can be used in multiple ways and allow for creativity, investigation, and problem solving.
- Varied in size, shape, and texture.
- Relevant to the children's interests.

Learning Environment: Nature

The outdoors is one example of an optimum learning environment to support early cognitive development. Nature provides one of the best environments for children's spontaneous exploration, play, and learning. A park, a field, a yard—any outdoor space is beneficial.

Direct experience with the natural world provides opportunities for problem solving and observation. The outdoors provides a wide variety of sensory experiences. Children can observe different textures, smells, and sounds. They can compare living and non-living things. This encourages informal learning as children explore and make discoveries.

The diverse materials found outdoors also facilitate imaginative play. Children can use plants, stones, and sticks to count, build, and create. Even in urban environments, outdoor play brings children into contact with nature. Children can feel the wind and watch how it moves objects like leaves or paper. They can see changes created by sunlight coming into contact with surfaces. They can experiment with shadows and reflections. They can describe and draw or count the kinds of clouds they see.

B – Socially Supporting Development

Children construct knowledge through social interactions with peers and adults. Socially supporting children's development requires using our observations about what children say and do to learn about their interests and current understandings.

When we operate from this perspective, educators and children become scientists together in a process of collaborative inquiry:

- Expressing curiosity
- Asking questions
- Exploring and investigating
- Sharing ideas

Social Support: Scaffolding

Image credits: EarlyEdU

Adults play a fundamental role in guiding children's STEM learning. Educators may add new information or facts that children may not know and ask additional questions that children may explore.

By observing what children are doing and then asking questions and working with them as they puzzle through their own understanding of the world, adults can, in a sense, walk them through increasingly complex ways of thinking.

Scaffolding is a term that describes techniques adults can use to support and help children in their learning. Scaffolding is offering the right level of learning support to take a child's knowledge to the next level. Just as a scaffold supports construction of a building, adults can scaffold a child's experience as they are learning.

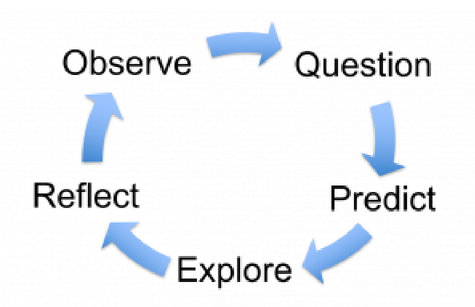
To scaffold an experience, adults can assist children by cuing, prompting, questioning, modeling, discussing, and explaining when children indicate they need this support. Using these tools, adults can stretch children's learning to a new level.

An adult can ask a child what they are doing and help them express their observations. Adults can also answer questions about what a child is encountering, define terms, and provide missing information.

Scaffolding is a balance. If we don't offer enough help, the child can struggle, become frustrated, and give up. But if we offer too much help, the child misses an opportunity to stretch their learning. To find the just-right spot, we have to pay attention to what the child is doing and, in older children, to help them talk about it or think aloud.

A little adult guidance can help young children reinforce their knowledge, correct misconceptions, and extend their thinking to figure out even more than they manage to learn on their own.

Social Support: Guiding Exploration



One way to scaffold learning is to ask open-ended questions that can guide a child's exploration. This can be useful for children of all ages—even infants can give non-verbal responses.

Adults can engage children in reflection through the process of asking questions, investigating, and constructing explanations.

Start by observing or noting something that is happening. Ask a question about how things will change in the future; Predict what that change might be. Explore the effect it had, and then reflect on what was learned.

Another benefit of scaffolding is that by actively observing individual children, we can assess their understanding of concepts.

Children who are dual language learners, for instance, may understand the concepts we are working on, but they may need assistance developing the English vocabulary to discuss their understandings. Allowing children to speak in the languages that are most comfortable to them is important in fostering curiosity and questioning.

Vide: Making Gak (0:51)

In this video, *Making Gak*, the same scaffolding approaches are helpful for younger children even though these children are preschool age.

As you watch, think about how the educator scaffolds the children's learning. Notice the language the educator uses, the questions they ask, and when they ask them.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=298#video-298-1

Video Debrief

How did the educator scaffold the children's play to support exploration and discovery? (click to toggle expand or collapse)

Possible answers are:

- The educator prompted children to observe what was happening. After adding more water, the educator cued the children to touch the substance and describe how it felt and asked them to keep stirring.
- The educator used questioning to invite children to make predictions. For example, the educator asked, "What happens when I add more water?"
- The educator modeled scientific language by using the word *predictions*.
- The educator discussed the children's predictions. After acknowledging the children's predictions, the educator asked, "Is it blowing up, or is it becoming foamy?"

> Using these tools, the educator stretched the children's learning to a new level.

Social Support: Questioning Mind

Another way to support cognitive development through social interactions is to model a *questioning mind*. A questioning mind is as simple as it sounds. As an educator, you can model questioning the world around you. Children will see and hear you questioning things and will want to try it out on their own.

You can ask questions, such as:

- "What happened here?"
- "I wonder what this is."
- "I wonder if other balls of the same color also bounce."

Learning to inquire is most successfully modeled when educators truly do not know the answer, do not have a preconceived answer in mind, or are clearly surprised by the results of the investigation. It is also helpful when educators are personally curious about the subjects of their inquiries.

As we discussed earlier about imitating actions, infants and toddlers are just as excited about imitating adult's vocalizations and eventually language.

Remember that even preverbal infants can question the world around them by pointing and looking to an adult or by directing their attention to different objects and areas of interest.

C – Planning Learning Experiences

Open-Ended Opportunities for Exploration

Combining what we have learned about designing learning environments and providing social support for early cognitive development, we can consider how those two ideas intersect when planning learning experiences for children.

Two key themes emerge about learning experiences that support cognitive development. They should be:

- Open-ended opportunities for exploration. Children will naturally want to investigate if they have the opportunity.
- Based on a collaborative inquiry process where you and the child are scientific part-

ners in the investigation of the world.

Scaffolding + Environment

One example of toddlers' desire to investigate, if given the chance, comes from a study in which researchers showed 2- to 4-year-old children a set of nested cups during a free-play session. The researchers never showed the children *how* to put the cups together on their own and told them that they could play in any way they wanted. The researchers never directed the children to nest the cups.

Image credits: EarlyEdU

When the toddlers had an open-ended playtime with the cups, they spontaneously began to nest the cups on their own, designing different strategies along the way to correct mistakes and to reach goals.

One way to engage children is to present them with an interesting end-state (e.g., the nested cups) and see how they problem-solve from a different starting state (e.g., the array of cups) to get to the end-state on their own. This is also a key time to employ scaffolding techniques by first observing what the child is doing and then asking questions to scaffold their learning.

For example, if a child is trying to use brute force to make a larger cup fit into a smaller one, you could use the emerging mathematical language of quantity comparison to ask, "Hmm… they don't fit. Is one cup larger than the other? Which one?"

Adults play an important role in arranging this environment to make sure it is conducive for STEM explorations. Educators can support STEM-skill development by providing opportunities to play with open-ended toys like building materials, art materials, shakers or other music-making objects, vehicle and character sets, and sensory and nature stations.

Learning Experiences

Theme-based activities are an excellent way to engage and promote infant and toddlers' natural motivation to explore and investigate.

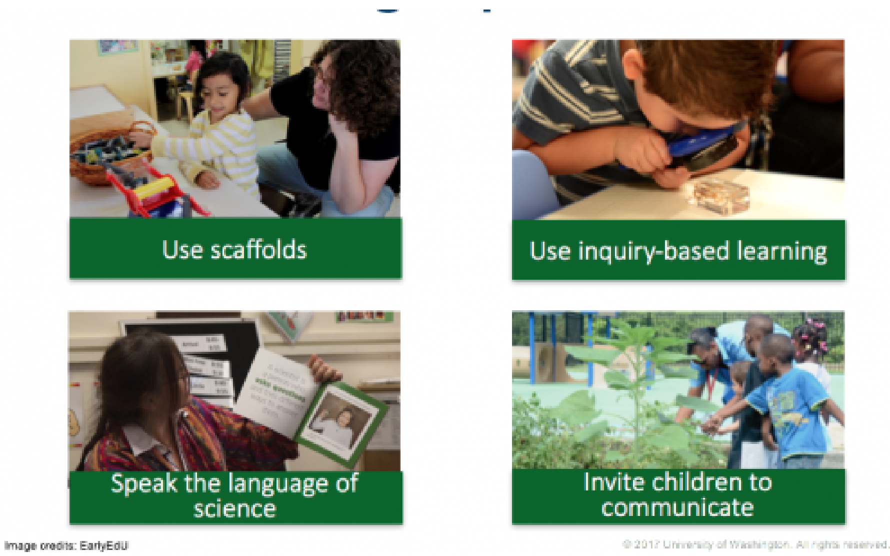
You can use one theme to explore many different ideas. For example, a trip to the garden center can be expanded in many ways—you can read books about flowers; observe the different sizes, shapes, and colors of seeds; discuss changes in the seasons; and give children garden props to make their own pretend (or real, depending on available space) gardens.

Here are some examples taken from an Office of Head Start material called *A Family Note on Finding the Math*. The theme of these activities is building emergent mathematical thinking skills at the park:

- You can use and identify spatial relationships by pointing out different observations.
- With older toddlers, you can ask them to provide their own observations, such as:
    - — "The squirrel is on the tree branch."
    - — "The roots of the tree are under the ground."
- You can use and identify number terms and quantity comparisons like:
    - — "Does this tree have more flowers than the other one?"
    - — "How many petals do the flowers on this tree have? Let's count!"
- You can collect stones, petals, leaves, and twigs and create repeating patterns with them to support pattern recognition.
- You can point out different shapes and sizes of trees, play structures, leaves, etc.
- If eating a snack at the park, you can count out crackers or pieces of fruit or ask the children to pick which bowl has more or less crackers in it. Another idea is to make shapes out of the food items on the plate before eating them.
- For infants, you could make shapes on plates and describe each before serving and eating: "Here is a circle made of strawberries. Let's see how many strawberries are in the circle. Let's count them—*1*, 2, *3*…"
- For younger toddlers, you could make shapes on plates, talk about each, and see if children can recognize them: "Which one is the circle? Let's eat the fruit in the shape of circle first. Can you find that plate? Let's count how many plates we have."
- For older toddlers, you could start to ask them to make the shapes on their own. You could either show them the finished product and ask them to reproduce it or see if they can do it on their own. Or, you could draw on the plate to give them a structure to follow.
- You could then follow up by asking them to find shapes in the park.

There are countless options and combinations for activities.

Learning Activities



Warm, nurturing, and effective interactions lay the foundation for children's discoveries and create opportunities for them to share their findings. Interactions with peers and adults encourage the development of scientific knowledge in addition to cognitive skills.

You can use all the support methods in your learning experiences:

- Use scaffolding to encourage exploration in new directions or to provide new information to update children's developing theories of the world.
- Use inquiry-based learning strategies where the educator and the child are both scientists asking questions and investigating the world together to make new discoveries.
- Speak the language of science, such as:
    - *More than* or *less than*
    - "Let's test that. Did that cause something to happen?"

Even with preverbal infants, the more exposure, the faster their learning of those terms will be later.

- Invite children to communicate their observations, their questions, and their discoveries. Ask them:
    - "What do you see?"
    - "What did you find?"

Reflection Point

What are three ways to encourage children's exploration of the world?

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9: Cognitive Development: Ages 3 to 5

In this lesson:

9-1 Mathematics Development

In this section, we cover the domain of Mathematics Development.

9-2 Scientific Reasoning

In this section, we cover the preschool Scientific Reasoning domain in the Head Start Early Learning Outcomes Framework.

9-3 Supporting Preschool Cognitive Development

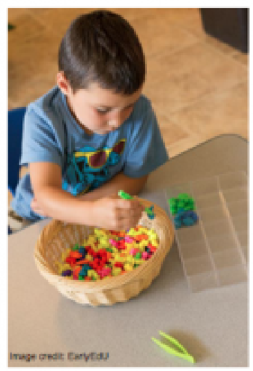
In this section, we cover ways that adults can support children's cognitive development in preschool, including a description of preschool STEM learning and how these subjects relate to the Head Start Early Learning Outcomes Framework Cognition domains of Mathematics Development and Scientific Reasoning.

9-1 Mathematics Development

A – Math and Science During Play

One way that children learn about the world is by exploring and experimenting during play. Exploration and hands-on learning naturally involves many cognitive skills.

In fact, one study found that during unstructured free play, 4- to 6-year-old children spent about half of their time engaged in some form of math or science-related activities. This was true regardless of gender or ethnicity.



Math Areas	Percentage of Time Spent in Free Play
Patterns, shapes	25
Comparing size	13
Counting	12
Spatial relationships	5
Classification	2

(Ginsburg, Pappas, & Seo, 2001)

Looking at the time spent on math and science activities, children spent about:

- 25 percent examining pattern and shapes
- 13 percent comparing sizes and amounts
- 12 percent counting
- 5 percent on spatial relations, such as the position, direction, or distance of objects relative to each other
- 2 percent on classification

These activities are all part of the Mathematics Development domain, and they demonstrate how much math is a part of children's (and adults') daily lives.

Children's play involved math, language, and thinking, even though math was not the primary focus of their play.

Children talked about things like "How much is *a lot*?" and "How little is *little*?" They often used their bodies to show size. They might, for instance, stretch their arms wide to show how big a pumpkin is or hold fingers close together to show that something was *a little bit scary*.

B – Counting and Cardinality

First Mathematics Development Subdomain

One of the four Mathematics Development subdomains is Counting and Cardinality.

As we covered in the previous lesson on early cognitive development, prior to 3 years of age, children have already begun to develop their skills in numbers, quantity comparison, spatial awareness, and sorting. From 3 to 5 years old, children use those foundational skills to build understanding about relations, patterns, and combinations of numbers.

The Counting and Cardinality subdomain encompasses many skills.

Counting includes:

- Knowing the names of numbers and how to write the numbers themselves
- Knowing the counting sequence and understanding the one-to-one object-number correspondence

Cardinality is understanding that the last number word of an array of counted items has a special meaning. It represents the set as a whole and the quantity of this set of items. This includes:

- Understanding the relationship between number and quantity
- Being able to recognize the number of a small set of objects without counting
- Making number comparisons

Performance on Cardinality Tasks

Between ages 3 and 5, children develop significant skills in mathematics.

But how do children get from small-number recognition and large-quantity comparisons to writing, counting, and understanding the number-quantity relationship, sometimes called *cardinality*?

Scientists studied this by asking 2-and-a-half- to 3-and-a-half-year-old children to give a puppet a specific number of toy dinosaurs.

Interactive: Cardinal Tasks

This is an interactive! Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=300#h5p-23

Interestingly, all children were also tested for their ability to count, and all children could accurately count up to four or five objects. So even though these children could count to four or five, they had not figured out the relationship between counting numbers and measuring quantities, what is called the concept of *cardinality*.

Scientists think that children develop the concept of cardinality for one object first, then two objects, then three objects. Then they expand this to any number of objects.

Understanding Cardinality

In a separate task, the children from this study were also asked to help a puppet find out how many toys they had. This is different from simply counting toys because children have to understand the concept of *cardinality*–that the last number in a counting sequence is also the number for the quantity of objects just counted—to answer the question: “How many?”

What scientists found was that the children who grabbed in the dinosaur toy task did not understand this concept.

However, there were a few children who had not grabbed in the dinosaur task and had instead, counted the toy dinosaurs before giving them to the puppet. All these children were 3-and-a-half-year-olds. The children who had counted understood the concept of cardinality.

What this means is that when children figure out the concept of cardinality, they begin to apply it in their daily lives when asked for a specific number of objects or when asked to figure out how many objects they have.

It also suggests that children don’t begin to understand the concept of cardinality until around 3-and-a-half years of age.

Vroom Tip

Check out this Vroom tip to get more ideas about how to help build children’s cognitive development in the area of reasoning and problem-solving skills.

View text-only alternative of this Vroom card

Bite Sized

Use mealtime to talk about what's on your plates. After you've cut up both your child's food and yours, take a bite and count how many pieces you have left. have your child then take a bite and count what's left. Take turns back and forth until you are full!

Ages 3-4

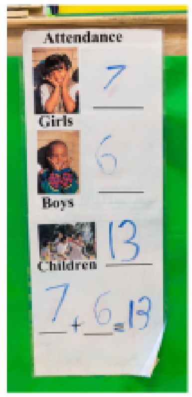
Brainy Background powered by Mind in the Making

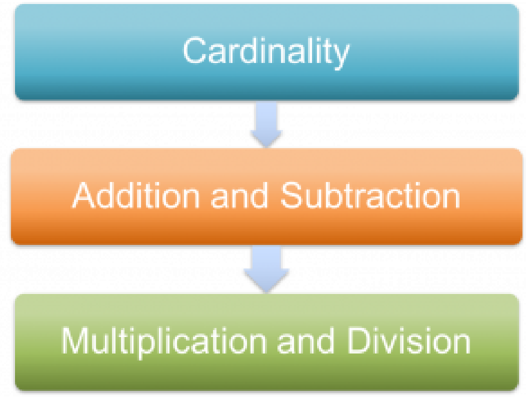
Back and forth conversations about what you are doing spark new connections in your child's growing brain. Counting the pieces on your plate as you eat them helps him/her learn about counting while having fun.

Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?

C – Operations and Algebraic Thinking

Second Mathematics Development Subdomain





The second Mathematics Development subdomain is Operations and Algebraic Thinking.

This includes the development of reasoning about patterns and arithmetic skills, such as being able to solve the mathematical operations of addition and subtraction.

It is widely understood that the development of arithmetic skills starts about the age of 3 and that it correlates with children's understanding of cardinality.

In addition, children's development of arithmetic skills follows this pattern:

- Cardinality develops.
- Addition leads to an understanding of subtraction.
- Knowledge of addition and subtraction aids in the understanding of multiplication. (For example, *2 x 3* means adding 2 to itself three times).
- Understanding multiplication contributes to knowledge of division.

Video: Let's Talk About Math: Everyday Fun with Addition and Subtraction: **(3:00)**

This video, *Let's Talk About Math: Everyday Fun with Addition and Subtraction*, shows children, birth to age 5, engaged in math-related activities that illustrate math development. This video is 3-minutes long.

Note that this video includes infants and toddlers and overlaps with content from the previous session.

While viewing the video, think about the following questions:

- How do young children develop math skills, particularly those related to addition and subtraction?
- How can adults foster these skills?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=300#oembed-1

Watch Everyday Fun with Addition and Subtraction from ZEROTOTHREE on Vimeo.

Video Debrief

How do young children develop math skills related to addition and subtraction?

(click to toggle expand or collapse)

Possible Answers

- Number and math concepts, such as adding and subtracting, when they are exploring groups of objects.
- Quantity and one-to-one correspondence by doing everyday activities, such as counting the number of sprays when they use a squirt bottle to clean the table.
- The concept of *one more* through routines like snack time.
- Addition and subtraction through talking, singing, and reading books together with adults.
- Objects missing from the group, such as muffin containers where some holes don't have muffins.
- The order of numbers.

How can adults foster these math skills?(click to toggle expand or collapse)

Possible Answers

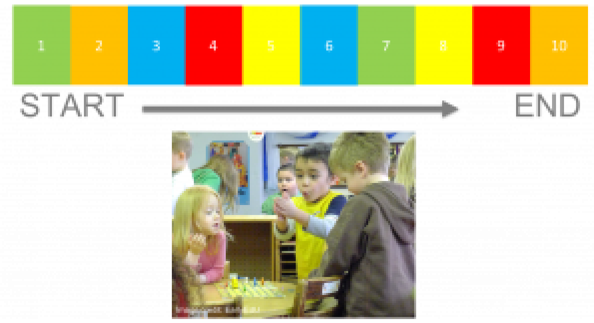
- Counting aloud small sets, such as four pieces of mail, even before children can do so.
- Pointing out differences in quantity as they play and talk with children.
- Using math language like *plus* and *taking away*.

Understanding Quantity

Researchers have found that learning arithmetic (addition and subtraction) and children's understanding of quantity is so connected that improving children's understanding of quantity can help them learn arithmetic later.

Scientists showed this by designing a simplified version of the board game *Chutes and Ladders* to improve preschool children's understanding of cardinality.

In the experimental board game (called *The Great Race*), 4- and 5-year-old children spun a spinner with a *1* and a *2* on it. If the spinner landed on the *1*, children advanced one space. If it landed on the *2*, they advanced two spaces. The experimenter played this game with children one-on-one for four 15- to 20-minute sessions during a 2-week period.



Children were tested for various arithmetic skills, including *magnitude comparison*, comparing which of two numbers is larger or smaller, and addition problems.

Magnitude comparison was measured by asking children to compare two numbers on a page—for example, *1* on the left versus *6* on the right. The experimenter asked the children, "Jane has one cookie, Sarah has six. Which one is more—one cookie or six cookies?"

Children were also tested with some simple addition problems, such as *2* + *1* and *2* + *3*.

Scientists found that children who played the number board game performed better on the arithmetic skills tests than children who played a similar game based on colors or who had participated in other number learning activities, such as object-counting tasks.

Social Benefits

Some may find it surprising that improving children's understanding of cardinality can also benefit them socially. Understanding cardinality and mathematical skills, in general, has been found to be related to children's ability to share.

For example, 3- to 5-year-old children were asked to share blocks equally between two dolls. The trick was that there were single, double, and triple blocks, but the goal was for the child to make sure that both dolls had the same total number of blocks.

If the child gave a double block to one recipient, they would have to give two single blocks to the other to ensure that they had equal amounts.

Four-year-olds struggled greatly with this task, often treating the double blocks as if they were equivalent to the single blocks, even when they were able to count the total number of blocks accurately.

In contrast, 5-year-olds were much more successful on this task.

Reasoning about Patterns

Reasoning about patterns is also an important part of the subdomain Operations and Algebraic thinking.

The development of pattern-creation and pattern-completion skills is a sign of children's growing ability to think more abstractly and flexibly about the world around them.

Before 5 years of age, children develop simple rules for completing patterns, such as: *Match the color of the fifth item*.

They struggle with patterns that require noting the relationships between multiple items, such as *triangle first, then circle, then square.*

Also, after sorting objects based on one attribute, such as color, 3- to 4-year-olds have a difficult time re-sorting the same objects based on a different attribute, such as size.

Practicing these kinds of games in the early learning setting or at home will help children build their abstract reasoning skills.

D – Measurement

Third Mathematics Development Subdomain

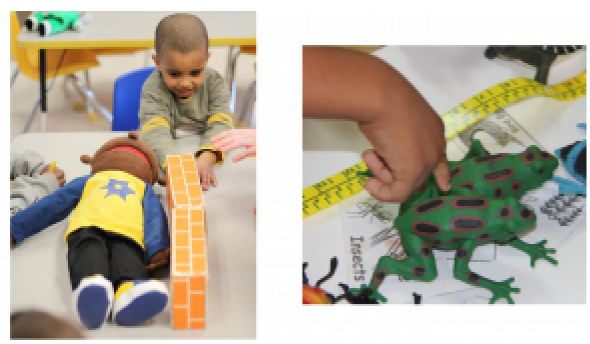


Image credits: EarlyEdU

The third Mathematics Development subdomain is Measurement.

Measurement may seem like a fairly basic skill, but it requires some fairly sophisticated understanding.

It requires the measurer to realize that a measurement is only useful if it is done using a single unit of measure.

For example, measuring the height of a block tower with a teddy bear, two blocks, and a ball is not very useful. But measuring the height with four matching balls is much more useful for replicating the measurement and making comparisons.

Measuring also requires the knowledge that if you want to compare the measurements of two objects, you should use the same measures for each.

For example, if you want to compare the height of your block tower to the height of your friend's block tower, measuring one in *number of teddy bears* and the other in *number of blocks* will make the comparison difficult.

Measuring Continuous Substances

In particular, children have difficulty with what scientists call *continuous substances*. Continuous substances don't have automatic units of measure that are easy to identify or count. For example, sand is a continuous substance. You can put it in cups and count the number of cups or weigh it on a scale, but it's not like counting blocks.

Scientists have shown that the ability to measure continuous substances develops between the ages of 3 and 5 years.

Scientists demonstrated this by presenting preschool children with one box with three cups containing 3 ounces of sand each and another box with two cups containing 3 ounces of sand each.

They would then ask the children to identify the larger quantity in two different comparisons, using these questions:

- Which box had more cups?
- Which box had more sand?

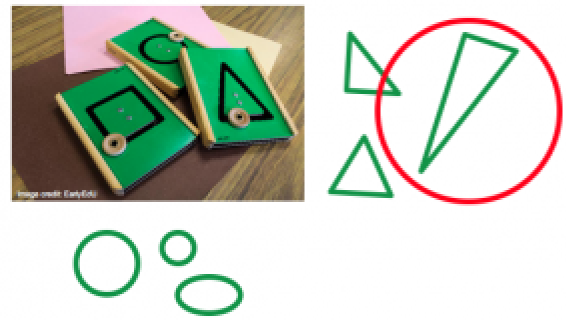
Younger preschool children had a hard time with the *more sand* comparison; they got it wrong more often than they got the cups comparison wrong. Older preschool children were able to do both comparisons.

This suggests that younger children were disregarding the use of the cups as a unit of measure for the sand.

Giving young children practice with units of continuous substances and guiding them through the quantity comparisons can help them develop quantity comparison skills with continuous substances.

E – Geometry and Spatial Sense

Fourth Mathematical Development Subdomain



The subdomain of Geometry and Spatial Sense includes the ability to recognize, build, and sort shapes.

From 3 to 5 years of age, children develop the skills necessary to recognize atypical examples of shapes. The development of these skills varies considerably between children and usually occurs first for shapes that retain their appearance despite changes in their size and orientation.

Many parents and some educators begin shape instruction in early infancy with board books and other materials. Children begin to identify shapes at a fairly young age as well. However, geometry and spatial reasoning of this kind is more than standard shape recognition.

Younger children base many of their shape judgments on visual characteristics, rather than the geometric properties. Often, children rely on a shape's orientation in the space. Also, children will often recognize standard shapes but not atypical ones, such as the triangle circled in red on this slide; children's ability to recognize atypical shapes as part of a specific shape category varies from shape to shape.

Scientists have found that shapes that retain their general shape (e.g., circles or rectangles) despite their size or orientation are easier for children to learn accurately, regardless of the complexity of their geometric properties.

Shapes like triangles can be much more difficult to recognize when they are not in their standard form.

Interactive: Social Support

This is an interactive! Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=300#h5p-42

Reflection Point

Use these questions to review the material from this section:

- What is the concept of cardinality?
- What is the developmental progression of cardinality? How and when do children learn the concept of cardinality?
- How do children initially learn to recognize shapes, and how does shape recognition change as they get older?

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9-2 Scientific Reasoning

A – Scientists and Children

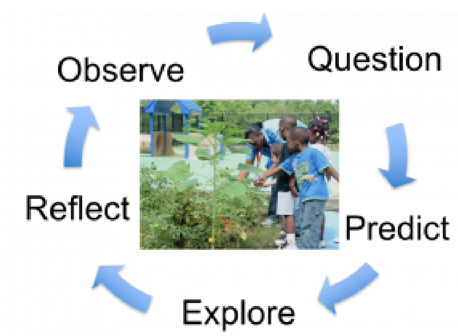
In many ways, scientists and children share the same job. They both are trying to figure out, to the best of their ability, just how the world works.

Scientists learn about the world by looking for patterns, asking questions, and doing experiments. They learn from their results and other scientists.

Image credits: EarlyEdU

Children, like scientists, learn from others. They watch what others are doing and learn from watching the results, asking questions, and figuring out how others respond to their actions.

Scientific Process



The scientific process has at least five parts:

- Observing the world through your senses
- Questioning why things are the way they are or how they work
- Predicting what will happen based on your theories of how the world works
- Exploring the world to either confirm or negate your predictions
- Reflecting on one's findings to update or strengthen your theories

The Scientific Reasoning domain includes these five components across its two subdomains.

- The Scientific Inquiry subdomain includes observation and exploration.

- The Reasoning and Problem-Solving subdomain includes questioning, predicting, and reflecting, along with exploration through planned investigations.

Video: Salt Melts Ice (1:00)

In this video, Salt Melts Ice, we'll see an educator guiding an experiment where children are using salt to melt ice. It is 1-minute long.

While watching the video, consider the following questions:

- What questions did the educator ask the children to encourage scientific inquiry?
- How did the educator guide children to notice similarities and differences?
- How did the educator encourage children to describe their observations?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=302#video-302-1

Video Debrief

What questions did the educator ask the children to encourage scientific inquiry? (click to toggle expand or collapse)

Possible Answer

The educator asked:

— "What did you find out?"

— "What happened?"

— "Anything different?"

How did the educator guide children to notice similarities and differences? (click to toggle expand or collapse)

Possible Answer

The educator asked each child their opinion about whether one salt was different than the other.

How did the educator encourage children to describe their observations? (click to toggle expand or collapse)

Possible Answer

> The educator modeled the use of different adjectives and asked each child for responses directly.

B – Scientific Inquiry

Cognitive Tools

The subdomain Scientific Inquiry focuses on the development of children's *cognitive tools* for observation and exploration.

These cognitive tools are children's senses, such as vision, touch, taste, hearing, and smell, and their ability to describe their observations.

Tools include devices that help to extend the senses, such as binoculars or microscopes to enhance visual observations, or tools like microphones that allow us to amplify sound.

Children's developing ability to describe their observations includes their growing use of adjectives and scientific talk to describe observations and inquiry processes.

Note that as children's senses develop (for example, as their vision improves), they experience development in other areas, such as cognition, because they can see more of what is happening. In other words, growth in one area impacts development in other areas.

Using Adjectives

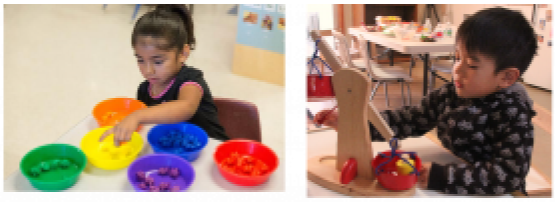
One way that children describe their observations of the world is through the use of adjectives.

By age 3, most children have a large repertoire of adjectives, but how they apply those adjectives can vary widely.

For example, researchers have found that 4-year-olds, but not 3-year-olds, can map new adjectives they hear onto new objects regardless of what kind of object it is. For example, if someone refers to a bumpy rhinoceros as a *blickish* rhinoceros and then asks for the *blickish* horse, 4-year-olds, but not 3-year-olds, would give them the bumpy horse.

Three-year-olds, on the other hand, *can* extend the new adjective between the same kinds of objects, for example, from a bumpy yellow horse to a bumpy purple horse.

Observing Attributes



Sorting by a **visible** object attribute (color)

Sorting by an **invisible** object attribute (weight)

Another component of scientific inquiry is the use of observed attributes for categorization of objects. For example, children may match socks by color, design, or length.

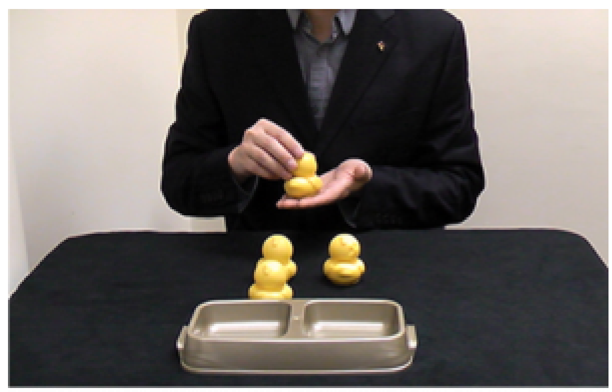
While infants and toddlers sort objects using more obvious attributes, such as shape and color, older children begin to sort objects by less obvious attributes, such as sound, smell, texture, and function. These types of attributes require the development of more discerning cognitive tools for observation.

For example, you can see that the objects in the picture on the left can easily be sorted by color. The materials in the image on the right may all look the same but once explored can be sorted by weight. Some of them are heavier, and some are lighter.

Sorting by Invisible Attribute

Scientists investigated 3- and 4-year-old children's sorting by an invisible attribute.

In this study, 3- and 4-year-olds watched an adult play with four rubber ducks. The ducks all looked the same, but two were heavier than the other two. The children watched as the adult lifted each toy and moved it up and down with their hand as if weighing it. Then the adult placed the objects in one of two bins, sorting them into heavy and light piles.



(Wang, Meltzoff, and Williamson, 2015)

Next, the adult gave the child a new set of identical, weighted toys. After watching the sorting demonstration, 4-year-olds, but not 3-year-olds, figured out there was an invisible property: weight.

When the 4-year-olds watched another person lift and weigh the objects, they used this information to figure out that the adult was sorting by an invisible property—weight.

As you can see from the previous few studies, a lot of development is occurring between the ages of 3 and 4. Playing math and science games and demonstrating new concepts at this time can help support children's growing cognitive development.

C – Reasoning and Problem-Solving

Developing Scientific Abilities

The subdomain Reasoning and Problem-Solving focuses on children's developing abilities to:

- Gather information.
- Make predictions.
- Plan investigations.
- Reflect and communicate their findings from their investigations.

If you think this sounds more like a description of a scientist than of a child, you're not alone. The connection between the way scientists develop theories of the world and the way that children do has not been lost on cognitive researchers.

As we mentioned at the beginning of this section on the domain Scientific Reasoning, the view of the child as a young scientist has motivated many studies on children's developing scientific abilities.

Testing Theories

When children observe events in the world, they begin to form theories of how and why those events are taking place.

As we discussed in the last session, even infants will test their observations of the world. For example, do you remember the infants who dropped the toy that was observed to defy gravity? Those infants were testing their theory that objects drop when not supported.

As children's observational skills and physical abilities develop, they are able to form and test a wider variety of theories.

Cause and Effect

Image credits: EarlyEdU

For example, children are increasingly curious about why cause and effect does not work 100 percent of the time.

Researchers used children's curiosity to explore children's ability to figure out complex causal relationships.

Children watched two experimenters. One researcher played with a light-up box, while the other watched. Some children saw that person successfully light up the box several times. Other children, however, saw that the other person was only successful about a quarter of the time.

Then, the experimenter, who was successful only a quarter of the time, revealed to the children that there was a flashlight under the table. To children, the flashlight could be a way of preventing the box from lighting up.

And that is what the researchers found. When given a turn to play with the box, children who saw the box work only some of the time tried turning the flashlight on and off as a way to control whether it worked or not.

Children who saw the box always work, however, did not think of the flashlight as a potential cause since the box worked perfectly. To these children, the flashlight just seemed like a random extra detail.

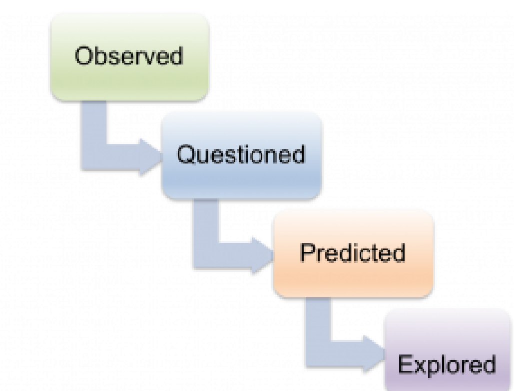
Essentially, what children figured out was that if the box wasn't working 100 percent of the time, something must be making it not work some of the time. Since they didn't know what the flashlight could do, they figured it might be what was making the box not work some of the time.

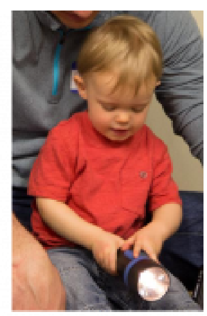
Children as young as 4 years old can reason about invisible causes by just observing a series of events.

D – Using Scientific Inquiry

Process of Scientific Inquiry

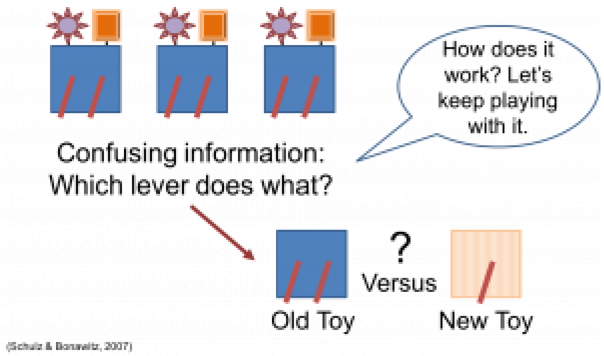
The children in this study, therefore, used the process of scientific inquiry to explore observed events. Children:





- First used their vision to observe the box's operation and the experimenter's use of a flashlight.
- Questioned why the box didn't work some of the time for the other person.
- Predicted that the flashlight might have some control over the box.
- Explored that possibility by playing with the flashlight when they got a turn to play with the box.

Choosing Confusing Toys



Scientists have even shown that when children are playing, they may sometimes be performing investigations about how things work.

For example, children are more likely to play with objects that are confusing than ones that they already understand. This suggests that they are motivated to play to learn new things.

Children ages 4 to 5 years old were shown a toy with two levers. When both levers were pushed, a small light and toy popped up from the top of the box.

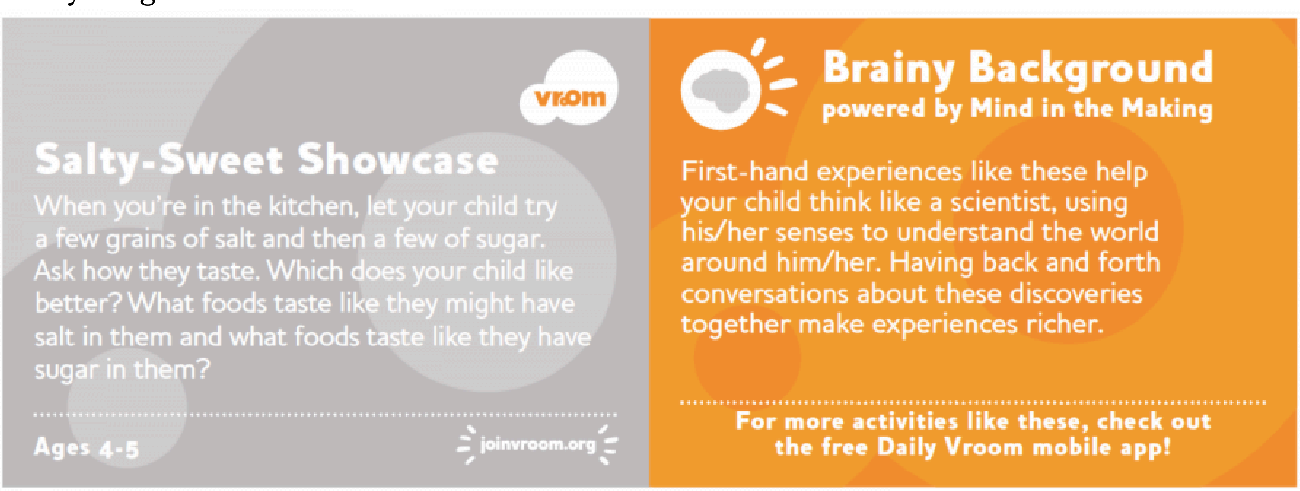
Since both levers were always pushed at the same time, there was no way to know how the levers worked. Did one lever control the light and the other the toy? Or did they both have to be pushed to make both toys come out of the box?

In fact, children were so curious about how the toy worked that they would choose to play with the toy they had already seen but didn't understand instead of playing with a completely new toy.

You may see the children you work with doing similar things. They may prefer to play with toys that are new or that they don't understand yet instead of toys that they know very well or that are very simple.

Vroom Tip

Check out this Vroom tip to get more ideas about how to investigate and talk about science with young children.



View text-only alternative of this Vroom card

Salty Sweet Showcase

When you're in the kitchen, let your child try a few grains of salt and then a few of sugar. Ask how they taste. Which does your child like better? What foods taste like they might have salt in them and what foods taste like they have sugar in them?

Ages 4-5

Brainy Background powered by Mind in the Making

First-hand experiences like these help your child think like a scientist, using his/her senses to understand the world around him/her. Having back and forth conversations about these discoveries together make experiences richer.

Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?

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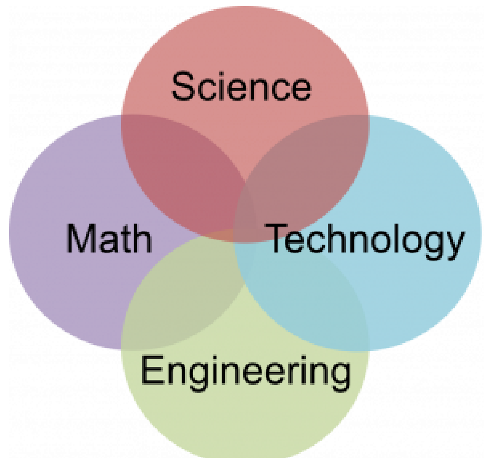
9-3 Supporting Preschool Cognitive Development

A – STEM Subjects

Again, STEM is an umbrella term, referring to a group of subjects linked together by a common approach and focus: They all require gathering and using evidence to create knowledge or solve problems.



STEM subjects are as relevant for preschool development as they are for infant and toddler development.

Just as we did in the last session with infants and toddlers, in this session we will cover how to support STEM learning for preschoolers. But first, let's go over how STEM learning connects to the preschooler Head Start Early Learning Outcomes Framework domains.

STEM: Science

The Scientific Reasoning domain obviously relates to science learning.

But specifically, the subdomain Scientific Inquiry characterizes children's development of observation skills and science talk—both important skills for science learning.

The ability to observe one's environment helps you generate theories about how the world works and allows you to observe the outcomes of your own and other people's explorations. Knowing the vocabulary of science learning and being able to use it helps children organize their investigations and place them in context.

The Reasoning and Problem-Solving subdomain characterizes children's development of information-gathering, prediction, investigative, and analytical skills. All of these developmental skills are key components of science learning.

These are essentially the foundational building blocks of scientific studies: making predictions, gathering data, testing theories, and then analyzing and communicating those results.

STEM: Technology

While the connection between science learning and the domain Scientific Reasoning may seem apparent, the relevant domains for technology learning might not be as obvious.

The subdomain Scientific Inquiry is particularly relevant to this area of learning since it deals with children's developing ability to sort, categorize, and observe with tools.

To sort and categorize, one must attend to the relevant attributes of a variety of objects. The ability to observe, find, and switch attention between important attributes of objects is a key component of learning new technologies.

Technology is also often used to extend the senses. The examples we used earlier, binoculars and microscopes, are forms of technology. Developing the skills to use these *sense-extenders* to aid in observation is important to the advancement of technology.

Video: Let's Talk About STEM: Everyday Fun with Engineering (3:00)

This video shows children in different stages of development doing STEM activities. The video is about 3 minutes long

While viewing the video, consider the following questions:

- How are young children developing engineering skills?
- How are adults encouraging children's engineering skills?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=305#oembed-1

Watch Everyday Fun with Engineering from ZEROTOTHREE on Vimeo.

Video Debrief

How are young children developing engineering skills? (click to toggle expand or collapse)

Possible Answers

- Problem-solving skills.
- An understanding of patterns, sequencing, and cause and effect.
- Systems thinking, or understanding that when they act on one part of the system it influences another part.

How are adults encouraging children's engineering skills? (click to toggle expand or collapse)

Possible Answers

- Describing what children are doing and what they are learning as they explore.
- Asking open-ended questions that help children focus on details that might encourage children to discover a solution.
- Showing a system in action, such as locking a door.
- Supporting them through the engineering process of exploring, creating, and improving.

STEM: Engineering

Engineering learning in the preschool years is primarily focused in the subdomains Measurement and Geometry and Spatial Sense.

Measurement is a critical engineering skill. Understanding how to compare different objects on the same scale, noting what scales are most informative, and knowing how to count quantities using various scales are all important foundational skills for engineering learning.

Also, understanding, recognizing, and creating shapes and spatial relationships between objects are important skills for engineering structures, whether a simple tower of blocks or a complicated skyscraper.

STEM: Math

Finally, preschoolers are developing many math skills in the Cognition domain, especially in Mathematics Development, one of the two preschool Cognition domains.

The Counting and Cardinality subdomain includes the development of relevant counting and number recognition and production skills, along with the critical development of understanding cardinality.

The subdomain Operations and Algebraic Thinking include the development of number combinations and comparisons like those used in arithmetic.

The Measurement subdomain includes the ability to use numbers to quantify objects and substances.

The Geometry and Spatial Sense subdomain includes the ability to understand geometric relationships.

B – Three Ways to Support Cognitive Development

At this point, we've covered a lot of cognitive skills that children are developing from 3 to 5 years of age and communicated about the rapid cognitive changes that are happening during this time.

Children are going from simple counting and maybe knowing the number *1* as a quantity at the age of 3 to being able to combine numbers through basic arithmetic and understanding the concept of cardinality (that the last number counted when counting a set of objects is the cardinality of objects in that set).

So, how do we, as adults, support children's development of these cognitive skills?

As we did with infants and toddlers in Session 8, we will now cover three areas where you, as an adult, can support the cognitive development of children from 3 to 5 years of age:

- Designing learning environments (materials, spaces, tools)
- Providing social support (positive and responsive interactions and modeling)
- Planning learning experiences (interactive, theme-based activities)

Learning Environment: Materials

First, remember the three characteristics to consider when choosing materials for children's learning environments:

- Open-ended: Materials that can be used in multiple ways and allow for creativity, investigation, and problem solving
- Varied: A mix of materials and objects varying in size, shape, and texture

- Relevant: Related to children's interests

The Focus of Inquiry

Children from 3 to 5 years of age are better able than younger children to focus on a particular topic of inquiry. It is important to support this ability to focus and pursue one line of inquiry.

The focus of the exploration might be considered the *content.*

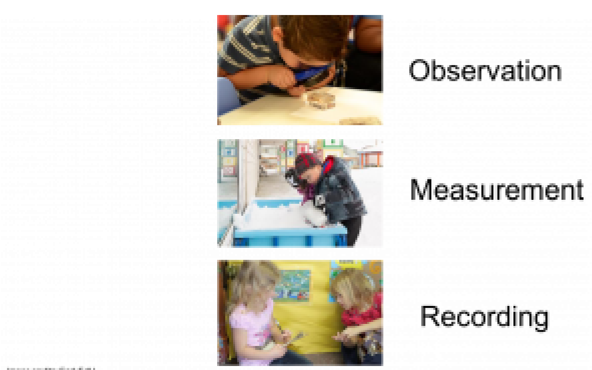
As in selecting materials, children will be most engaged in the learning environment if the focus is based on their interests.

For example, children are naturally fascinated by living things. They may see a caterpillar in the yard and wonder how it is born, where it sleeps, or what it eats.

By finding out what children already know about caterpillars and butterflies, you can select materials to introduce new experiences and information. Children may collect caterpillars and observe, discuss, and document their observations
Here are some example caterpillar activities:

- Art: painting with different mediums, using cut potatoes to stamp the dots on the body
- Search and find: searching in the early learning outdoor environment or a local park for caterpillars
- Books: topics like the lifecycle of caterpillars
- Dress-up: wearing green or colored clothing and acting out the life cycle of the caterpillar

Tools for Investigation



Scientists, even our youngest ones, also need access to the proper tools for their investigations, including tools for:

- Observation: magnifiers and hand lenses to help children observe details
- Measurement: measuring cups, balance scales, and measuring tape
- Recording: paper journals, pencils, markers, and cameras

When considering tools for investigations, remember to think about the ages and development of the young scientists with whom you are working. For example, individual paper journals are appropriate for older preschoolers, but recording for 3-year-olds will look much different.

Having the materials is not enough; they must be accessible to children. Not only should materials be where children can access them independently, but the tools should also be the proper size and type for young learners. An adult-sized pair of binoculars will be too heavy and not the right size for children's eyes to line up properly to see.

When appropriate, adapt materials to ensure that children with special needs can participate as independently as possible. Some possible modifications include: placing the materials in an optimal position, stabilizing materials, providing adaptations to make tools easier to grasp, and making materials larger or brighter.

Materials for Play

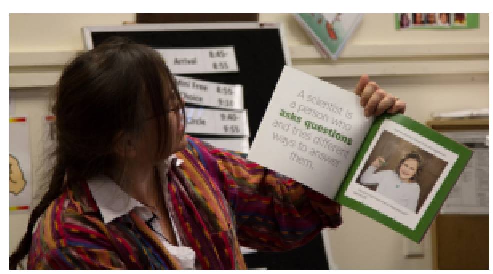
There are many ways to support cognitive development through play. The materials you select don't necessarily have to look like math materials.

For example, environments that support math development provide opportunities for children to use math as a language to describe the world around them.

Counting blocks and comparing quantities or sizes is a great way to practice math skills. Putting out baskets of pretend fruit and talking about the different shapes and sizes help children practice geometry skills. Using a scale to measure the weight of fruit supports the development of children's measurement skills.

Remember that children are using math any time they compare amounts, such as *more* or *less*, or size, such as *big* or *littl*e; notice a sequence; play hopscotch; estimate a distance; or count.

Books



Besides experiencing STEM through nature, children can also experience it without leaving the early learning environment.

Books can be an engaging way to present STEM to children. Both fiction and non-fiction titles offer a way to introduce and discuss the complete range of STEM topics. You can use books to make connections to the real world and children's experiences or to model approaches to problem-solving. Books can draw in students and act as a springboard for STEM activities.

For example, after reading the *Three Little Pigs*, provide children with straw, sticks, or blocks to construct a house to withstand the big bad wolf's huffing and puffing.

Studies have shown that books encourage interest in science in the early years. They can provide accurate information in a way that's interesting and easy for a child to understand.

Books also boost children's science vocabulary. Knowing the names of things can prompt children to ask questions about their environment.

When using STEM books with children who are dual language learners, learn some of the key words and phrases in the children's home languages. Use real objects, photographs, and illustrations to support them in acquiring the English words for key vocabulary and concepts.

C – Social Support

Again, social support is important for toddlers' and infants' cognitive development, and it is equally important for preschoolers.

Although older children are now developing more and more independence in their ability to learn and gather information, 3- to 5-year-olds still benefit from social support in their cognitive development. For example, adults can add new information or facts that children may not know and ask additional questions that children can explore.

Scaffolding and guided play are just as useful for older children as they are for younger children.

An important part of preschoolers' cognitive development also includes the ability to convey findings or observations to those around them (Reasoning and Problem-Solving subdomain). This ability is primarily fostered through social interactions.

In addition, by actively observing individual children, we can assess their understanding of concepts.

Studying Social Support

Adults can help children who are learning through exploration. But we must be careful to guide without hampering children's natural exploration. Too much direction from adults can sometimes narrow the range of children's ideas.

Research shows that how an adult introduces a new task or object can impact preschoolers' exploration and play.

In one study, children were shown a toy that had four unique features—a button that turned on a light, a mirror inside a tube, a tube that made a squeaky noise, and a button that played a song. Children watched an experimenter demonstrate just one of those features.

The researchers divided the children into three groups and gave each group a different introduction to the toy.

Three Approaches

For the first *expert* group, the experimenter brought out the toy and said, “Look at my toy! This is my toy. I’m going to show you how my toy works. Watch this!” Then the experimenter demonstrated that pressing one of the tubes makes it squeak.

In the second *interrupted* group, the experimenter said the same words as in the expert group. But this time, after squeaking the tube, they interrupted the demonstration and said, “I just realized I have to stop because I forgot to write down something over there. I have to go take care of it right now!” The experimenter then left the child to play with the toy.

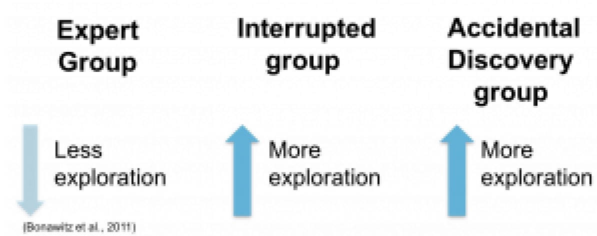
In the third *accidental discovery* group, the experimenter acted as if the toy was new. The experimenter said, “Look at this toy. I just found this toy.” As they placed the toy on the table, they accidentally made the tube squeak. Then they said, “Huh, did you see that? Let me try to do that!” They purposely pressed the tube to make it squeak. The child then had a chance to play with the toy.

Researchers observed children’s responses in three areas:

- How long they played with the toy
- How many of the toy’s features they discovered
- How much they played with the squeaker

Impact on Children’s Exploration

Children in the *expert* group spent less time playing with the toy overall and were less likely to discover the other features of the toy, but they spent more time playing with the squeaker than the other groups.



It seems that children who watched the experimenter introduce the toy as if they were the expert were less likely to explore it. They also spent more time playing with the feature the adult had highlighted. Children proceeded as if the feature the expert showed them was what they were supposed to play with too.

Even though the *interrupted* group heard the same introduction as the *expert* group, they were more likely to explore. This is because it appeared that the experimenter got interrupted. Children may have thought that there were other ways to play with the toy, but the experimenter had to leave before they could describe them all. Even that little bit of ambiguity made children more likely to explore.

Children in the *accidental discovery* group discovered more features than either the expert or the interrupted group. When the experimenter acted as if the toy was new to them as well, children were more likely to explore.

Children look to adults and trust their authority. Children are aware of teaching and assume that an educator has given them the information that is most important to know. Behaving like an expert signals children to follow our lead. Often, following an educator's lead is the desired outcome, but in some circumstances, acting like an expert while children are exploring can limit their exploration and creativity.

STEM Co-Explorers

Image credits: EarlyEdU

There are other reasons to consider how we present information to children.

In the traditional idea of a learning environment, the educator presents knowledge and children learn and retain it. This belief may cause some educators to be anxious about their abilities in STEM disciplines and ultimately cause them to avoid participating in these activities.

The good news is that by thinking about ourselves as co-explorers, we can reduce anxiety about teaching STEM concepts. When we change our perspectives about what teaching science looks like, we move from teaching specific content to children to listening to children's questions and modeling a questioning mind. We no longer view ourselves as experts and recognize we do not have all the answers. Instead, we acknowledge and validate children's thinking and look for answers to their questions together.

Here are some examples of goals we can have when working with children to shift our thinking. Instead of thinking, "As a teacher, I am the expert and I need to have answers to all the questions they ask," we can approach the situation with the perspective of "I don't know. Let's find out together."

Modeling A Questioning Mind

Here's another example: Instead of approaching a lesson with the thought that "I am going to teach children lots of information about this topic," we can shift to "I listen to children's questions and model a questioning mind. We explore together."

Reflection Point

Use these questions to consider the topic of when adults need to be experts when guiding children:

- In what instances do adults need to be the experts?
- What are some situations where adults don't need to be the experts?

D – Social Interactions

Social interactions can support cognitive development in many ways. We will explore a few examples:

- Introducing the process of scientific inquiry explicitly
- Using scientific language
- Encouraging children to communicate and share their findings

Introducing Inquiry Skills

Adults can encourage children to learn about their world by introducing basic inquiry skills. Inquiry skills are a series of steps called the *scientific method*. The scientific method includes observing, forming questions, making predictions, designing and carrying out experiments, and discussing.

Adults can engage children in reflection through the process of asking questions, investigating, and constructing explanations. Asking open-ended questions also models this process for children so that ultimately, they will develop questions about their observations.

Encourage children to think about their observations and their questions. From what they know and want to know, they can make predictions and say what they think will happen. Encourage children to experiment and test their predictions.

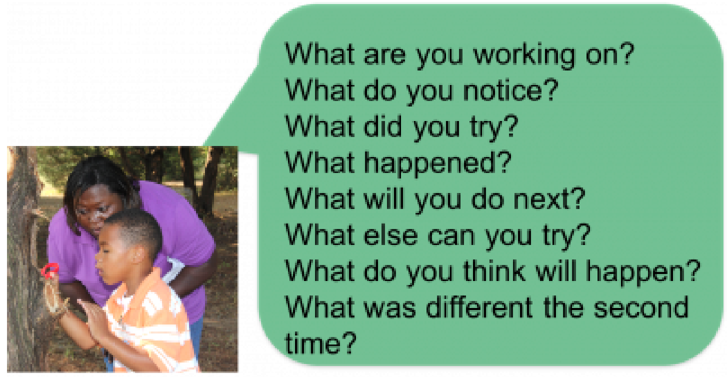
During and following their explorations and experiments, provide opportunities for children to discuss the results of their experiments. Communicating their thoughts and ideas helps children develop their thinking.

Using Scientific Language

How else can adults support children as they observe, question, explore, and reflect? One of the ways we can do this is with language.

The way adults speak to children can encourage reflection and problem-solving. By modeling and providing children with meaningful opportunities to use scientific language, we are not only enhancing children's science learning, but we are also teaching advanced vocabulary in a meaningful context.

Inviting Communication



Invite children to communicate as they engage in the process of scientific inquiry by asking open-ended questions and most importantly, accepting their answers without judgment. This also allows an adult to learn about the child's thinking, so they can help extend their learning.

Here are some questions to encourage problem-solving with young children:

- What are you working on?
- What do you notice?
- What did you try?
- What happened?
- What will you do next?
- What else could you try?
- What do you think will happen?
- What was different the second time?

This will also model asking questions for children developing the ability to gather information on their own.

Older children ask questions to learn about the world. In one study, children between the ages of 2 and 5 were found to ask an average of 76 questions per hour.

Their questions included requests for many different types of information. Fact-based questions were the most frequent, but requests for explanations increased with age. Between the ages of 2 and 2-and-a-half, only 4 percent of children's questions were requests for explanations. But at age 5, an average of 30 percent of children's questions were requests for explanations.

About age 3, children showed a considerable increase in the proportion of requests for explanations. This suggests that about this time, children use inquiry as another tool to help them figure out how things work.

Reflection Point

Use these questions to review the material from this section:

- What are three ways to support preschool cognitive development through social interactions?
- Based on the research findings, when an adult presents an object as an expert:
    - How can this hinder learning in preschoolers?
    - How can this help their learning?

E – Interactive Learning Experiences

With greater motor ability and independence as children get older, the design of engaging learning experiences also changes.

Image credits: EarlyEdU

Adults can find many ways to engage preschoolers in interactive learning experiences that support their cognitive development.

- Book reading
- Measurement activities
- Object-exploration activities (e.g., sink or float)
- Categorization tasks
- Games that practice executive function skills (e.g., *Simon Says*)
- Problem-solving tasks

We'll now present some examples of learning activities and how they relate to cognitive development.

Using Books

Many researchers agree that using picture books, if they are carefully chosen, can be an effective approach to teaching science concepts to young children.

Almost any book can connect to STEM topics through discussion and questions like the ones we considered earlier, such as “What do you notice about the two trees?”

When selecting STEM-related books for young children, you can:

- Start with: Is it fun to read? Do you like it? Do you respond to the language and illustrations? Is it captivating—a good story? Chances are that if you enjoy reading the book, the children you read it with will enjoy it too.
- Examine whether the book has a theme and if the theme is one you want to share.
- Look for books that show gender and racial diversity. Help children avoid making inferences about who may find STEM relevant by presenting books with characters of different genders, races, and cultures engaged in STEM-related activities. STEM is for everyone, not just a certain type of person.

Reflection Point

Use these questions to discuss STEM books:

- Do you have a favorite children’s book that is STEM-related?
- What is it?
- What topics do you like to relate to it?

F – Measurement Activities

Making Comparisons

Encourage children to make quantity or size comparisons through measurement activities.

Image credits: EarlyEdU

An adult may ask, "How big is it?" A child can estimate, measure, and describe.

An adult may ask, "How could you measure it?" A child can analyze the possibilities.

Check in with children about their measurement theories by asking them why something is bigger or smaller or has more or less. Sometimes they will surprise you with their explanations.

Sorting

Sorting games can engage children as well. Try to set them up so that items can be categorized based on more than one feature, such as color, shape, or size.

Interactive: Shape Sorting

This is an interactive! You'll drag and drop the shapes onto different areas of the screen to make as many different sorting groups as you can.

Click the black area to see the instructions and begin the simulation.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=305#h5p-41

Activity Debrief

What are some common ways to sort? (click here to reveal)

Why it matters

Possible Answer

Did you group the shapes by color? Did you notice that there was more than one way to sort the objects?

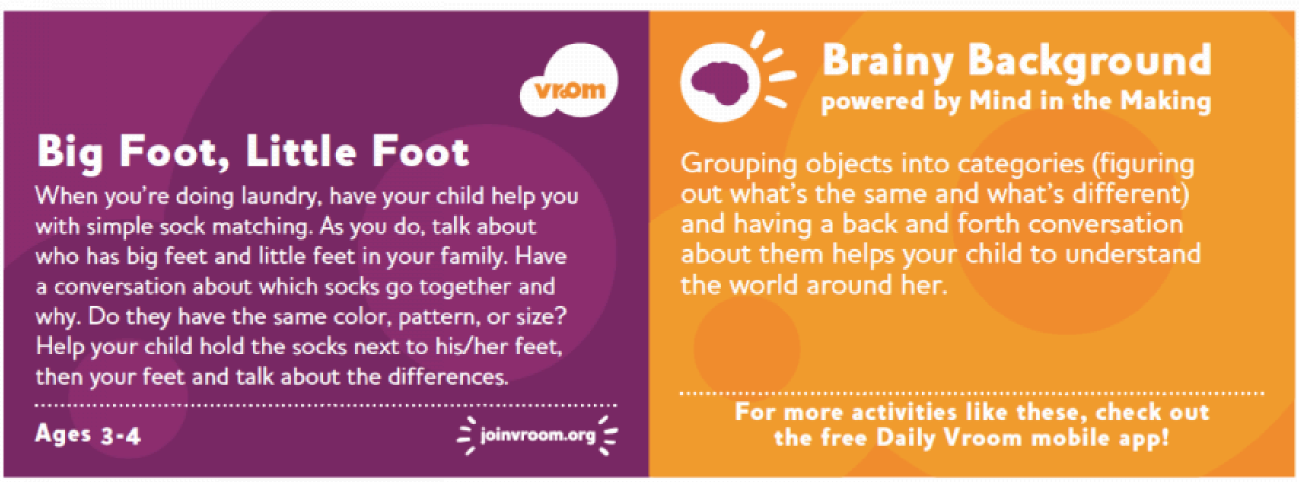
Sorting and categorizing games like this one, or ones in which objects must be sorted first by one feature, such as color, and then another, such as shape, help children learn to recognize and switch between two sets of rules.

You can even include items that have differences in invisible properties, such as weight (heavy versus light) or sound (rattles versus bells).

Vroom Tip

Check out this Vroom tip to get more ideas about how to talk about categories with young children.

Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?



View text-only alternative of this Vroom card

Big Foot, Little Foot

When you're doing laundry, have your child help you with simple sock matching. As you do, talk about who has big feet and little feet in your family. Have a conversation about which socks go together and why. Do they have the same color, pattern, or size? Help your child hold the socks next to his/her feet, then your feet and talk about the differences.

Ages 3-4

Brainy Background powered by Mind in the Making

Grouping objects into categories (figuring out what's the same and what's different) and having a back and forth conversation about them helps your child to understand the world around her.

Hands-On Learning Experiences

STEM is all around us, ready to be discovered by willing young explorers.

Remember that children are active learners. Try to provide them with hands-on experiences for learning.

In summary, when making efforts to support children's cognitive development remember to:

- Select materials and activities that **engage the senses**: textures, smells, tastes, sounds, and sights. Set up a taste test, and have children compare foods. Ask which is crunchier, sweeter, or smoother. Combine science and art. Have children paint different surfaces with the same color then compare their appearance.
- Design activities that **ask children to sequence, identify the steps in a process, or put items in order by size or weight**. These are all precursors to understanding computer languages. Regularly include counting and measuring in activities. Tools for measuring and weighing help with number familiarity.
- **Play games that use executive function**. These can be simple clapping patterns and rhymes, sorting tasks, or motion games like *Simon Says*.
- **Speak STEM** by including problem-solving and math-rich language in all types of activities. Listen to children's observations and provide scaffolds when appropriate.

- **Explore the outdoors and nature.** These are settings that encourage creative and active exploration and problem-solving.
- **Read fiction and non-fiction books with STEM-related content.** Literature provides a great springboard for discussion and activities.
- **Schedule open-ended time.** Children need time to become fully engaged in exploration and investigations.

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10: Learning and Development in Context: Birth to Age 3

In this lesson:

10-1 Approaches to Learning

This section covers the infant and toddler Approaches to Learning domain. This domain focuses on how children learn.

10-2 Review: Developmental Indicators

In this section, we briefly review all the developmental domains, subdomains, and indicators we've covered in the last nine lessons.

10-3 Learning Throughout the Day

In this section, we look at how children learn skills in all the domain areas throughout the day.

10-1 Approaches to Learning

A – Approaches to Learning

Head Start Early Learning Outcomes Framework

The Head Start Early Learning Outcomes Framework's infant and toddler Approaches to Learning domain has four subdomains:

- Emotional and Behavioral Self-Regulation
- Cognitive Self-Regulation
- Initiative and Curiosity
- Creativity

	CENTRAL DOMAINS				
	APPROACHES TO LEARNING	SOCIAL AND EMOTIONAL DEVELOPMENT	LANGUAGE AND LITERACY	COGNITION	PERCEPTUAL, MOTOR, AND PHYSICAL DEVELOPMENT
▲ INFANT/ TODDLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication	Cognition	Perceptual, Motor, and Physical Development
● PRESCHOOLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication Literacy	Mathematics Development Scientific Reasoning	Perceptual, Motor, and Physical Development

This domain includes the development of skills that support children as they learn and explore their world.

For example, the Emotional and Behavioral Self-Regulation subdomain illustrates children's growth from engaging with familiar adults for calming and comfort to using various strategies like removing oneself from the situation or seeking support from a familiar adult to help manage strong emotions.

We'll now briefly go over each of the Approaches to Learning subdomains. As we do, think about how the skills in each subdomain are intertwined with children's learning and development.

Emotional and Behavioral Self-Regulation

One of the four Approaches to Learning subdomains is Emotional and Behavioral Self-Regulation.

Emotional and behavioral self-regulation is an important school readiness skill. Being able to self-regulate in many different situations is an important aspect of becoming a successful learner.

In the early years, as children are starting to learn how to regulate their emotions and behaviors, they need assistance from adults, through responsive, back-and-forth interactions to build these skills.

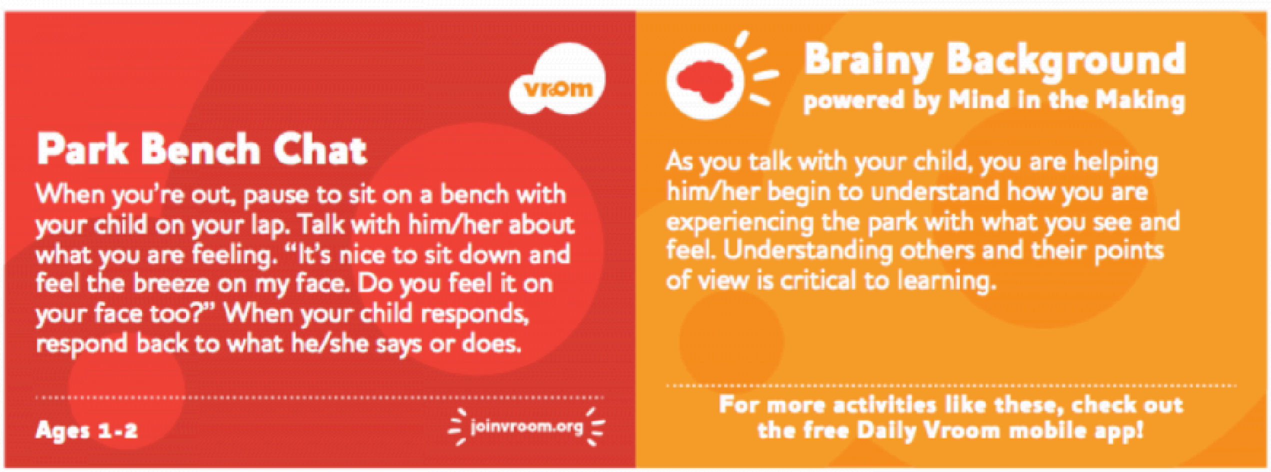
From birth to 9 months, children will engage with familiar adults for comfort, to focus their attention, and to share joy.

Between 8 and 18 months, children begin to seek out closeness or look to a familiar adult to help them with strong emotions.

And by age 3, toddlers are developing more complex strategies for dealing with emotions, such as removing themselves from a situation, covering their eyes or ears, or seeking out a familiar adult for help and support.

Vroom Tip

Check out this Vroom tip. It has ideas about how to help build children's emotional and behavioral self-regulation.



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Park Bench Chat

When you're out, pause to sit on a bench with your child on your lap. Talk with him/her about what you are feeling. "It's nice to sit down and feel the breeze on my face. Do you feel it on your face too?" When your child responds, respond back to what he/she says or does.

Ages 1-2

Brainy Background powered by Mind in the Making

As you talk with your child, you are helping him/her begin to understand how you are experiencing the park with what you see and feel. Understanding others and their points of view is critical to learning.

Does this tip make sense in the context of an early learning environment? And if not, how might you adapt the activity to better fit that environment?

Responsive Interactions

Children, from birth to age 3, are also learning how to manage their feelings and behavior with the support of adults. They are beginning to develop coping strategies to manage feelings and behaviors during routine early learning program activities, such as playtime or times when they need to follow rules. Responsive adults can help children handle strong feelings and guide their behavior when they have conflicts.

For example, when an attentive caregiver responds, children between birth and 9 months are learning to calm down or stop crying.

Between 8 and 18 months, children begin to look to familiar adults for help or guidance with their behavior and actions. They may begin to self-calm by sucking on their thumb or fingers.

By age 3, children are developing more tools, such as being able to say "no" or "stop" rather than hitting, during conflicts. They are able to tell adults if they are tired or hungry.

Development in this area prepares children for important, everyday tasks, including participating in routines with the support of familiar adults, communicating about basic needs, managing short delays in getting needs met, and following basic rules for managing their actions and behaviors.

Reflection Point

We just talked about how children build emotional and behavioral self-regulation skills in the context of responsive caregiving. But what exactly is responsive caregiving? What does it look like and why do you think it is important for children's emotional and behavioral self-regulation?

B – Developing Emotional Self-Regulation Skills

Children need a lot of support as they develop self-regulation skills. Children are not born knowing how to regulate their emotions or behavior, and we shouldn't expect young children to know how.

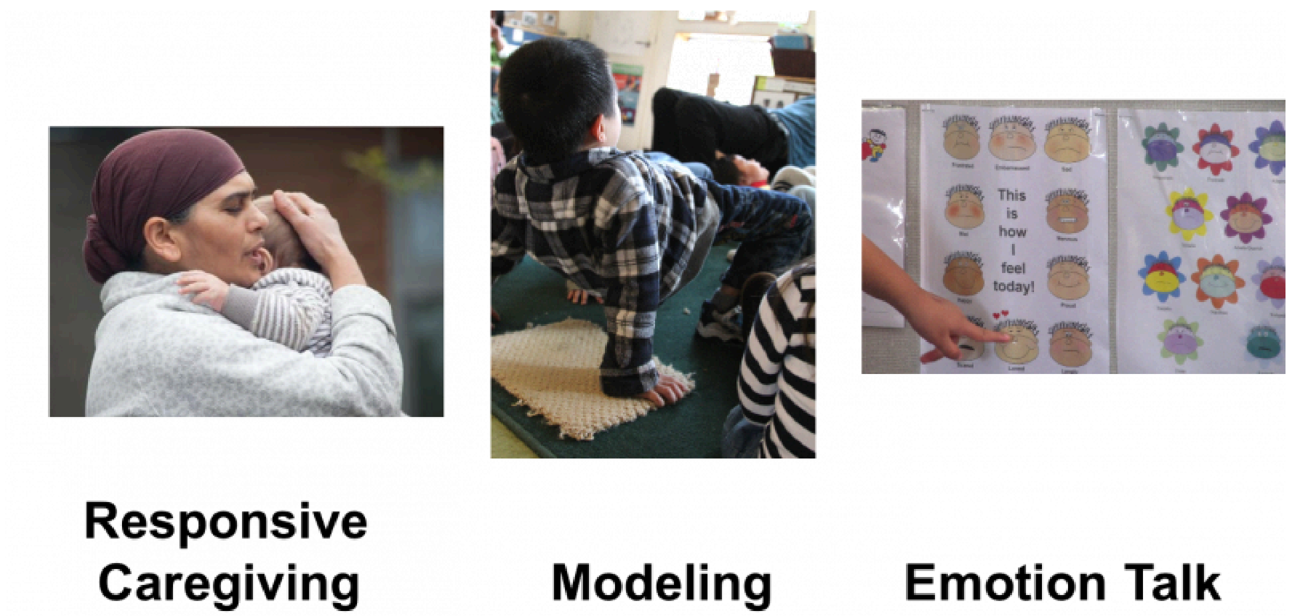


Image credits: EarlyEdU

Providing individualized, responsive care helps children feel secure. When children experience strong emotions, knowing that they have a responsive caregiver to help them manage those emotions sets the foundation for self-regulatory skills.

Children learn self-regulation skills by interacting with adults who model how to deal with their emotions and behavior, especially emotions like anger or frustration.

Verbalizing what you are feeling or describing actions you are taking to manage your emotions helps children learn. For example, if you accidentally spill a pitcher of milk and you feel yourself getting frustrated, you can verbalize your feelings, saying, “I am feeling frustrated because I spilled the milk and now I have to clean it up and change my shirt.”

Modeling ways to deal with strong emotions, such as going to a quiet place, also helps children build tools for dealing with their own strong feelings.

Talking to children about the emotions that they are having, and helping to label them, even from a very early age, helps children build the vocabulary and awareness they need to be able to verbalize what they are feeling and to seek help in navigating difficult situations.

C – Basic Cognitive Self-Regulation

Focus and Attention

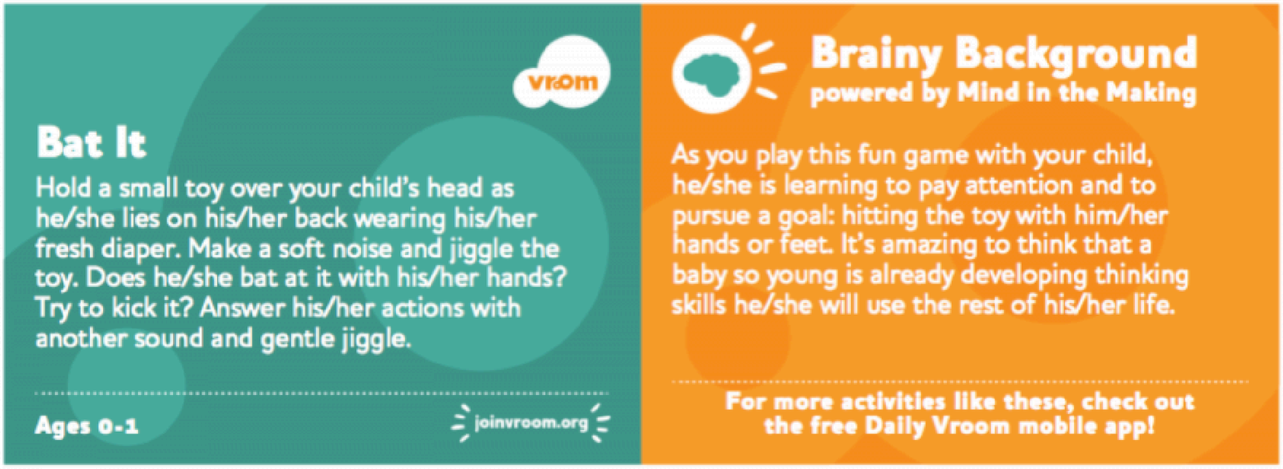
In addition to emotional and behavioral self-regulation, children are also learning basic cognitive self-regulation skills during this period of development, including skills that allow them to focus their attention, persist in a task, and be somewhat flexible in their behavior and actions. Just like emotional and behavioral self-regulation, these cognitive self-regulation skills are fundamental to children’s ability to learn. Let’s look at how these skills develop during the first 3 years of life.

Learning to maintain focus and attention is a skill that children are developing during the first 3 years of life. Between birth and 9 months, children are beginning to learn to filter out distractions in their environment to focus on important people and objects.

Between 8 and 18 months, children’s ability to attend to objects, activities, and people grows. By 36 months, children can maintain engagement with familiar people, maintain focus on a simple task for short periods of time, and pay attention to activities that they actively join or initiate.

Vroom Tip

Check out this Vroom tip. It has ideas about how to help build children’s cognitive self-regulation in the area of reasoning and problem-solving skills.



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Bat It

Hold a small toy over your child's head as he/she lies on his/her back wearing his/her fresh diaper. Make a soft noise and jiggle the toy. Does he/she bat at it with his/her hands? Try to kick it? Answer his/her actions with another sound and gentle jiggle.

Ages 0-1

Brainy Background powered by Mind in the Making

As you play this fun games with your child, he/she is learning to pay attention and to pursue a goal: hitting the toy with him/her hands or feet. It's amazing to think that a baby so young is already developing thinking skills he/she will use the rest of his/her life.

Does this tip make sense in the context of an early learning environment? If not, how can you adapt the activity to better fit that environment?

Persistence

Children are also developing the ability to persist in their actions and behavior.

Over the first 9 months, children grow in their ability to engage in interactions with adults for more than just a short period.

Between 8 and 18 months, children start to show a willingness to repeat actions to solve a problem or repeat attempts to communicate with adults.

At about 9 months, when children are engaging in a task, they are able to pick the most appropriate action to solve a particular task. For example, let's say one ball makes a sound when you squeeze it and another when you shake it. At this age, children are able to squish one ball to make a sound and shake another.

At 15 months, children will often want to complete a task on their own, sometimes resisting help. They are also able to persist in more complicated tasks that have multiple parts. For example, they might find the right block to fit into the hole of a shape-sorter toy and then continue until all the blocks are in the shape sorter.

By age 3, children are able to stay engaged as they work toward a goal or solve a problem. Even if the task is difficult, children often will try different strategies until they are successful.

Being able to persist in tasks, even in early infancy, influences development in other domains. For example, one study found that an infant's ability to persist on a task at 6 months and 14 months links to a child's cognitive development at 14 months.

Flexibility

Flexibility in behavior is another important skill that children are developing. Being flexible in behavior helps children to transition between activities and to deal with changes to their routines.

During the first 9 months, children often repeat behavior, trying the same actions over and over again. At this age, they may sometimes take a different approach when they are trying to solve a problem or engage in an interaction.

Children build on these early skills, gaining the ability to shift their focus, participate in a new activity, or try a new approach to solving a problem.

By 3 years, children are able to modify their actions or behavior as they solve problems, engage in social situations, and participate in daily routines.

At this point, children can transition to new activities that are part of their regular schedule and to some degree can adjust to changes in routine if they learn about it ahead of time.

For example, by age 3, children who are told in advance may be able to follow a new morning routine, such as leaving the house earlier to drop off a sibling, or adjust to a change in the afternoon routine due to bad weather.

Flexible Problem-Solving

Children also show flexibility in problem-solving. They may try more than one approach as they work to solve problems and engage with their environment.

Children's problem-solving approaches change over time. In one study, researchers showed 2- to 4-year-old children a set of nested cups during a free-play session and then gave children a chance to play with a set of separated cups. The earlier play made them want to nest them, and children worked hard to solve the problem. They used a mix of strategies, which varied by their age.

A common strategy used by children younger than 30 months was brute force. When children placed a large cup on a smaller one, they would repeatedly twist, bang, or press down hard on the cup that didn't fit. Another strategy the younger children used was to take apart all of the nested cups and start again if a cup did not fit.

Older children (30 to 42 months) used different strategies when a cup didn't fit. They worked specifically with the non-fitting cup in relation to the set. For example, they took apart the stack at a point that let them put a new cup in the correct spot. Older children also showed a *reversal* strategy. After placing two cups together that didn't fit, the child would immediately reverse them and try again. The younger group did not show the reversal strategy.

As children build skills, their ability to try new strategies to solve problems grows.

Executive Function

Many of the skills we have talked about so far, including self-regulation, the ability to focus and maintain attention, persisting in solving a problem, and flexibility in behavior or actions, are all executive function skills.

Executive function is an umbrella term for a whole host of skills, including:

- Focusing attention
- Motivation
- Decision-making
- Planning behavior
- Problem-solving
- Switching between tasks
- Organization
- Self-regulation
- Memory.

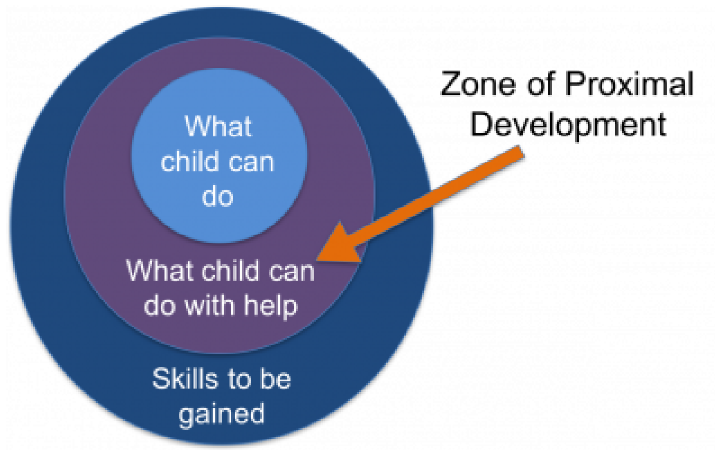
We will talk more about executive function next session when we discuss children's development from 3 to 5 years. The foundations for these skills are set in the very early years of development.

Executive function skills are important for success in school and learning across domains. Self-regulation and executive function are strong predictors of academic achievement. For example, one study that followed children during the entire course of their education found that a child's ability at age 4 to pay attention and complete a task were the greatest predictors of whether they completed college by age 25.

By scaffolding everyday interactions with children, educators can help children build these fundamental skills.

D – Developing Cognitive Self-Regulation Skills

Scaffolding

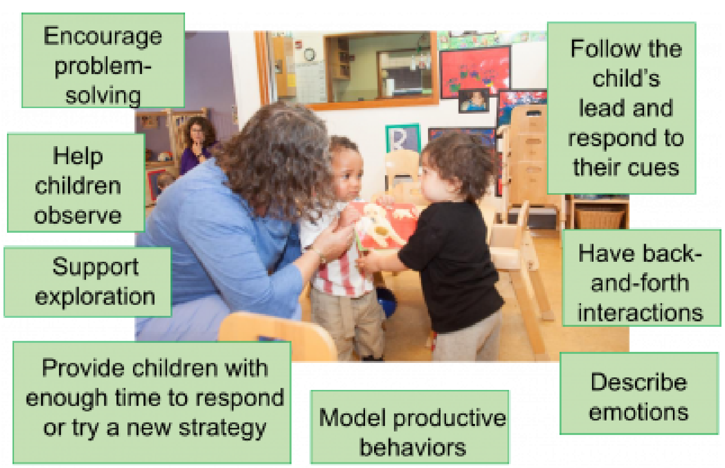


We've talked about scaffolding before in this course book. *Scaffolding* is a term that describes techniques adults can use to support and help children in their learning. Scaffolding is offering the right level of learning support to take a child's knowledge to the next level. Just as a scaffold supports the construction of a building, adults can scaffold children's experiences as they are learning.

In Session 1, we learned about the psychologist Lev Vygotsky's Zone of Proximal Development. The Zone of Proximal Development describes a subset of children's growing knowledge: the things that a child can do with help. Older or more capable people can help children acquire new skills by pushing them beyond their natural boundaries into this zone and helping them to expand their knowledge. When adults help children acquire new skills in this way, they are scaffolding children's learning.

In Session 8, we talked about scaffolding children's cognitive development. But what about skills like self-regulation or flexible thinking?

Tools to Scaffold Learning



Adults scaffold children's learning by providing cueing, prompting, questioning, modeling, discussing, and telling. Using these tools, adults can stretch children's learning to a new level.

Adults can help scaffold children's emotional and behavioral self-regulation by describing their emotions and the emotions that they think children might be feeling. Adults can also model productive behaviors for children and talk them through challenging situations.

For example, in this situation, the educator may describe the boys' emotions by describing how they both want the book and talking about their feelings of frustration. She may then model how the boys can sit and read the book together or help one boy give the book to the other. She could then help the first boy find something else to play with, modeling a self-regulatory technique of finding another activity when a situation is frustrating.

Adults can also help children develop their flexible thinking skills by supporting them in their exploration of the world and asking leading questions.

As children puzzle through new experiences, it is important to wait and give children the chance to respond or try a new strategy on their own. Giving children time to process helps them focus on the task and gives them the opportunity to develop their unique strategies to solve a problem.

Video: Exploring Shapes and Sounds (2:09)

The video *Exploring Shapes and Sounds* focuses mostly on the interactions of one child and educator, although another child joins the activity toward the end of the video.

Let's look at an example of an educator scaffolding children's exploration of different toys. As you watch, identify when children are building early executive functioning skills like maintaining focus, persisting in an activity, and demonstrating flexibility in their thinking and behavior.

While watching the video, think about the following questions:

- What did you notice?
- Which executive function skills were children working on, and how did the educator help support their learning?
- Is there anything the educator could have done to further their learning?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=307#video-307-1

Video Debrief

Which executive function skills were children working on, and how did the educator help support their learning? (click to toggle expand or collapse)

Possible Answers

- **Attention and focus**. One child was building attention and focus skills while working to stack the cups. The educator helped scaffold the child's attention to the task by asking questions about the cups when the surrounding environment was distracting. The educator also helped the child transition to a new task—playing with the balls. Even though the child switched tasks, the child was still maintaining focus. The educator helped the child engage in the new task and explore the different properties of the balls.

- **Persistence**. The one child persisted in stacking the cups, even when the child couldn't quite figure out how to fit one inside the other. The educator provided scaffolding by asking leading questions to help the child think about what other strategies to try.
- **Flexible thinking**. The same child tried multiple strategies while playing with the cups, trying different shapes and sizes. When the child shifted attention to the balls, the child also experimented with different strategies, trying to figure out the best way to make noise with them—shaking or squeezing. The educator supported the child's learning by making observations that helped the child think about what was happening and providing suggestions for other strategies to try like squeezing.

Is there anything the educator could have done to further their learning? (click to toggle expand or collapse)

Possible Answer

The educator guided the child's learning in a busy environment. Given all the activity in the room, the child might have benefitted if the educator slowed down a little, waiting longer before asking a new question or suggesting a new strategy.

E – Exploring the World

Initiative and Curiosity

Children use gestures and other strategies during this period to begin to resist things that they do not want or like. While this behavior can be challenging at times, it is an important part of children's development as they learn to express their unique tastes and preferences in the world and begin to establish agency.

By age 3, children are often eager to try new experiences and attempt new tasks with or without help from adults; they have clear preferences and are able to make choices.

Interactive: Initiative and Curiosity

This is an interactive! Use the arrows on the interactive below or click on each label on the timeline to explore the actions of a baby born in September 2018.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=307#h5p-24

Growing Curiosity

Children's curiosity also grows during this time. Children's early curiosity is expressed as they excitedly engage in back-and-forth interactions with an adult or as they interact with their environment, perhaps batting a dangling toy with their feet.

As children grow, they show more focused interest in their surroundings. For example, the child in these images is carefully examining the leaves, touching them, and perhaps trying to pull one off the plant.

Children may start to notice other aspects of their environment too. They may closely listen to a new song playing on the radio or explore a new piece of furniture.

By age 3, children often actively participate in new experiences, ask many questions, and enjoy experimenting with new materials or activities.

Creating engaging environments for infants and toddlers to explore helps foster their growing curiosity about the world and how it works.

Vroom Tip

Check out this Vroom tip. It has ideas about how to help children build curiosity about the world.

View text-only alternative of this Vroom card

Clean Up Song

As you clean, sing a song with your child about what you are doing. "I am dusting the chair" or "I am picking up toys that fill you with joy." You can use silly voices, rhymes or singing to the tune of a favorite song. If your child is old enough to help, hand him/her a dust cloth or invite him/her to pick up toys with you.

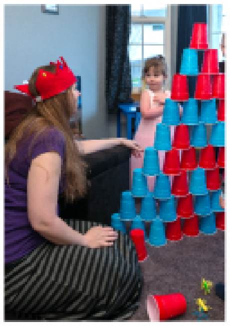
Ages 2-3

Brainy Background powered by Mind in the Making

A song about what you are doing will catch your child's attention and he/she will make connections between sounds, sight and meaning. Children are especially curious about new things and curiosity is very important in learning.

Does this tip make sense in the context of an early learning environment? If not, how might you adapt the activity to better fit that environment?

Engaging Environments



Environments that support creativity and exploration for infants and toddlers include materials that are varied, open-ended, and relevant.

Having a wide variety of materials that are open-ended can deepen learning. Choose materials that can be used in many ways and allow for creativity, investigation, and problem-solving. Varied materials provide opportunities for all children to participate.

For infants and toddlers, it can be helpful to intentionally group items near others so that children can mix and match them in their play and exploration. For example, a shelf might have nesting cups in one cubby, dolls or figurines in another, and a large basket of bandanas. Children may choose to nest the cups or use them to *feed* the figurines. They may fill the basket with the items or use the bandanas to *wash* the cups. Mixing items like this creates many options for imaginative play and can be an especially helpful strategy for mixed age groups.

Providing materials that are culturally and thematically relevant to children is also important. Asking parents about what types of materials their children like to play with at home is an effective way to figure out meaningful items to include in play and exploration areas of the early learning program. Each child has their own set of unique experiences and items that are familiar. Culturally relevant items provide children with the opportunity to play with familiar objects and allow other children to learn about different cultures.

Materials that you provide do not have to be expensive. Recycled, donated, or handmade items provide just as rich a play experience for children as new or purchased items. Often these materials provide even better exploration and learning opportunities since commercial materials don't usually encourage as much imagination or creativity.

F – Developing Creativity Skills

Creativity is the final subdomain of the Approaches to Learning domain. Children use their growing creativity skills to support and further their learning.

For example, from birth to 9 months, infants change their expressions, behaviors, or actions depending on the responses they get from the people they are interacting with.

Between 8 and 18 months, children will start to use objects in creative ways, such as using a hand towel to cover a baby doll or a plastic bowl as a hat.

Between 16 months and 3 years, children begin to combine objects or materials in new ways. For example, they may bring objects from the dramatic play area to the block center to use in their play. At this age, children are also excited about making or creating new things. Providing a variety of materials in close proximity, as we just discussed, provides opportunities for children to explore items in new and creative ways.

By age 3, children are often willing to try new experiences or activities and notice and pay attention to new objects in their environment.

Children also express their developing creativity skills through the creative use of language, such as making up new words or creating rhymes.

Imagination

Children's imagination begins to grow during this period of development.

Imaginative behavior first appears as the child uses playful sounds, gestures, and words during interactions, songs, and games.

Children are also learning to use their creativity to make and build new things like complex structures with blocks or works of art from crayons, paper, and paint.

Between 16 months and 3 years, most children will start to use their imagination to explore possible *alternative* uses of objects and materials. Referred to as *symbolic play*, it takes form as blocks become a birthday cake, a stick becomes a fork, and a spoon becomes a brush for a doll's hair.

Interactive: Symbolic Play

This is an interactive! Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=307#h5p-25

As infants build their symbolic play skills, they are also building skills in combining mental representations of objects, actions, or relationships in their world into logical sequences.

Research suggests that the development of single-object play is linked to early language skills like babbling and the emergence of more complex symbolic behavior later in development.

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Cite this resource:
EarlyEdU Alliance (Publisher). (2018). 10-1 Approaches to learning. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

10-2 Developmental Indicators

A – Review Developmental Domains

In the next section, we are going to take all that we've learned about children's development and apply it to a day in an infant and toddler early learning program.

We will watch a series of video clips that follow children as they go through everyday experiences, such as mealtime or nap time. In small groups, you will use what you have learned about child development to identify what skills children are building during everyday interactions.

You will use the Head Start Early Learning Outcomes Framework's five developmental infant and toddler domains and the skills children are developing in each to identify children's development and learning in each of the videos.

Before we do that, review each domain.

As you know, there are five developmental infant and toddler domains outlined in the framework:

- Approaches to Learning
- Social and Emotional Development
- Cognition
- Language and Literacy
- Perceptual, Physical, and Motor Development

Approaches to Learning

In this section, we've talked about the infant and toddler Approaches to Learning domain. This domain focuses on the development of skills and behaviors that children use to learn about the world. This domain includes the four subdomains Emotional and Behavioral Self-regulation, Cognitive Self-Regulation, Initiative and Curiosity, and Creativity. It covers the development of skills that are necessary to acquire new knowledge.

Children exhibit behavior in these subdomains as seen in their emotional reactions, their behavioral choices, and their ability to focus their attention. For example, the framework indicates that by age 3 children:

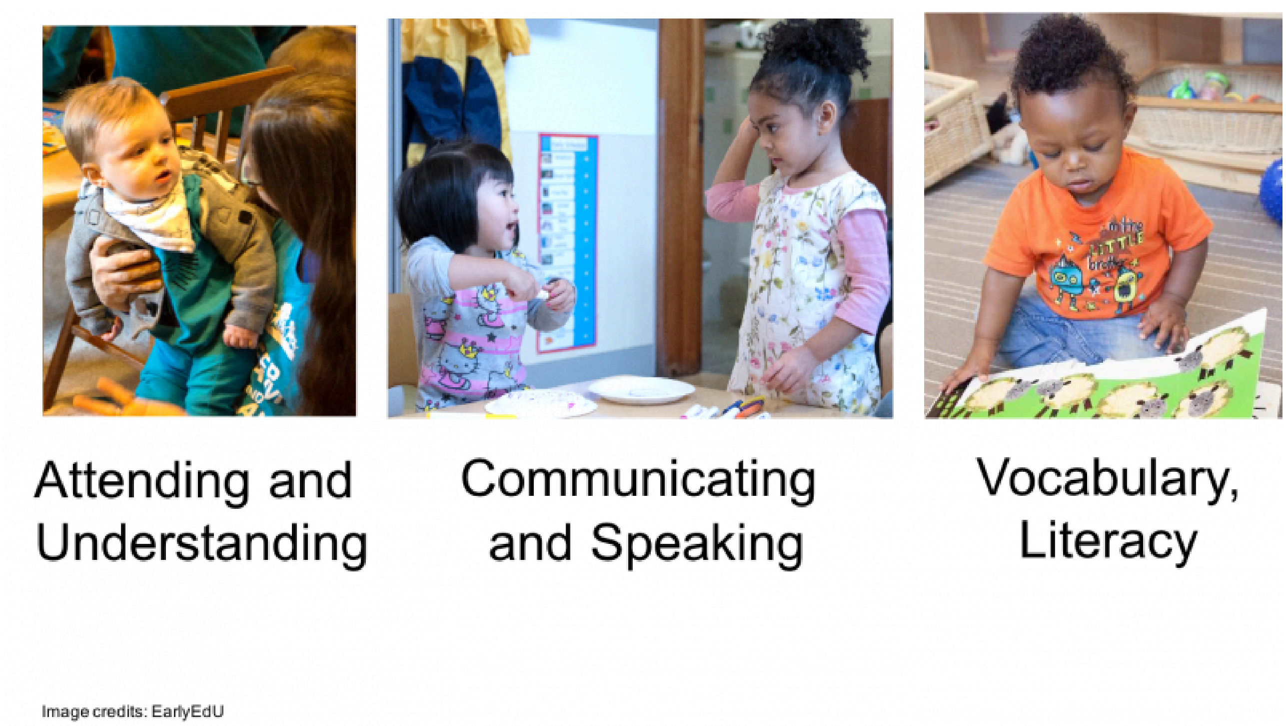
- Have learned to use strategies, such as to seek contact with a familiar adult or remove oneself from a situation, to handle strong feelings and emotions (emotional and behavioral regulation).
- Should be able to maintain focus and attention on a simple task or activity for short periods (cognitive regulation, executive functioning).

Social and Emotional Development

The infant and toddler Social and Emotional Development domain focuses on a child's ability to create meaningful relationships with other people and to express, recognize, and manage their own and other people's emotions. This domain includes four subdomains: Relationships with Adults, Relationships with Other Children, Emotional Functioning, and Sense of Identity and Belonging.

Language and Literacy

The infant and toddler Language and Literacy domain focuses on the development of a child's ability to listen, understand, and produce language. This domain includes the four subdomains Attending and Understanding, Communicating and Speaking, Vocabulary, and Emergent Literacy.



This domain includes the skills needed to communicate effectively with others. Children's proficiency with language and literacy eventually affects their learning across all domains.

Cognition

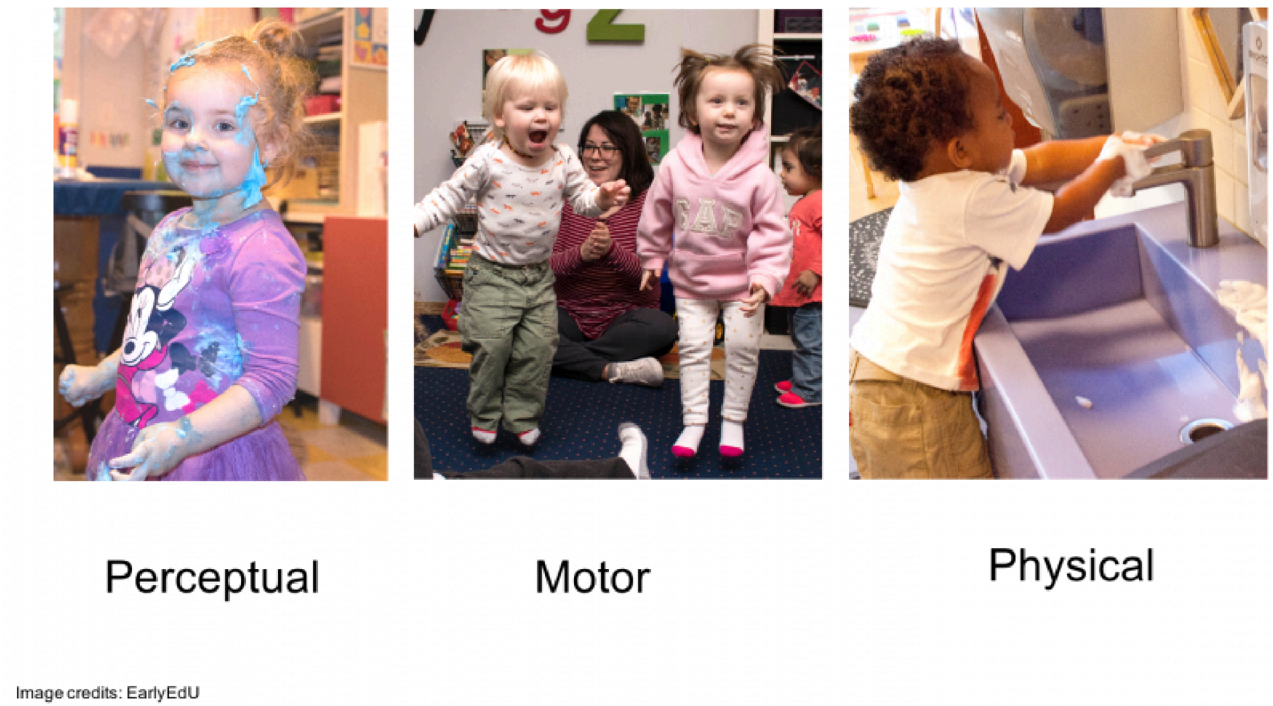
The infant and toddler Cognition domain focuses on the development of reasoning, memory, and problem-solving. This domain encompasses the sub-domains Exploration and Discovery, Memory, Reasoning and Problem-Solving, Imitation and Symbolic Representation and Play, and Emergent Mathematical Thinking. Note that the images only illustrate three of the five subdomains.

Image credits: EarlyEdU

The skills that children gain in this domain eventually develop into math and science skills in preschool and beyond.

Perceptual, Motor, and Physical Development

The infant and toddler Perceptual, Motor, and Physical Development domain includes perceptual development, or how children engage their senses as they grow; motor development, such as walking, running, and grasping; and physical development, such as nutrition and hygiene.



These are fundamental areas of development that support all other domains, whether cognitive, linguistic, emotional, or social. Without proper nutrition, solid sleep, or a safe environment in which to develop perceptual and motor skills, neither play nor instruction will do much to help build children's cognitive, language, and social and emotional skills.

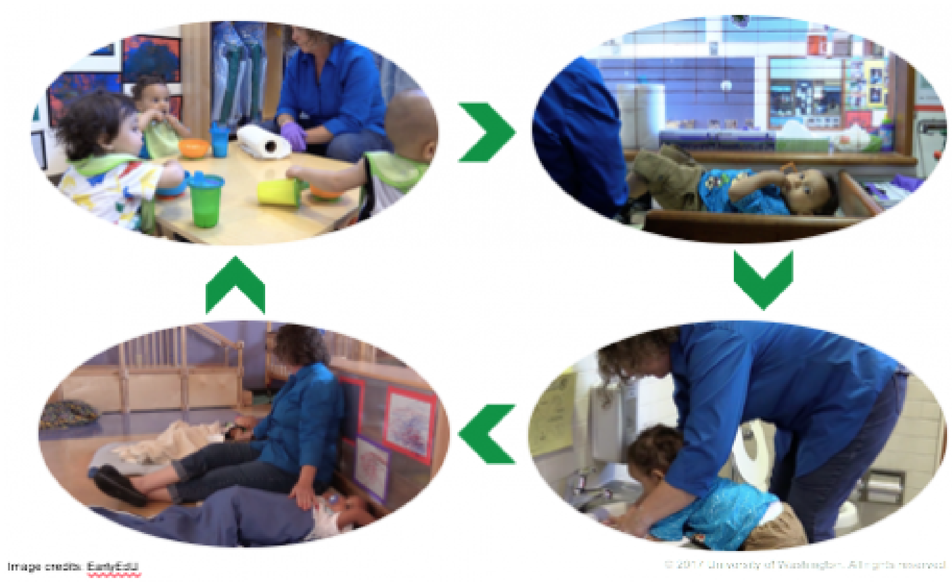
Reference

U.S. Department of Health and Human Services, Administration for Children and Families, Office of Head Start. (n.d.). *Head Start Early Learning Outcomes Framework: Ages birth to five.* [Article]

Cite this resource:
EarlyEdU Alliance (Publisher). (2018). 10-2 Developmental indicators. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

10-3 Learning Throughout the Day

A – Looking At A Day



We have learned a lot about children's development during the past nine sessions. Together we have explored children's social and emotional, cognitive, language, and physical development.

In this session, we've talked about other important skills that infants and toddlers are learning, including self-regulation, problem-solving, and creativity.

Each session we've focused on a domain, but children don't learn one skill at a time. Especially in early childhood, children are learning many skills and concepts during almost every interaction and experience they have throughout the day.

Now, we are going to take all that we have learned about children's development and apply it to a day in an infant and toddler early learning program.

We are going to watch a series of video clips that follow children as they go through everyday experiences, such as mealtime or nap time.

We'll observe what children are learning in each vignette. We'll discuss how the children are building skills across developmental domains and how educators are supporting their learning.

Domains of Development

Remember that each domain relates to and influences the others. Learning and development always happen in context, and rich, supportive learning environments, such as the ones that we are about to observe, help to support the whole child as they grow.

B – Learning In Everyday Experiences

In this lesson, we have talked about how children learn and develop through everyday experiences from mealtime, to nap time, to story time.

Responsive, supportive adults help children learn and build skills by engaging with them, paying attention to their cues, and scaffolding their learning.

By doing so, nearly every experience in a child's life can be an opportunity for growth and skill-building.

Video Gallery

As you watch the following videos think about the skills children are building in a developmental domain and how the educator is supporting children's learning and development in that area.

Video: Tissue Paper Fun (1:19)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=311#video-311-1

Video: Washing Hands (1:41)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=311#video-311-2

Video: Lunch Conversation (1:16)

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Video: Diaper Change (2:25)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=311#video-311-4

Video: Naptime (1:56)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=311#video-311-5

Video: Old MacDonald (0:59)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=311#video-311-6

Video: Singing Together (0:33)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=311#video-311-7

References

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11: Learning and Development in Context: Ages 3 to 5

In this lesson:

11-1 Approaches to Learning

This section covers the infant and toddler Approaches to Learning domain. This domain focuses on how children learn.

11-2 Review Developmental Indicators

In this section, we review how children of different preschool ages behave or perform tasks in each of the seven domains. Note that there are two more domains for preschoolers than for infants and toddlers.

11-3 Learning Throughout the Day

In this section, we view videos of activities that occur throughout a typical day. We watch for skills that preschool children are building and ways that educators are supporting children's learning and development.

11-1 Approaches to Learning

A – Preschooler Skills

Despite having developed an extensive vocabulary and sometimes even some impressive self-regulatory skills and strategies, children's developmental journey continues well into the preschool years, and a preschooler's social-cognitive world makes surprisingly large shifts and changes between ages 3 and 5.

Essential Readiness Skills

In the last lesson, we covered which skills are essential for school and community engagement and how children begin to develop those skills in infancy and early childhood.

Now we'll consider how those skills develop in the preschool years. Preschoolers often get lumped into one group, but the differences between older and younger preschoolers can be vast.

Reflection Point

Take a moment to consider these differences and how they may affect one's behavioral expectations.

Consider these questions:

- What learning and participation skills do you think preschoolers are developing?
- What skills and behaviors do you expect from older preschoolers that you don't expect from younger ones?

B – Approaches to Learning

<table>
<tr><th></th><th colspan="5">CENTRAL DOMAINS</th></tr>
<tr><th></th><th>APPROACHES TO LEARNING</th><th>SOCIAL AND EMOTIONAL DEVELOPMENT</th><th>LANGUAGE AND LITERACY</th><th>COGNITION</th><th>PERCEPTUAL, MOTOR, AND PHYSICAL DEVELOPMENT</th></tr>
<tr><td>▲ INFANT/ TODDLER DOMAINS</td><td>Approaches to Learning</td><td>Social and Emotional Development</td><td>Language and Communication</td><td>Cognition</td><td>Perceptual, Motor, and Physical Development</td></tr>
<tr><td rowspan="2">● PRESCHOOLER DOMAINS</td><td rowspan="2">Approaches to Learning</td><td rowspan="2">Social and Emotional Development</td><td>Language and Communication</td><td>Mathematics Development</td><td rowspan="2">Perceptual, Motor, and Physical Development</td></tr>
<tr><td>Literacy</td><td>Scientific Reasoning</td></tr>
</table>

The Head Start Early Learning Outcomes Framework (HSELOF) preschool Approaches to Learning domain has the same four subdomains as the Approaches to Learning domain for infants and toddlers does.

For example, the Creativity subdomain shows children's growth from responding to adults' prompts to express creative ideas to both communicating and applying their creative skills to tasks and problem-solving with and without prompting from adults.

The four subdomains within the preschool Approaches to Learning domain are: Emotional and Behavioral Self-Regulation, Cognitive Self-regulation, Initiative and Curiosity, and Creativity.

We'll now briefly go over each of these subdomains. As we do, think about how each of these skills is intertwined in children's learning and development.

Emotional and Behavioral Self-Regulation

One of the four Approaches to Learning subdomains is Emotional and Behavioral Self-Regulation. Being able to regulate one's emotions and behaviors leads to greater social acceptance from peers and correlates with higher incidences of unprompted prosocial acts in later childhood.

As children develop in the preschool years, they will gradually be able to regulate their emotions and behaviors with greater independence from adult prompting.

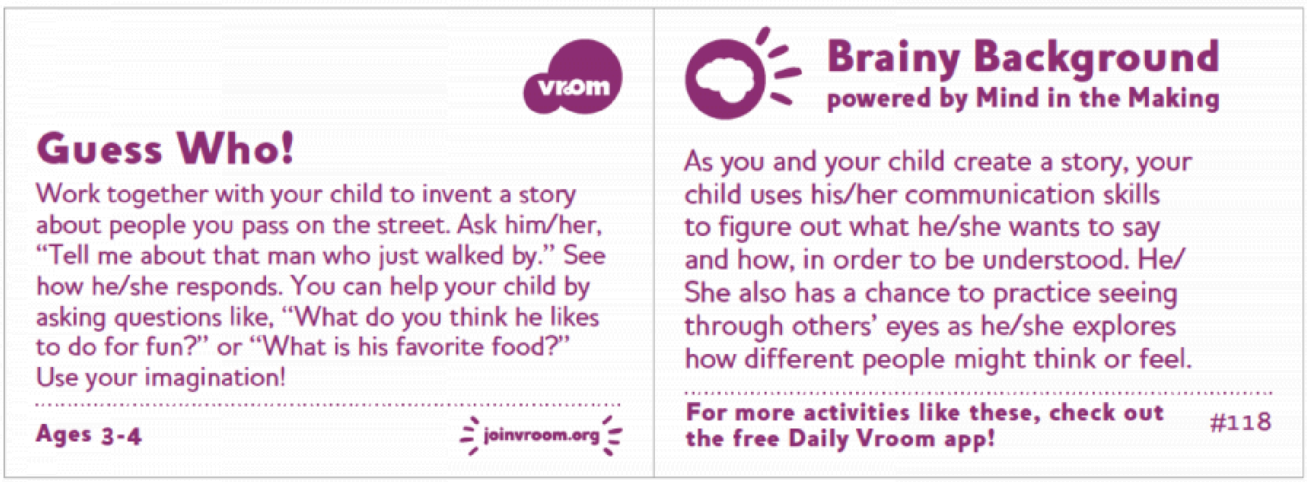
At 3 years, children can generally follow simple rules and routines with reminders (sitting down or taking shoes off when asked to), handle classroom materials properly with adult support (reminders of where materials belong), and need frequent support from adults to manage their emotions, actions, and words (reminder to use gentle touches).

By age 5, children are able to follow rules, routines, and signals and know the rules when asked what they are. They can handle materials appropriately and clean them up, putting them in the correct locations. A 5-year-old will be able to use words and control their actions in response to challenging situations, such as resource sharing, with minimal support from adults.

Older preschoolers also typically show reduced aggression toward others and begin to understand the consequences of their behavior, including describing and predicting the consequences of their behavior on others.

Vroom Tip

Check out this Vroom Tip to get more ideas about how to help build children's emotional and behavioral self-regulation.



View text-only alternative of this Vroom card

Guess Who!

Work together with your child to invent a story about people you pass on the street. Ask him/her, "Tell me about that man who just walked by." See how he/she responds. You can help your child by asking questions like, "What do you think he likes to do for fun?" or "What is his favorite food?" Use your imagination!

Ages 3-4

Brainy Background powered by Mind in the Making

As you and your child create a story, your child uses his/her communication skills to figure out what he/she wants to say and how, in order to be understood. He/She also has a chance to practice seeing through others' eyes as he/she explores how different people might think or feel.

Does it make sense in the context of an early learning environment? And if not, how can you adapt the activity to better fit that environment?

Context of Learning

The Approaches to Learning domain focuses on *how* children learn. Social and emotional development is often overlooked in the context of learning and academic achievement.

We've covered how children's emotional and behavioral regulation skills develop and change in the preschool years, but ***why are these skills important for learning?***

Join the conversation about the benefits of healthy social and emotional development. The learning benefits of emotional regulation skills include, but are not limited to:

- Better focus and attention.
- Lower cortisol, which allows for better retention of learned information.
- Better peer relationships, which helps children feel included and supported.

Reflection Point

Think of a typical learning activity in your early learning program and discuss how children's skills in doing that activity will differ depending on their emotional and behavioral regulation skills. Consider these questions:

- What possible learning benefits will a child with more mature emotional and behavioral regulation skills have when doing that activity?
- How could you use that activity to support a child's emotional and behavioral regulation development?

C – Developing Self-Regulation Skills

Cognitive Self-Regulation

Similar to infants and toddlers, preschoolers are continuing to develop their cognitive self-regulation skills.

At age 3, children frequently engage in impulsive behaviors and often need adult help to control those behaviors.

However, between 3 to 4 years, children begin to focus their attention with adult support, continue working on a task despite small challenges, and can complete simple two-step tasks from memory. Their memory abilities and brain areas are still developing, so instructions that involve more than two steps are difficult for them to retain.

Even with these new skills, you may find that younger preschoolers get distracted or forget the second step in less focused environments, such as a noisy room with many children doing different activities, or in the face of distractions, such as a new person entering the room, drawing their attention away from their current task.

Younger preschoolers also differ from infants and toddlers in their ability to switch gears on a task, such as trying a new way to open a box, when prompted by an adult. Children at this age are starting to respond to adult prompts reliably. This ability is critical for the development of creative problem-solving and task-switching.

Waiting and Persisting

By age 5, children are better able to delay meeting their desires, as indicated in their increasing ability to wait their turn, can independently maintain focus on an activity for up to 15 minutes, and can complete challenging tasks by persisting or seeking help from adults.

They are also beginning to remember some multi-step instructions. This behavior may not be consistent, but it will continue to develop as supporting brain structures continue to mature.

Older preschoolers are also better able to think flexibly and switch gears without adult prompting. One example is using indoor voices inside and outdoor voices outside. This helps them to navigate task transitions more calmly than younger preschoolers.

Video: Executive Function Skills (7:23)

The skills we have just covered are all included under the umbrella term *executive function* skills, which we discussed briefly in Session 10.

Let's watch a video called *Executive Function Skills*. Dr. Juliet Morrison from Washington State's Department of Early Learning and Dr. Gail Joseph, associate professor of educational psychology and director of Cultivate Learning and the EarlyEdU Alliance at the University of Washington, explain executive function skills.

This video is an excerpt of a longer webinar by the former National Center on Quality Teaching and Learning.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=313#video-313-1

Play and Self-Regulation

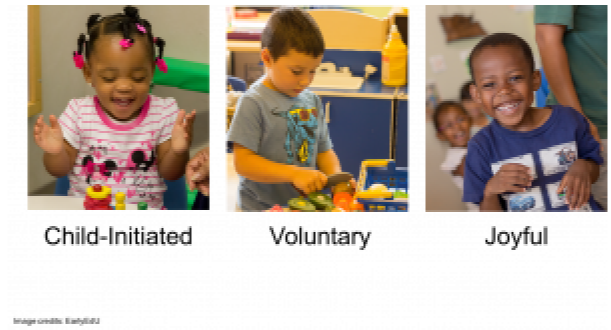
One way to support children's self-regulation and executive-function skill-building is through play. Play provides a context for social growth, learning, and exploration (and makes kids happier, too).

There are many kinds of play, including social or cooperative play, object play, pretend play, and physical or rough-and-tumble play. Instances of social, cooperative, and pretend play surge during the preschool years. Children are now paying extra attention to their peers and attempting to engage them in play behaviors.

Through these play activities, children are learning a wealth of developmental skills, such as strategies for approaching others, social consequences, social problem-solving, and strategies for self-regulation. Play offers a myriad of opportunities to practice social skills and communication, build relationships, and try out ideas in a safe and protected way.

When preschool-age children engage in dramatic play, they learn how to see others' perspectives and practice communicating thoughts and feelings. Through cooperative play activities, such as building blocks or trains, children learn how to coordinate their actions with others and how to navigate social exchanges. Differences of opinion or planning typically arise and provide opportunities for children to learn how to solve social problems.

What Is Play?



What is play? How is it different from other childhood experiences? While we probably all have some idea about what constitutes play, it is, in fact, a complex and multi-faceted endeavor.

Researchers commonly use three characteristics to describe play:

- First, the child often initiates it. When someone else initiates an experience, it can become a moment for instruction rather than play.
- Second, play is voluntary. If a child is required to do something, even if it's an enjoyable experience, it is often no longer considered play.
- Third, play is a joyful experience for the child. If the child experiences stress or discomfort, they are no longer playing. The joyful aspect of play is critical to its success as a learning experience. Joyful play conveys that the child is highly motivated by a positive force to participate at their highest level of achievement.

Since play is both voluntary and child-directed, it is highly individualized. The joyful part of play motivates children to do their best and often encourages them to explore at the edges of their knowledge and abilities. These aspects of play make it an ideal learning tool.

In the context of play, children can learn new physical skills, try out new social roles, and attempt new and difficult tasks, all while staying within their own comfort zone.

Since children set the limits and levels of their play, observing children during play can be a key way to understand the developmental trajectory of a child in multiple domains.

Dramatic Play

Children develop:

- Self-control by staying in character.
- Working memory by remembering the context.
- Mental flexibility by adjusting their behavior.

Play, especially role play and pretend play, builds and promotes the development of children's self-regulation and executive-function skills.

Pretend play may appear to be a relatively simple activity, but it requires a lot of self-regulation. Children must inhibit their behavior to stay *in character*. They also must remember the context they have created and are playing in. And they need to coordinate with others by adjusting their behavior or finding solutions to social problems.

Also, when children are trying to create solutions for social problems, they must be able to regulate their emotions. This is an advanced skill at any age.

In fact, research has found that curriculum that includes play-based learning outperforms other, more instruction-only programs in measures of self-regulation, such as self-control, working memory, and mental flexibility.

Reflection Point

Take a moment to think about what peer social interactions you've observed during play. Think about interactions you've observed between children during play. Think about the ages of the children, the location of the interaction, and the circumstances of the interaction.

For example:

> I was watching one child get upset because another child picked up a toy they were planning to use in their pretend castle. The child who picked up the toy then handed it back to the one who was crying. This illustrates a child practicing inhibiting their emotional response—the second child could have cried, hit, or yelled in response, but they didn't. Handing back the toy meant that they delayed their desire to get the toy and exercised mental flexibility by changing what they were going to do.

Consider this question:

What social, emotional, and cognitive self-regulation skills were children practicing during those social interactions?

D – Practicing Mental Flexibility

Rule-Based Play

In addition to providing many opportunities for dramatic free play, rule-based games like *Simon Says, Red Light Green Light*, or *Head, Shoulders, Knees, and Toes* are terrific ways to help children practice their cognitive skills.

These games all require behavioral control. They must use:

- Working memory: Children must remember the rules of the game

- Attention: Children must pay attention to what the instructor or game leader is saying and doing.

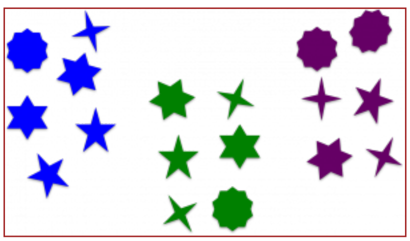
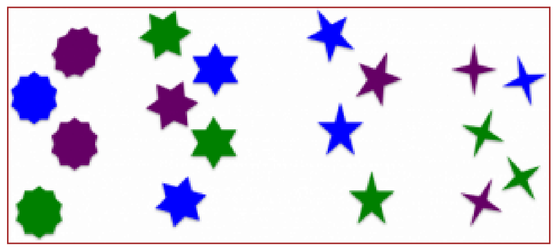
In fact, recent research has found that how well children played a game that required these skills in kindergarten predicted growth across academic domains.

You can even use these games to practice mental flexibility—being able to switch tasks—which requires both emotional and cognitive self-regulation.

E – Code Switching

Rule-Based Games

Remember the activity from before (lesson 9) where you sorted these shapes into different groups?

Some of you grouped by color. Others may have sorted by shape. Still others may have seen both ways to sort.

What other groups, such as sharp edges versus rounded, can you think of?

Sorting and categorizing games like this work much the same way that the other rule-based action games, such as *Simon Says*, work.

Children must consider one rule first, such as sort by color or touch your nose, when the educator says, "Simon says, touch your nose." And then they need to consider another rule, such as sort by shape or *do not* touch your nose, if the educator does not say, "Simon says," first.

These types of rule-based games help children learn to recognize and switch between two sets of rules. This helps to build cognitive flexibility—a part of executive function.

Switching the Rules

Let's play another game that helps build executive function and self-regulation skills.

Interactive: Head and Shoulders

To give you an idea of what it feels like to work out your executive function, we'll play an altered version of the game Head, Shoulders, Knees and Toes.

Try out this interactive game; this interactive will play music, so you may want to use headphones. Or you can view the video alternative: Code Switching Demo (2:27).

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=313#h5p-40

Activity Debrief

How did it go? Did you find that activity easy or difficult?

Why it matters

Researchers asked children to play this same game to measure their executive-function skills, including:

- Inhibitory control—A child must inhibit the dominant response and do the opposite of what the adult says.
- Working memory—A child must remember the rules of the task.
- Focused attention—A child must focus attention on the directions that the adult gives.
- A recent study found that how well children did on this task in preschool predicted growth in mathematics. Children's level of proficiency at this game in kindergarten predicted growth in all academic outcomes.

A recent study found that how well children did on this task in preschool predicted growth in mathematics. Children's level of proficiency at this game in kindergarten predicted growth in all academic outcomes.

Video: The Timer (2:47)

In the video, *The Timer*, let's look at an example of a child using executive-function and self-regulation skills in an early learning environment.

As you watch the video, think about: When are the children building executive-functioning skills, including maintaining focus, persisting in an activity, and flexibility in thinking and behavior?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=313#video-313-2

Video Debrief

What skills executive-function skills were children working on? (click to toggle expand or collapse)

Possible Answers

Examples are:

- Attention and Focus—Filtering out ambient noise and responding to an educator while remembering where they were in their pretend play together.
- Persistence—Continuing to play despite interruptions.
- Flexible thinking—Responding to each other's changing ideas of what the state of the pretend play world is. For example, when one child has said that it is nighttime, the other responds by whispering. Then when the whispering child decides that it is daytime, the other child responds by waking up the animals.

An additional question to think about: How might you expect younger students to behave differently? (click to toggle expand or collapse)

Possible Answer

Younger students might be more distracted and unable to react as quickly when peers change the pretend story line. This could lead to disagreements about their pretend play.

F – Executive-Functioning Skills

Initiative and Curiosity

Just as with infants and toddlers, the Approaches to Learning domain also focuses on other skills, such as initiative and curiosity, that help children explore and learn about their world.

By age 3, children have begun to regularly show initiative in their interactions with familiar adults and to maintain engagement in tasks for brief periods without prompting from adults. Their focus and attention have improved, which helps them work independently for increasingly longer periods of time.

Between the ages of 4 and 5, children begin to show more initiative to engage in their preferred activities. They will also demonstrate an increased willingness and capability to work independently.

By age 5, children will regularly engage in independent activities. They will communicate their choices to both adults and other children, and they can identify and seek out the items they need to complete an activity or task.

Let's walk through how the same task might look at different ages:

- Picture 3- to 4-year-old children who want to pretend to be king of a castle. Perhaps they'll recruit a familiar adult's help in finding a suitable castle or the crown and cape necessary to dress up as a monarch. Once they find these items, they may even play on their own for a brief of time.
- In contrast, 4- to 5-year-old children might bypass an adult's help and find a crown and cape on their own. Once they find the items, they might play on their own as king of the castle for a longer period.
- Finally, by 5 years, children might decide that they want to make a crown for a scenario in which they play members of a royal family. They might then seek out scissors, paper, and glitter to make crowns for this activity. They might also try to recruit other children to be members of the royal family.

Curiosity

Along with their initiative, children's curiosity continues to grow. It's no wonder that many developmental psychology researchers call children *little scientists.*

Preschool children are increasing their knowledge-seeking behavior by asking questions.

Young preschoolers primarily seek information with the help of adults by asking questions or trying out new ideas after consulting with adults about their plans.

As they mature, children will establish more independent information-seeking behaviors. They may find a new rock or leaf and examine it in multiple ways on their own before asking an adult about the item.

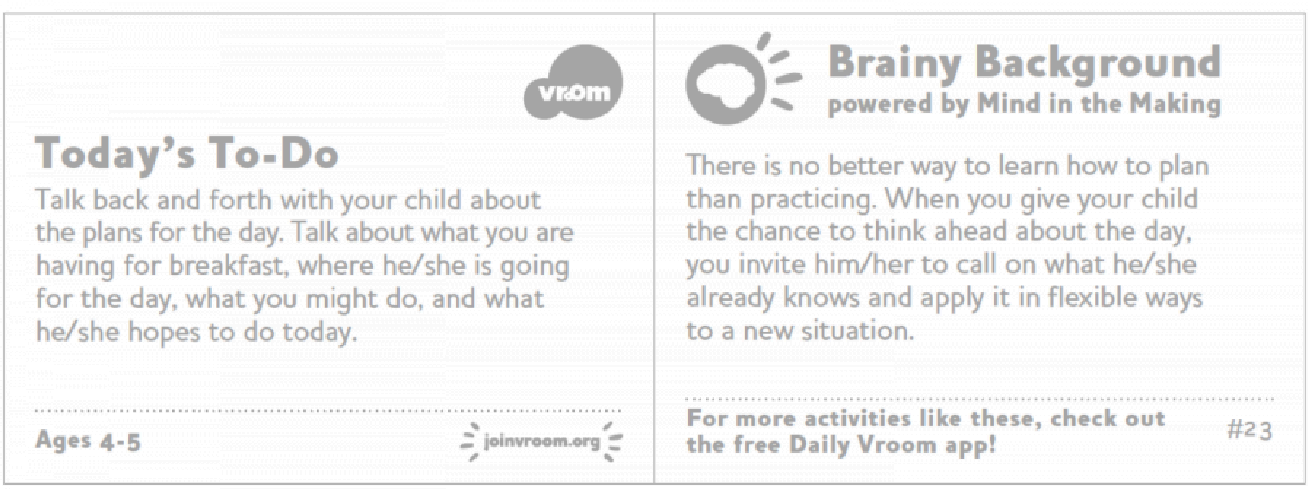
They also begin to seek out challenges more often. They have the confidence to take on new experiences despite the difficulties. This is especially the case if children have the social and emotional confidence to take on challenges, plus confidence in their self-regulation skills.

Self-regulation skills reduce the stress associated with failure and this give children the tools they need to face increasingly difficult challenges.

Vroom Tip

Check out this Vroom Tip to get more ideas about how to help build children's curiosity about the world.

Does it make sense in the context of an early learning environment? If not, how will you adapt the activity to better fit that environment?



vroom

Today's To-Do

Talk back and forth with your child about the plans for the day. Talk about what you are having for breakfast, where he/she is going for the day, what you might do, and what he/she hopes to do today.

Ages 4-5

joinvroom.org

Brainy Background

powered by Mind in the Making

There is no better way to learn how to plan than practicing. When you give your child the chance to think ahead about the day, you invite him/her to call on what he/she already knows and apply it in flexible ways to a new situation.

For more activities like these, check out the free Daily Vroom app!

#23

View text-only alternative of this Vroom card

Today's To-Do

Talk back and forth with your child about the plans for the day. Talk about what you are having for breakfast, where he/she is going for the day, what you might do, and what he/she hopes to do today.

Ages 4-5

Brainy Background powered by Mind in the Making

There is no better way to learn how to plan than practicing. When you give your child the chance to think ahead about the day, you invite him/her to call on what he/she already knows and apply it in flexible ways to a new situation.

Creativity: Communicating Ideas

Young preschoolers begin to express their creative ideas in words or actions with adults' help.

For example, a child might want to build something out of blocks, and an educator might ask questions like this: "What do you want to build?" "How tall will it be?" "What is it for?" "Will animals live inside?" With these questions, educators help children convey their creative ideas.

As children mature, they gradually use these models of communication to more independently express their creative ideas.

By age 5, children can express their creative ideas independently and they begin to ask questions about activities, demonstrating how they are thinking creatively about them. Along with the development of their executive functions and mental flexibility, they begin to display creative problem-solving.

Creativity: Imagination

One specific creative arena in which children develop is in the use of their imagination.

Between ages 3 and 4, children often use imagination in play and begin to communicate imaginative thoughts and plans to other children and adults.

Between ages 4 and 5, children's imagination becomes more complex. They develop elaborate stories with each other and adults during play.

By age 5, children's imagination is seemingly boundless. They regularly engage in social and pretend play with other children. They use their imagination to turn everyday objects into magical tokens and fantastical beasts. They combine various materials to discover new ways to create works of art.

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Cite this resource:
EarlyEdU Alliance (Publisher). (2018). 11-1 Approaches to Learning. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

11-2 Developmental Indicators

Review: Developmental Indicators

In lesson 10, we reviewed all the developmental domains, subdomains, and indicators that we have covered in the last nine sessions.

You will use two learning activities to review how children of different ages behave or perform tasks in each of the preschool domains:

- Approaches to Learning
- Social and Emotional Development
- Language and Communication
- Literacy
- Mathematics Development
- Scientific Reasoning
- Perceptual, Physical, and Motor Development

These activities will resemble the activities from last lesson, but the content will be different.

First, we'll review the preschooler indicators.

Second, we'll consider how older and younger preschoolers differ on the indicators in the different subdomains.

Just as in a past lesson, watch a series of video clips following children throughout a typical day. This time the children will be preschoolers. Then, you will again identify the skills children are building during these everyday events using the framework structure.

References

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Office of Head Start (n.d.). *Head Start Early Learning Outcomes Framework: Ages birth to five.* [Website]

Cite this resource:
EarlyEdU Alliance (Publisher). (2018). 11-2 Developmental indicators. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

11-3 Learning Throughout the Day

A – Learning Throughout the Day

In this lesson, we have discussed how preschoolers' ability to control themselves (self-regulation) and their ability to engage with the world and others matures considerably between 3 and 5 years of age.

Children learn these skills together, which helps them develop complex actions. They also do not learn these skills as sudden epiphanies—there are no *aha* moments.

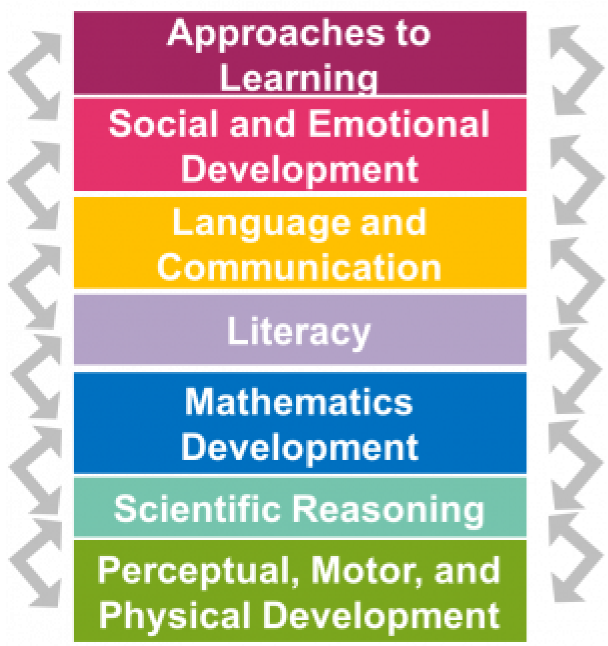
Instead, children gradually use skills more consistently. One day, they may regulate their emotion well during one social encounter, only to drop to the floor in a tantrum at the next social encounter. Eventually, and with adult guidance, children begin to regulate their emotions more consistently throughout different events.

Every event of every day is an opportunity for children to practice and further develop these skills.

B – Domains of Development

During the previous lesson, we watched infants and toddlers throughout key activities in their day. In this lesson, we'll view videos from different preschool environments throughout the day.

Keep in mind how the skills that you are observing in the videos relate to skills in other domains. Learning and development always happen in context, and rich, supportive learning environments, such as the ones that we are about to observe, help to support the whole child as they grow.



Video Gallery

As you did the last lesson, think about the skill-building moments in each video and how educators are supporting the children in their development.

Video: Whose Shirt? (2:21)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=317#video-317-1

Video: Transitions (1:35)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=317#video-317-2

Video: Pass the Bananas (3:55)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=317#video-317-3

Video: Building Towers (3:14)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=317#video-317-4

Video: Shapes on the Light Table (2:43)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=317#video-317-5

Video: Talking about Animals (3:15)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=317#video-317-6

Video: Countdown to Cleanup (2:04)

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=317#video-317-7

Reflection Point

In this section, we have talked about how preschoolers learn and build skills through their everyday experiences. Now, take a moment to consider how children's behaviors in these videos differ from those of the infants and toddlers who we watched during routine activities in last lesson.

- Did children engage in similar activities? If so, how did educators interact with older and younger children differently, even when children were engaging in the same tasks?
- What are some expectations that you have for infants, toddlers, younger preschoolers, and older preschoolers during everyday tasks?
- Did you notice any differences in how educators talked to older and younger children?

References

Cultivate Learning (Producer). (2017). *Building towers*. University of Washington. [Video File]

Cultivate Learning (Producer). (2017). *Countdown to cleanup*. University of Washington. [Video File]

Cultivate Learning (Producer). (2017). *Pass the bananas*. University of Washington. [Video File]

Cultivate Learning (Producer). (2017). *Shapes on the light table*. University of Washington. [Video File]

Cultivate Learning (Producer). (2017). *Talking about animals*. University of Washington. [Video File]

Cultivate Learning (Producer). (2017). *Transitions: How should I do it?* University of Washington. [Video File]

Cultivate Learning (Producer). (2017). *Whose shirt?* University of Washington. [Video File]

Cite this resource:
EarlyEdU Alliance (Publisher). (2018). 11-3 Learning throughout the day. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

12: Child Development in the Context of Family

In this lesson:

12-1 Relationships and Engaging Families

This section covers the importance of engaging families.

12-2 Multiculturalism

Next, we talk about the impact of multiculturalism on children's development. We talk about the importance of culture, how to honor different cultures in the early learning environment, and how stereotypes based on culture begin to form.

12-3 Screens and Young Children

This section shifts directions to highlight the research on how screen media affects children's development.

12-1 Relationships and Engaging Families

A – Parents As Children's First Teachers

Parents and families are children's first and most important teachers. As you have learned throughout this course, children learn so much from caregivers in their earliest days and months of life. Language, social cognition, and the brain are rapidly developing in these early days.

Image credits: EarlyEdU

In addition to these foundational skills, parents and families teach children about their unique family history and their culture and customs in a way that no one else can. Although some of this teaching may be explicit, much is implicit and conveyed as families celebrate holidays and enjoy one another's company.

From the first day of life, parents not only have the opportunity to teach children about the world, but they also are beginning to form strong bonds with their children. Strong early relationships give children the confidence to explore their world and the encouragement to learn new things. These relationships will persist long after formal schooling ends.

Why Engage Families?

Given that children spend so much of their time with parents and families and given that children learn so much in the early years, parents and families are natural partners for educators. But what are some of the specific benefits of engaging families in children's education?

Researchers have found a variety of positive effects of increased family engagement on children's learning. For example, children with meaningfully engaged families tend to have fewer behavior problems in school, demonstrate increased motivation and persistence in tasks, have better relationships with their peers, and show better academic preparedness to enter kindergarten.

In addition to these short-term effects, increased parent engagement has been shown to offset the negative academic effects that are often associated with living in a low-income household. Coming from a low-income household has been associated with fewer experiences that might increase skill development and academic success. Research, however, demonstrates that family engagement may override these negative factors. Whereas children from low-income households typically start behind and stay behind their peers from middle- and upper-class households, when families become engaged in children's education and school, they can eliminate this disadvantage.

Because the effects of family engagement are far-reaching—from children's behavior in the early learning setting to their attitude toward challenging situations and even their later academic success—family engagement becomes critical for educators. It not only increases the effectiveness of the school environment for each child, but it also creates a better school environment for all children.

Interactive: Learning in Informal Environments

This is an interactive! Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=319#h5p-26

What is Family Engagement?

Read the definition of family engagement from the Office of Head Start:

> "Family engagement is a collaborative and strengths-based process through which early

childhood professionals, families, and children build positive and goal-oriented relationships. It is a shared responsibility of families and staff at all levels that requires mutual respect for the roles and strengths each has to offer. Family engagement focuses on culturally and linguistically responsive relationship-building with key family members in a child's life."

- What words and phrases are powerful?
- Which ones are surprising?

Video: Supporting Family Engagement (1:54)

This video, *Supporting Family Engagement*, features a mentor-educator, identified in this video as a technical assistance coordinator.

As you watch, consider how this mentor-educator talks about strategies for engaging families.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=319#video-319-1

Video Debrief

What strategies did this educator mention for engaging families? (click to toggle expand or collapse)

Possible Answer

After watching the video, what strategies did this educator mention for engaging families?

We considered the following as possible responses:

- Learning about families' passions and struggles.
- Working to make sure families feel welcome, cared for, and loved.
- Preparing families intentionally during enrollment for children's first day.
- Creating a friendly culture.

B – Building Relationships with Families

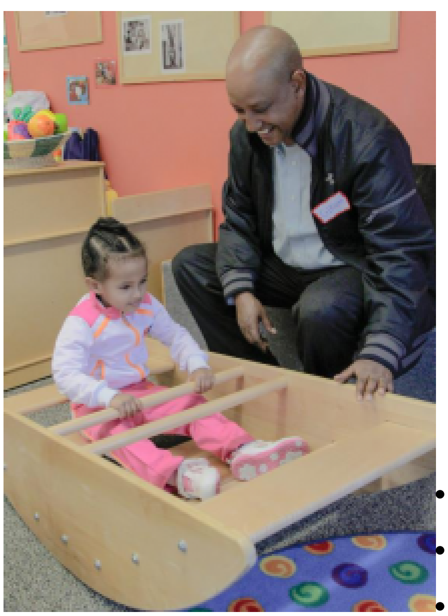
Strong relationships with families must be authentic. Both parties need to come together to focus on their common goal—the well-being of the child. In authentic partnerships, both parties are equals, though they may have different areas of expertise.

An important aspect of engaging families is open and honest communication. Invite parents to tell you about their children and to share their effective strategies for encouraging their children's learning and development—what works and what does not. Being responsive to families' suggestions lets them know that you are listening and value their opinion.

Through communication, work to build consistency between the early learning program and home. Children thrive and feel safe when they have consistency in their lives. A program's willingness to build consistency also lets families know that a genuine partnership is valued.

Finally, be sure to create a welcoming environment for families. This means welcoming families into the early learning environment and also accepting families of all backgrounds and cultures.

What's Special About Fathers?



Fathers are often more involved in child rearing than fathers were in the past. They may prepare meals, read to children, and help with homework.

However, many fathers report that public opinion still considers them a babysitter or temporary caregiver for children instead of an involved parent.

Recent research demonstrates that fathers make important contributions to children's development. When fathers are more engaged, children have:

- Better language and cognitive skills.
- Increased academic readiness.
- More emotional security.
- Better friendships.

To send a message that fathers are welcome in early learning settings, educators might display photos of both mothers and fathers interacting with children, make sure to talk with both mothers and fathers, and communicate that they recognize fathers as equal in parenting tasks.

Video: Welcoming Families (3:56)

Based on the information on multiculturalism, consider these questions:

- How did the family advocate talk about helping diverse families connect with the program?
- What processes does this program use to make sure families feel welcome?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=319#video-319-2

Video Debrief

What are some ways that the family advocate talks about helping diverse families engage with the program?(click to toggle expand or collapse)

- Families that do not speak English can communicate in their home languages.
- Staff members who share the cultural and linguistic backgrounds of families help with communication.
- Families have opportunities to participate in the early learning program.

What processes does this program use to make sure families feel welcome? (click to toggle expand or collapse)

- Accepting families *where they are at*
- An orientation, or welcome, meeting
- Invitations to participate in the early learning environment and to meet educators, program staff, and management
- A tour of the building

Reflection Point

Answer the following questions for review:

- What is family engagement and why is it important?
- Name one effect of family engagement on children's development (hint: there are five possible answers).
- What are two strategies for engaging families in their children's learning?

C – Using Strengths-Based Approaches

An important part of engaging families is honoring their knowledge, expertise, and contributions. When educators adopt strengths-based approaches with families, the relationship grows.

Strengths-based Attitudes

Strengths-based approaches are grounded in positive attitudes about the families you are working with. These attitudes will inform your opinions, judgments, and behaviors. Some examples of strengths-based attitudes for educators include these from the Office of Head Start's National Center on Parent, Family, and Community Engagement:

- Families are the first and most important teachers of their children.
- Families are our partners with a critical role in their family's development.
- Families have expertise about their child and their family.
- Families' contributions are important and valuable.

Video: Vroom: Everyone Has What It Takes To Be a Brain Builder! (2:10)

This video, produced by Vroom, is based on the idea that parents already *have what it takes* to be a good parent. It's an example of a strengths-based approach.

Think about strengths-based approaches based on the information you see in the video.

- What is the message for parents?
- How do parents react to the message, and why do you think they react that way?

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=319#oembed-1

Watch Everyone Has What it Takes to be a Brain Builder! from Vroom on YouTube.

Video Debrief

What messages did you see? (click to toggle expand or collapse)

Possible Answer

- What was the message for parents? The message is: You already have what it takes.
- How did parents react to the message, and why do you think they reacted that way?
  - One possibility is that parents can feel overwhelmed and unprepared for the massive and important task of raising a child.
  - After hearing the message, parents felt empowered to know that they already have what they need to support their child.

Reflection Point

Consider the following questions:

- What environmental factors may influence whether parents feel like *good parents*?
- Describe one strengths-based approach that you use with families in your program.
- Name one more strengths-based approach that you can use in your teaching practice this week.

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12-2 Multiculturalism

A – Everyone Has A Culture!

We all come from somewhere and identify with at least one culture.

Many of us identify with more than one culture. Perhaps your grandparents were immigrants and taught you about their home country, but you may also affiliate yourself with the customs and traditions of a particular religion or the culture in which you grew up.

Each person's personal history informs their cultural identity. This culture becomes transmitted across generations and evolves.

Culture can determine everything from the language we speak to the holidays we celebrate, the foods we eat, and the clothes we wear.

Culture can also influence child development. Different cultures have different beliefs about childrearing practices and even different beliefs about what children should learn as they grow. For example, in some cultures, toddlers are expected to feed themselves. In other cultures, parents feed toddlers.

Cultural Learning Begins In Infancy

Children begin learning about their culture from the moment they are born. As you have learned during this course, infants are beginning to learn the sounds of the languages to which they are exposed, and newborn infants are able to imitate the facial expressions of the adults around them.

Children's cultural learning continues throughout childhood. Children are keen observers of the world, and they learn about culture and customs by watching the adults around them.

For example, if children observe that each time they walk into the library with their family their mother starts to whisper, the child learns that in their culture, it is proper to whisper in a library. Similarly, a child who notices that each mealtime begins with a prayer learns that part of their culture is to pray before mealtime.

As children develop, they are increasingly able to participate in cultural practices. They might help make the special meal, attend a ceremony for the first time, or even explain the cultural belief to a friend.

Language and Culture

Image credits: EarlyEdU

Language plays a critical role in the development of cultural identity.

Culture often determines whether children will grow up speaking one or more languages. If children's parents come from two different cultures—and two different languages—then a child might grow up in the same way. If parents share a culture, then children are likely to speak the same common language as their parents.

Not only is a family's home language often determined by their culture, but many aspects of culture are transmitted through language. Native American communities, for example, hold all ceremonial events in their heritage language. In tribal communities where heritage languages are endangered, many communities engage in efforts to preserve the language and thereby preserve many important aspects of their culture.

Identity Development

Identity is a multi-faceted concept. It includes:

- Who you are
- What you value
- What directions you pursue in life.

Since culture influences so much of who we are, what we value, and the directions we pursue in life, it's important to consider the identity of the children and families with whom we work.

Many theorists, like Erik Erikson, believe that identity is not really formed until adolescence.

Nevertheless, children's early years play an important role in providing a strong foundation for their later identity formation.

Children's social and emotional connections during childhood are important for later identity formation. Children who have better attachment relationships with their families have an easier time figuring out their identities as teenagers. Researchers think this is because children with secure attachments to their family can voice their own opinions and seek guidance from family as they form their identities. Thus, early social and emotional connections are an important part of supporting children's identity development.

It's also critical for parents to expose children to elements of culture that they value. Over time, children will include these customs and traditions into their cultural identity.

Remember that even though children are just beginning their cultural journey, children's families have already formed their identity.

Honoring Cultural Identities

Image credits: EarlyEdU

Once children have begun to form a cultural identity, it is important to help them honor this in their early learning setting. Early childhood educators can help to reflect the cultural diversity of children in their program by including books from other cultures, displaying signs with multiple languages, and celebrating a variety of holidays and traditions throughout the year.

Educators can also work to pronounce each child's name accurately, thereby honoring their heritage. They can learn to say a few words in each child's language. Again, this honors the culture and lets every child know that they are important and valued.

Remember that families are an asset for developing a culturally relevant program. Families can provide books, translations, and information about holidays. Families can also provide in-person support to the program if they are welcome to visit.

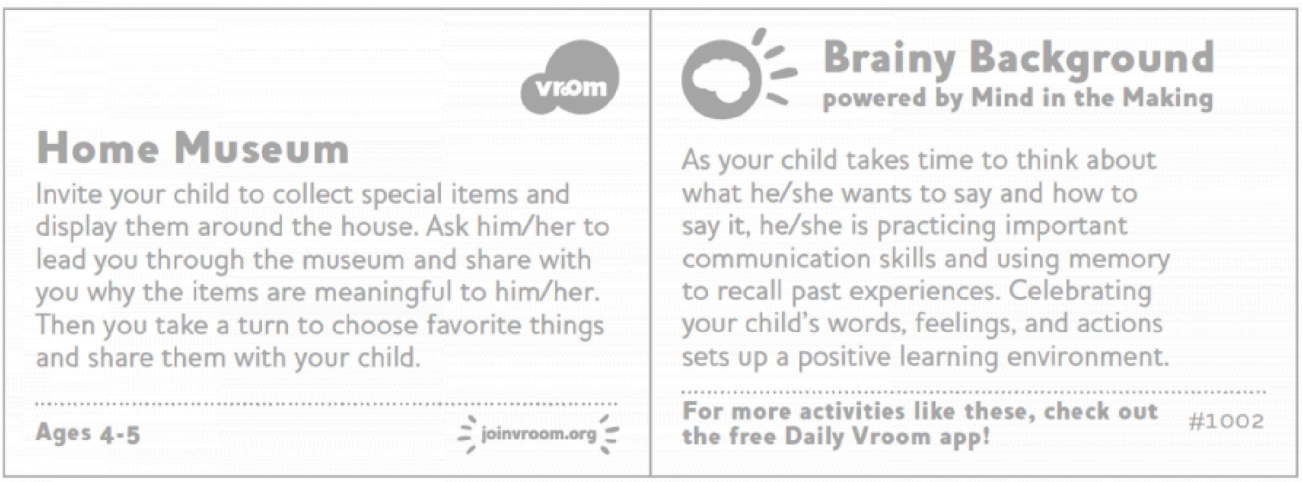
If you are in an early learning environment with children who speak multiple languages, teach children to communicate across languages. This may be through gestures at first and simple words later. This not only builds cultural understanding, but it also develops children's creativity.

Honoring each child's cultural identity at their early learning program not only makes children feel welcome and at home, but it also demonstrates that the program values the diversity of its families.

Vroom Tip

Check out this Vroom Tip to get ideas about how to support multiculturalism. This activity can be given to families at the beginning of the year to help populate the early learning program with culturally relevant items.

Does this tip make sense in the context of an early learning environment? If not, how will you adapt the activity to better fit that environment?



View text-only alternative of this Vroom card

Home Museum

Invite your child to collect special items and display them around the house. Ask him/her to lead you through the museum and share with you why the items are meaningful to heim/her. Then you take a turn to choose favorite things and share them with your child.

Ages 4-5

Brainy Background powered by Mind in the Making

As your child takes time to think about what he/she wants to say and how to say it, he/she is practicing important communication skills and using memory to recall past experiences. Celebrating your child's words, feelings, and actions sets up a positive learning environment.

Reflection Point

Use these points to consider the importance of honoring culture in early learning environments:

- Describe the diversity of cultures represented in your early learning program.
- What is one new way to honor culture in your program?
- What are the similarities between family engagement and multiculturalism?

B – Stereotypes in Childhood

Interactive: The Development of Stereotypes

This is an interactive! Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=321#h5p-28

The last stage in this timeline is that a short time after children learn about stereotypes, they may state that they have changed their interest in subjects according to the stereotype. For instance, a girl may say, "I don't do math."

The danger is that these stereotypes and conformity to them may cause children to experience an opportunity gap or even influence children's academic performance. Boys and girls do not innately have different math abilities, but internalizing the stereotype has negative consequences. For both genders, children who had stronger implicit math self-concept or the internalized idea that *I'm a math person* tended to do better on math tests.

Interactive: Long-term Effects of Stereotypes

This is an interactive! Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=321#h5p-27

Even though this research examines the effects of stereotypes in older children, it is important to understand and combat the roots of stereotypes to prevent children from internalizing them.

Combating Stereotypes

The good news is that stereotypes are not innate or fixed, and we can give all children opportunities to learn.

For example:

- We can expose children to mathematicians who don't fit the stereotype of an old white man. We can introduce role models in the community who embrace math and who may give children something to which they can aspire.
- We can expose children to a variety of experiences regardless of their culture, such as giving every child the opportunity to cook for the group, even if it's pretend cooking.
- We can discuss and celebrate cultural and other differences so that children do not think these topics are off-limits for discussion.
- We can make sure not to reinforce differences unintentionally. Instead of saying, "Good morning boys and girls!" we can say, "Good morning children!"

Reflection Point

Use these questions to think about stereotypes:

- What stereotypes do you think affect the children in your early learning program?
- How can you provide positive counterexamples to combat stereotypes?

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12-3 Screens and Young Children

A – Screens and Young Children

Screens are increasingly a presence in children's lives, particularly since children's families are using screens. So it's important content to consider as we think about children's development in the context of the family.

The most recent screen-use data indicates that children have access to screens everywhere.

- Children birth to age 8 spend almost **2 hours** with screen media per day.
- **36**% of parents report that the television is on all or most of the time at home.
- **72**% of children have used mobile media, such as tablets and smartphones.
- **58**% of parents have downloaded an app for their child.
- **27**% of screen media exposure is with computers, tablets, and cell phones.

American Academy of Pediatrics

To guide parents' and caregivers' thinking, the American Academy of Pediatrics has made recommendations for children and screens.

The latest guide, released in 2016, makes these recommendations:

- Children younger than 18 months should avoid screen time, except video chats.
- For children from 18 months to 5 years, parents should choose high-quality programming and interact with children around the screen to help them understand the content.

Two additional recommendations are:

- For children older than 6 years, parents should set limits on the use of screens and the type of screens and parents should make sure that screens do not replace other critical activities for children like sleeping or playing outside.
- Parents should designate screen-free times and locations, such as meal times and bedrooms.

In the rest of this section, we'll briefly explore some of the research that guided the American Academy of Pediatrics' position on this topic.

Reflection Point

Use these questions to discuss the American Academy of Pediatrics' recommendations about screen time:

- Did you know that the American Academy of Pediatrics has guidelines about screen time?
- What parts of these guidelines will be easier or more challenging for families to implement?

B – The Video Deficit Effect

Lots of research has demonstrated that children learn better from live interactions than they do from screen media, an effect known as the *video deficit.* Even when children are capable of learning something from video, research typically shows that children learn better and faster through live interactions. This trend continues through childhood.

Image credits: EarlyEdU

We talked about one example in lesson 4 on early language development. When 9-month-old children listened to a native Mandarin speaker in person, they learned the sounds of Mandarin, but when they heard the same speaker on DVD or audio CD, they showed no evidence of learning.

Other research examined infants' ability to imitate actions they saw demonstrated in person or on video. Both the in-person and video groups imitated the action, but the group who was learning from the video required double the number of demonstrations before they could imitate from video. These 1- to 2-year-olds learned much faster from the live person.

One final example looked at children's ability to learn words from videos or a combination of videos and live interactions. Children younger than 3 years were unable to learn from the video by itself, but they did learn new words when they interacted with an adult around the screen. The adult demonstrated the actions on the screen, labeled things, and provided the child with social interaction.

Although children older than 3 years were able to learn words from the video alone, they did not show the same depth of learning as children who had the adult interaction in addition to the video. Children learned better when they could interact with an adult in addition to watching the video.

Video Chats

While research indicates that children seem to learn from screens differently than they learn from live interactions, there is one exception—video chat.

Video chat is an interesting exception to screen time and one that the American Academy of Pediatrics acknowledged in their recommendations because even though children are using a screen, video-chat technology allows children to experience a live interaction with the person on the other side of the screen.

When children use video chats, they engage a genuine back-and-forth interaction with the person on the other side of the screen. The person can talk to them and respond accurately to them. Eye gaze across video chats is imperfect because of the relative positions of the screen and the camera, but video chats have many of the other elements that researchers think are critical to children's ability to learn from live interactions.

Indeed, children seem to learn from video chats just like they learn from live interactions. Researchers taught children new words either through video, video chat, or live interactions. Two-year-olds learned the novel words from video chat just like they did from the live interactions. They did not learn from the video. This supports the idea that video chats should not be placed in the same screen category as traditional video.

Talking Toys

As we start to think about what interacting with a child looks like, a recent study tells us a little bit about what it's not.

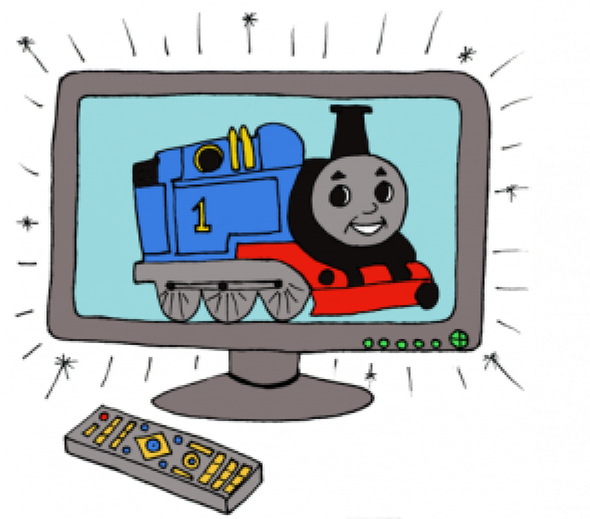


Image credit: Head Start Center for Inclusion

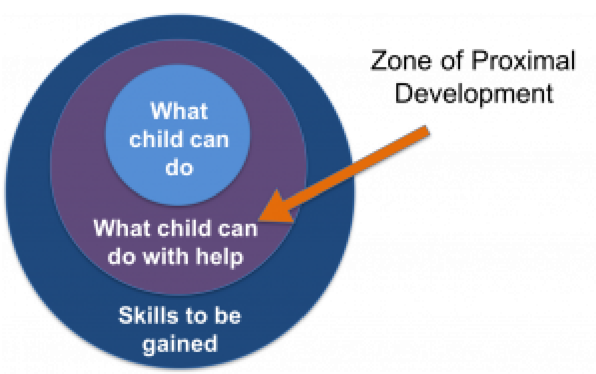
Professor Anna Sosa at Northern Arizona University was interested in talking toys—toys that label objects. This particular study used a talking farm, a baby cellphone, and a baby laptop. The researcher looked at parent-child interactions while children were playing with one of the talking toys.

Sosa found that when a child was playing with the talking toy, parents said fewer words and fewer content-specific words. Children also used fewer words, and the parent and child had less back-and-forth interaction.

The researcher noted that when something else, such as a toy, was doing the talking, parents seemed to let toy talk and respond for them. In essence, it's as if the talking toy turns off the parent-child interaction.

The talking toy, although using words and making noises, cannot take the place of a real-life social interaction for children. The toy isn't social, the parent is. This is important as we start to think about optimal parent-child interactions around technology.

Scaffolding



As we discussed in lesson 1, the psychologist Vygotsky talked about the Zone of Proximal Development. This zone of children's knowledge represents skills that children can do or learn with help. In this zone, older or more capable people can help children acquire new skills by pushing them beyond their natural boundaries and therefore expanding their knowledge.

When adults support children this way, it is called *scaffolding*. Scaffolding is critically important to children's ability to learn from screen media. Adults can help children:

- Make sense of the two-dimensional world of screens and draw parallels to the real world. For example, adults might say, "Do you see the dog on the screen? That's just like Fido in our house. The dog on the screen is brown, and Fido is brown, too. Do you think the dog on the screen likes bones as much as Fido does?"

- Understand content by explaining new vocabulary words, helping children understand the actions of characters, or answering children's questions.
- Navigate the fine-motor tasks related to technology. Computer mice are particularly difficult to operate.

Media Scaffolding

We'll use the content from the next two videos to discuss scaffolding around media. While watching the videos, consider: What do you notice about how the educators scaffold children's media use?

Video: Your Turn (0:12)

This video called *Your Turn*, shows an educator scaffolding content and turn-taking around a tablet.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=323#video-323-1

Video: Restarting the Computer (1:59)

The video, *Restarting the Computer*, shows an educator scaffolding the technical aspects of using a computer, such as restarting and waiting for it to reboot.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=323#video-323-2

Video Debrief

What did you notice about how the educators scaffolded children's media use?

(click to toggle expand or collapse)

Possible Answer

We considered the following possible answers:

- Counted to help a child wait while the computer rebooted.
- Talked about what to expect with the computer restart, saying, "You'll

see a black screen."

- Prompted turn-taking with the tablet in a rehearsed answer.

Next, think of at least two more techniques you might use to scaffold children's media use. Think of one strategy to help children with the technology and one to scaffold content. Your ideas will depend on your own experiences, but possible answers are:

- Use pictures with steps showing how to use computers and tablets.
- Have an adult model use of the computer when introducing the computer area.
- Provide a sign-in chart.
- Have educational games, apps, and web pages preloaded and easy to access.

Reflection Point

Use these questions to review.

- What are two recommendations the American Academy of Pediatrics makes for screen media and children?
- Why is scaffolding screen media important for children's learning?

C – Technology In Adult Lives

Just as technology is increasingly present in children's lives, technology is also present in the lives of parents. Researchers have been curious about how adult use of technology affects children's development.

In general, new research finds that when parents use digital technology around children, the quality and quantity of parent-child interactions decreases. Specifically, there are fewer parent-child interactions overall and lower responsivity to children's bids for attention when parents use mobile technology in front of children. Some research has even suggested that parents respond to children with more hostility when the child interrupts their use of technology.

To the extent that children model their actions after the actions they see, children are also forming norms about how and when to use technology by watching their parents. In sum, when we think about the effect of screens on children's development, we need to consider parents' use of technology in addition to children's use of technology.

Learning From Screens

Increasingly, researchers are beginning to understand that children learn from screens in the same way they learn in other contexts.

That is, children learn:

- When they are **actively involved**.
- When they are **engaged**.
- In **socially interactive** contexts.
- When the content is **meaningful**.

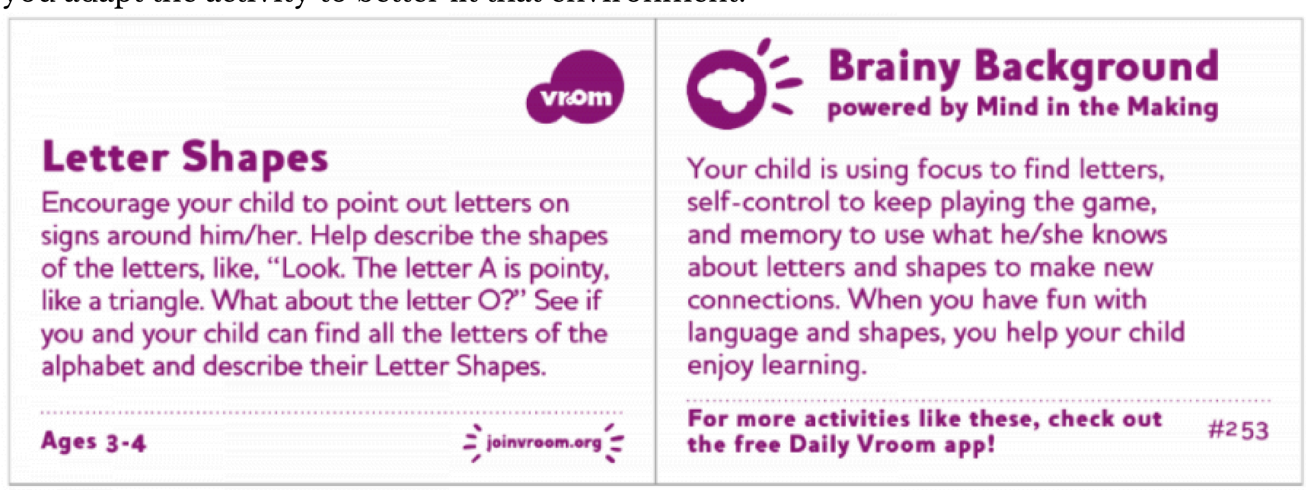
Using these principles, we can understand why technologies like video chat work so well—it satisfies all of these criteria! Similarly, when adults scaffold children's media experiences, they create the ideal scenario for children's learning.

Being able to develop abstract principles like these is helpful because research cannot keep up with new technologies, much less with particular apps and programs. These principles can help us evaluate new technologies and create quality learning experiences for children.

Vroom Tip

Check out this Vroom tip to get more ideas about how to support young children's development. These same kinds of questions can be used to guide adult interactions with children around screens.

Does this tip make sense in the context of an early learning environment? If not, how will you adapt the activity to better fit that environment?



View text-only alternative of this Vroom card

Letter Shapes

Encourage your child to point out letters on signs around him/her. Help describe the shapes of the letters, like, "Look. The letter A is pointy, like a triangle. What about the letter O?" See if you and your child can find all the letters of the alphabet and describe their Letter Shapes.

Ages 3-4

Brainy Background powered by Mind in the Making

Your child is using focus to find letters, self-control to keep playing the game, and memory to use what he/she knows about letters and shapes to make new connections. When you have fun with language and shapes, you help your child enjoy learning.

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13: Trauma and Resilience in the Early Years

⚠ Trigger Warning

In this lesson, we talk about difficult topics: childhood trauma and chronic, toxic stress.

As you go through this lesson, notice the emotions that you may be feeling, or the reactions to the material that you are having. As you work through this material, be patient and kind with yourself, and others in the class.

Even if you have not personally experienced trauma, thinking about and sitting with pain that others have gone through is challenging and emotionally taxing. Please feel free to take a break at any time.

In this lesson:

13-1 Toxic Stress

In this section, we cover how toxic stress is different from other types of stress and how adults can support children's development and provide a buffer from the effects of toxic stress.

13-2 Adverse Childhood Experiences

In this section, we cover adverse childhood experiences, the long-term effects of these experiences, and what we as early childhood educators can do to help buffer their negative long-term effects.

13-3 Trauma-Informed Care

In this section, we address what trauma-informed care is and consider suggestions for implementing it in an early learning setting.

13-4 Resilience in the Early Years

In this section, we cover resilience in early childhood.

13-1 Toxic Stress

A – Types of Stress

Stress Is a Continuum

We will talk about toxic stress in a moment, but before we do, take a moment to think about what the difference is between normal, everyday stress and toxic stress.

Not all stress in a child's life is toxic. In fact, some stress is good stress. Positive stress is an important part of healthy development. Positive stress is the result of common experiences in a child's life like starting school or going to the doctor's office to get a shot.

These stressful experiences don't last very long and are eased by the presence of a supportive adult. These early life experiences with positive stress help children learn how to cope with stressors that they will face throughout their life.

Tolerable stress is a longer stress response to a more intense situation like the loss of a loved one or experiencing a natural disaster like a tornado. If the child has the help of a supportive adult to buffer the stress, then these situations don't necessarily lead to lifelong, lasting effects.

Toxic stress is the result of prolonged experiences of adversity, such as emotional or physical abuse, neglect, exposure to violence, a caregiver who has a mental illness or abuses substances, or the combined effects of poverty in the absence of buffering by an adult.

Toxic stress can have a negative, lifelong impact.

Next, we will watch a short video to help us think more about these terms.

Video: Toxic Stress (4:07)

This Alberta Family Wellness *Toxic Stress* video describes what toxic stress is and how it is different from positive and tolerable stress. It is an overview of the differences between the three different types of stress: positive, tolerable, and toxic.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=325#oembed-1

Watch Toxic Stress from Alberta Family Wellness on YouTube.

Video Debrief

How would you buffer a child's stress? What could you do to support a child who is experiencing a stressful situation? (click to toggle expand or collapse)

Possible Answer

In this video, we learned more about the different types of stressors a child faces in their early years. Research indicates that the presence of a supportive and responsive adult during a stressful situation can help buffer and mediate the stress response. Supportive adults can buffer children's stressful experiences, like a natural disaster, and prevent those experiences from eliciting a toxic stress response. We found the following to be possible responses to the questions:

- Create and provide an environment where children feel safe. This may look different for each child but reminding children that they are safe and telling them that what you are doing to keep their bodies safe can help.
- Be available and responsive, paying attention to children's behavior, listening to what they say, and responding warmly and sensitively to their needs.
- Maintain routines as much as possible. When children are going through a stressful situation, having some anchor like a routine can help them cope.
- Model coping skills like taking deep breaths or a few minutes to calm down after experiencing big emotions and listening to others' points of view.
- Let children practice coping with some stresses like disappointments. If children never have the opportunity to practice their coping and self-soothing skills, then it will be more difficult for them to deal with larger stresses later in life. Letting children experience stress doesn't mean that you aren't there to help them. Help children cope by talking about ways to process their disappointment or sharing what you do to help yourself feel better when you are disappointed.

- Exercise! Physical movement is helpful to children and adults who are experiencing stressful situations. Provide lots of opportunities for children to move their bodies during play.

What is Toxic Stress?

As you begin to get a sense of what toxic stress is, try to think of examples of everyday stresses that are toxic and ones that are not toxic. Not all stressors are toxic. Also consider: What makes toxic stress so toxic?

Video: How does the Toxic Stress of Poverty Hurt the Developing Brain? (10:03)

The video *How Does the Toxic Stress of Poverty Hurt the Developing Brain?* illustrates how toxic stress affects children's development using a case study of a mom and four children from Honduras living in the U.S. and the father living abroad. Both the mother and the children experienced toxic stress that adversely affected them. A commercial will play before the video begins.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=325#h5p-37

Read the Full Transcript at PBS.org.

This video defined the term *toxic stress*, and we learned about a family that experienced toxic stress.

Video Debrief

What makes toxic stress so toxic? (click to toggle expand or collapse)

Possible Answers

Examples are:

- Toxic stress can disrupt brain circuits and create a weaker foundation for circuitry that is essential for learning, memory, concentration, solving problems, and self-regulation.
- Stress becomes toxic when it is unrelenting and children have little or no support from adults in their lives to help them manage stressful sit-

uations and build resilience.

B – Impact of Stress on the Body and the Brain

Extended periods of stress can have a lasting impact on the brain and body. Let's take a closer look at the body's stress response and the result of long-term exposure to this stress.

When we come across a possible threat in our daily lives, it triggers a stress response in our bodies. For example, imagine that you are about to cross the street and from out of nowhere, a car speeds around a corner. Seemingly without even thinking about it, you jump out of the way. You have your body's stress response to thank for that.

The Stress Response System

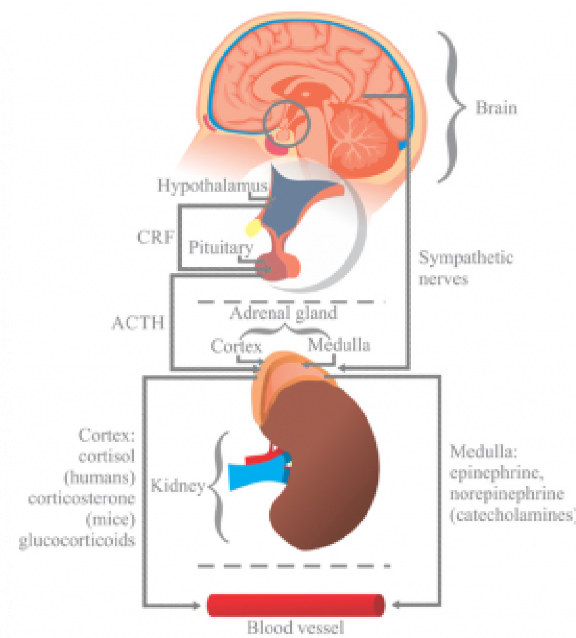

Image credit: Campos-Rodríguez et al., distributed under a CC BY-3.0 license

When we perceive a threat, a region in our brain called the *hypothalamus* sets off an alarm, triggering both the release of hormonal signals from the brain's pituitary gland and neural signals. These signals, in turn, trigger the adrenal glands, which are located just above the kidneys, to release a sea of hormones. These hormones include both cortisol and adrenaline and they trigger a widespread response throughout our bodies.

During stressful situations, our hearts beat faster, our blood pressure rises, and our energy stores increase. For example, energy is made available to our muscles to help us jump quickly out of the car's path.

Our body's immune system, digestive system, and reproductive system are suppressed so that more energy is available to our bodies to deal with the potential threat.

Typically, our bodies regulate this stress response. Once the threat is gone, our hormone levels return to their normal level and blood pressure, heart rates, and body systems also return to baseline.

Impact on Development

But sometimes the perceived threat doesn't go away. Imagine a child living with someone who abuses substances. This presents the possibility that there is always the threat of anger or violence, and the child's stress response system stays active.

As adults, this chronic, long-term stress response system activation can lead to a host of health problems, such as anxiety, depression, digestive problems, weight gain, memory loss, and even heart disease.

In children, neural circuits involved in the stress response are still developing, and long-term exposure to stress can actually alter how the brain and body are wired. This can result in neural changes that can make it harder for children to concentrate, control emotions, and form stable, supportive relationships.

Combined with the other physical effects of prolonged exposure to stress, these early childhood experiences can have a life-long lasting impact.

We'll talk more about these early experiences in the next section.

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13-2 Adverse Childhood Experiences

A – Impact of Children's Experiences

We know that young children's experiences can have a lifelong impact. This is true of both positive and negative experiences.

In the 1990s, the Centers for Disease Control and Prevention (CDC) partnered with the health care company Kaiser Permanente to quantify the impact of childhood abuse and neglect on later-life health and well-being. Early life negative experiences have come to be referred to as *adverse childhood experiences*, or *ACEs*.

Research from the original study and others have linked ACEs to:

- Risky health behaviors
- Chronic health conditions
- Low life potential
- Early death

Importantly, as the number of ACEs increases, so does the risk for these outcomes.

However, adversity early in life does not necessarily result in poor life outcomes. With the help of supportive adults in their lives, children can recover from early life trauma.

Let's take a closer look at the original study and how adults can provide support for children who are experiencing abuse, trauma, and neglect.

ACEs: Three Groups

Again, to better understand ACEs, the CDC and Kaiser Permanente conducted surveys with more than 17,000 Kaiser Permanente patients.

Participants received a survey in the mail asking a series of questions about the presence of adverse experiences in the first 18 years of their life as well as questions about their physical and mental health.

In the study, ACEs were categorized into three categories:

- Abuse
- Neglect
- Family and household challenges

Within each category there were multiple sub-categories. Take a moment to read through this list of ACEs on the table below.

Abuse	**Neglect**	**Household Challenges**
• Emotional • Physical • Sexual	• Emotional • Physical	• Mother treated violently • Household substance abuse • Mental Illness in household • Parental separation or divorce • Household member with criminal history

Interactive: Participants in the ACEs Study

This is an interactive! Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here: https://uw.pressbooks.pub/eeducdbb/?p=327#h5p-30

Potential Lifelong Effects

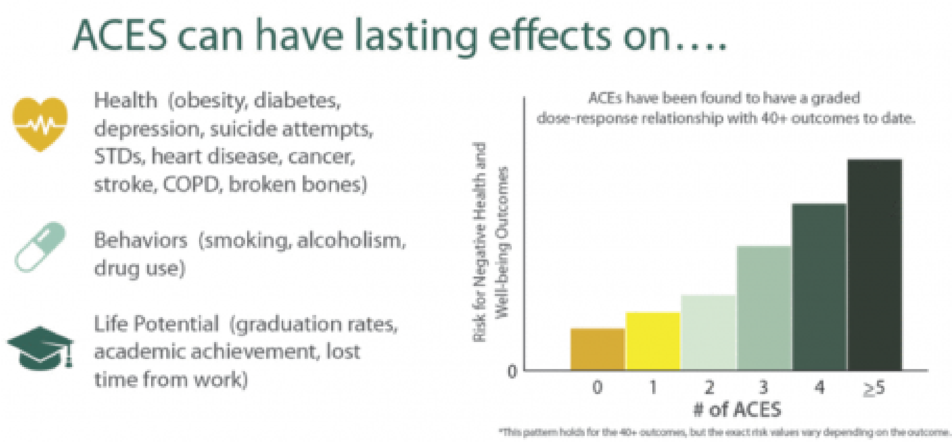
The study found a strong link between ACEs and a long list of poor life outcomes. The more ACEs a person has in their lifetime, the greater their risk for these outcomes.

As the number of ACEs increases so does the risk for:

- Alcoholism and alcohol abuse
- Chronic obstructive pulmonary disease
- Depression
- Fetal death
- Health-related quality of life issues
- Illicit drug use
- Ischemic heart disease
- Liver disease
- Poor work performance
- Financial stress
- Risk for intimate partner violence
- Multiple sexual partners
- Sexually transmitted diseases
- Smoking
- Suicide attempts
- Unintended pregnancies
- Early initiation of smoking
- Early initiation of sexual activity
- Adolescent pregnancy
- Risk for sexual violence
- Poor academic achievement

This list is not exhaustive. Note that the list here is longer than the one on the slide. For more outcomes see the CDC's *Adverse Childhood Experiences Journal Articles by Topic Area* (reference below).

Cumulative Effects



Again, the more ACEs a person has, the greater their risk of having health problems such as obesity, diabetes, depression, heart disease, and even cancer.

Part of this may be because the more ACEs a person has, the more likely a person is to engage in harmful behaviors like smoking, alcoholism, and drug use.

And finally, people with more ACEs tend to have lower graduation rates and more time lost from work.

Reflection Point

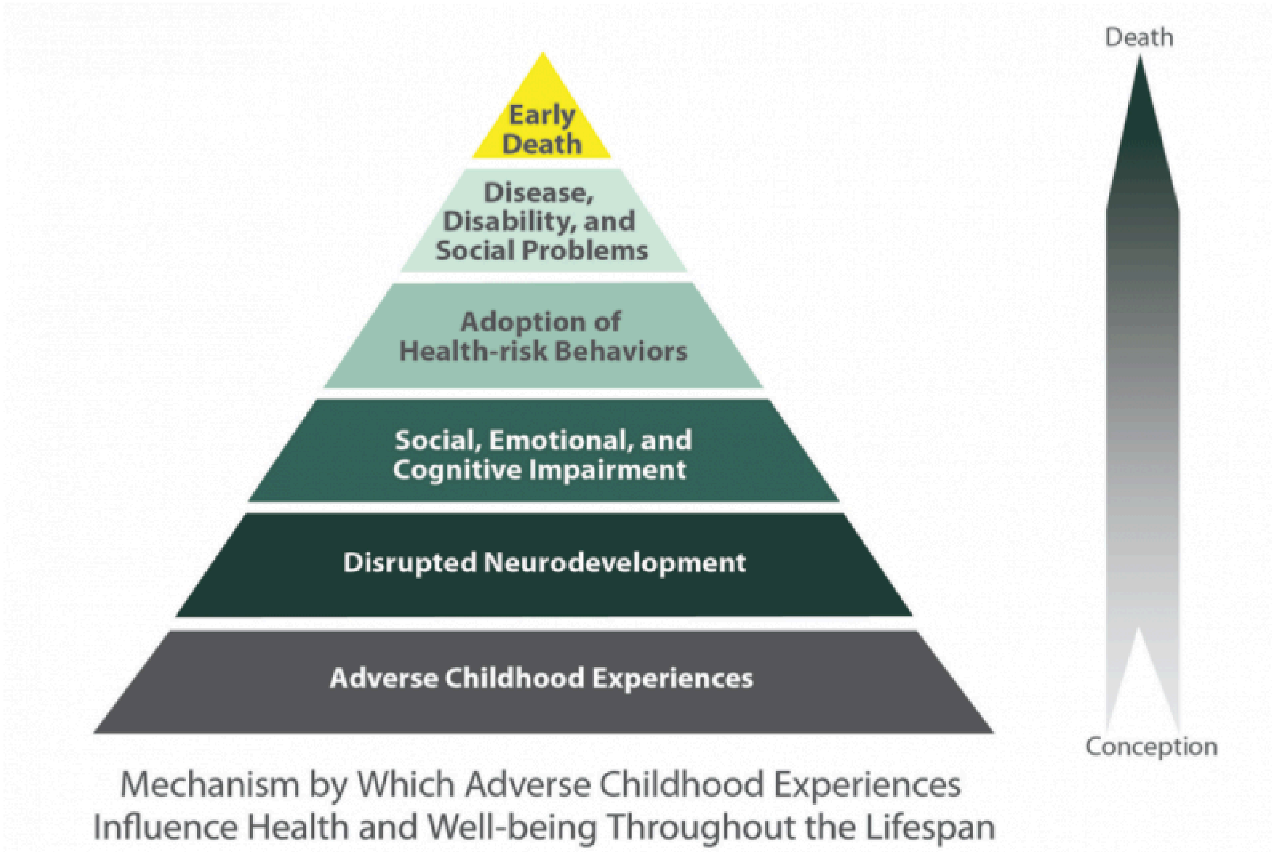
Consider the following question:

Why do you think ACEs have such strong and lasting effects on people's lives?

B – Effects of ACEs

CDC Model

To help understand why ACEs have such long-term impacts, the CDC has developed this model that explains how early experiences influence the rest of our lives. Research indicates that ACEs can disrupt the formation of key circuits in the developing brain, especially those needed for learning and success in school. The disruption of these circuits can lead to social, emotional, and cognitive impairment.



These impairments predispose people to adopt high-risk behaviors like drug and alcohol use. These high-risk behaviors can increase the risk of disease and disability, which in turn can lead to an early death.

Early adverse experiences can set in motion a cascade of outcomes from altered brain circuitry to predisposition to high-risk behaviors.

Interactive: ACEs are Common

This is an interactive. Use the slider to explore the graph.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=327#h5p-29

This means that a large percentage of the population is facing poor health and life outcomes as the result of their experiences as children. ACEs aren't just a problem for certain communities, they are a problem for ALL communities, touching the lives of almost everyone.

ACEs Can Cause Toxic Stress

Prolonged and intense stress from ACEs can:

- Cause toxic stress.
- Impact the developing brain.

Toxic stress can cause trauma. Trauma is the psychological, emotional, and physiological residue that remains after children experience continued levels of toxic stress from living with high levels of danger, violence, life-threatening events, and critical loss.

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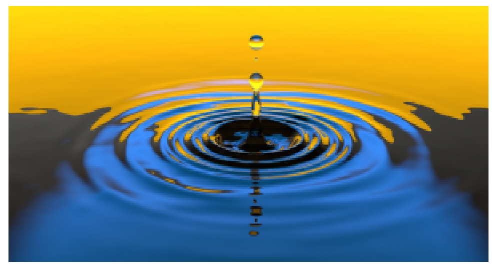
13-3 Trauma-Informed Care

A – Trauma's Impact



We are going to dedicate this section to thinking about trauma and caring for those who have gone through or are going through a traumatic situation. Caring for a child that has undergone trauma requires different behaviors and supports than a child who has not. Keeping a child's trauma in mind and changing your behaviors to support that child is called *trauma-informed care*.

We'll talk more about what trauma-informed care is in a moment, but first, let's take some time to think about what trauma is and its impact.

Effects of Trauma

The Substance Abuse and Mental Health Services Administration compares the effects of trauma to a rock hitting the water's surface. Here is an excerpt from page 30 of *A Treatment Improvement Protocol: Trauma-Informed Care in Behavioral Health Services*:

> "Trauma is similar to a rock hitting the water's surface. The impact first creates the largest wave, which is followed by ever-expanding, but less intense, ripples. Likewise, the influence of a given trauma can be broad, but generally, its effects are less intense for individuals further removed from the trauma; eventually, its impact dissipates all around. For trauma survivors, the impact of trauma can be far-reaching and can affect life areas and relationships long after the trauma occurred. This analogy can also broadly describe the recovery process for individuals who have experienced trauma and for those who have the privilege of hearing their stories. As survivors reveal their trauma-related experiences and struggles to a counselor or another caregiver, the trauma becomes a shared experience, although it is not likely to be as intense for the caregiver as it was for the individual who experienced the trauma. The caregiver may hold onto the trauma's known and unknown effects or may consciously decide to engage in behaviors that provide support to further dissipate the impact of this trauma and the risk of secondary trauma."

Reflection Point

> "Trauma is similar to a rock hitting the water's surface."

This quote is from p. 30 of *A Treatment Improvement Protocol: Trauma-Informed Care in Behavioral Health Services*.

Does this description of experiencing trauma or caring for someone recovering from trauma resonate with you? Why or why not?

B – How to Support Children Who Have Experienced Trauma

Advice from Head Start

Video: Head Start-Trauma Smart (5:30)

The video *Head Start-Trauma Start* gives an overview of a Head Start program in Missouri specifically designed to support children who have experienced childhood trauma.

As you watch, see how early childhood educators support children who have experienced trauma.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=329#oembed-1

Watch Head Start-Trauma Smart from Robert Wood Johnson Foundation on YouTube.

Video Debrief

What can early learning childhood professionals do to support children who have experienced trauma? (click to toggle expand or collapse)

Possible Answers

What can early learning childhood professionals do to support children who have experienced trauma?

Possible responses based on the video are that educators can:

- Notice children's *big* feelings and identify and validate those for children.
- Encourage children to ask one another what kind of help they need.
- Teach stress-reduction strategies.
- Collaborate with families and other program staff.
- Take the time to care for themselves.

Reflection Point

Consider your responses to the following questions:

- What does it mean for a program to be trauma-informed?
- What are some elements of trauma-informed care?

C – Elements of Trauma-Informed Care

There are many components of trauma-informed care. We will briefly talk about only three of these pieces:

- Actively promote awareness and understanding of trauma and its impacts and recognize that certain behaviors, both challenging and seemingly benign, can be the result of trauma.
- Create a safe environment and work to form supportive relationships while considering each child's unique experience with trauma.
- Use a strengths-based perspective and work to promote resiliency and to foster trauma-resistant skills.

Effects of Trauma

Trauma is common. About one in four children experience at least one traumatic event in the first four years of their life. As a person who works with children, you will encounter many children who are recovering from trauma. But it isn't always easy to identify children who have suffered a trauma. Each child experiences trauma in their own way, and of course, each trauma is unique.

It is important to realize that trauma-related behaviors are the result of children adapting their behaviors to those traumatic experiences. In many ways, these behaviors may be an attempt to try and stay safe in the event of a perceived threat or to try to get attention in the only way that they are able to when under intense stress.

Children who have experienced trauma may show challenging behavior in a variety of developmental domains. Here are some areas where children may have challenges:

- **Early trauma can have an impact on language development.** Children who have experienced mostly instrumental language, or language that commands or directs a child's behavior, such as "Be quiet," "Put that down," or "Stay there!" may use this same type of language with their peers. A child who uses this type of language may seem inflexible or demanding, but when considered in context, this behavior may be the result of a child not having the language skills to navigate more complex conversations and solve problems.
- **Regulating emotions can also be difficult for children who have experienced trauma**. Children may frequently feel afraid and stressed, which can manifest in challenging behaviors like being unable to control their impulses, aggressive behavior, misunderstanding cues, and showing insecurity in relationships.
- **Children may also struggle to connect with their peers and have difficulty building relationships**. For children who have experienced unsafe environments, this type of behavior can be a tool that they use to keep others at a distance to protect themselves emotionally and sometimes physically. Children who have experienced trauma may instead be very quiet and reserved, afraid to make themselves more visible in fear of punishment or adult retaliation.
- **Some children may seem withdrawn, or have a hard time concentrating in class**. Their stress response may be to draw inward and withdraw from the world around them. Or some sensory experience—a sound, a touch, or a smell—may trigger memories of the trauma and they may freeze or dissociate from the situation. Sometimes this behavior can even be misinterpreted as daydreaming.

Not all children who display these behaviors will have gone through trauma, but it is important to be aware that trauma can be the cause. Often, educators and other adults will link children's difficult behaviors to disobedience rather than being rooted in their response to trauma.

If you suspect that trauma may be playing a role in a child's behavior, seeking help from a supervisor can be important.

Creating Safe Environments

It is important to create a safe environment and foster relationship growth with all children in your care. Recognize that working with children who have experienced trauma can be challenging.

In an article for the National Association for the Education of Young Children (NAEYC), Katie Statman-Weil created this list of suggestions for helping children who have experienced trauma:

- Create and maintain consistent daily routines.
- Tell children when something out of the ordinary is going to occur.
- Offer children developmentally appropriate choices—often a loss of control is experienced during traumatic events. Empowering children by giving them choices can help them gain a sense of control and agency in their life.
- Anticipate difficult periods and transitions during the day, and offer extra support during these times.
- Use techniques to support children's self-regulation.
- Understand that children make sense of their experiences by reenacting them in play or through interactions with peers and adults.
- Be nurturing and affectionate but also sensitive to children's individual triggers.
- Use positive guidance to help all children.

Reflection Point

Take a moment to consider why each of the suggestions from the National Association for the Education of Young Children is helpful to promote resiliency in children who are recovering from trauma:

- Provide daily routines

- Give advance notice of changes
- Offer children choices
- Offer extra support for difficult transitions
- Support children's self-regulation
- Allow children to reenact experiences
- Be nurturing, affectionate, and sensitive to possible triggers
- Use positive guidance

Think of any personal experiences you have had using these techniques or consider what using these techniques might look like in your early learning program.

D – A Strengths-Based Approach

It is always best practice to take a strengths-based approach when working with children and their families, but it is particularly important to do so when a child and their family are experiencing or have experienced trauma.

A child and their support network need to know that this trauma is not their fault and be encouraged to continue to lean on their current resources.

Taking a strengths-based approach means shifting the focus away from *What is wrong with you?* to *What has worked for you?* This helps to move the focus from solely on the trauma to adaptive behaviors and individual strengths that a family can lean on as they work through their recovery process.

Trauma and Resilience

As we discussed at the beginning of this section, a traumatic effect is like a rock hitting the water. The effects of the trauma ripple out, touching many aspects of a child's life as well as the lives of those around them.

Your life is one of those lives that the ripples will inevitably touch. Take the time to care for yourself. You need to have enough personal reserves to be able to help others in need.

When caring for a child who is recovering from trauma, it is important to take a trauma-informed approach.

Many behaviors that are perceived as *difficult* are actually the result of a child adapting to scary or life-threating situations that have happened or are currently happening. Recognizing these behaviors as symptoms of the trauma is a crucial element of caring for children that have survived a traumatic experience.

Implementing trauma-informed care and taking a strengths-based approach helps all children in your program, even those who have not experienced trauma.

Recovery from trauma is possible. Both children and adults are resilient and can work through trauma when they have support.

In the next section, we will talk about resiliency and how to support children as they build this trait. First, we will do an activity where you will think about support networks.

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13-4 Resilience in the Early Years

A – Resilience in the Early Years

Center on the Developing Child

To begin our conversation about resilience, you will watch a sequence of three short videos produced by the Center on the Developing Child at Harvard University. In these videos, you will watch experts talk about what resilience is, the science of resilience, and how resilience is built.

Video: InBrief: What is Resilience? (2:22)

Let's watch the video *InBrief: What is Resilience?* The video defines resilience and provides examples of what resilience looks like in children.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=331#oembed-1

Watch InBrief: What is Resilience? from Center on the Developing Child, Harvard University on YouTube.

Video Debrief

What is resilience? What is your experience with resilience in your life? When have you seen resilience in children? (click to toggle expand or collapse)

Possible Answers

In general, *resilience* is the ability to move forward in life, even in the face of adversity and challenges.

It is important to note that being resilient does not mean that a person doesn't need help from others. Support from the community helps to foster resilience.

Video: InBrief: The Science of Resilience (2:29)

In the next video, we'll listen to experts discuss the science of resilience. *InBrief: The Science of Resilience*, covers how resilience develops in children and what factors are important in the development and support of resilience in children.

As you watch this video, think about:

- Whether we are born resilient.
- Factors that may contribute to children's ability to handle a traumatic event.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=331#oembed-2

Watch InBrief: The Science of Resilience from Center on the Developing Child, Harvard University on YouTube.

Video Debrief

What factors may contribute to a child's ability to handle a traumatic event? (click to toggle expand or collapse)

Possible Answers

- While some children may have a predisposition to resilience, any child can learn to be resilient with the help of supportive adults in their life.
- Many factors contribute to a child's resilience. A few examples are:
- Children's home environment and the degree of support that is available from parents or guardians
- Their school or child-care environment and the degree of support and individualized care that is available
- The opportunity to work through their trauma with supportive adults
- The opportunity to play and feel safe

Video: InBrief: How Resilience Is Built (2:17)

As you watch this final video, think about how you can support children in building resilience. *InBrief: How Resilience is Built* covers the factors that contribute to building resilience in children and what adults can do to support children's development of resilience.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=331#oembed-3

Watch [InBrief: How Resilience Is Built] from Center on the Developing Child, Harvard University on YouTube.

Video Debrief

How can you help children build resiliency? (click to toggle expand or collapse)

Possible Answers

Examples are:

- Building authentic relationships with children and their families
- Learning more about how trauma affects children
- Partnering with others, such as counselors, families, coaches, and supervisors, in support of children

B – Resilience Activity

Imagine that you have a new 3-year-old child named Omid in your early learning program. This child has recently moved to your town after their house was destroyed during a hurricane.

List a set of actions that you can take now to help Omid recover from this trauma and build resilience.

Points to guide your planning are:

- Questions you have for Omid or Omid's family
- Changes you can make to your behavior or what you say
- Changes you can make to the early learning program schedule or points in the day where you can provide Omid with extra support
- Possible resources in your community for you or Omid and Omid's family

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Cite this resource:
EarlyEdU Alliance (Publisher). (2018). 13-4 Resilience in the early years. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

14: Child Development in the Context of Community

In this lesson:

14-1 Individualized Teaching

We've talked about the importance of recognizing individual differences and each child's individual trajectory. Early childhood educators are responsible for supporting the learning and development needs of many children at a time in early learning settings.

In this section we'll examine: What does it look like in an early learning environment when educators are managing the unique individual needs of multiple children at once?

14-2 Community Supports

This section covers the importance of community supports for children, families, and educators.

14-3 Policy

The last section talks about policies that impact early childhood education.

14-1 Individualized Teaching

A – Considering Individual Children

When we think of individual children and their strengths, challenges, and needs, we can begin by asking ourselves what we know about them:

- Where are they developmentally? Consider each domain.
- What are their strengths?
- In what areas are they challenged?
- What is their cultural, linguistic, and family background?
- What is their educational history?

If there are questions that you don't have a ready answer for, perhaps you can observe children's behavior in the early learning environment, talk with them, or use family engagement strategies to learn the answers.

Adjusting Teaching

We teach in early learning settings, where we are responsible for many children, each with unique needs.

It can be difficult to focus on each child as well as the group.

Educators can use a variety of teaching practices to individualize their instruction throughout the day. These teaching practices allow educators to support each child's needs.

Reflection Point

Start thinking about how you recognize and support individual children's needs while also supporting the class as a whole.

- What materials and approaches do you use to engage children in the early learning environment?
- How do you use these to individualize instruction and meet children's needs?

B – Ways to Individualize

There are many different types of individualized supports. Depending on the need and the activity, one type of support may be more effective than another.

- **Environmental support:** Physical, social, or temporal supports embedded into the environment, such as visuals like squares that provide a visual cue about where to stand when lining up, an engaging activity that involves sharing, or extra time for a child who is finishing a complex model when it is clean-up time
- **Material adaptations:** Supports used to adapt materials, such as thick pencils or markers for children who are having a difficult time holding writing utensils
- **Activity simplification:** Breaking activities into small parts or reducing steps. For instance, a child who cannot make a pattern yet can match the materials to an outline of a pattern
- **Child preferences:** Using a child's interests, such as developing a transportation theme for the dramatic play area
- **Special equipment:** Adaptive equipment, such as a wedge seat cushion on the floor that allows children to wiggle.
- **Adult support:** Support that involves an adult being present to intentionally help, such as an adult playing in the dramatic play area and using new vocabulary.
- **Language support:** Supports that target oral language development and supports for children who are dual language learners, such as using gestures while speaking
- **Peer support:** Support from peer interactions, such as pairing a child with well-developed language skills with a child who is working to develop their language skills
- **Invisible support:** Purposeful arrangement of naturally occurring events, such as arranging a child's turn after several other children's so that child has many oppor-

tunities to see the steps

Individualized Supports

As you watch the two videos below, think about these questions:

- What needs did you see educators support?
- How did the support meet children's needs?

Video: Small Change, Big Impact **(3:00)**

The video *Small Change, Big Impact* introduces the purpose of curriculum modifications, or simple changes that educators can make in early learning environments, and gives some examples.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=333#video-333-1

Video: Adjusting in the Moment **(1:33)**

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=333#video-333-2

Video Debrief

What needs did you see educators support in the two videos? In what ways did the support meet children's needs? (click to toggle expand or collapse)

Possible Answers

- Showing children where to sit and where their bodies should be using carpet squares for them to sit on
- Holding the paper still with tape so children who struggle to draw or write don't also have to hold the paper
- Physically guiding a child's hand to a railing so the child can climb the stairs of the playground structure

- Children's home environment and the degree of support that is available from parents or guardians
- Their school or child-care environment and the degree of support and individualized care that is available
- The opportunity to work through their trauma with supportive adults
- The opportunity to play and feel safe

Video: What Would You Do? (2:59)

In the video *What Would You Do?* you'll notice educators may have more than one way to support a disengaged child and that what the educator does is not necessarily the only or correct way to support a child.

An interactive H5P element has been excluded from this version of the text. You can view it online here:
https://uw.pressbooks.pub/eeducdbb/?p=333#h5p-34

Video Debrief

- It is important to recognize and support each child's unique needs in the early learning environment.
- Specific strategies, such as scaffolding and prompts, may help support children's learning and encourage participation.

C – Activity: Create a Support Table

Try this activity to think about children's development and learning needs and the types of support that adults can give.

Instructions:

Read each example and brainstorm what support the adult is using and what the child's need is. Download the handout [DOCX] for this activity to fill in the table.

Adult Supports Table

Example	Support Type	Child's Need
Ask a child to share what the child enjoyed about a field trip. Take time to wait for the child to reflect and respond.		
Verbally remind a child to put away the toys they used before moving to a new activity.		
Suggest that a child watch how a peer holds a pitcher to pour a drink before doing it on their own.		
Physically help a child grasp and hold a coat zipper.		
Make a *Shh* sign with your fingers and hand to remind children to be quiet during a story.		

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Cite this resource:
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14-2 Community Supports

A – The Importance of Community

As we consider the exosystem of Bronfenbrenner's model, it's important to talk about the communities in which children live. Communities provide a variety of resources for children, families, and even for educators.

This quote from the U.S. Department of Education's web article, *Better Use of Community Resources,* emphasizes that communities have a wealth of resources that can enrich children's lives:

"Leveraging community resources and local partnerships supports high-quality academic and enrichment opportunities by broadening the experiences that may be typically offered to students and by expanding access to local expertise."

Community Resources

In this section, we'll consider community in several ways. We'll think about programs that provide support to parents and families, enriching children's development by giving families a more supportive environment. We'll also think about how educators can leverage community resources to support their teaching practices. Finally, we'll consider the ways that children can interact directly with community resources to support their learning.

Reflection Point

Consider the following two questions:

- What resources in the community do you personally use?
- How have you used community resources to expand the experiences of children in your early learning program?

B – Community Supports for Parents

Community support programs for parents typically have the goal of strengthening existing parent abilities and developing new competencies to promote children's development.

These kinds of programs are called *capacity-building* because they are designed to give parents skills that last beyond the duration of the program. These skills often help parents learn where to go for help and how to access a variety of services.

Community-based programs for parents are based on the idea that when parents are supported and have access to resources, they feel better about themselves and their parenting abilities, and in turn, they have higher quality interactions with children, leading to improved child development.

Many programs that provide support to parents use a strengths-based approach. They recognize parents as children's first and most important educators, treat parents with respect, and recognize parents as important partners. This approach gives parents the confidence to make decisions about their child's development and education.

Program Spotlight: Home Visiting

One delivery method for community-based parent support is home visiting.

Home-visiting programs typically give pregnant and new parents, especially at-risk families, the resources and skills to support children's development. These voluntary programs connect families with professionals who meet with them in the home environment and provide support for children's physical, social and emotional, and cognitive development.

The federal government has historically provided some funding for home-visiting programs through the Maternal, Infant, and Early Childhood Home Visiting Program (MIECHV). In 2016, MIECHV supported home visiting for more than 160,000 families across the country. Programs supported by MIECHV funds must measure outcomes in six domains:

- Improvement in maternal and newborn health
- Reduction in child injuries, abuse, and neglect
- Improved school readiness and achievement

- Reduction in crime or domestic violence
- Improved family economic self-sufficiency
- Improved coordination and referral for other community resources and supports

Different home-visiting programs use a variety of models to provide services to families. Some of the most common programs are:

- Nurse Family Partnership (NFP) – Here, nurses visit first-time mothers starting early in pregnancy and continuing through the child's second birthday.
- Parent-Child Home Program (PCHP) – This program provides two years of twice-weekly home visits to parents and children between the ages of 16 months and 4 years. Home visitors are typically from the same community and culture as families.
- Parents as Teachers (PAT) – In this program, parents are trained on the PAT model to be parent educators to fellow parents. Parents receive support from PAT for at least two years, sometime between the prenatal period and when the child enters kindergarten.

A variety of research has demonstrated lasting effects of home visiting on children's development. For example, a recent study of the PCHP program in Seattle, Washington, found that children who participated in PCHP showed increased kindergarten readiness, increased kindergarten English-language proficiency, and increased third-grade academic performance.

Program Spotlight: Play and Learn

Another way that communities offer support to parents is through play-and-learn or other similar groups.

Generally, play-and-learn groups are free opportunities for parents and children to attend facilitated play groups. No registration is required, and parents can drop in as their schedule allows. The children play and interact with other children their age. Parents support their play while the facilitator shares information about activities that support child development, what to expect with child development, and school readiness expectations.

The goal of play-and-learn groups is to give families the skills and knowledge they need to support children's development.

Many communities offer play-and-learn groups in a variety of languages and some offer groups for specific populations like children with disabilities.

Kaleidoscope Play and Learn groups are a specific version of the play-and-learn model that follows set guidelines and evaluates outcomes annually. These evaluations found that about 90 percent of parents feel more supported after participating in the program.

Reflection Point

What kinds of similar programs do you have in your community?

C – Community Supports for Educators

Educators can also take advantage of community resources to expose children to new and interesting foods, places, and concepts, but educators can also use community resources for their professional benefit.

To the extent that field trips are possible, consider taking children into the community. Parks and gardens are fantastic places to talk about bugs, plant life, weather, and science. You can even talk about ideas about animals' feelings to focus on social and emotional skills.

The Office of Head Start also suggests visiting local grocery stores or farmers markets as ways to encourage healthy eating habits. By exposing children to new fruits and vegetables—and perhaps by sampling them—children may discover new foods and tastes. You could also use these opportunities to talk about culture, if you are at a specialty store, and local agriculture and geography by focusing on foods grown in the region.

Child Development Resources

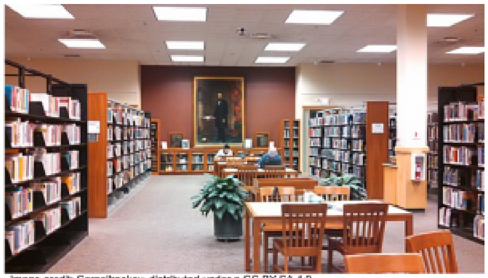
Some communities have specific resources that are intended to provide educators with a variety of professional services.

The University of Alabama's Child Development Resources, for example, provides free professional development trainings and has a workroom with supplies that educators can use to make copies and prepare activities.

They also have a library of materials that educators can check out for use in the early learning setting. These materials may be anything from bundles of books on a similar topic to activity kits for children of different ages that support a variety of skills.

Although these resources are only available to educators in that area, other communities have resources that provide similar professional services to educators.

Libraries



Libraries are another resource that is widely available in communities across the country.

Libraries not only provide educators with a variety of books that will support their professional development, but they also can provide educators with resources for early learning program use.

Children's sections of libraries provide a wealth of books that can be checked out for program use. Educators can assemble a set of books on a similar topic or that reinforce a certain message. By repeating the same topic or message through different books, children will learn more effectively.

Children's librarians are often an untapped source of wisdom when it comes to children's books. They often know the new titles or the often-overlooked gem that might be exactly what an educator needs. By getting to know the local children's librarian, educators can get access to a free, knowledgeable resource.

How to Find Resources

Although many communities have resources available to families and educators, finding the resources can be tricky. Talk to other educators and get to know the professionals you encounter in the community. Where do they go for support and resources?

You might also look to the local newspaper, as it potentially highlights programs or programs may advertise in the paper.

Also, consider other ways to find local resources, such as:

- Parenting and family support organizations
- Local parenting groups and play groups
- Schools
- Babysitting clubs
- Libraries
- Government agencies
- Family and friends

Video: Change Is Coming to Weinland Park (4:55)

This Annie E. Casey Foundation video, *Change is Coming to Weinland Park*, covers the changes that residents and others are seeing in the Weinland Park neighborhood in Columbus, Ohio, and their hopes for the future.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=335#oembed-1

Watch Change is Coming to Weinland Park from Annie E. Casey Foundation on YouTube.

Video Debrief

What specific programs did you see mentioned here? (click to toggle expand or collapse)

Possible Answers

- A faith-based sports program
- Moms2B

How did these programs serve the community? (click to toggle expand or collapse)

Possible Answers

- The sports program gave children community, skills, and adult role models.
- Moms2B provided social and emotional support for mothers and families.

What barriers did the programs overcome? (click to toggle expand or collapse)

Possible Answer

- They had no registration fees to reduce financial obstacles.
- They provided positive role models to support children who needed them.
- They offered support and information to help women who lacked support to have full-term, healthy children.

Reflection Point

Start thinking about how family engagement relates to community resources. The idea is that to create an environment where educators and families effectively and comfortably share information about community resources, early learning professionals must know the family well and develop a strong partnership with them. This in turn supports children's learning and development.

Consider the following two questions:

- What are some connections between family engagement and community resources?
- How can you use both community resources and family engagement to encourage children's learning and development?

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14-3 Policy

A – Policies in Early Education

Federal and state governments have a variety of policies that help to provide early learning services to children.

At the federal level, Head Start and Early Head Start serve more than 1 million children annually at a cost of nearly $8 billion. Head Start and Early Head Start provide comprehensive services to low-income children between birth and age five and their families. These programs promote school readiness by supporting children's early learning, health, and family well-being.

Also, at the federal level, the Child Care and Development Fund (CCDF) provides about 4 million childcare subsidies to low-income working families and serves Head Start and public preschool programs.

At the state and local level, many areas of the country have developed public preschool programs or other public programs that provide early learning services. Particular models and amount of funding vary by location.

Access Challenges

Despite the many programs that offer early learning to low-income children and families around the country, not all low-income children are served by these public programs and not all programs are high-quality.

Families looking for early learning opportunities for their child may encounter several challenges in accessing these programs. We will consider two issues in more depth:

- Are adequate spaces available for children who need services?

- Is high-quality learning equally available for all children in early learning settings?

Regarding adequate slots for children in need of services, consider this: In 2012, more than half of the states were able to serve eligible families who applied for child-care assistance without placing any on waiting lists or freezing intake. However, nearly half of the states had waiting lists or frozen intake for at least some families applying for assistance. Even if families qualify for assistance, there may not be enough slots to give services to everyone who wants them.

As to high-quality early learning, this continues to be a concern for educators in the field. Even when families can access slots, it's possible that high-quality programs may not be available. Findings suggest that subsidies may enhance care quality, but that parents who use subsidies are not accessing the highest quality care available.

It is important to consider how these factors have an impact on children's care and development.

Policies That Impact Families

Additional issues, besides the ability to find a high-quality early learning slot for their child, impact families.

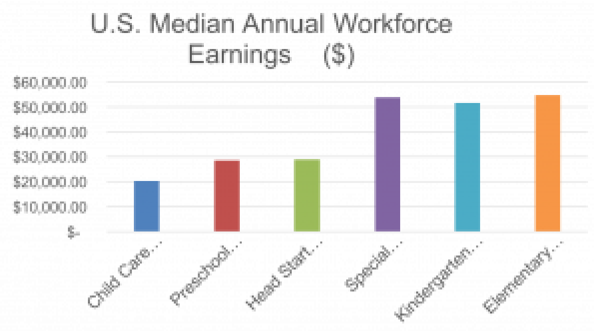
Consider parental workplace policies, for example. Not all companies offer parental leave to new parents, and those that do often require parents to use their sick time or vacation time to be home with a new baby. Similarly, not all parents have flexible work schedules, even after parents have returned to work. When children get sick and need to leave their early learning program, who will pick them up? Given everything we have talked about in this course on the importance of children's earliest years, think about the impact that parental workplace policies have on child development.

Beyond parental workplace policies, we can also think about larger infrastructures that are important to families with young children. For example, is affordable housing widely available? Is public transportation available? If so, is it reliable?

For many new families, these areas of policy are important, even if they are not directly related to children's development. If you are a low-income family in a large city, it's important that buses run on schedule so you can make it to the child's doctor's appointment on time while missing as little work as possible.

What other policies might affect families with young children? Think about policies that support the family and community around the child.

Policies That Impact Educators



(Adapted from U.S. Departments of Education and Health and Human Services, 2016, p. 14)

When we think about policies that affect the lives of educators, one of the biggest is salary, and for good reason. A 2016 report on U.S. median annual workforce earnings found that child-care, preschool, and Head Start educators make, on average, $20,000 less per year than their K-12 counterparts.

As we understand more about the importance of children's early development, many have argued that early learning professionals deserve to be compensated relative to the important work they do, at least on par with teachers in the K-12 system.

As of 2016, only four states required that state preschool programs pay their lead teachers the equivalent of K-12 teachers and only eight states have the same requirement for lead teachers in preschool programs located in public schools.

Recent data indicate that low compensation of early learning educators results in low quality education since the early learning workforce is unable to attract the highest quality workers with low rates of compensation.

Regarding an educator's ability to provide the highest quality of care to children, it makes sense that educators who earn a living wage provide higher quality environments for children. As we have talked about in this course, low-income families are at risk for experiencing a number of stressors in their life, from food insecurity to working multiple jobs. Educators are not immune to these stressors and it affects the children in their care.

Reflection Point

Many aspects of a child's life that are out of their control have a significant influence on their development.

Consider these questions in light of the previous information and its influence on child development:

- What influence does state and federal spending on early education have on a child?
- What influence do unemployment and family income have on a child?

B – Case Study

Louisiana School Readiness Tax Credit

One example of a state policy that impacts the lives of educators is the Louisiana School Readiness Tax Credit. Established in 2008, this provides tax credits to families, programs, members of the early childhood workforce, and businesses that support quality early care and education.

Families earn credits by having a child enrolled in a child-care program that participates in the state's Quality Rating and Improvement System (QRIS), and they receive greater tax benefits as the quality of the program they choose increases.

Child-care programs earn tax credits by increasing their quality score on the QRIS system. Members of the early learning workforce earn tax credits by working in a center enrolled in the QRIS system and their individual tax credit increases as they pursue professional development opportunities or earn higher degrees.

Together, this system is designed to increase the quality of early learning opportunities offered in the state while also providing a financial benefit for those who are working to increase quality.

During the first years of the tax credit, from 2008 to 2011, the number of centers participating in the QRIS system doubled, and the number of centers achieving a quality rating increased from 15 to 50 percent.

Video: The Influence of Policy (17:28)

This TEDx Talk, *The Influence of Policy,* is by Amy Hanauer, the founding director of Policy Matters Ohio. It is centered on the difference that public policy makes in a community and how the smallest change in policy can make a large difference. Hanauer highlights how individual action can affect larger issues in a community and urges people to discover what they can do to influence policy decisions in their neighborhood.

One or more interactive elements has been excluded from this version of the text. You can view them online here: https://uw.pressbooks.pub/eeducdbb/?p=337#oembed-1

Watch The Influence of Policy from TEDx Talks on YouTube.

Video Debrief

What difference does public policy make in a community? (click to toggle expand or collapse)

Possible Answers

- Public policy can have an enormous impact on people's health and well-being.
- Public policy can affect transportation, care for children and people who are elderly, the availability of art, and whether the air and water are clean.
- A small change in public policy can make a large difference in a community.

How can individual action affect larger issues in a community? (click to toggle expand or collapse)

Possible Answers

- Public policy can be hard to change with individual action.
- Usually, a larger group of people is needed to make an impact.

C – Activity

Instructions

Develop an action plan showing ways you can influence policy.

Think of ideas at multiple levels of government:

- What can you do locally, in your neighborhood or city?
- What can you do in your state?
- What can you do at the national level?

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15: Bringing it All Together

In this lesson:

15-1 Wrap-Up

In this section, we do an activity to review and summarize the information we've learned in the course and explore ways to use it in your teaching practice.

15-2 Capstone Project

In this section, we'll brainstorm ideas for the remaining part of your capstone project.

15-1 Wrap-up

A – Domain Highlights

Now, you will review what you learned in this course and how to apply that to your teaching practice. Begin reflecting on all areas of child development addressed in this course.

	CENTRAL DOMAINS				
	APPROACHES TO LEARNING	SOCIAL AND EMOTIONAL DEVELOPMENT	LANGUAGE AND LITERACY	COGNITION	PERCEPTUAL, MOTOR, AND PHYSICAL DEVELOPMENT
▲ INFANT/ TODDLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication	Cognition	Perceptual, Motor, and Physical Development
● PRESCHOOLER DOMAINS	Approaches to Learning	Social and Emotional Development	Language and Communication	Mathematics Development	Perceptual, Motor, and Physical Development
			Literacy	Scientific Reasoning	

What impacted you the most about each area of development? What did you learn about each domain of development? What were your significant "take-aways", highlight, or new knowledge learned about each domain?

Here is an example:

> Domain: Social and emotional development for children birth to age 3.
>
> One highlight is: realizing that possessive statements like "It's mine!" can be a way for children to express their developing self-identity.

Highlights in Practice

Now that you've thought about the new knowledge you've gained about each domain of development and topic area discussed in this course, consider how your teaching practice will change as a result of your learning: How will this course impact your interactions with children? What new experiences will you provide for the children in your care? What will you do differently to support each area/domain of development?

Consider how you could use some surprising ideas in your teaching practice.

An example practice is:

> When hearing a child make possessive statements, try to encourage their developing self-identity while guiding them toward more positive behavior by saying, "Yes, that is yours right now, but in 5 minutes will you give someone else a turn?"

B – Connections to Other Areas

Development does not occur in a vacuum. Development in one area connects in many ways to development in other areas.

Describe **two** ways in which development in one area or domain connects to other areas of development that we've covered. This connection can include connections to non-framework areas, such as trauma and resilience.

An example of connections to other areas is:

> Children's social and emotional development can be adversely affected by the experience of a traumatic event or toxic stress. Children may act more aggressively to protect themselves or may not trust adults, which will prevent them from forming positive attachments to adult caregivers. However, supporting social and emotional development can help to

buffer the adverse effects of such experiences. (Connection to trauma and resilience)

Connections to Other Ages

Having considered connections between your area and other areas of development, now think about how children's development in your topic area varies throughout childhood. Think about the differences or similarities between children of different ages in your topic area.

Choose **one** domain of development in the HSELOF. Think about similarities and/or differences in children's development at different ages in your topic area. The similarities/differences can address characteristics of development or ways that adult support development. You can review information in the lessons and/or consult the HSELOF as a resource if needed.

Think about **five** similarities or differences in children's development at different ages in your topic area.

Examples of connections to other ages are:

- Younger children are doing most of their social engagement with adults, while older children are beginning to engage with other children as well (difference).
- Both younger and older children benefit from responsive and consistent social and emotional engagement with adults (similarity).

C – Questions

As early childhood educators, we never stop learning about child development. Having questions about child development can drive our continued professional growth. Having questions is also a sign of in-depth thinking and ongoing reflection about a topic.

We've learned a lot in this course, but we've not covered every topic or answered every possible question. Think about **two** questions that you still have about child development. Then for each question, consider at least one resource you could check to start finding the answer.

Cite this resource:

EarlyEdU Alliance (Publisher). (2018). 15-1 Wrap-up. In *Child Development: Brain Building Course Book*. University of Washington. [UW Pressbooks]

15-2 Capstone Project

A – Age Modifications

Consider the similarities and differences in children's development at different ages, as we just discussed in the review activity. How do those developmental similarities and differences affect children's participation in the activity you developed for your Capstone Project? How is the developmental support that adults provide during your activity different depending on children's ages?

Part of the Capstone Project – Achievement 3 is to describe how you might modify your activity for children who are 6 months to a year younger and 6 months to a year older. These questions will help you think about that topic:

- For what age of children is your activity for?
- What are key elements of your activity that make it effective for that age group?
- How would you change those elements for younger children?
- How would you change them for older children?

How might you modify an activity? (click to toggle collapse or reveal an example)

Here is an example response to the first set of questions using the game *Head, Shoulders, Knees, and Toes:*

- The activity is for 3- to 4-year-old children.
- Key elements are: standing and walking, so not appropriate for pre-walkers or crawlers, and language understanding, so not appropriate for young infants. The activity is possibly too simple or not engaging enough for older children.
- For toddlers and infants, you could simplify the language by pointing to children's body parts as you say them or modeling where to touch as you say the words. You could do the activity

sitting down as well.

- For older children, you could make the task more challenging by changing which body part to touch when a particular word is said. For example, you could ask children to touch their toes when you say, “Head.” This type of approach helps support children’s development of self-regulation and executive-function skills.

B – How-To Guide

For this topic, think about the information we have discussed in the course about supportive environments. Part of a supportive environment is the room itself. Is it set up in a way that encourages children’s safe engagement? Does it support or hinder an educator in their daily activities?

Part of creating an effective environment is making sure that you have the space, time, and necessary materials to lead an activity effectively. Now we’ll consider what those might be.

Part of the Capstone Project – Achievement 3 is to develop a *how-to* guide, including a supply list and scaffolding prompts, for educators who might want to use this activity in their program.

These questions will help you think about that topic:

- What kinds of general materials do you think are most important when doing an activity in your program?
- How do you make space and time estimates?
- What materials and space and time recommendations would you make for your activity?

How might you create a how-to guide for your activity? (click to toggle collapse or reveal an example)

Here are some possible responses to the first set of questions and prompts:

- Important materials for activities in an early learning program are tools to complete activities and models of what the activities are meant to produce.

- For space, consider whether children need floor or table areas. Do they need to be inside or outside? Do children need to be able to see an educator modeling the activity?
- For time recommendations, consider how long children at various ages take to complete a task and how engaged they might be. For example, younger children might lose interest faster. Or if the activity takes place before lunch, children may be hungry and distracted.
- The final response will depend on participants' individual activities. Thinking about materials for a letter-tracing example, you could make a slight overestimate of the materials the children will need for the activity, such as 25 pens for 20 children, so that you will have extra pens if any stop working. Or you could provide at least two pictures of each letter for children to trace.

C – Parent Handout

For this topic, consider the information we've covered about engaging parents and the community.

Part of the Capstone Project – Achievement 3 is develop a parent handout that describes what children are learning when they engage in this activity and some tips for continuing to support that learning at home. Include a way to invite parents to share their ideas about extending learning.

Think about these questions:

- What information or materials do you think would best help parents understand your activity and why? Brainstorm your top three.
- What tips would you give parents to help support this learning at home?
- How could you encourage parents to share their ideas to extend learning?

What are some considerations for a parent handout for your activity? (click to toggle collapse or reveal an example)

Possible responses are:

- Brain-building activities and online resources, such as the Head Start framework, could be ways to help parents understand children's learning during a play-based activity.
- For the example *Head, Shoulders, Knees, and Toes*, some tips could be to play other self-regulation games, such as *Simon Says* or *Red Light, Green Light*. Or, if focusing on communication, educators might recommend that parents point to various body parts while labeling them or to other objects around their home while saying their names.
- You might include a question on the handout asking parents what ideas they have for activities to extend children's learning.

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List of Terms

developmental trajectories

Developmental progressions are the skills, behaviors, and knowledge that children demonstrate as they move toward goals in different age ranges.

sensitive period

A sensitive period is a period when a child is more sensitive to specific experiences. During this period, those experiences can cause important changes in the child's development.

social referencing

As infants get older and move into the toddlerhood stage, they begin to establish relationships with adults as resources in their environment. They will reference adults as sources of social information. See more at 6-1 Early Social and Emotional Development: Relationships

webbook

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The webbook includes the navigation arrows attached to the bottom of the page to navigate backward or forward within the website. At the middle of the page bottom is an arrow that points upward to bring you back to the top of the page.

See more at The Pressbooks Reading Interface.

Standards Alignment

Courses from the EarlyEdU Alliance® center on a set of competencies that describe what students should know and be able to do as a result of participating in the course. Each competency corresponds to standards and practices identified by the National Association for the Education of Young Children (NAEYC), Child Development Associate (CDA) Credentialing Program, and the Division for Early Childhood (DEC) of the Council for Exceptional Children.

Course Competency 1

Demonstrate knowledge of brain development and the developmental progressions of children birth to age 5 in physical, language, social-emotional, and cognitive areas.

NAEYC Professional Standards and Competencies	CDA Standards	DEC Recommended Practices
1a: Understand the developmental period of early childhood from birth through age 8 across physical, cognitive, social and emotional, and linguistic domains, including bilingual/multilingual development.	Standard II: To advance physical and intellectual competence Standard III: To support social and emotional development and to provide positive guidance	INT4. Practitioners promote the child's cognitive development by observing, interpreting, and responding intentionally to the child's exploration, play, and social activity by joining in and expanding on the child's focus, actions, and intent.

Course Competency 2

Identify children's developmental progressions as expressed through their behavior in their environments.

NAEYC Professional Standards and Competencies	CDA Standards	DEC Recommended Practices
1b: Understand and value each child as an individual with unique developmental variations, experiences, strengths, interests, abilities, challenges, approaches to learning, and with the capacity to make choices. 4b: Understand and use teaching skills that are responsive to the learning trajectories of young children and to the needs of each child, recognizing that differentiating instruction, incorporating play as a core teaching practice, and supporting the development of executive function skills are critical for young children.	Standard II: To advance physical and intellectual competence Standard III: To support social and emotional development and to provide positive guidance Standard V: To ensure a well-run, purposeful program that is responsive to participant needs	INS1. Practitioners, with the family, identify each child's strengths, preferences, and interests to engage the child in active learning. A7. Practitioners obtain information about the child's skills in daily activities, routines, and environments such as home, center, and community.

Course Competency 3

Identify and create learning activities and environments, and plan adult–child interactions that support children's developmental progressions in physical, language, social-emotional, and cognitive domains.

NAEYC Professional Standards and Competencies	CDA Standards	DEC Recommended Practices
1d: Use this multidimensional knowledge—that is, knowledge about the developmental period of early childhood, about individual children, and about development and learning in cultural contexts—to make evidence-based decisions that support each child. 4c: Use a broad repertoire of developmentally appropriate, culturally, and linguistically relevant, anti-bias, evidence-based teaching skills and strategies that reflect the principles of universal design for learning.	Standard II: To advance physical and intellectual competence Standard III: To support social and emotional development and to provide positive guidance	E1. Practitioners provide services and supports in natural and inclusive environments during daily routines and activities to promote the child's access to and participation in learning experiences. E3. Practitioners work with the family and other adults to modify and adapt the physical, social, and temporal environments to promote each child's access to and participation in learning experiences. INS2. Practitioners, with the family, identify skills to target for instruction that help a child become adaptive, competent, socially connected, and engaged and that promote learning in natural and inclusive environments. INT1. Practitioners promote the child's social-emotional development by observing, interpreting, and responding contingently to the range of the child's emotional expressions.

Course Competency 4

Demonstrate an understanding of the key roles that individual differences and family, program, and socio-cultural contexts play in development.

NAEYC Professional Standards and Competencies	CDA Standards	DEC Recommended Practices
1c: Understand the ways that child development and the learning process occur in multiple contexts, including family, culture, language, community, and early learning setting, as well as in a larger societal context that includes structural inequities.	Standard II: To advance physical and intellectual competence Standard III: To support social and emotional development and to provide positive guidance Standard IV: To establish positive and productive relationships with families Standard VI: To maintain a commitment to professionalism	TC1. Practitioners representing multiple disciplines and families work together as a team to plan and implement supports and services to meet the unique needs of each child and family.

Course Competency 5

Apply strategies to build positive relationships with and between children and families.

NAEYC Professional Standards and Competencies	CDA Standards	DEC Recommended Practices
2a: Know about, understand, and value the diversity of families. 2b: Collaborate as partners with families in young children's development and learning through respectful, reciprocal relationships and engagement.	Standard IV: To establish positive and productive relationships with families	INS13. Practitioners use coaching or consultation strategies with primary caregivers or other adults to facilitate positive adult-child interactions and instruction intentionally designed to promote child learning and development. F5. Practitioners support family functioning, promote family confidence and competence, and strengthen family-child relationships by acting in ways that recognize and build on family strengths and capacities. F6. Practitioners engage the family in opportunities that support and strengthen parenting knowledge and skills and parenting competence and confidence in ways that are flexible, individualized, and tailored to the family's preferences. TC2. Practitioners and families work together as a team to systematically and regularly exchange expertise, knowledge, and information to build team capacity and jointly solve problems, plan, and implement interventions.