

Chapter 9

Materials for Sparking Children's Curiosity and Play

LEARNING OUTCOMES

After exploring this chapter, you should be able to

1. Describe what is meant by curiosity, the characteristics of curiosity, and the role of curiosity in children's play and learning.
2. Explain the theory of loose parts and open-ended materials in relation to the thinking lens framework.
3. Discuss the concepts of intelligent materials, materials with language, and materials as thinking tools in early learning programs.
4. Explain the Hawkins theory of messing about.
5. Document strategies for enhancing children's curiosity with materials and spaces in indoor and outdoor environments.

A CHILD'S STORY Maddie and Bailey

As our daddy brought us up to the entrance of our play-school, I thought I saw something amazing in the play garden. From what I could see, it had a long stick and something on it that looked just like a lollipop. I said to Bailey, "I see lollipops in the garden." She said, "Lollipops in the garden. Are you kidding?" Then I said to my daddy, "I think I do. I think I do see a great big lollipop in the garden." Daddy said, "Lollipops in the garden? Great big lollipops in the garden. How would great big lollipops get into the garden? Shall we go look at the lollipops in the garden, because I have never, ever, ever seen great big lollipops in a garden!" Together we said, "Let's go see the lollipops!" As we entered the garden,

we saw the most incredible thing in the garden. Bailey said, "Oh, it is far more beautiful than I had imagined! Look at the colours . . . look at the shapes!" Daddy said, "It is beautiful! Do you still think that it is a lollipop, or does it just look like a lollipop?" "Oh, Daddy, it is just too big to be a lollipop!" Then Daddy said, "Girls, why don't you think about this today and let's come back here when I come to pick you up and then we can discuss what our thoughts are about what this might be." Bailey said, "I am going to ask my teacher if I can take a picture of this, because I want to show Shawn when we get home." I said to Daddy and Bailey, "I think I know what it is . . . but I am not telling you until after playschool."



A children's play garden.

Peter Dietze

CHAPTER PREVIEW

Hold childhood in reverence, and do not be in any hurry to judge it for good or ill. Leave exceptional cases to show themselves, let their qualities be tested and confirmed, before special methods are adopted. Give nature time to work before you take over her business, lest you interfere with her dealings.

You assert that you know the value of time and are afraid to waste it. You fail to perceive that it is a greater waste of time to use it ill than to do nothing, and that a child ill taught is further from virtue than a child who has learnt nothing at all. You are afraid to see him spending his early years doing nothing. What! Is it nothing to be happy, nothing to run and jump all day? He will never be so busy again all his life long.

—JEAN-JACQUES ROUSSEAU (1712–1778)

Environments that offer children opportunities to explore and learn are places of play where early learning students and professionals provide rich learning experiences that reflect the interests, rights, and needs of children and adults. These environments don't just offer children similar experiences and materials on a daily basis; instead, they are places that intrigue children with unique materials and resources that foster wonderment and curiosity and motivate them to explore and seek answers to their questions. Children's curiosity and wonderment influence their social, emotional, cognitive, and physical development by helping them bring meaning to people, places, and things in their world (Driscoll & Lownds, 2007). In this chapter, we explore the big idea of curiosity and encourage early learning students to claim their own, as depicted in Box 9.1 on the next page.

Box 9.1 Claim Your Curiosity



Chepko Danil/Fotolia

CLAIM YOUR CURIOSITY as an early learning student who likes to explore ideas and create questions that will trigger children’s sense of wonderment and intrigue when exposed to materials.

According to Heck (n.d.), before children become curious they need to have a sense of ambition. This means that before children will attempt to seek out answers to their questions, they first need to be in a psychological space and place where they want to advance their thinking. Without a sense of ambition, “curiosity is simply a biological and neurological reaction to stimulus” (Heick, n.d., p. 8). Early learning students’ and professionals’ values, attitudes, and sense of curiosity and wonderment can shape how children explore their environments and the materials available to them.

A variety of strategies are used to support children in fostering their sense of wonder and curiosity. Creating environments that have interesting materials, places for exploration, and adults who support their quest for answers to their questions all trigger children’s curiosity, which leads them to “construct knowledge and go on constructing it” (Kamii & Devries, 1993, p. 54). When early learning students and professionals take a constructivist view of learning, children are more likely to have a greater number of opportunities for the wonder, exploration, and discovery that are part of the curiosity process. Think about the early learning environments that you have been in or observed. Is every child curious? Is every adult curious? Reflect on the opening story of Bailey and Maddie. Did they exhibit curiosity about what might be a lollipop in the play garden? How did their father stretch their potential learning opportunities? How might early learning professionals complement the children’s curiosity?

WHAT IS CURIOSITY?

curiosity A multi-dimensional concept involving a motivation to explore, discover, question, and seek wonderment.

Defining **curiosity** is challenging because its meaning varies among disciplines and individuals, depending on one’s theoretical framework and perspective of how children grow and develop. In reviewing the literature, evidence suggests that curiosity plays an important role in the lives of children and is strongly influenced by the adults and the environments

to which children are exposed. Curiosity can be a powerful motivator of behaviour that stimulates children to initiate actions, make social connections, or access resources to explore and make sense of their world (Arnone, Small, Shauncey, & McKenna, 2011). Early learning students and professionals benefit from thinking about big ideas that could influence children’s options for and levels of curiosity.

Curiosity and the process of being curious have been studied in a number of disciplines since the 1950s. For example, Piaget (1936/1952) examined curiosity from the perspective of children needing to make sense of their world through their innate “interest in novelty.” He suggested that children’s interest in novelty and the act of seeking answers to the things that trigger their interest is a cognitive process linked to the development of intelligence. Berlyne (1954/1960) examined curiosity from neurophysiological perspective. He viewed curiosity as a state of arousal influenced by changes to an environment or uncertainty within an environment (Arnone et al., 2011). Berlyne (1978) identified four forms of curiosity that could be used to analyze children’s play behaviour: perceptual curiosity, epistemic curiosity, specific curiosity, and diverse curiosity. *Perceptual curiosity* relates to interest in and attention to novel perceptual stimulation, which is rewarding to the child and can lead the child to engage in further visual and sensory exploration. *Epistemic curiosity* refers to a quest for knowledge and is influenced by the materials and experiences offered within early learning environments to support children’s play. *Specific curiosity* refers to having a desire to seek out specific information or knowledge on a topic, such as when children become interested in building bridges or wondering about monsters. *Diverse curiosity* is similar to being bored and seeking stimulation to bring a sense of excitement into the environment. For example, if early learning programming becomes stagnant, children might try behaviours that normally would not occur, such as throwing rocks at the fence as a way to seek stimulation.

Curiosity can also be examined from a multi-dimensional perspective. For example, Reio, Petrosko, Wiswell, and Thongsukmag (2006) suggested that curiosity be viewed as cognitive curiosity plus physical and social thrill-seeking. Children express differences in their preferences and depth of curiosity, thrill-seeking, or novelty, depending on life experiences (Chak, 2007). Some children may try to satisfy their curiosity by using their minds, while others will wish to explore using a more hands-on approach (Dietze, 2006).



Hands-on gardening with children—growing plants from seeds.

Bora Kim

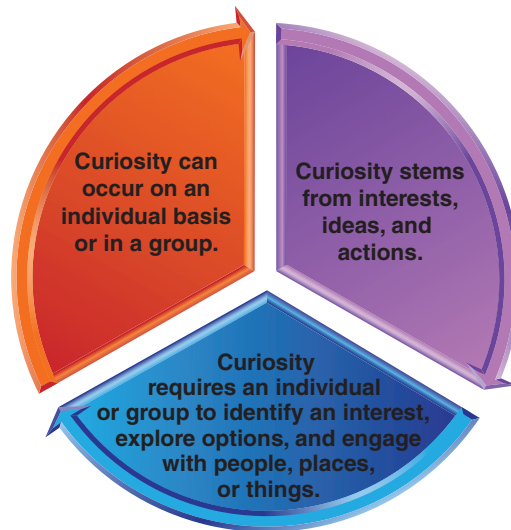


Figure 9.1 Triggering curiosity is multi-faceted

As identified in Figure 9.1, curiosity is multi-faceted and can be triggered by more than one stimulus in the environment. Early learning students and professionals facilitate opportunities for children to use new materials and have new experiences as a way to transform an expressed short-term interest or attraction into more in-depth, long-term exploration (Chak, 2007; Driscoll & Lownds, 2007). This can be achieved when early learning professionals and students adopt practices that focus on understanding children and their interests so that the resources provided are intriguing and spark curiosity.

When children are attracted to a stimulus, it is generally thought that they are seeking new information or trying to figure out how they can apply what they know about some topic to other situations. Children explore the stimulus and attempt to answer various epistemic questions, such as, What happens if . . . ? Why does that happen? Would my idea of . . . work? Children have higher levels of exploration, discovery, and learning when they are in environments with unique resources and experiences that trigger curiosity and where curiosity is honoured (Perry, 2001).

Children may express their curiosity and levels of curiosity in a number of ways. Think about and watch children who are exhibiting a sense of wonderment when they first use a new loose part or intelligent materials. Examine the questions in Table 9.1 and think what you might observe when children become curious about new materials or experiences. Note how children increase their active play, their motivation to seek answers, their language skills, and connections to their playmates and adults when their curiosity has been aroused (Chak, 2007).

Drawing on practices of Reggio-inspired programs, another strategy that is used in programs today to spark children's curiosity is the use of provocations or invitations in the environment. *Provocations* are the deliberate and thoughtful actions taken by adults, or in some cases children, to provoke or extend children's sense of wonder and thinking, such as by adding displays or materials that may attract children to areas of the environment. Provocations, such as intelligent materials as outlined in Chapter 2, are placed in areas where children will discover and then explore them. Think about what might happen if a bouquet of flowers is placed near some paint and paper. How might that trigger children's sense of creativity and observations of the flowers, colours, and beauty within their environment? How might these lead children to explore mixing paint colours or using different paint brushes to create lines and texture in their artwork? Provocations are intended to entice children to expand their sense of wonderment and appreciation of how their environments can be intriguing and mysterious.

Table 9.1 How Children Exhibit their Curiosity

Observing How Children Express Their Curiosity

Examples of Children's Curiosity Behaviours

When children see new materials in their environments, how do they take initiative to explore the materials?

Children immediately are drawn to the area where the new materials are placed.
Children ask questions of the early learning professional about the materials.

How do children explore the materials?

Children touch the materials and try to manipulate them, e.g., by bending or stacking them, or lining them up.
Children ask questions of their playmates and adults.
Children listen to conversations about the materials and observe how their playmates or adults use the materials before trying them.

What qualities do children exhibit when their curiosity has been aroused?

Children increase their activity level with the materials that they are curious about.
Children use new language to include the materials, the attributes of the materials, and what they can do with the materials.
Children may connect with other playmates, who can support them in gaining new knowledge needed to understand ways and try new possibilities in which the materials may be used.

What behaviours do children express when their level of curiosity has been fulfilled with the new materials?

Children quickly or gradually move from the materials.
Children pose fewer questions to playmates or adults.
Children's need for information and answers becomes less immediate. They move from exploring materials to incorporating materials into play episodes.

HOW CHILDREN'S SPACES INFLUENCE CURIOSITY

Many factors may trigger curiosity among children in early learning programs, one of which is the environment. The adults in an environment and environmental conditions can either facilitate children's desire to be curious and the depth to which they will explore their space or create barriers that reduce the desire to act upon their sense of wonder (Chak, 2007). Chak (2007) suggested that we think of a *psychological region* as the child's cognitive structure, including the do's and don'ts or rules and regulations within different environments. The *physical region* refers to the early learning floor space, outdoor space, and materials within those spaces. The *social region* refers to the children and adults in the early learning environment, as well as parents and extended family members. Each of these regions supports the concept of fluidity, movement, and change in early learning programs. For example, think about a child who is building a structure in a block centre. How does each region change for this child as other children are invited and join in on the building project? How might these regional changes alter the depth and breadth of the play and level of intensity of each child's curiosity?

Jenkins, Clinton, Purushotma, Robinson, and Weigel (2006) proposed using **affinity spaces** to promote informal learning cultures and participatory learning opportunities as a way to support children in using curiosity in their play. Affinity spaces are described as

affinity spaces Places in the indoor and outdoor environments where children can experiment, be innovative, and "mess about" with materials and ideas.

“experimental, innovative, having provisional rather than institutional structures, adaptable to short-term and temporary interests, *ad hoc* and localized, easy to enter and exit on demand and very generative” (p. 184). Affinity spaces in early learning programs could be places where children play, perform, put things together, take things apart, network with other children and adults, or work with a peer or group of peers to explore an idea. These spaces differ from the other spaces because children come to the affinity space when they have a clearly defined idea that they wish to pursue over the short or long term. The materials and resources are maintained as children work on them. Further information on materials will be discussed later in the chapter.

THE RELATIONSHIP OF CURIOSITY TO PLAY AND INQUIRY

Children’s levels of curiosity and exploration are affected by multiple competing factors, such as the psychological, physical, and social regions within their life space (Lewin, 1951/1997). A child’s life space takes on many characteristics owing in part to the people, the place, and the resources within that space. As early learning students and professionals think about the relationship of curiosity to play and inquiry, observations and pedagogical documentation will offer insight and guidance into how children use materials and resources as part of their learning agenda.

Renninger, Sansone, and Smith (2004) suggested that how children choose to engage in a learning activity or play episode is correlated with curiosity. They outlined three levels of engagement that children use in their play, as shown in Figure 9.2.

The first level is *participative engagement*. This refers to children engaging in the activity because of an imposed requirement by a parent or teacher. For example, if children are required to complete an art activity at a specific time using specified materials, the level of intrinsic desire to engage in messy play or muck about is greatly reduced. *Affective engagement* occurs when children participate in an experience for pure enjoyment. For example, if children are given the freedom to take a train and books outdoors, having choices of space and place contributes to the novelty and the level of enjoyment. Affective engagement may stimulate interest in new experiences, thus sparking curiosity, which could lead them to engage in the third level—*cognitive engagement*. This level of engagement occurs when children are intrinsically motivated and their curiosity is triggered to explore an interest either on their own or with others. Thinking about the connection between curiosity and learning, take a look at the Reflective Moment box to consider what would happen if the relationship was not acknowledged. As shown in Figure 9.3, when children are in environments that support curiosity, once they have acquired an answer to one question, new exploration and discoveries can trigger the process to begin all over again.

Children with a sense of curiosity display enthusiasm, ambition, and motivation, which lead them to explore and develop confidence. Children who are highly curious ask more questions of adults who are responsive and engaged with them than adults who are



Figure 9.2 Children’s level of engagement in play

A Reflective Moment

If the relationship between curiosity and learning is not acknowledged or understood, how will you know when

curiosity has the potential to enhance a child's experience? Take a reflective moment to think about your answer.

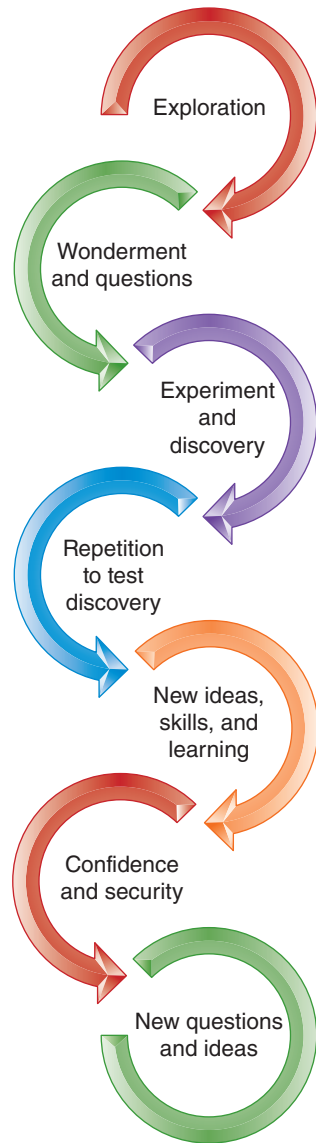


Figure 9.3 Cycle of curiosity

unresponsive or have limited connections to the children (Arnone et al., 2011). Adults who observe children and engage with them are better able to understand children's questions or pose questions that will support the children in taking their exploration to the next level. Children require adults who will listen to them and extend opportunities for them to be introduced to new ideas, resources, or experiences. Early learning professionals examine strategies and processes that will lead children to explore their ideas in new ways and offer various types of support if they become overwhelmed or frustrated or state that they can't do something.

There are many barriers to curiosity and play, one of which is the rules that are imposed on children. Barriers reduce movement and a child's natural instinct to explore. Often, such barriers are deemed to be put in place for safety reasons, but as you will recall in Chapter 8, curiosity is closely associated with risk taking. If children's sense of curiosity and risk taking is influenced by barriers, their sense of wonderment is reduced. Perry (2004) cautioned early learning professionals in constraining curiosity. He determined that for children, "curiosity dimmed is a future denied. Our potential—emotional, social, physical and cognitive—is expressed through the quantity and quality of our experiences. And less-curious children will make fewer new friends, join fewer social groups, read fewer books, and take fewer hikes" (p. 1).

Children are thinkers in their play. They require environments that offer them interesting materials, supports, and opportunities to take risks that will lead them to apply knowledge, try out new ideas, and develop new ways of thinking. When children are in stimulating environments, they will actively work toward constructing strategies to gain answers to their questions. They think about the same type of problem or issue in multiple ways. The newer the experience, the more ways of thinking children use to seek answers to the experience. Children need environments with materials or ideas that will trigger their curiosity.

Early learning students and professionals using big ideas with children can support what children know, as well as what they can learn. The experience of exploring deeply together can direct future experiences, such as how children will design and execute other play options. The collaborative pondering of ideas that can be explored in depth is intended to extend children's thinking and provide the impetus for more inquiry. Inquiry can provide the vehicle for learning every day during everyday moments. Inquiry can also lead to in-depth investigations through long-term projects. For professionals, big ideas are useful tools to support professional learning, curriculum development, and the creation of professional knowledge to guide practice.

STRATEGIES FOR TRIGGERING CURIOSITY

Children may be born curious, but environmental factors, such as available resources and the ways in which adults encourage their play, will influence how they continue to use curiosity in their learning. Early learning students and professionals play a significant role in promoting children's curiosity and their desire to explore their ideas and areas of wonderment.

Promoting wonder, exploration, and curiosity can take many forms with children and the materials in the environment. Early learning students and professionals consistently seek out information from children that will give them insight into how the children view ideas and situations. They use observations, discussions, and questions with the children to ascertain certain types of information that will give them insight into their mode of exploration and curiosity and the level of their thinking and conceptual understanding (Driscoll & Lownds, 2007). These adults can differentiate between how they view a situation and how children may view the situation (Lewin, 1951/1997). Children are encouraged to ask questions and form a hypothesis as a way to help them bring meaning and understanding to their experience. If the environment is rich with options, this will trigger children's questions and the sense of curiosity that comes from their own inquisitive nature and events in their environments (Church, 2007). There are many ways to trigger curiosity. We introduce you to three strategies that can be used as **investigative triggers** for children—ideas that surface from the "wonder-type" comments, conversations, or interests that children express during their play.

investigative triggers Ideas that surface from the "wonder-type" comments, conversations, or interests that children express during their play.

Wonder Walls

Wonder walls offer children and adults a visual, engaging space to record questions, ideas, or observations that are intended to spark conversation and lead them to explore materials or ideas further. They are places for children to gain basic knowledge about materials and their uses. When other children and adults pose further questions, wonder can be



A wonder wall visual used to trigger curiosity.

Peter Dietze

ignited. Wonder walls are places where children's curiosity may be sparked, leading them to take the idea in new directions. Such walls begin with children's or adult's questions. Examine the accompanying photo. What might be some of the questions that children posed? What types of questions might adults have posed to the children? How might materials on wonder walls, such as in the photo trigger further exploration and creativity?

Trial Balloons

Trial balloons is a new concept that the authors have used as a process of extending provocations to children. We view trial balloons as idea floaters. The purpose of trial balloons is to float an idea to children as a way to trigger their sense of curiosity and potentially expand their play experiences. These ideas may be curriculum based, such as, "How could we make an ice castle?" or a schedule idea, such as, "What would you do and what would you need to play outdoors from 9:00 a.m. to 11:00 a.m.?" Floating trial balloons is similar to planting seeds—the intent is to trigger children's thinking and actions and add new experiences or dimensions for exploration that children have not necessarily encountered before. Early learning professionals may use trial balloons as a way to incorporate the concept of big ideas into children's programming and their practice.

When early learning students and professionals are considering floating a trial balloon, there are benefits to having discussions with peers and critical friends to explore the various

ideas, angles, and processes that may help them prepare to launch the trial balloon. Critical dialogue with critical friends provides early learning professionals with a plan of action and the confidence to launch the trial balloon. Collaboratively, the early learning students, professionals, and children explore, wonder, experiment, and create new options for learning. Telling the story of how trial balloons influence children’s play and professionals’ practice adds to knowledge for the early learning sector.

A Thinking Lens Framework

Carter and Curtis (2007) introduced a thinking lens framework that helps early learning students and professionals to think deeply and reflect on practice in a way that makes it meaningful and responsive to children’s curiosity, learning, and development. You can find a handout with a full description of the thinking lens at <http://bit.ly/12oz7Uh>. Figure 9.4 lists six steps to take in order to see your practice through a thinking lens.

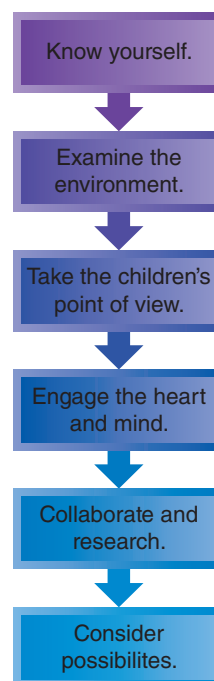
In the thinking lens framework, the first course of action involves knowing yourself. Let’s think about materials. Think back to your own childhood and your most vivid memory of playing with materials. How would you describe the materials and the experience? You may have had many opportunities to play with materials, or you may have had more experience with traditional toys such as dolls and figurines. Some of you may recall experiences messing about with materials, where you had a chance to manipulate, create, and transform within a wide range of media. You may remember this as being messy. How do you feel about messy experiences for children? Think deeply about how your own experiences may influence what you would provide for children.

How does the environment need to be set up to give children easy access to materials? If the experience is messy, what does the early learning professional need to consider? How can spaces be designed so that children can create with materials? How can the day be scheduled so that there is ample time for children to play with intelligent materials?

From a child’s point of view, what do you think would be preferable: open-ended, transformative materials, or closed-ended toys that can be used only one way? A child can

Figure 9.4 A thinking lens for early learning professionals

Source: Adapted from Carter & Curtis, 2007.



put together an airport from assorted blocks, boxes, paper airplanes, and other materials. A child might instead be given a toy airport to play with. From the perspective of the child, which do you think would be more fun to play with? Which experience would be more engaging and give the child a chance to play with others? Which perspective would support a child's sense of curiosity?

What do you need to think about during the children's experiences with materials? Are you thinking about skills, development, and learning? Are you thinking about how you can increase the value and potential of the experience? Are you considering how you can document the experience? What is pulling at your heartstrings? According to Carter and Curtis (2007), thinking about what is touching your heart and engaging your mind about the children's experience will help you apply a thinking lens to your practice.

Think about materials you could bring to early learning environments that are easy to find, inexpensive, and have plenty of play and learning potential. Do you think if you collaborated with others, your list of intelligent materials would expand? What if you did research? Collaborating with others and researching theoretical perspectives and development principles will increase your ability to apply a thinking lens. Applying a thinking lens will help to illuminate possibilities and opportunities for next steps.

THE THEORY OF LOOSE PARTS

When early learning professionals apply a thinking lens, they consider theoretical perspectives. Nicholson (1971) coined the term **loose parts theory** to describe the idea that children should be given open-ended materials to be used alone or with other materials, without specific direction, to spark their creativity. If you go to <http://bit.ly/1aVM8xU>, you will find a document that was created to support standards for "playwork" in the United Kingdom; it provides background on the theory as it relates to those standards, and provides a list of suggested items that can be used for loose parts. Thinking deeply about the theory of loose parts will bring to light the complexities of these often simple materials as the basis for learning and development in the early years. To begin your thinking, consider this quotation from a book about John Dewey's educational theories, which describes what can happen when such materials are brought into the learning environment:

The materials we choose to bring into our classrooms reveal the choices we have made about knowledge and what we think is important to know. How children are invited to use the materials indicates the role they shall have in their learning. Materials are the text of early childhood classrooms. Unlike books filled with facts and printed with words, materials are more like outlines. They offer openings and pathways by and through which children may enter the world of knowledge. Materials become the tools with which children give form to and express their understanding of the world and the meanings they have constructed. (Cuffaro, 1995, p. 33)

Early learning students and professionals embed theory into practice. When loose parts are offered to children, they provide many opportunities, provocations, and invitations to use, transport, combine, and transform them. Making connections to theory in practice requires a thinking lens. Imagine seeing the learning environment through a lens that helps you envision the theory behind the practice. Viewing materials as intelligent is a perspective that brings theory to life.

INTELLIGENT MATERIALS

Intelligent materials are open-ended materials that are full of potential to spark children's creativity. The more a material can do, the more intelligent it can become with children, because what a material can do determines the potential for learning. In early learning environments, you may hear the word *sensory*, which means that something relates to or

loose parts theory A theory suggesting that children be given open-ended materials to be used alone or with other materials, without specific directions, which they can move, carry, combine, redesign, line up, take apart, and put back together in multiple ways, offering many opportunities to be creative.

intelligent materials Open-ended creative resources that are full of potential to express children's creativity.

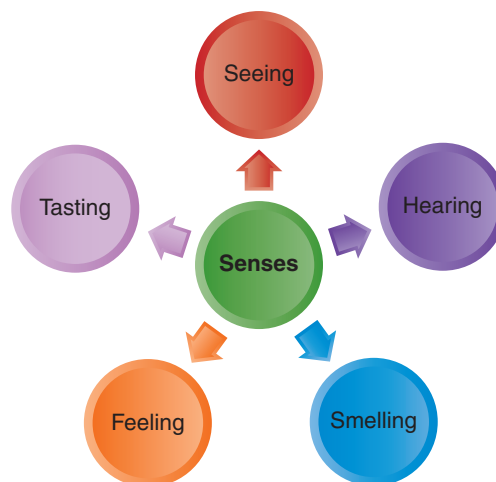
Loose parts and materials in the environment.

Angela Brant and Fox Hollow Child Care Centre



provokes the senses. Use a search engine and type in “sensory activities in early learning”— you will find many links with suggestions. Reviewing the list will reveal that touch is a common sense for children to explore in early learning environments, but the more senses that are involved in an experience, the higher the potential is for learning. There are five physical senses, as illustrated in Figure 9.5.

Figure 9.5 The five senses





Children exploring in the garden.

Angela Brant and Fox Hollow Child Care Centre

In addition to being sensorial, intelligent materials have potential to communicate—to be expressive. They need to speak in languages or “alphabets.” Look at the photo on this page. How might children explore the sensory experience? What senses may they potentially use in their exploration? Why?

MATERIALS AS LANGUAGES

When children encounter materials and begin to explore them, they build awareness of what can happen. Early learning students and professionals can be there to observe and support. It is through interactions between a child and a material that a language is developed. “As children use their minds and hands to act on a material using gestures and tools and begin to acquire skills, experience, strategies, and rules, structures are developed within the child that can be considered a sort of alphabet or grammar” (Gandini, 2005, p. 13). The child discovers the language of the material through experimentation and by observing and interacting with others (Gandini, 2005). Think about a ball made of elastic bands as an example of a material. Figure 9.6 on the next page depicts the types of knowledge that can be acquired by acting on this particular material.

A material’s language can be thought of as the combination of the features of a particular material with the relationship that emerges in the interaction that the child has with the material. It is during this process that the possibilities for modification, transformation, and structuring of the material become apparent. It then becomes a “conduit for expression that communicates the child’s thoughts and feelings” (Gandini, 2005, p. 13). Throughout the experience, the child is “acquiring knowledge about the material itself” (Gandini, 2005, p. 14).

Look around you and take in whatever objects are in your environment. Start to think about these ordinary objects as intelligent materials. Reggio educators give the example of a paper napkin:

A paper napkin is an anonymous object camouflaged by daily use and presence. A customary material which, when explored, reveals many properties. It is white, lightweight, soft and delicate

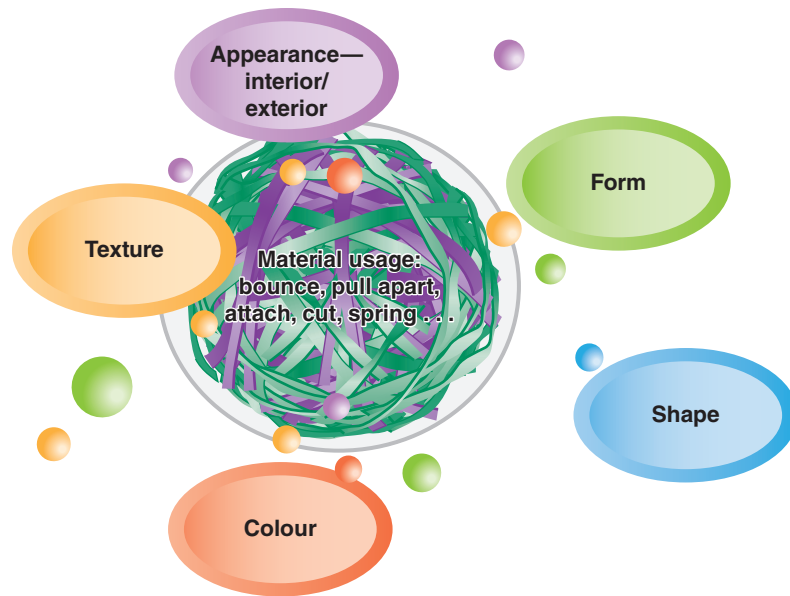


Figure 9.6 The language of a ball of elastic bands

and just slightly rough to the touch. In layers it obscures light but when unfolded it is almost transparent. Hands, perceptions, mind and material come together to know each other. Children's gestures build the first shapes. Research is being done on a "grammar" for the material, alphabets and compositions that will carry traces of the children's thinking and the identity of the material used. Compositions are placed next to each other and made to merge. They become extended and re-combined into one large final composition searching for balance between different gestures, different way of thinking. (Cavallini, Filippini, Vecchi, & Trancossi, 2011, p. 74)

Everyday objects have the potential to spark curiosity. These materials can become part of the indoor or outdoor environments. When early learning students and professionals offer children intelligent materials that can be expressive in many ways, they are creating material-rich environments. Think about the outdoor environment during the fall. What types of intelligent materials can students and children gather from their play spaces or within the community? How do the beautiful leaves or pine cones offer children different ways of thinking? What new languages might children express as a result of using these materials? What happens when you make resources available, such as magnifying glasses, paper, and paint?

MATERIAL-RICH ENVIRONMENTS

By creating and sustaining environments that are rich with materials, early learning professionals provide opportunities for children to be expressive and acquire knowledge and skills while thinking creatively and designing their own play experiences and representations. Many questions can be asked about adding materials to the environment:

- Will the material be used in many ways, or does the material dictate a particular use?
- Will many children use the material, or does the material have limited usage?
- Does the material lend itself to a variety of different kinds of explorations?
- How could the material be introduced to the children to allow for the greatest number of possibilities?
- Is the material better suited for indoor or outdoor exploration? Why?

OPEN-ENDED MATERIALS AND FLEXIBLE FURNISHINGS

Carter and Curtis (2003) suggested that when children are offered furnishings that are flexible and that can be moved in combination with open-ended materials, they engage in a range of activities that foster development and learning. **Open-ended materials** stand in contrast to closed-ended materials, which are limited in their use. Consider a puzzle piece—it is closed-ended if it can be used only as a part of a puzzle. The piece fits in one particular space. What happens when a puzzle piece goes missing? Early learning professionals have choices to make. If they choose, puzzle pieces can become loose parts and have open-ended possibilities as they are added to the imaginative creations that children construct. Another possibility is for children to have an opportunity to solve a problem, as illustrated in this story of an early learning professional and a missing puzzle piece experience: <http://bit.ly/1boztSE>. Consider the choices made and relate this story to the thinking lens framework.

open-ended materials Materials that can be used in many possible ways.

When children have ample opportunities to engage in experiences with materials in environments that are not static but flexible, they “become more competent in their physical abilities and develop self-confidence and independence. They develop specific skills, self-awareness, and an alertness and respect for others around them. Open-ended materials encourage children to become flexible thinkers and responsive playmates” (Carter & Curtis, 2003, p. 57). Figure 9.7 illustrates the many ways children respond to open-ended materials and flexible furnishings.

As children manipulate and build with materials, they may need an area in the room to be expanded to accommodate larger groups of children or larger construction projects. Being able to push furnishings back to increase the floor space is beneficial. Depending on the group of children, they may need smaller spaces within larger ones for cozier gatherings. Portable screens or dividers can be used to give children the opportunity to “work” in smaller spaces. With two-tiered steps and risers placed against walls, children can use open-ended materials to create different arrangements and scenes (Carter & Curtis, 2003).

Creating arrangements and scenes are a way for children to engage in **small world play**, a type of imaginative play that uses figurines and loose parts or materials, giving children an opportunity to mix and match as well as improvise to create their own symbolic scenarios. Think about the possibilities when children are provided with small animals and other creatures, such as farm, zoo, and domestic animals; prehistoric animals; and sea creatures. They can create a pond, beach, swimming pool, snow, swamp, forest, hills, mountains, valleys, and space scene. The children can put together a parking lot, airport, railroad, roads, or fields. By adding figurines of people and/or vehicles such as cars, trains, planes, and buses, they can make their play scenes more complex. Rocks, blocks, pebbles, boxes, tins, cones, shells, and pieces of fabric, carpet, or paper will add to the possibilities as the children create their small world play scenes. During small world play, children get the chance to be in control of their environment—to make things happen how and when they choose (Bromley & Scott, 2004). For more information on small world play, go to <http://bit.ly/14tpyaF>.

small world play The manipulation of small materials and toys to act out stories and to develop ideas.

Building Manipulating
Problem solving
Representing
Creating
Investigating
Communicating
Moving

Figure 9.7 Children’s response to open-ended materials and flexible furnishings

THE BEAUTIFUL STUFF OF CHILDHOOD

In 1999, Cathy Weisman Topal and Lella Gandini wrote *Beautiful Stuff! Learning with Found Materials*, chronicling the experience of early learning professionals who were inspired by the Reggio Emilia educators to explore the potential of materials in learning environments for young children. In the introduction to the book, they described the wonder of materials:

To the young child the world is full of materials to touch, discover, and explore. To find, collect, sort and use materials is to embark on a special kind of adventure. For adults, gathering materials means rediscovering the richness and beauty in natural, unexpected, and recyclable objects that are all around us, but not often noticed. One way to rediscover our own creative impulses is to see possibilities in material. Children possess a natural openness to the potential of materials. When adults become aware of this process, they find ways to watch and listen to children. Children and adults become collaborators as they discover, collect, sort, arrange, experiment, create, construct, and think with materials. The goal is to allow children to become fluent with materials—as if materials were a language. (Topal & Gandini, 1999, p. 1)

Taking the view that materials are a language will also help early learning professionals to see the potential of materials as a way of thinking. Gandini and Topal (1999) suggested that bringing materials into the environment and “discovering their potential for learning will involve many of the same process skills used in math and science and interpreting literature. It’s a way of thinking about things” (p. 98). Materials are thinking tools for children and adults.

MATERIAL CHOICES

Schwall (2005) offered ideas for the material choices in the learning environment. For example, in open jars, baskets, or trays that are placed on accessible shelves, early learning professionals can supply children with collections of shells, leaves, folded paper strips, and small wood and metal items that contrast and complement one another. Think about offering baskets of various wires, beads, nuts and bolts, and materials for twisting, such as foil paper and screen door mesh. When the materials are presented in an enticing and inviting manner, they “send a message of complexity, connection, and openness” (Schwall, 2005, p. 22). This supports children in gaining an appreciation for their environment and a sense of intrigue about how the materials may be used in their play and learning experiences.

Early learning students and professionals benefit from thinking deeply about possible materials that they can supply to children that will facilitate opportunities to explore, discover, and create. In order to think deeply about possibilities, you need practice. In addition to the materials suggested by Schwall (2005), Dietze and Kashin’s list (2012) in Table 9.2 suggests many different objects, often reclaimed and repurposed, that can spark the creativity and curiosity of children, giving them chances for playful expression in many languages. Keep in mind that these materials are suggested for you to mess about and explore with. Some of these materials, such as Styrofoam, may be restricted in some areas and for some ages because of choking hazards.

MATERIALS AS THINKING TOOLS

An excellent source for learning about how important materials are to the early learning environment, written by British pedagogical consultant Debi Keyte-Hartland, can be found at <http://bit.ly/12V9H0f>. In an artful way, this presentation demonstrates how the materials offered in the learning environment create the context of learning and shows that there is an interrelationship between the use and types of materials offered and the ethics, values, and knowledge of the early learning professional.



Light as a material choice.

Angela Brant and Fox Hollow Child Care Centre

Table 9.2 Material Possibilities

REPURPOSED	FOUND	ACQUIRED
Straws	Driftwood	Metal materials
Clothespins & fasteners	Rocks	Blocks
Rulers	Pebbles	Magnets
Wood	Beach glass	Glass & plastic lenses
Corks & straws	Dirt	Levers & pulleys
Pegboard	Sand	String, ribbon, rope
Wire	Water	Clay & molding materials
Flashlights	Shells	Lids
LED lights	Sticks	Tubing
Squirt bottles	Seeds	Popsicle sticks
Sieves	Leaves	Electronics
Bottles & jars	Plants	Measuring cups
Batteries	Pine cones	Air pumps
Styrofoam	Dried plants & flowers	Tools: shovels, hammers, screwdrivers

Source: Based on Table 8.2 from *Playing and Learning in Early Childhood Education*, 1e by Dietze, p. 243. Copyright (©) 2012 by Pearson Canada.

Early learning professionals make ethical choices in the materials they choose to offer children. Ethically, do you think that it is appropriate to give children food as materials? How do you feel about children picking flowers to bring into the early learning environment? Early learning students and professionals keep environmental responsibility in mind. For more on environmental education in early learning, follow this link: <http://bit.ly/150y00a>. Consider your own values and beliefs regarding materials and their usage. How do your ideas connect with environmental perspectives? What might you need to explore further? Your knowledge about materials and the environment indoors and outdoors will increase the likelihood that you will make appropriate material choices.

THE HAWKINS THEORY OF MESSING ABOUT

Hawkins (2000) maintained that adults need time to play with materials in order to realize their potential for learning. By experimenting, you might realize that when you combine different materials what you are really doing is exploring concepts such as balance, aerodynamics, and velocity, for example. When you then offer these materials to children, you will be more confident in scaffolding their understanding and experimentation with these concepts. Hawkins understood the importance of offering materials to adults and children as a way to learn. Hawkins saw nature as a significant source of materials. For this “eminent mathematician and philosopher of science, the ideal location for messing about is a pond” (Kellogg, 2010).

For Hawkins, mathematics is the language of nature. The heart of his ideas about education lay in his passion for the workings of the natural world and for the beauty of the patterns of the rhythms of the attendant mathematics and physics. This world seemed to furnish an infinity of paths to be explored, discovered and rediscovered. He seemed to feel himself as part of the pulse. (Kellogg, 2010, p. 60)

In the 1970s, David Hawkins and his wife, Frances, engaged with a group of young children and their teachers in the study of a pond (Kellogg, 2010). A pond can be an environment rich with intelligent natural materials to be explored. Think about how we have described investigative triggers, and then ponder ideas about what you might find in a pond.

To understand materials as tools for expression, you need to experiment, explore, and investigate the different material choices in order to discover their possibilities. Hawkins (2000) suggested that you “mess about” with materials; you will not know how to support aspects of learning unless you “have been encouraged to explore and appreciate the manifold ways these simple materials of childhood play are related, as subject matter, to the style and character and history of the great world around us” (p. 52). We encourage exploring materials indoors and outdoors. We invite you to play with others in your experimentations and record your discoveries before offering children those very same materials.

OUTDOOR AND INDOOR MATERIALS

Although the types of experiences and curiosity triggers may differ between indoor and outdoor environments, they are equally important to children and should be given equal consideration in design and materials. The early learning program philosophy influences the accessibility that children have to the outdoor environment and, in turn, to materials. One of the major differences between the indoor and outdoor environment is that the outdoor environment may have natural attributes that add materials. For example, when children have access to grass, pine cones, mud, and plants, as well as weather combinations, the experiences may lead them to have specific questions, such as where the rain comes from or



Eolithism - begins with a child's existing curiosity and content and engages a sense of wonder from the exhibit Cultivate the Scientist in Every Child <http://bit.ly/1uYydQx>.

Diane Kashin

Table 9.3 Levels of Complexity of Materials

Simple Units

Refers to single-use materials to manipulate or create, such as a swing, tricycle, or slide.

Complex Units

Refers to two different kinds of materials that children may manipulate together, such as clay and scissors.

Super-Complex Units

Refers to three or more kinds of materials that children may combine, such as sand, water, and digging tools.

Source: Adapted from Kritchevsky et al., 1977.

what makes clouds. As with the indoor environment, early learning students and professionals ensure that there are various types of materials outdoors to support children in wanting to explore and wonder, while stimulating them to seek answers to their questions in various ways.

Kritchevsky, Prescott, and Walling (1977) noted that early learning students and professionals benefit from considering the levels of complexity of various materials. Table 9.3 outlines the levels of complexity. Early learning students and professionals examine their environments to ensure that materials are available to support each level. Super-complex units offer children many opportunities to explore a variety of ideas, sometimes at great depth, because of the open-ended nature of the materials.

PROGRAM DESIGN FOR CHILDREN

Early learning professionals' work can include a wide range of children. The developmental profile of an infant is different from that of a child of three or a child of six years of age. When designing a program that is rich with materials, age and development must be considered. In Table 9.4 on the next page, we offer a way to bring materials into the learning environment for three age groups: infancy, early childhood, and middle childhood.

Table 9.4 Ways of Bringing Materials into the Learning Environment

INFANCY

Program Suggestion

Treasure Baskets



Diane Kashin

Description

An excellent way to introduce materials to very young children is with a treasure basket. This gives early learning students and professionals an opportunity to collect age-appropriate, safe materials for infants in a way that is aesthetically pleasing and accessible.

Big Ideas

Look closely and observe the interactions that infants and toddlers have with materials. How do they react to the different materials? How would you interpret the learning involved? Have the children discovered properties of materials? What other materials could be added to enhance the learning?

EARLY CHILDHOOD

Program Suggestion

Marble Run



Diane Kashin

Description

Creating ramps and pathways for balls or marbles will help young children create, construct, and combine materials for a purpose. For more on marble runs, see <http://bit.ly/12CRzgJ>.

Big Ideas

Document the children's progress as they are building their ramps and pathways for marbles and balls. What big ideas are they discovering? Are they grappling with balance, size, and velocity? What other materials can you offer that will scaffold their learning?

MIDDLE CHILDHOOD

Program Suggestion

Building Down



Diane Kashin

Description

Older children can use materials suspended from a ceiling indoors or a tree branch outdoors to build down instead of the more common experience of building up. Children can use pipe, loose parts, and other materials to build down.

Big Ideas

Building down affords children the opportunity to explore big ideas such as weight, balance, and aerodynamics. What materials could be added to enhance the experience?

PROGRAM DESIGN FOR FAMILIES

Families can be given the opportunity to engage with their children and materials in a collaborative way. At the Acorn School (www.acornschool.ca) in Ontario, a beautiful stuff project was launched with an invitation to families to collect materials at home in a paper bag. Lined up in the cubby area of the kindergarten room, the bags of beautiful stuff left the children overcome with excitement as the time came closer for them to unveil the materials that they had collected with their families. When the materials were emptied from the bags, they became a provocation for children to observe and compare, sort and classify. The materials became a provocation for the child to observe and compare, sort and classify as depicted in the accompanying photo.



Beautiful stuff organized by colour.

Diane Kashin

ROLES AND RESPONSIBILITIES OF EARLY LEARNING PROFESSIONALS

Think back to the child's story at the beginning of the chapter. If Maddie and Bailey approached you asking questions about the materials that were added to the outdoor play area, what would you say? What would you do? Your role and responsibility as an early learning professional is to enhance learning in a way that is meaningful for children. By applying the thinking lens previously discussed in the chapter, early learning students and professionals can take on the child's perspective and consider the following, based on Carter and Curtis (2003), as well as the idea of investigative triggers and trial balloons.

- What is drawing the attention of Maddie and Bailey, and what are they excited about?
- What might the children want to accomplish with the materials they observed in the outdoor play space?
- How might the children interact with others using this material and different materials in the outdoor play area?
- What developmental themes, ideas, or theories might the children be exploring during this time?
- What trial balloons may be used to trigger play?
- What types of materials or experiences may be introduced as part of an investigative trigger?

Found materials that the children have collected can also be added to other open-ended objects or be used by the children on their own. When such materials are found outdoors, you can take inspiration from the famous British artist Andy Goldsworthy, who creates huge pieces of land art in the environment using natural objects, such as pebbles, twigs, branches, pine cones, mud, leaves, and petals. Type the words “images of Andy Goldsworthy art with children” into a search engine to see examples of art created by children using these natural, loose, beautiful parts of the outdoor environment. We introduce nature art in Figure 9.8's programming bubble.



Figure 9.8 Programming bubble: nature art inspired by Goldsworthy

FEATURED RESEARCH

David Hawkins was a philosopher, mathematician, historian, physicist, educator, and essayist. His wife, Frances P. Hawkins, was an early learning professional and writer. Together they made many contributions to the early learning sector (New, Cochran, & Franzosa, 2006). David spent many years as a teaching professor at the University of Boulder in Colorado. He was the recipient of numerous awards for his work in philosophy and early science education. Frances taught for many years and was a thoughtful and passionate observer of young children in action. In the 1970s, David and Frances founded and directed a centre in Colorado for professional learning, providing workshops “notable for [the] inclusion of the voices of teachers writing about teaching and learning in their classrooms” (New et al., 2006, p. 409). When David visited Reggio Emilia, he became friendly with Loris Malaguzzi. Malaguzzi referenced Hawkins as a source of his understanding of teaching and learning, and Hawkins wrote about this experience of meeting Malaguzzi (Hawkins, 1998). As proponents of free play as a significant element of scientific exploration, David and Frances made a substantial contribution to early learning. They are truly role models for early learning students and professionals, as they were also activists who believed strongly in peace and social justice (New et al., 2006). For more information on the lives, writings, and theories of David and Frances Hawkins, see www.hawkinscenters.org.

PEDAGOGICAL TOOLS

We suggest early learning students and professionals take inspiration from the ideas of this chapter and consider using play as a pedagogical tool. Play with materials and play with each other are ways for you to realize the significance of play, the importance of materials, and the benefits of experiential learning. The opportunities for play and learning for early learning students and professionals have expanded. To be professionally literate means more than reading professional literature presented in traditional print format. It can include multiple literacies: playing online, while searching, collecting, archiving, curating, and sharing professional resources. For early learning students and professionals, this can be a playful experience.

PROFESSIONAL CASE STUDY

Marelli, James, Jill, and Joel were employed at an early learning centre for six years. They considered the early learning centre to be a traditional centre. Over the years the owner had purchased most of the play materials from a supply catalogue for early childhood programs. For example, the materials for the art centre were displayed in colourful plastic tubs. Sometimes when they looked at the environment, it was like viewing the colours in a kaleidoscope.

Marelli, James, Jill, and Joel have now purchased the early learning centre. One of their goals is to reconfigure the environment so that it is engaging for the children. For example, they want to remove as much plastic as they can from the environment. They want to bring natural products in, and they want the materials to have meaning for the children. As they think about making this shift, they feel overwhelmed. Many questions have surfaced and need answers. How will they know if and when the materials are suitable for children? What signs will give them clues that the materials are supporting children's curiosity? Should they establish ways to use trial balloons or wonder walls? How will they know if the environment is right for the children?

REFLECTION QUESTIONS FOR SELF-LEARNING

In this case study, Marelli, James, Jill, and Joel ask themselves many questions as they think about reconfiguring the early learning environment. Think about the following questions. How would you respond?

1. What advice would you give them on the types of materials they may wish to incorporate into the environment?
2. What suggestions would you have in relation to bringing cultural materials into the environment?
3. How might they know if the environment is supporting children's sense of wonderment and curiosity?
4. How might their program philosophy require adjustment? Why?

BIG IDEAS FOR DIALOGIC LEARNING

Materials within the indoor and outdoor play spaces are key contributors to supporting children's sense of wonderment, exploration, and curiosity. Think about early learning environments where you have visited or worked. When you think about the intelligent materials, loose parts, and open-ended materials, how do you visualize displaying them? What natural materials would you bring to the environment? How would those natural displays change with the seasons? What natural materials would you bring to the environment to support local cultures and family cultures? Now think about a potential trial balloon that you might want to share with the children. Why use trial balloons? How are trial balloons different from provocations? How do the two concepts differ? What are their similarities? How do you bring materials into the environment that will trigger children to have big ideas?

Use the following questions to consider environmental factors and the big ideas of providing materials that support children's curiosity and learning.

1. You are required to prepare a curiosity basket that will be placed in an outdoor snowbank. What natural items will you put in the basket? Why?
2. In small groups, share ideas of interesting items from the hardware store that you could put together to create a display that may spark big ideas with children.

3. Examine the Acorn School story of beautiful stuff. In small groups, create an idea for a bag of beautiful stuff. What would your group put in the bag? Create the bag and share with your colleagues. Listen to the language, and think about questions that could extend the level of exploration or curiosity.
4. While each group presents its beautiful stuff bag, think about how this sparks your interest to explore. How does this inform your practice?

VISION

It is our vision that early learning students will develop an understanding of the potential of materials to be vehicles for children to express themselves in multiple ways. By claiming your curiosity and exploring opportunities to experiment with learning through play as an adult learner, you will be able to realize value and apply high-level thinking about pedagogy in professional practice. The importance of materials cannot be underestimated. Playing with social media is one way to express your understanding. We invite you to begin by creating a social poster as described in Making Connections that reflects your beliefs about materials.

MAKING CONNECTIONS

Technology is a process and a tool that can be used to enhance professional learning (Dietze & Kashin, 2013) and to advocate for children’s right to material-intensive learning environments that keep them engaged, playful, and cognitively challenged. By connecting with others through social media, you can make a case for material-intensive play environments. Take on a technological and cognitive challenge to develop a social poster that depicts your values and beliefs about materials. Figure 9.9 depicts two examples of social posters that can also be found at <http://checkthis.com/user/dianekashin>.

The steps to making a social poster are not difficult. You need to think of a title and perhaps a subtitle. Then you will need some content. Make sure to reference your content. You can include images, video, and links to other sites. Once you are satisfied that your social poster is an excellent representation of your beliefs and professionalism, make it public. You are now a connected professional!

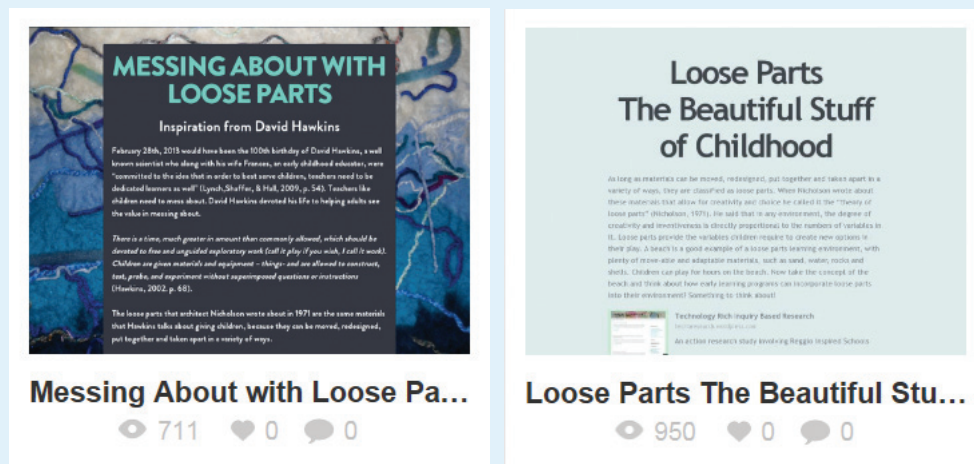


Figure 9.9 Social posters about materials

Source: Diane Kashin

KEY TERMS

Affinity spaces 207

Curiosity 204

Intelligent materials 213

Investigative triggers 210

Loose parts theory 213

Open-ended materials 217

Small world play 217

AFFINITY SPACES CURIOSITY
INTELLIGENT MATERIALS
INVESTIGATIVE TRIGGERS
LOOSE PARTS THEORY
OPEN-ENDED MATERIALS
SMALL WORLD PLAY

Figure 9.10 Key terms wordle

SUMMARY

This chapter reflects on the relationship of spaces and materials to children’s sense of curiosity, wonderment, and experimentation. Early learning students can benefit from thinking about what makes them curious and how that sense of curiosity can be extended to their practice. Think about the learning outcomes and reflect upon the following:

1. Materials in the environment, including intelligent materials, have a major influence on children’s play, learning, and desire to engage with the people, things, and opportunities within the environment.
2. *Loose parts* and *open-ended* are terms that relate to the process of building curiosity and supporting children’s play. When early learning students and professionals apply a thinking lens to reflect on the process, the importance of these materials becomes more apparent.
3. When early learning students and professionals see materials as intelligent and as having their own language, they too become a thinking tool to embed theory into practice.
4. The Hawkins theory of messing about provides another way for adults to see the importance of open-ended materials in the lives of children. By looking at both the indoor and outdoor environments and considering strategies for enhancing children’s curiosity, early learning students and professionals can realize the potential of materials.

“Cultivate the Scientist in Every Child: The Philosophy of Frances and David Hawkins” is an educational exhibit created by the Hawkins Centers of Learning as a tribute to the work of this couple. Their work has a very timely message about the importance of incorporating materials both as a vehicle for children’s learning and as a tool for early learning professionals to mess about with, so as to be better able to enrich unstructured learning experiences for the children with whom they work. The exhibit is travelling through the United States and spent a year in Canada. For more information about the exhibit, go to www.hawkinscenters.org/exhibit.

For Further Thought