

Chapter 2

Drawing to Learn

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Abstract This chapter will demonstrate how a specific Vygotskian sociocultural framework can assist teachers in their understanding and support of young children's drawing processes. Using examples of children drawing in a kindergarten and year-one classroom, I will explore the notion that in drawing, there is evidence of a relationship between thought and drawing that becomes visible through the study of meaning-making processes. Drawing supports the movement from simple spontaneous concepts to more complex concepts and plays an important role in promoting higher mental functions. When drawing is used in a collaborative and communicative manner, it becomes a powerful meaning-making tool. When drawing is recognized as a meaning-making process, supporting drawing then becomes central to the teaching and learning of young children.

Keywords Drawing • Vygotsky • Meaning-making • Early childhood • Higher mental functions • Sociocultural

Drawing provides children with their first means of making a permanent, tangible, concrete, and communicable record of their ideas so that most young children have a strong desire to draw. Drawing and mark-making are also among the child's first efforts at abstraction and the use of a symbol system (Athey, 1990; Cox, 1991; Eisner, 1972; Matthews, 1999). Facility with abstractions and symbol systems are essential for school-based literacy like mathematics, information technology, reading, and writing (Athey, 1990; Barratt-Pugh & Rohl, 2000; Gifford, 1997).

In this chapter we will see how young children, in an early childhood classroom in Canada, productively used drawing in a range of contexts to make sense of the world in which they live. The children were encouraged to talk about, share, revise, and revisit their drawings. Drawing slowed responses to stimulus by engaging the child with the subject in meaningful ways for longer periods. Drawing mediated between thought and action to support progressively complex ideas. These drawing processes extended the children's thinking as well as their awareness of different

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possibilities for representation and their drawing repertoire. In everyday life the arts often explore “big ideas.” The arts give form to some very complex concepts. This distillation (and often crystallization) of concepts allows us to make connections between ideas and concepts that we might not normally easily make.

The writings of Lev Vygotsky (1962, 1978, 1987, 1998) offer us a rich and productive way of examining young children’s drawing processes that acknowledges both the children’s context and their intentions. Sociocultural theory, as proposed by Vygotsky (1987), offers a way of understanding mental processes through disclosure of their emergence and subsequent growth. He viewed learning and development as dialectical in nature, working together as a dynamic process in a sociocultural context. The learner brings prior knowledge and combines it with new knowledge through his or her interaction with others. Expertise is shared in order to negotiate and construct meaning (Duran & Syzmanski, 1995; Rogoff, 1990). Development of the individual is “a process in which children grow into the intellectual life of those around them” (Vygotsky, 1978).

Drawing is also dialectical in nature, and this chapter describes how drawing can be a powerful tool for mediating learning within a community of learners. Drawing in a social context mediates new knowledge and understanding. Focusing on children’s drawing processes and applying an explicitly Vygotskian analysis is a departure from the way we have traditionally analyzed drawing, where individual drawings have typically been viewed in a decontextualized and developmental manner (Brooks, 2002). By examining drawing events over time, threads of children’s thinking can be followed, illuminating the consequential progression of increasingly complex ideas.

Thought and Drawing

Vygotsky was interested in the connections between thought and speech. He suggested that “the rational, intentional conveying of experience and thought to others requires a mediating system, the prototype of which is human speech born of the need of intercourse during work” (Vygotsky, 1962, p.6). However, he also considered other forms of communication such as symbols, algebraic systems, art, drawing, writing, and diagrams (Vygotsky, 1962). These signs and symbols might also be considered forms of language and a way of communicating. Vygotsky was not able to pursue his exploration of these other symbol systems in his short lifetime. My work builds upon Vygotsky’s initial ideas and explores them further in relation to drawing. I chose drawing because it is something most children do and is considered to be foundational to the visual arts. If we also consider drawing to be a language of sorts, then we can begin to see how drawing might contribute to the formulation of thinking and meaning. The diagram (Fig. 2.1) illustrates Vygotsky’s theory of the connection between thought and speech and the development of verbal thought. Verbal thought is “the linkage of multiple layers of language and thought as they transform themselves into greater mental abilities, the joining of thought and

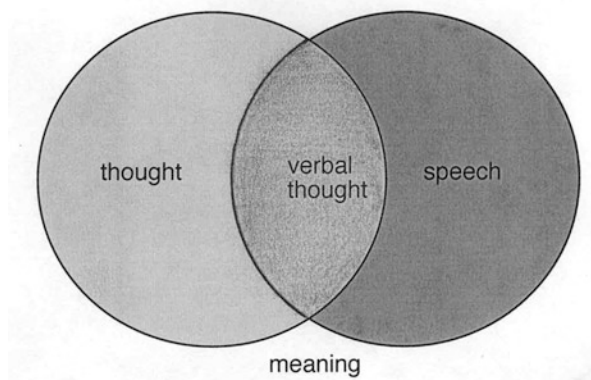


Fig. 2.1 Verbal thought (Adapted from Wink & Putney, 2002, p. xxv)

language to make meaning” (Wink & Putney, 2002, p.152). Speech informs thought and thought is given life through speech. Meaning is created at the intersection of, and through a dynamic relationship between, thought and speech. Vygotsky proposed that it is in “word meaning” that thought and speech join to become verbal thought and that through the study of meaning-making, we might find ways to understand children’s thinking. He proposes that it is “in meaning [that the] answers to our questions about the relationship between thought and speech can be found” (Vygotsky, 1962, p. 5).

Vygotsky wrote about two forms of meaning: meaning as reference and abstraction and meaning as contextualized personal sense (Wertsch, 2000). There are also two basic assumptions about meaning as reference and abstractions. One is that “language meaning is a matter of referential relationships between signs and objects,” and the other is that “the development of meaning is a matter of increasing generalization and abstraction” (Wertsch, 2000, p. 20). Vygotsky believed that an understanding of the difference between what he termed a child’s spontaneous concept and a child’s scientific concept depended on one’s understanding of these two assumptions. It is in the spontaneous concept, which occurs in a child’s first encounter with an experience that the referential use of language plays an important role. However, for meaning to develop further into abstraction, the child has to move beyond this direct linking of referent to object to a more generalized meaning. Objects are grouped into categories rather than remaining single objects. I suggest that drawing assists this movement, and later in this chapter, I present several examples of what this looks like for young children in the context of the early childhood classroom.

The diagram (Fig. 2.2) borrows from Vygotsky’s theory and illustrates a possible connection between thought, drawing, and the development of visual thought (Brooks, 2002, 2003). When drawing informs thought and thought is given life through drawing, we can begin to see the connection between thought and drawing and the value of drawing in the creation of meaning.

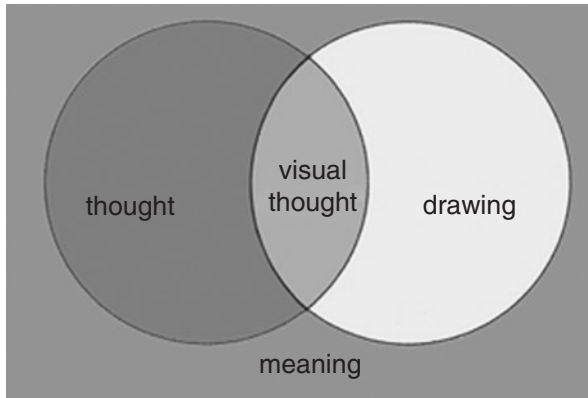


Fig. 2.2 Visual thought

If we consider drawing to be a communication system that supports meaning and that might operate in similar ways to language, and if we replace the word “language” with the word “drawing” in the above hypothesis, then we can begin to understand how drawing might function at the referential level as well as be a mediator between a child’s spontaneous concept and a child’s more complex and scientific concept. Vygotsky (1962) describes a thought as being both whole and simultaneous. It does not consist of individual words like speech nor is it always connected to speech. What is contained simultaneously in thought unfolds sequentially in speech (Vygotsky, 1987). There is simultaneity of ideas and concepts in a completed drawing that parallels Vygotsky’s description of thought. A drawing is seen as whole and simultaneous, whereas speech has a more linear and temporal order. Perhaps the power of drawing for children (and adults) is that it more closely represents thought.

The materiality of a drawing offers opportunities for ideas to be shared with others as well as revisited, re-evaluated, and reworked. The relative permanency of drawing over speech offers children possibilities for an extended dialogic engagement with and around the drawing and the ideas it represents; this might not be as possible to achieve with speech. When young children do not yet have fluency with text, or perhaps even oral language, then drawing offers a means of communication and a viable mediating role for collaboration, meaning-making, and problem-solving. Drawing provides a bridge to thinking that could have some advantages over speech or writing.

The rest of this chapter will illustrate, and expand on, four important concepts in relation to drawing and a Vygotskian theoretical framework. These four concepts are: drawing in the social context of the classroom, interpersonal and intrapersonal drawing dialogues, how drawing supports higher mental functions, and the consequential progression of ideas through drawing. Each concept relates to the other while also building upon each other.

Drawing in the Social Context of the Classroom

In the context of a dark Canadian winter, “light” was a meaningful and relevant topic for the children in this year-one classroom to investigate. The children brought a variety of light sources from home so that everyone in the class could examine them more closely (Fig. 2.3). They also brought their own understanding of light that was acquired from their experiences and interactions with their families and friends outside of the classroom. In the classroom a new social context for sharing the collective understanding about light was created. These children were now exposed to a range of ideas that might be very different, and sometimes conflicting, from their own.

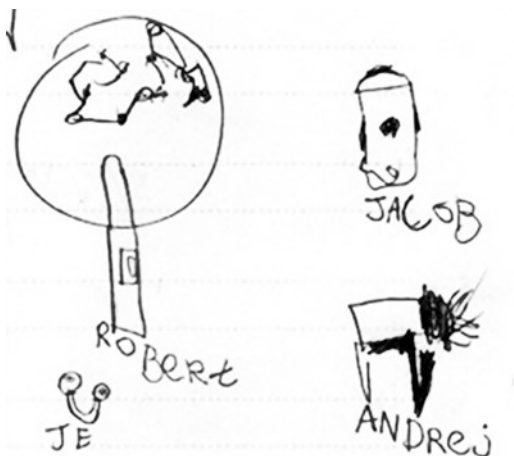
Vygotsky suggests that cognitive construction is influenced by past experiences as well as the immediate social contexts and that both affect not just what is learned but also how it is learned (Moll, 2002; Vygotsky, 1962, 1978; Wink & Putney, 2002). The differing ideas helped to raise the questions that provided the impetus for further investigation by individuals and small groups. Drawing was a crucial element of the investigations. Compiling and comparing observational drawings gave the children a reference upon which to build and elaborate their ideas. Through shared reviewing and discussions, the drawings prompted a deeper understanding of the concepts in question. For example, the differences among flashlights became evident through drawing and comparison of the drawings.

In Blair’s inventory of different flashlights (Fig. 2.4), he investigates the very different purposes of these flashlights. He notices that each has a different level of light that suits its purpose. His drawing provides the impetus for an exploration of the concept of candlepower and how much light we need to see to read.



Fig. 2.3 Observational drawing of flashlights by three children (age: 5 years)

Fig. 2.4 Blair's drawings of four different flashlights



Comparing flashlights against different criteria helped the children to group and categorize in more complex ways; ways that acknowledged the scope of the technology of the culture in which they live. The children in this class were encouraged to formulate good questions and to investigate these questions either in small groups or independently. Drawing was supported and encouraged as an investigative and meaning-making tool. Vygotsky (1978) suggests that new knowledge exists first in a shared, or interpersonal, level before it is internalized. He recognized the school as an important site for promoting the shift from personal experiences and interpersonal dialogues to more complex thinking. Drawing helped to make the children's thinking visible. When their ideas were given some form of tangible, external permanency through their drawings then the children were able to use the drawings to discuss, compare, and elaborate on their own and each other's ideas. When children are exposed to different ideas through these interactions with others in their community, they are able to grow into the intellectual life of those around them. In this model the cultural, historical, and social elements of a child's life that are so crucial to a Vygotskian framework are acknowledged so that teaching and learning become truly dialogic in nature (Vygotsky 1978).

Interpersonal Drawing Dialogues

In the social context of the classroom, children are able to borrow the ideas of others and try them out for themselves, and so they become part of their own mental processes. The notion of socially shared cognition is one of the unique contributions Vygotsky has made to our understanding of how children learn (Vygotsky, 1978). The following example explores how one child develops an idea he has and how he considers, and sometimes incorporates, the ideas of others through his drawings.

A flashlight that had a four-way switch (see larger flashlight in Fig. 2.4) to produce three levels of light particularly fascinated Ed and challenged his notion of the concept of “on” and “off.” He told me that he thought the light changes had something to do with the switches. However, his friend Blair suggested instead that the changes had more to do with some mechanism around the bulb. Ed began his investigation of this flashlight by doing a detailed observation drawing of it. His initial drawing is a fairly detailed representational drawing that brought the flashlight into the realm of symbolic. This drawing represents his immediate encounter with the flashlight where he is working from the object and using his drawing to help him clarify the concept he is working with.

At an interpersonal level, one of the functions of drawing is to provide a referent to the object, thus drawing the experienced object into the symbolic realm. When Ed was drawing the flashlight, he was taking his accumulated experiences of flashlights along with his observations and compiling the information into an immediate and holistic representation of the salient features of this flashlight. His drawing became a symbolic representation of some of the ideas he had about the flashlight. While he was drawing the flashlight, he was also talking with his peers about it. He was looking at other drawings children had done of the flashlight as well as receiving responses from his peers about his drawing. The drawings provided a common point of reference that was shared among the children. The drawings and discussions are examples of new knowledge existing in a shared context.

Intrapersonal Drawing Dialogues

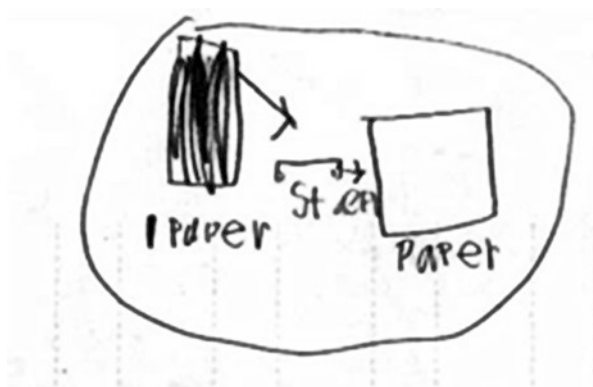
Ed drew the flashlight with the light on and brought his recent experience of observing the flashlight in a dark space into his drawing by coloring the background to the flashlight black to represent darkness. In order to represent his initial idea of “on and off,” he took a black-colored square of paper and made a cover for his drawing of the light bulb on the flashlight. When the black paper square covered the drawn light, this represented the “off,” or “no light,” and when the black square was removed to reveal the drawn light, this represented “on” (Fig. 2.5).

This was Ed’s way of representing the contrast between light and dark and the corresponding notion of on and off. Linking these two concepts through his drawing process moved him beyond a more immediate referent/object response to an intrapersonal level of interaction with his drawing. In this action drawing, Ed is giving symbolic form to his initial idea. When he is able to give a physical and symbolic form to his thinking through his drawing, he is then able to play with his ideas. One of the powerful features of drawing is the way it helps to focus attention, aid in planning, develop deliberate memory and logical thinking, and mediate perception. Ed wanted a way to connect his dark-colored piece of paper to his drawing so that it created a flap that opened and closed and would not get lost. To solve this problem, he drew a plan (Fig. 2.6), as he drew he thought aloud of the various possibilities. Drawing his plan helped him to select from a range of options and to organize the

Fig. 2.5 Ed demonstrates how the “on/off” flap works. The flashlight is “off” when he covers the light part of the drawing with a black paper square and “on” when he removes it



Fig. 2.6 Ed's plan for how to make a flap



materials he needed to assemble to make the flap (i.e., the flap, a staple, and the drawing). In a busy classroom, his plan reminded him what he needed to do. It focused his attention and provided a logical series of steps. Ed then attached two pipe cleaners to his drawing and tucked another black-colored piece of paper under them to represent the switch on the flashlight. The two pipe cleaners held the switch in place while also allowing it to move back and forth like the switch on the flashlight did. Now he could synchronize the moving of the switch with the opening of the flap over the light bulb (Fig. 2.7). This drawing is a good example of drawing functioning as a learning activity that was leading Ed's development. He extended his notion of on and off to include the notion of four levels of “on/off.” His drawing was more than a replica of what he saw. The process of drawing out his ideas and observations and playing with them has moved him to higher levels of thinking. Ed has been able to build upon his initial observations of the flashlight and develop an increasingly complex set of ideas. The focus in these drawings has consistently been upon the meaning the drawing holds in the construction of new knowledge. Any attempts Ed made at likeness or verisimilitude seem to have been to better under-

Fig. 2.7 Ed's final drawing of the flashlight



stand the functioning of the flashlight, rather than to create a more realistic drawing. When drawing dialogues like this support meaning-making in the social context of the classroom, children will be able to function at much higher levels of thinking.

Drawing in this context is a metacognitive tool. The progression from an interpersonal dialogue to an intrapersonal dialogue with drawing might be considered as part of the law of the development of higher mental functions (Vygotsky, 1978). However, when adults are reluctant to engage meaningfully with children's drawing, the shift from interpersonal to intrapersonal is compromised. The teacher has a very important role in assisting children's competencies with a cultural tool like drawing. It is important that teachers recognize that drawing is part of the development of higher mental functions and a powerful way of making meaning for young children.

Higher Mental Functions

In order to know how we can better help children move to higher levels of thinking, it is important to understand what Vygotsky means by the terms "spontaneous concepts" and "scientific concepts" (Vygotsky 1987). Vygotsky believed that a child's spontaneous concept differs from a child's scientific concept, particularly in the path the child takes in his or her thinking.

Table 2.1 The relationship between spontaneous and scientific concepts

Spontaneous concept	Scientific concept
Referential relationship between signs and objects	Increasing generalization and abstraction
First, or immediate, encounter with an experience or object	Mediated relation to the object
Referential use of language	Objects grouped into categories
The child moves from the thing to the concept	Child moves from the concept to the thing
Absence of a system	System in place
Empirical connections between objects	Supra-empirical connections between concepts become possible

The birth of the spontaneous concept is usually associated with the child's immediate encounter with things . . . In contrast, the birth of the scientific concept begins not with an immediate encounter with things, but with a mediated relation to the object. With the spontaneous concept the child moves from the thing to the concept. With the scientific concept, he is forced to follow the opposite path - from the concept to the thing. (Vygotsky, 1987, p. 219)

It is the referential nature of the relationship between the sign and the object that is the key to understanding the differences between everyday spontaneous concepts and more abstract, scientific concepts.

The key difference . . . is a function of the presence or absence of a system. Concepts stand in a different relationship to the object when they exist outside a system than when they enter one. The relationship of the word 'flower' to the object is completely different for the child who does not yet know the words rose, violet or lily than it is for the child who does. Outside a system, the only possible connections between concepts are those that exist between the objects themselves, that is, empirical connections . . . These relationships mediate the concept's relationship to the object through its relationship to other concepts. A different relationship between the concept and the object develops. Supra empirical connections between concepts become possible. (Vygotsky, 1987, p. 234)

Table 2.1 summarizes the shift of thinking as the child moves from a spontaneous concept to a scientific concept. So, for example, when a child is working at a spontaneous conceptual level, they tend to have "a referential relationship between signs and objects" (Wertsch, 2000, p. 20), and when they move to a scientific conceptual level, this referential relationship changes to show "increasing generalization and abstraction" (Wertsch, 2000, p. 20).

Vygotsky (1962) states that it is not enough to have labels for objects in order to think and solve problems. What is also needed is the ability to manipulate these labels across contexts that will allow for connections that promote thinking at a more abstract and conceptual level and so develop higher levels of thinking. However, the ability to manipulate labels across contexts is dependent upon the child's adequate understanding of the concept. The acquisition of word labels does not necessarily presume a clear understanding. Vygotsky (1962) suggests that a working, or experiential, understanding is needed.

Drawing helps with the definition of words that, initially, often only otherwise exist at the level of recitation, by providing the child with a working experience.

Drawing plays an important role in focusing children's attention on the spontaneous concept as well as allowing them to make connections between concepts. Drawing will often contain and make visible the essence of an idea or concept. When these thoughts or concepts exist outside of the child, the child can then work with the idea in relation to other ideas. Drawing, when used as a medium of exchange, can form a dynamic function that allows an elaboration of an initial idea and the definition of a concept as well as assisting with building supra-empirical connections between concepts and systems.

The next series of drawings done by Ed demonstrates the shift from spontaneous concepts to scientific concepts and the important role drawing plays in the development of higher mental functions. When the children were exploring flashlights, they discovered that flashlights often cast a shadow. This observation led most children in the class into a wider exploration of shadows. We began by going outside with our drawing clipboards to observe shadows in natural settings.

Ed's Exploration of Shadows

The shadow of the bike rack (Fig. 2.8) was the subject of Ed's next investigation. He said, "I drew the bike rack because the shadow looked so different from the rack." He wondered why that would happen. He was surprised that shadows were not necessarily replicas of the objects that created them. Referring to both his drawing (Fig. 2.9) and the bike rack, Ed was able to point out to me how the hoops of the bike rack were separate circles that were attached to the bar at the top, while the shadows appeared to be a continuous loop. Ed's motivation for drawing the bike rack and its shadow was to discover more about the nature of shadows. In this context, drawing was a meaning-making tool. Ed began with the spontaneous encounter and concept,



Fig. 2.8 The bike rack and shadow



Fig. 2.9 Ed's drawing of the bike rack and shadow

and through his drawing moved to a higher level of thinking. Ed discovered that shadows were not necessarily replicas of the objects that created them. Drawing acted as the mediation tool that allowed this new understanding to occur. When I encountered Ed drawing the bike rack, our discussion focused upon what he had chosen to draw, why he had chosen to draw it, as well as what he was discovering in the process. Back in the classroom, when sharing his drawing with his peers, he talked about how he had discovered something new about shadows and how this discovery became clearer to him while he was drawing.

In the classroom the children set up some mannequins and a light to reflect their shadows (Fig. 2.10). Ed launched into an ambitious drawing of the whole setting (Fig. 2.11). He singled out one figure to pay particular attention to and began to draw its shadow. He said, "Look, the shadow is bigger than the head." He had noticed that there was a difference between the size of the figure's head and the size of the shadow cast by the head. The shadow of the head was much bigger than the head. There is a connection between this drawing and Ed's drawing of the bike rack and its shadow. Ed is interested in the size and shape of shadows in relation to the objects that cast them. He is intrigued that there should be a difference in size and shape. This latest investigation allowed Ed to try out a similar idea in a different context. Through his drawing Ed moved between concepts to operate at a supra-empirical level and develop higher mental functions. Ed continued with his exploration of the size and shape of shadows by making a plasticine figure, directing light onto it from different angles, and tracing and comparing the shadows.

Vygotsky (1978) considered the shift from everyday concepts to scientific concepts important in the formation of higher mental functions. A scientific concept allows empirical connections between concepts. A system is in place and increasing generalizations and abstractions are possible. Spontaneous concepts reach up into scientific concepts, while scientific concepts reach down and pull the spontaneous concept up. In both cases the abstraction of drawing requires a level of interpretation and engagement that works to raise the level of thinking so that the children engage in more complex thinking. When children are encouraged to make observational drawings, or to draw out their initial ideas or experiences, they can then revisit, revise, and recontextualize their drawing as well as compile a series of related drawings. Drawing processes such as this can play a critical role in the

Fig. 2.10 Lamp, mannequins, and shadows

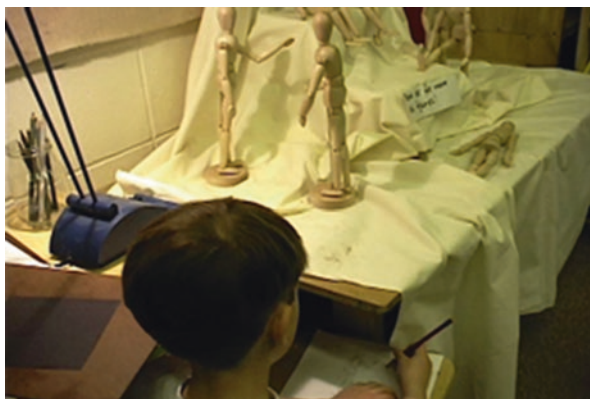


Fig. 2.11 Ed's drawing of the head's shadow

movement between spontaneous concepts and scientific concepts and the development of higher mental functions.

Drawing and the Consequential Progression of Ideas

Mapping the consequential progression of ideas is one way of linking the notions of a social context for drawing and learning, with interpersonal and intrapersonal dialogues as well as with higher mental thinking. Consequential progression for the children in this classroom is a process whereby the interactions among children and the interactions through and with their drawings build cyclically over extended periods of time so that the understanding of the group becomes increasingly complex.

The understanding that builds through this increasingly complex dialogic engagement also becomes a cultural resource that allows the group to progress as a strong learning community. Drawing becomes part of the cultural resources of the group. When drawings are shared between and among the children on an ongoing basis, they play a vital and accessible mediating role in knowledge building.

Central to an understanding of consequential progression is the notion of intersubjectivity (Wink & Putney, 2002). Intersubjectivity in this context is the collective history and mutual meanings shared by a group of people, in particular the children in my classroom. This collective history and mutual meanings are negotiated and accumulated through drawing. Drawing creates intersubjective spaces in the classroom. Intersubjectivity comes about through the dynamic relationship between intertextuality and intercontextuality. Drawing acts as an intertextual event so that the cultural significance of artifacts and ideas is brought forward within the classroom community. Drawing allows the children to recognize each other's thoughts and ideas and link them to their own and to carry these thoughts and ideas forward to future projects. At an intercontextual level, drawing links cultural practices and concepts with ways of being or actions taken. Drawing allows children to explicitly link previous experience with new learning. Drawing helps children to trust their own knowledge and provides a vehicle to work together to jointly construct a mutual understanding. These understandings become increasingly complex as the knowledge base expands.

Another idea, or topic, that grew out of the children's initial study of flashlights was how to trap light. During class time small groups and individual children drew plans and worked on the floor with flashlights and at the light table to enclose light with unit blocks. They seemed to have formed a common agreement that all of the traps should be made from unit blocks. Each day before leaving the classroom we gathered as a class and tested the traps by putting out the main lights, plunging the classroom into darkness. This way we could better see if light was escaping from any trap. To help us better understand the notion of a consequential progression of ideas, I will describe how a small group of 5- and 6-year-old boys used drawing to explore ideas in relation to building the light traps. I will demonstrate how drawing in a social context mediated new knowledge and understanding for these children. I will examine drawing events over time and follow threads of children's thinking and the consequential progression of increasingly complex ideas.

Ed's Light Trap

Ed was one of the first children to build a light trap. While he chose to work by himself on the light table, it is important to remember that he was working within the context of the classroom where there had already been many discussions about, and shared drawings of, light traps. Ed began by drawing a plan for his trap. His drawing contained elements of ideas from his peers as well as his own emerging ideas (Fig. 2.12). The drawing brought the accumulated knowledge of light traps forward into Ed's particular project.

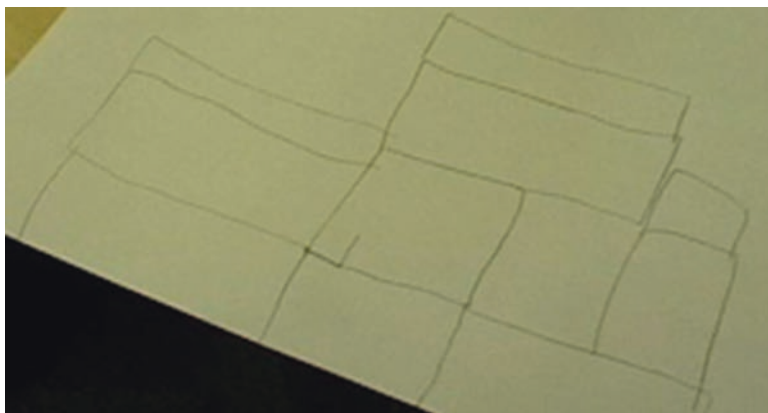


Fig. 2.12 Ed's drawing of his light trap

Fig. 2.13 Ed uses his plan to help build the light trap



After drawing his plan, Ed collected the blocks he thought he needed and took them to the light table. His drawing helped him make decisions about which blocks to choose and how many (Fig. 2.13). His drawing mediated between thought and action to make his actions more deliberate. Ed's drawing fulfilled a significant role in his knowledge construction. Ed's drawing was functioning as an intertextual event so that the cultural significance of ideas was brought forward within the classroom community through drawing. Ed's aim seemed to be to build a structure that absolutely contained the light without any of it escaping. His focus was on the "light tightness" of a basic box, block structure (Fig. 2.14); however, he could not solve the problem of light escaping from around his structure.

Fig. 2.14 Ed's finished light trap (Stuart and Anton's light trap is behind it)



Stuart and Anton's Light Trap

Stuart and Anton decided to build a light trap next to Ed. The two boys sat together to plan their light trap. Each made a drawing of how they thought the light trap would look. As they drew they talked with each other about their plans and looked at each other's drawing. The drawings allowed each child to see what the other was thinking. This facilitated a common understanding. Stuart and Anton were also aware of Ed's drawing and construction and were keen to try to address the problem Ed had with light escaping. Stuart and Anton also gained access to Ed's idea through the sharing of his drawing at a large group meeting.

Mirrors were featured in Stuart and Anton's conversation from the very beginning. When previously studying flashlights, the boys had noticed the reflecting mirror around the bulb in the flashlight and seemed convinced that mirrors and light had to go together. Stuart said the mirror gave the light "more power." Here, drawing is functioning at an intercontextual level that works to link cultural practices and concepts with current ways of being or actions taken. Stuart and Anton's drawings allowed them to explicitly link previous experiences with new learning. In the first drawing, Stuart placed the mirror under the drawbridge (Fig. 2.15). His rationale was that any light that escaped from around the castle walls would be trapped in the mirror and bounced back down to where it came from. Anton, however, drew the light going up inside the towers. He wanted to trap the light within the hollow towers. Anton's drawing showed towers connected by a drawbridge (Fig. 2.16).

However, Stuart pointed out that the light could only travel successfully up one tower because the other had windows in it where the light could escape. Stuart suggested a mirror be placed in the tower with the windows. Anton ignored that suggestion and pointed out that the drawbridge was hollow. He reasoned that the light would only be able to go up the tower, through the drawbridge, and down the other tower. There would then only be one path for the light to travel and it would not be able to go anywhere else. This plan seemed to make the mirror redundant. Stuart suggested trying to incorporate the mirror at the end of the drawbridge. The two

Fig. 2.15 Stuart's first drawing of a light trap with the mirror placed below the drawbridge



Fig. 2.16 Anton's first drawing of a light trap. Two towers and a drawbridge



boys discussed the necessity of the mirror. Stuart insisted that it was the mirror that made the light “bounce off” and “keep moving.” When Stuart mentioned “keep moving,” Anton paused and suddenly seemed to understand the purpose of the mirror. If they placed a mirror strategically at both ends of the drawbridge then the light would be forced to travel back and forward across the drawbridge indefinitely thus creating the perfect trap. Anton revised his drawing to show how the light would bounce between the mirrors at either end of the drawbridge. Stuart also revised his drawing to incorporate Anton’s ideas with his own. Drawing helped the two boys take some initial and tentative ideas about how to trap light and elaborate and extend them through their drawing, talking, and building. In this series of drawings, we can again also see the movement between spontaneous concepts and scientific concepts to higher mental thinking as well as the consequential progression of ideas.

In this case, the two boys worked together to share their existing knowledge and in the process not only extended their individual knowledge but also extended their collective knowledge. Revising their drawings after they had built their structure helped to transform new knowledge from an interpersonal state to a more intraper-

sonal state as each was able to recall and retell, through the drawing, the new knowledge they had acquired. Sharing their drawings with the class added to collective knowledge of this group of children.

Conclusion and Recommendations

In this chapter I have focused on what children bring to drawing, their interactions with their environment, and how they work to solve the problems or questions they encounter through their drawing. The focus has not been on the performance level the children achieved in drawing but rather on the process by which performance was achieved. I would suggest that it is important to pay close attention to the kinds of activities, opportunities, and discussions that can support drawing in the social context of the classroom. I have shown that drawing can help children make their ideas visible and that it is often through drawing that children's ideas, questions, and misconceptions can be effectively processed. When drawing is one of the modes of exchange in a classroom, then drawings can be preserved as a record of children's thinking that can be reviewed and revisited by both teacher and child, while also serving as a vehicle of exchange within the wider learning community.

"A child does not just become a thinker or a problem solver: she becomes a special kind of thinker, rememberer, listener, and communicator that is a reflection of the social context" (Bodrova & Leong, 1996, p. 10). In the context of school, ideas and ways of processing information are shared among the teachers and children. When we value collaborative work and structure our classroom space, time, and materials in ways that supported this value position, then much of the burden for learning is shifted from the teacher and shared among the whole class group. This provides a richer and more dialogic learning environment. When the nature of the interactions between teacher and child, and child and child, are ones that encourage a dialogue about ideas, meaning, and learning, then children hear that this is something their learning community values. Strategies for learning, thinking, and using drawing as a meaning-making tool need to be modeled and talked about individually, in small groups, as well as in large group discussions. This approach to learning recognizes the particular skills and experiences each child brings to the learning situation and works to involve the child in a continuous dialogic spiral where collective understanding and discussions work to support individual constructions. Drawing functions well as part of this dialogic model.

One of the great strengths of drawing lies in its ability to immediately reflect back to the person drawing the ideas that are revealed. This is perhaps why young children find drawing such an attractive and powerful tool. It is immediately holistic and interactive in ways that writing is not. The examples used in this chapter have demonstrated that children are able to represent complex ideas in their drawings. It has also demonstrated that children are able to absorb information from the contexts in which they work and to assimilate and transform new ideas through their drawings. However, the support, time, and opportunity for children to pursue com-

plexity in their drawing must be part of the teaching-learning environment. The focus of the discussion around the drawing has to be on the meaning and information it contains rather than on drawing skills and aesthetic qualities. This shifts the focus from performance-based criteria to one that is concerned with the meaning that the children are trying to make of certain phenomena through their drawing. This approach opens a dialogue that actively involves children at a cognitive level. I would suggest that when our focus is primarily on the meanings represented through drawing, we could begin to see drawing as an invaluable teaching and learning tool. Drawings like those I have just described provide valuable insights into children's thinking and provide records of children's cognitive growth. If we think of drawing involving many steps and perhaps many drawings in the pursuit of an idea, this opens possibilities for children using drawing over again in many different ways and contexts. The generative and divergent possibilities offered by drawing are among its most important qualities. When young children take their drawings home each day, we lose important records. It is important that drawings are easily accessible and carefully stored in the classroom.

When drawing is viewed as a tool that is part of a meaning-making repertoire, this helps teachers to see drawing as part of a learning process rather than as a product that is indicative of a more rigid stage of development. When the drawing skills involved become part of the child's struggle to articulate meaning, then teachers can work with the child to clarify the meaning with the assumption that it may take several drawings to reach a desired level of understanding. These examples show that while it is important to draw at the interpersonal level, it is worthwhile pursuing the cognitive complexity and abstraction that drawing seems to support at an intrapersonal level. This often means asking more from children through drawing. A Vygotskian theoretical framework has helped us to look at drawing as much more than recreation and decoration. It has helped us understand how meaning and understanding can be facilitated through drawing and that drawing can play a significant role in the development of young children's thinking.

References

- Athey, C. (1990). *Extending thought in young children*. London: Paul Chapman Publishing.
- Barratt-Pugh, C., & Rohl, M. (2000). *Literacy learning in the early years*. Sydney, Australia: Allen & Unwin.
- Bodrova, E., & Leong, D. J. (1996). *Tools of the mind – The Vygotskian approach to early childhood education*. Columbus, OH: Merrill/Prentice Hall.
- Brooks, M. (2002). *Drawing to learn*. Unpublished PhD thesis. University of Alberta, Canada.
- Brooks, M. (2003). Drawing, thinking, meaning. TRACEY, <http://www.lboro.ac.uk/departments/ac/tracey/thin/Brooks.html>.
- Cox, M. V. (1991). *The child's point of view* (2nd ed.). London: Harvester Wheatsheaf.
- Duran, R. P., & Syzmanski, M. H. (1995). Co-operative learning interaction and construction of activity. *Discourse Processes*, 10(1), 149–164.
- Eisner, E. W. (1972). *Educating artistic vision*. New York: Macmillan.

- Gifford, S. (1997). When should they start doing sums? A critical consideration of the emergent mathematics approach. In I. Thompson (Ed.), *Teaching and learning early number* (pp. 178–183). Buckingham, UK: Open University Press.
- Matthews, J. (1999). *The art of childhood and adolescence: The construction of meaning*. London: Falmer Press.
- Moll, L. (2002). Inspired by Vygotsky: Ethnographic experiments in education. In C. D. Lee & P. Smagorinsky (Eds.), *Vygotskian perspectives on literacy research: Constructing meaning through collaborative inquiry* (pp. 256–268). New York: Cambridge University Press.
- Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York: Oxford University Press.
- Vygotsky, L. S. (1962). *Thought and language*. Cambridge, MA: M.I.T. Press.
- Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University Press.
- Vygotsky, L. S. (1987). Thinking and speech. In L. S. Vygotsky (Ed.), *The collected works of L. S. Vygotsky, Vol. 1, problems of general psychology* (pp. 39–285) (trans. Minick, N.; Eds. Rieber, R. W. & Carton, A. S.). New York: Plenum Press.
- Vygotsky, L. S. (1998). The history of the development of higher mental functions. In L. S. Vygotsky (Ed.), *The collected works of L. S. Vygotsky, Vol. 4, problems of general psychology* (pp. 39–285). (trans. Minick, N.; Eds. Rieber, R. W. & Carton, A. S.). New York: Plenum Press.
- Wertsch, J. (2000). Vygotsky's two minds on the nature of meaning. In C. D. Lee & P. Smagorinsky (Eds.), *Vygotskian perspectives on literacy research: Constructing meaning through collaborative inquiry* (pp. 19–30). New York: Cambridge University Press.
- Wink, J., & Putney, L. (2002). *A vision of Vygotsky*. Boston: Allyn and Bacon.

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