

Improving Student Thinking Through Elementary Art Instruction

Improving student thinking has long been considered a major goal of education. Yet, there is some indication that schools today have not been very successful in this respect. Many of the national reports on public education released over the past decade have cited deficiencies in students' cognitive performance and have reaffirmed the need for teachers to foster thinking in all areas of the school curriculum.

What is thinking? How can thinking be fostered in elementary art classes? What are some ways that art teachers already do it? What insights might art teachers gain from looking at recent research on cognition in learning? My aim in this chapter is to provide some possible answers to these questions. Art education offers rich opportunities for encouraging thinking among elementary students and teachers have shown a growing interest in using it for this purpose. Traditionally, art has been taught in elementary schools as a productive activity with an emphasis on the procedural or mechanical aspects of art making. Recent efforts to legitimize art in the school curriculum have called this practice into question and have led to increased attention being paid to the cogent nature of learning in art. This trend has been supported by an expanding body of research and literature in art education related to the role of cognition in the making of and responding to works of art.

It seems, however, that the full potential of art education for fostering thinking among elementary students is yet to be realized. Rather, teaching thinking in elementary art classes today frequently means having children view and talk about artistic exemplars (often from the 18th and 19th century) following prescribed methods designed to elicit predetermined responses to those particular works of art. While this approach may require students to use certain "critical thinking" skills in the process, it is doubtful whether they transfer those skills on their own to other works of art or whether they better understand the art they encounter outside the classroom as a result.

In this chapter, I attempt to establish a basis for a more “holistic” approach to teaching thinking in the area of art education—one in which the full range of cognitive possibilities of students in art might be explored. In the following pages, I offer a modest proposal for planning elementary art instruction that places student thinking at its very core. After a brief review of some general aspects of thinking and current efforts to promote student thinking in art, I will discuss several instructional principles that cognitive research suggests are central to fostering thinking in learners. I apply each principle to learning in art and offer specific recommendations regarding possible teaching strategies that will likely lead to thoughtful behaviors among elementary students.

Thinking Defined

Teachers concerned with improving student thinking need to first determine what is meant by “thinking.” There are several different ways to conceptualize and define thinking. Many teachers equate thinking with “higher order thinking,” “critical thinking” or “creative thinking.” It is recommended, however, that thinking be viewed in its broadest sense—as an umbrella under which various kinds of thinking can occur. This approach prevents focusing on one type of thinking in the classroom to the neglect of others.

Consider, for example, the definition by Edward de Bono (1976): “Thinking is the deliberate exploration of experience for a purpose” (p. 32). In this way, an individual may actively direct his or her thinking towards a subject in order to solve a problem, make a decision, predict an event, plan an action, or create a painting. Another general conception of thinking is offered by Barry Beyer (1987) who defines thinking as “the search for meaning” (p. 16). For example, an individual must think either to find meaning in a work of art that is assumed to exist or to make meaning out of it when it has no readily apparent meaning. Thinking then, according to Beyer’s definition, consists of the mental processes used by an individual to make sense of experience.

Both of the authors mentioned above characterize thinking as intentional, purposeful and goal oriented. From this perspective, thinking could be viewed as involving controlled processes and conscious attention. The amount of attention required depends upon an individual's experience with a given task and its degree of novelty. The more novel or unfamiliar a task, the more attention it requires to complete it. Of course, there is also thinking which is automatic and which requires little, if any, conscious control or attention (Anderson, 1985, Glaser, 1988). An individual employs automatic thinking when engaged in activities which are very familiar and well practiced such as walking, reading or driving a car. It is important for teachers to consider the relation between controlled and automatic thinking for two reasons.

First, it helps to clarify the type of learning structure that students need in order to actively engage in thinking. Tasks that have a certain degree of novelty, but which are not totally outside the students' experiences seem to foster the best results (Kuhn, 1986). Too much novelty in a task renders it ineffective because students have no relevant past experience to draw upon as a frame of reference. On the other hand, tasks that are relatively familiar to students are generally processed automatically without much cognitive energy expended. Hence, learning activities intended to encourage thinking in students should involve some blend of controlled and automatic behaviors. Good teachers know this from experience. The introduction of elements of novelty into a learning situation tends to add to the intellectual excitement among students. Moreover, instruction that highlights relations between unfamiliar concepts presented in class and students' prior experiences and understandings results in high interest and involvement among students in the lesson. This general notion is consistent with the theories of such scholars as Dewey (1910), Bruner (1968), Piaget (1976), and Sternberg (1988).

Second, applying this view of thinking to the classroom we can see that if students are to develop proficiency in any newly introduced thinking skill they must do it often enough for it to

become automatic and a part of their cognitive repertoire. A principle goal of teaching thinking is to produce individuals who know when to use a particular thinking operation and who do so on their own to generate knowledge (Beyer, 1987). Such a desired outcome is likely to emerge by providing students with instruction in how to execute a thinking skill or strategy effectively and with multiple opportunities to practice using it—both under the guidance of the teacher and on their own initiative. The issue of practice in fostering student thinking is a crucial one and I will return to it later in this chapter.

Some conceptions of thinking acknowledge a hierarchical structure among the various cognitive operations involved in thinking. However, this should not be taken to mean that some thinking is better to promote than others. On the contrary, experts are developing new insights into the interrelations that exist among different kinds of thinking and the ways in which they depend on one another. For example, Robert Sternberg (1988) recently proposed a triarchic model of intelligence which divides thinking into three interdependent categories: executive or “metacognitive” processes (which are used to plan, monitor and evaluate one’s thinking); performance processes (which are used to actually carry out plans and solve problems); and knowledge-acquisition processes (which are used to learn how to think and solve problems in the first place). Sternberg emphasizes that while the parts of his theory are distinguishable they work together in an integrated fashion. The metacomponents direct the performance and knowledge-acquisition components and these latter kinds of components provide feedback to the metacomponents.

Similarly, Barbara Presseisen (1987) suggests that any curricular design for teaching thinking requires a framework that is broad enough to account for the complexity of human thought processes. To this end, Presseisen draws upon Karen Kirchner’s three-level model of thinking (Kirchner, 1983) which includes: *cognition* at the first level; *metacognition* at the second level; and *epistemic cognition* at the third level. Cognition refers to the essential mental

operations that underlie an individual's thinking when engaged in a cognitive task: for example, skills such as analyzing, classifying, comparing, and interpreting which are typically involved in thinking about works of art. This level also includes cognitive processes like problem solving, critical thinking and creative thinking. Metacognition, as previously defined, refers to the reflective strategies and processes involved in self-monitoring and conscious control of task performance. When an individual reflects upon, makes explicit, and studies the mental processes by which his or her thoughts and learning behaviors operate, that person is thinking at this level. Epistemic cognition refers to the ways in which an individual's knowledge in a discipline determines how that person thinks when engaged in cognitive tasks related to the particular subject context. An individual is thinking at this level when confronting the major problems, questions, assumptions and concepts embedded in a discipline and when learning cognitive structures for adapting to new information in that discipline.

In sum, a general view of thinking might be considered unsatisfactory for educational purposes on the basis that it lacks specificity and provides too little guidance for teachers in planning for instruction designed to foster thinking or in judging the outcomes of such instruction. A precise definition of thinking as well as detailed descriptions of thinking skills would certainly be more acceptable to the forces of accountability which dictate that teachers be explicit in writing specified objectives for schooling. Moreover, some experts suggest that students can benefit from direct instruction and practice designed to improve specific thinking skills. Nonetheless, we need to consider that effective thinking often engages a variety of mental operations and dispositions which are interdependent and that can not be easily separated in distinct, easily identifiable categories. Consequently, a concern for fostering thinking means that we must address the totality of thinking if the goal of improving student thinking is to become a reality.

Cognition in Art Education

The nature of cognition as it relates to art has been the subject of intense study and debate in the field of art education for many years (Madeja, 1978). Indeed, philosophers, researchers, artists, and educators from the time of Plato have questioned whether art is essentially a “cognitive” or a “noncognitive” activity. At issue, is the extent to which thinking or feeling determine how a work of art is made and how it is perceived. Some scholars argue that thinking and feeling are not distinct aspects of aesthetic experience; rather, they are inseparable (see, e.g., Perkins, 1981; Goodman, 1968). This notion is not, however, particularly common in schools where cognition and affect are set apart; and where subjects which are thought to involve the mind are considered more worthy of study than those which are thought to involve the body (Eisner, 1981). The art classroom is often seen in as a place where students “express their feelings” or “work with their hands.” Thus, art as a subject of study is generally assigned lower intellectual status among the regular school subjects. Perhaps as a way to strengthen their relative position in schools, art educators have widely embraced a *cognitive* view of art in recent years.

The present reform movement in art education, which has its roots in the early 1960s, is clearly an attempt to make the study of art more “intellectually acceptable” in schools. Spurred on by financial and moral support by the Getty Foundation in the 1980s, proponents of this movement advocate that schools develop comprehensive and “academically rigorous” art programs that provide children with increased opportunities to study content from the disciplines of aesthetics, art criticism, art history, and art production (Getty Center for Education in the Arts, 1985). This “new” approach to art education, labeled *Discipline-Based Art Education* (DBAE), is aimed at developing “...mature students who are comfortable and familiar with major aspects of the disciplines of art and who are able to express ideas with art media, who read about and

criticize art, who are aware of art history, and who have a basic understanding of issues in aesthetics” (Clark, Day & Greer, 1987, p. 138).

One of the key principles of DBAE ideology involves the belief that art teachers should draw equally from the four disciplines in planning a sequentially organized course of study for their students. According to DBAE proponents, the methods of inquiry and sets of concepts used by aestheticians, art critics, art historians, and artists serve as sources for shaping students’ thinking and learning about art (Clark, Day & Greer, 1987). Art instruction guided by DBAE tenets should foster in students increasing sophistication in using these various “avenues of thought” (Clark, Day & Greer, 1987, p. 138) to construct more meaningful and complete understandings of art.

The idea that art is not only a medium of thought but is also a vehicle for developing it is clearly supported in the rhetoric of our field. While art education has long been considered synonymous with creative thinking, much of the talk today about improving student thinking in art seems to suggest that critical thinking is now a matter of greater concern to art educators. Signs of this new emphasis, nourished by the DBAE reform movement, are everywhere. The contemporary literature of art education is saturated with articles on teaching children “how to” use critical thinking skills in order to study, understand and judge works of art better. Arts teachers pack sessions on aesthetics and art criticism at professional conferences looking for ways to engage their students in critical inquiry about works of art. Textbooks and instructional resources that include lessons in describing, analyzing, interpreting, and evaluating works of art have become commonplace in many art classrooms.

The current interest in teaching students to think critically about works of art has caused teachers to reexamine their beliefs concerning what it means to know and learn in art. Although some teachers have been reluctant to deemphasize the role of studio production as the sole basis for learning in art, many recognize that they need to teach their students new skills for

responding to and valuing works of art. All teachers want to help their students make sense of the subject matters they study together; and at the very least, chopping art knowledge into the disciplinary areas of aesthetics, art criticism, art history, and art production is a convenient way to organize the content of art for the purpose of instruction. However, as Wanda May (1989) cautions, “defining subjects as disciplines with their own inherent structures forces an artificial boundary around ways of knowing” (P. 59).

Preparing students to eventually think like experts in the four art disciplines appears to be an important goal of the discipline-based view of art education (Clark and Zimmerman, 1988). Accordingly, the work of teachers is seen as one of moving their students from naïve to mature states of understandings commonly exhibited by professional practitioners in the field. How is this to be accomplished? DBAE proponents call for lessons that help students to develop integrated understandings of art content from the perspectives of the four disciplines of art. For some teachers this means lecturing to their students on the history of art; imparting to them a particular way of looking at and talking about art; and asking them to mimic the style of well-known artists in their own artwork. But such a didactical approach to art content not only violates the very nature of art, it also forces students to be passive receptacles of knowledge that originated in other worlds—the adult worlds of aestheticians, art critics, art historians, artists, and art teachers.

In 1916 John Dewey argued that organized forms of knowledge enter directly into the activities of the expert and the teacher, but not into that of the child—the learner. The adult’s attitude and knowledge of subject matter extends far beyond the range of the child’s understanding, experience, and interest so that the same content might be viewed by the two in quite different ways. From a Deweyan perspective, it might be said that the average child is not likely to be particularly concerned with art as it is organized for its own sake by art historians. Introduced to the subject through slides or prints of works of art from the past—all of which have

names and styles to be learned—the student will probably respond to the content, at best, as information to be temporarily stored for “school purposes” because the data and abstractions it presents are often totally outside his or her limited knowledge and experience. According to Dewey, content becomes more than information to be remembered for school purposes only when two conditions are met: First, the content must relate to “some question with which the learner is concerned,” and secondly, it must “fit into his [or her] more direct acquaintance so as to increase its efficacy and deepen its meaning” (Dewey, 1916, p. 186).

In his landmark book, *The Process of Education*, Jerome Bruner (1963) makes a similar case: “The task of teaching a subject to a child at any particular age is one of representing the structure of that subject in terms of the child’s way of viewing things” (p. 33). Likewise, Jeanne Bamberger (1978) sees the challenge of teachers as one of helping individual children connect their own ways of understanding experience which she calls “intuitive knowledge” with the conventional formulas or “formal knowledge” that people need to know in order to succeed in school and society. In agreement, Eleanor Duckworth (1987) puts it this way:

As teachers, we need to respect the meaning our students are giving to the events that we share. In the interest of making connections between their understanding and ours, we must adopt an insider’s view: seek to understand their sense as well as help them understand ours (p.112).

More recently, May (1989) urges us to conceive of learners as novices who through the educational process “are to be slowly and deliberately inculcated into more sophisticated adult ways of knowing,” but, who also “are active agents and designers of their own knowledge and the knowledge of future generations.” Implicit in this conception of learners is the assumption that knowledge is “actively constructed, evolving rather than inert, tacit as well as explicit, culturally contextual, and politically and emotionally contextual” (p. 61).

What this concern for the learner suggests is that we may need to broaden our definition of “discipline” as it relates to teaching and learning in art. Whereas the conception of *discipline* frequently put forward in DBAE literature emphasizes the study of stored forms of knowledge, the conception of *discipline* from the perspective of learner stresses the creation of new forms of knowledge. This reconceptualization does not mean abandoning the values of a DBAE approach to art curriculum, nor does it mean returning to the permissive instructional practices of yesteryear. It does mean, particularly at the elementary level, that if teachers are to effectively translate into classroom practice the concern for a broader knowledge base in art they will need to design and select curricular activities that help children bridge the gap between the “psychological” organization of their own worlds and the “logical” organization of content inherent in adult worlds of art. This task requires that teachers maintain a balance between content and process in shaping the art curriculum into instructional practices that actively engage their students in the learning process. Consequently, teachers not only need to be knowledgeable of the content that they expect their students to learn; but, they also need to be aware of the cognitive processes that must be used by learners in order to make meaning from the content being studied.

Much of the emphasis in art education today is on defining the dimensions of collective art knowledge and its relevance in general education for all students. Such epistemic considerations are certainly important. The foregoing discussion suggests, however, that the learner’s contribution in the educational enterprise deserves far more attention than it has previously received in the reform literature of art education. This point seems especially relevant if we expect our students to acquire the knowledge we have selected for them, to think critically about it, to use it to interpret new experiences, and to go beyond it in creative ways.

Teaching Content and Thinking in Art

It is possible that in our rush to improve students' learning of certain art content, we may be neglecting the development of their fundamental mental abilities to use the content we have selected for them in ways that would deepen its present meaning and ensure its future applicability. If so, what can we do to engage our students in the thinking necessary for deep and meaningful learning to take place? The growing body of research in cognitive psychology suggests a number of possibilities. Cognitive psychology is concerned with the mental activities governing human information processing, problem solving and learning, and it currently represents the mainstream of thinking in both psychology and education (Shuell, 1986). From a cognitive perspective, teaching children to think is primarily a matter of helping them to master the ways in which symbols (e.g., words, numbers, pictures, and so on) are used to denote, represent and express material or abstract meanings (Gardner, 1983). In the remainder of this chapter, I outline five basic themes or principles which have been gleaned from recent studies and theories in this area that appear to hold great promise for empowering students to think and reason in the course of learning. To provide the appropriate perspective, I will also refer to some of the literature in art education and in general education that has relevance to each of the principles discussed. Furthermore, I will offer several suggestions for planning elementary art instruction intended to foster better thinking among students as they engage in learning about art.

Principle 1: Art instruction should attend to what children already know and believe about art.

Cognitive researchers view learning as an active constructive process that is dependent upon the mental activities of the learner (Shuell, 1986). It is now generally recognized that learners build new knowledge structures using their previously formed ideas and beliefs—they continually try to make sense of the new in terms of what they already know (Glaser, 1988;

Anderson, 1984). Not surprisingly, children's ideas about a subject are sometimes quite different from those the teacher is trying to teach them. An important consequence of recent cognitive research involves the finding that when students' conceptions are at variance with those presented by the teacher, these ideas actually interfere with intended learning outcomes and often persist despite formal instruction (Eaton et al., 1984; Nussbaum & Novick, 1982). While this work has largely focused on how children's *alternative conceptions* play a crucial role in their understandings of science, the lessons learned by researchers could be applied to other school subjects such as math, reading and art (Resnick & Klopfer, 1989; Perkins, 1987; Koroscik, 1988).

Just as in science, research shows that children have their own ideas and beliefs about art that influence their thinking and learning in our art classes. For example, studies by Strokrocki (1986) and Johnson (1982) reveal that children of elementary school age often share similar views about the nature of art. Many children conceive of art as an activity involving drawing, painting or "making stuff." Some think of art as a place "where you draw" such as in the art room. Others think of art as something that happens at a particular time of the day—say, two o'clock on Friday afternoons. Still others associate art with objects such as pictures, paintings or "some projects." Furthermore, virtually all elementary school children believe that art is "fun" or "nice."

Developmental studies also reveal that distinctive age-related changes occur in children with respect to their conceptions of art (Parsons, 1987; Winner, 1982; Gardner, Winner, & Kircher, 1975). For example, up to the age of seven or so, young children show a strong affinity for paintings that include familiar subjects and favorite colors. If a painting includes horses, for instance, children at this age will probably say they like it or think it is good because they like horses. Thus, young children view a painting as a source of private pleasure. Around the age of 8, however, favoritism gives way to realistic representation and children tend to focus on how

the subject matter is depicted in a painting. Hence, older children often judge realistic paintings as better than abstract paintings. The underlying assumption being that paintings are supposed to represent something and those that do not are considered less meaningful. Many untrained adults also share this view.

An important aspect of children's conceptions of art has to do with their source. The general consensus among researchers and art educators today is that children acquire their understandings of art largely through the sociocultural context within which their growth, education and encounters in art occur. Thus, it seems reasonable to conclude that adults are principle determiners in what children come to know and believe about art. Several implications for teaching art to children might evolve from this assertion and the foregoing discussion.

First, in order to construct meaningful views of art, instruction must attend to children's present knowledge and beliefs about the nature of art and the artistic process. This means that teachers need to be knowledgeable of the various understandings that their students have about art in order to devise effective pedagogical strategies for teaching it. One way teachers could acquire this knowledge is by asking students questions about art that require inferential thinking. What do you think the artist is saying in this work? Why do you think that? By carefully listening to the explanations and reasons students give for their responses to works of art shown in class, teachers might gain insight into the assumptions students hold about art; the expectations they have about what it should be like; the qualities they believe it should possess; and, the ways in which they think it should be judged (Parsons, 1987). Teachers could also pose contradictions to students' initial conceptions and then ask for responses. For example, a few common household objects might be used to initiate a discussion on the nature of art. Is it art? What makes this art? Why isn't this art? When might we consider this art? Probe different ideas expressed by students and encourage them to ask questions of each other. But, do so with considerable diplomacy. Ideas should be challenged without attacking a child's whole

perspective. When listening to children talk about art, we need to keep in mind that they can't always put into words what they think or feel about art. We also should remember that there are different and perhaps equally valid ways of creating meaning from the same art experience.

Second, the recognition that children bring to our art classes certain ideas and beliefs about art that may be in opposition to those we wish to teach them poses certain obstacles to effective learning that must be overcome by instruction. Studies indicate that students must become aware of their alternative conceptions and in effect *unlearn* them before new learning may occur. Accordingly, the goal of instruction may be seen as one of restructuring an existing body of knowledge rather than one of imparting new knowledge into a vacuum. Research indicates that this goal is best achieved when teachers provide students with opportunities to explore their own knowledge of the subject; to challenge and rethink ideas (most often their own); to analyze and discuss other possible explanations) such as those offered by their peers or outside experts); and, to test new ideas in various contexts in order to determine their validity or worth (Eaton et al., 1984; Nussbaum & Novick, 1982). Underlying the use of these pedagogical strategies is the assumption that changes in thinking occur when students' preconceptions are confronted by specific challenges and contradictions (Dewey, 1910). While their description comes from science education literature, these methods seem suitable to art education as well, especially in teaching aesthetics and art criticism where students are encouraged to engage in reflective discourse about various alternative conceptions of art including their own (Hagaman, 1990; Lankford, 1990; Ecker, 1973).

Finally, the assumption that children's conceptions of art are derived primarily through adult-mediated experiences implies that teachers need to look closely at what they are presently teaching about art, how they are teaching it, and the meanings that children construct about art as a result. Research suggests that learners may construct meanings from art instruction that are quite different from those that teachers have in mind. It is possible, for example, that when

instruction emphasizes the manipulative aspects of art-making, children may develop a rather simplistic and mechanical view of art in which thinking has little or no consequence. It is also possible that when instruction focuses solely on artist models, art media and art knowledge of past centuries children may develop conceptions of art which might be considered inadequate from a contemporary art perspective; in that, they may lack the knowledge structures necessary to recognize or to judge art forms and concepts which have been advanced for the most part during the present century. However well meant our intentions may be, we should consider that what we teach children about art may actually cause them to get the *wrong* ideas about art. If this is indeed so, prevailing school practices deserve our careful scrutiny.

Principle 2: Art instruction should help children build an adequate knowledge base in art.

Another theme that emerges from cognitive research centers on the interdependence of thinking and knowledge. There is considerable evidence to show that the amount of knowledge one possesses in a domain has a substantial impact on how one thinks in that domain. Recent studies involving individuals with varying levels of expertise consistently reveal that experts and novices solve problems in fundamentally different ways (Anderson, 1984; Glaser, 1988, 1984; Khun, 1986; Kitchener, 1983). Compared with novices, experts interpret and structure the demands of a problem more effectively because they bring a well-developed knowledge base to bear on that task. Experts usually encounter familiar problems, and consequently, they often rely on automatized thinking. This allows them to spend more time dealing with the novel aspects presented by the problem. Along this line, reports on individuals known for their creative achievements show that they are not only great thinkers, they also know a lot about their fields (John-Steiner, 1985). Thus, it seems that as knowledge in a domain develops, the context in which effective thinking can function becomes available (Resnick, 1989).

As earlier discussed, preparing students to think like experts in the four disciplines of art appears to be an important mission for art education today. To accomplish this goal, we need to consider how to best approach the chasm that exists between what children know about art on the one side and what trained adults know about art on the other. It might be assumed that when working with children, we should begin by ensuring they acquire an adequate knowledge base. But, art instruction that is highly didactical in nature will not serve our purpose well. When the emphasis is on giving out information and instructions rather than on discussion and challenge, children have little chance to make sense of it all. Cognitive research suggests, instead, that children be enabled to create knowledge and meaning themselves as they experience new information. “To know something is not just to have received information but also to have interpreted it and related it to other knowledge” (Resnick & Klopfer, 1989, p. 4). Accordingly, a primary challenge facing teachers is to determine how the content of art can be taught in ways that foster and stimulate children’s mental elaborations of their own emerging knowledge structures. One thing is certain—thinking takes time.

Cognitive researchers concur that teachers should spend more time having students actively using knowledge and less time having them simply acquiring more facts and concepts. This means that an art curriculum designed to foster thinking will cover few topics in depth rather than many in a fleeting fashion (Mattil et al., 1961). Such coverage makes it possible for teachers to help students gain access to new information; examine its structure; question it; link it to other ideas; and relate it to their own present knowledge, beliefs and experience. The underlying assumption being that by providing more time for students to explore a subject more deeply they will build better knowledge structures that can be used to interpret new experiences; to solve new problems; to think and to reason; and to learn independently later on (Resnick & Klopfer, 1989).

The importance of children being mentally engaged in the process of learning has been brought to our attention before (Bruner, 1963; Dewey, 1910). Recent cognitive research reaffirms the old axiom that children learn best “by doing.” Today, cognitive approaches to learning stress that children be viewed as builders of their own knowledge structures and that the act of instruction be seen as a form of “scaffolding” enabling children to internalize external knowledge and higher intellectual functioning that they might not be able to do otherwise if left to their own devices (Wood, Bruner & Ross, 1976). As children reach these new levels of understanding, the scaffolding is removed.

During the current period of redefining the nature of knowledge in our field, it might be prudent for us to consider what we know about cognition in learning when planning our curricular and instructional strategies. The field of cognitive research is still in its infancy; however, its findings to date urge us to be judicious about what we select for children to study in art. We need to find ways to synthesize the various professional role models being advanced in art education today, if children are to understand how to relate them to one another within their own emerging knowledge structures. In this respect, an art curriculum organized around conceptual clusters involving students in the key ideas, problems, questions, and values which illuminate art as a field of inquiry might greatly facilitate their development as thinkers.

Principle 3: Art Instruction should promote intrinsic motivation and autonomy in children.

A third theme that comes out of current cognitive research in education is that a major emphasis must be placed on the motivation of the learner. Many researchers today regard motivation as an integral part of cognition. “Indeed, we believe that a very large fraction of learning to think—and of thinking—is a problem of motivation” (Nickerson, et al., 1985, p. 338). There is considerable evidence to indicate that an individual’s perseverance and sense of motivation when engaged in an intellectual task is a determining factor in whether a successful

outcome is achieved (Sternberg, 1988). In this respect, it might be suggested that as important as knowledge is to developing minds, it is just as important to foster in children a desire to put their knowledge and thinking to good use.

Merlin Wittrock (1987) defines motivation as, “the process of initiating, sustaining, and directing activity” (p. 304). He also reviews a number of studies that reveal how motivational factors such as attribution and locus of control direct students’ thinking and learning in school. *Attribution* refers to students’ perceptions of the causes of their successes and failures as learners. Studies have shown that students are motivated to learn when they attribute success or failure to their own effort, rather than to uncontrollable factors such as luck, lack of ability, or the difficulty of the task. There is also evidence to indicate that teacher reinforcement and praise may not increase students’ motivation or persistence, unless it is directed toward the effort they exert on a task. Nor will success in itself enhance students’ learning or future performance. Children must perceive their success as connected to their own self-initiated actions.

Closely related to attribution is the concept of *locus of control*, that is, a feeling of being in control rather than being controlled by some outside source. Students with internal or external loci of control differ in their attributions and in their willingness to commit themselves to challenging intellectual tasks (Cohen, 1986). This research suggests that teaching students to exercise self-control over their learning and encouraging them to persist in their efforts are crucial links in developing the dispositions necessary for effective thinking. Thinking can be hard work. Students must be convinced that they can do it and that it’s worth the effort.

Another area of motivation that has important implications for fostering thinking in students involves the influence of extrinsic rewards on intrinsic motivation. Amabile (1983) has studied the effects of external surveillance, evaluation and rewards on artistic and verbal creativity in both adults and children. The results of her work provide clear evidence that external rewards (such as grades or competitions) can lead to diminished interest in an activity

that initially is perceived by individuals as intrinsically interesting in itself. In other words, a reward can be counterproductive when seen by individuals as controlling an activity that they would otherwise do without the reward. Gerhart (1986) reports similar findings in a study involving the effects of evaluative statements on the continuing motivation of fourth-grade students regarding drawing and visual puzzles. He found that the threat of grades or peer comparisons seem to undermine children's willingness to commit themselves to future task participation. Consequently, research suggests very strongly that teachers should refrain from using grades or rewards to elicit students' thinking and actions and instead encourage intrinsic motivation—a desire to pursue a task or problem for its own sake.

One way for teachers to promote intrinsic motivation is to select or design learning activities that children will find inherently interesting and enjoyable so that they will engage in these tasks willingly without the need for extrinsic rewards. As previously mentioned, tasks that challenge students to think and use what they know in novel (yet somewhat familiar) situations might foster interest and involvement. For instance, Marjorie and Brent Wilson (1982) suggest a number of drawing games that challenge children to draw as many of something as they can or to draw something in as many ways as they can.

Of course, children often find studio art activities to be enjoyable and intrinsically rewarding. For this reason alone, many teachers are reluctant to reduce the time children spend making art in order to increase the time available for classroom discussions about art. Yet, the sharing of one's intellectual processes with others can also be intrinsically rewarding and therefore be motivating to children. The use of collaborative learning strategies involving children in group dialogue about art is clearly supported by the work of the noted Soviet psychologist Lev Vygotsky, who believed that learning involves the internalization of activities originally witnessed and practiced in cooperative social settings (Vygotsky, 1978; Fielding, 1989). That is, children learn by participating in group activities where they are exposed to a

variety of models who differ in expertise including their teacher and peers. Drawing upon the work of Vygotsky and others, Sally Hagan (1990) proposes a pedagogical approach involving a “community of inquiry” within which teacher and students explore various aesthetic issues related to art. If carefully orchestrated by the teacher, such an approach would undoubtedly be intrinsically motivating to all those involved.

This is not meant to suggest that an emphasis be placed on collaborative learning strategies in the art classroom and that less emphasis be placed on strategies involving individual achievement. Rather, there appears to be a place and a need for both in art education even at the elementary school level. Howard Gardner (1989) recommends that “peri-artistic” activities involving critical, historical and responsive learning should grow from children’s own art productions. “The heart of any arts-educational process must be the capacity to handle, to use, to transform different artistic symbol systems— *to think with and in* the materials of an artistic medium” (Gardner, 1988, p.163). Younger children, in particular, should be introduced to art objects made by others in relation to the art objects they make themselves. Such encounters are likely to interest children more and encourage them to develop their knowledge and skills in art further.

Along these lines, George Szekely (1988) illustrates how children can be introduced to the world of art by “trying on the role” of the contemporary artist. By becoming contemporary artists themselves, children not only make art; but also they engage in a continuous search for what art is. They think about art, look at it, talk about it, and come to understand its importance as a unique form of human activity. In short, they become aestheticians, art critics, art historians, and artists. Teachers will find Szekely’s approach to art education especially challenging in that it places a pedagogical emphasis on student autonomy and independent decision-making. This leads to a final point.

If we want children to be more thoughtful and understanding about art as adults, we need to provide them with opportunities to act upon their own intellectual initiative as often as possible in their art classes at school. When we make all of the decisions for them, students may fail to see art as a cognitive activity intrinsically valuable to pursue or as something meaningful to their lives in and out of school. In order for students to construct meaningful views of art, we need to increase their sense of personal control over their own thinking and learning. This is likely to occur if we: (1) permit students, at least occasionally, to formulate their own problems to solve (Eisner, 1983); (2) offer them meaningful choices to make; (3) expect them to monitor and evaluate their own thinking (Costa, 1984); (4) help them to see the value in what they are doing; and (5) encourage them to become actively involved in the learning process.

Principle 4: Art instruction should provide children with opportunities to practice their thinking and to use their existing knowledge.

A fourth theme derived from cognitive research concerns the importance of practice in developing children's knowledge and thinking in art. A review of the literature on teaching thinking reveals a bewildering variety of programs and curricula based on different models and conceptions of thinking (Costa, 1985; Nickerson et al., 1985). Some emphasize critical thinking, good thinking, formal reasoning, decision making or problem solving, while others focus on moral development, reflective thinking, higher-order thinking, creative thinking or right-brain thinking. Although approaches to teaching thinking can differ in many ways, they all are based upon a common assumption—that thinking is a form of skilled behavior that one can develop and improve through practice.

Experts have recognized the importance of practice in developing children's thinking for quite some time (Dewey, 1910). Deanna Khun (1986) notes that, even though there is no empirical evidence to support such a belief, there has been unusual consistency among theorists over the years regarding the view that the only effective way to teach students to think

better is to engage them in thinking. Implicit in this philosophy is the assumption that the development of students' thinking requires more than teaching them the strategies and principles associated with it. Rather, it requires providing them with repeated opportunities to exercise their minds in the context of learning new subject matter with the thinking skills and knowledge they have at their current level of development. With long-term practice, comes the potential for improvement of thinking; in that, the cognitive processes employed become strengthened and a part of students' knowledge structures. This enables students to process information within a domain more effectively and with less mental energy (Khun, 1986; Glaser, 1984).

To understand the role of practice in developing children's proficiency in thinking it might be helpful to examine the difference between declarative and procedural knowledge (Bransford & Vye, 1989; Alexander & Judy, 1988; Anderson, 1982). Students acquire *declarative knowledge* when they receive instructions or factual information from a teacher or a textbook. They acquire *procedural knowledge* by converting memorized facts or instructions into mental acts or actual behaviors. In art, for example, when students learn from their teacher such as facts as "rhythm is a principle of design" and "rhythm is produced by repeating compositional elements" they are acquiring declarative knowledge. When students create rhythm in their own artwork or describe how rhythm is achieved in a Jackson Pollack painting, they must activate their memory and transform those declarative facts relevant to the task into procedural form. In order to make this transition from "knowing what" to "knowing how" automatically, students need a great deal of practice and experience.

Practice and experience appear to be especially crucial to children's development in art. From a cognitive point of view, "all art works contain symbols and are themselves symbols" (Winner, 1982, p. 6). Accordingly, understanding and making art might be seen as involving the acquisition of symbolic competence (i.e., the ability to perceive, to create and to reflect within a

particular symbol system). How is this competence acquired? For many years, developmental researchers assumed that the growth of children's perceptual and motor abilities in art occurred spontaneously, irrespective of cultural influence. Accordingly, several early attempts at explicating developmental patterns in art sought to attribute age-related differences found among children to regular changes or universal cognitive shifts that occur in children's minds as a result of the natural process of development (see, e.g., Gardner, et al., 1975 and Macholtka, 1966). More recently, however, developmental researchers recognize that while a sophisticated understanding of art requires the pre-existence of certain cognitive structures, it is unlikely that children will acquire these necessary structures of thought through maturation alone. Rather, this new perspective strongly suggests that a child's development in art is highly dependent on specific kinds of external contributions such as those offered by a formal education in art (Gardner 1988; Parsons, 1987; Feldman, 1987). This view is, of course, strongly shared by art educators. For example, Jean Rush (1984) writes:

Making and comprehending art are skills that must be learned. Children begin to manipulate visual and plastic images at a younger age if they find tools and materials at hand in their environments. Children left to their own devices without being taught art skills, however, develop into non-artistic adults. (P. 13)

How can we translate the elementary art curriculum into instructional opportunities that provide children with extensive practice in using the skills and knowledge they have on the content we want them to learn? Several alternatives are possible. For instance, as already suggested, providing frequent opportunities for class dialogue and debate about various "contingent" matters in art are obviously beneficial when students are able to: (1) relate the topic to their own knowledge and beliefs;(2) rethink their initial ideas and assumptions in light of possible contradictions; (3) explore alternative views and explanations for the same situation; and (4) refute views expressed in class (including their own) by means of available evidence

(Eisner, 1983). It is through such planned encounters, that ordinary thinking becomes critical thinking (Khun, 1986).

Another strategy that could prove useful for engaging children's minds on a regular basis in art involves presenting new art content in the form of problems to be solved with the use of art materials or resources available in the home, the art room, the school and the community.

Dewey (1910) first promoted the idea that thinking occurs when an individual is faced with a problem that is ambiguous and that proposes alternatives. Likewise, Bruner (1968) recognized the importance of problem solving as a vehicle for stimulating thinking in the classroom. From a motivational standpoint, children are often willing to devote considerable effort to solving a problem for no reason other than the enjoyment of meeting the intellectual challenge it poses.

Consider, for instance, the problem of: *Using materials found around the home, create a mask that when worn will give you a special power.* Art problems like this one offer rich opportunities for students to exercise a wide range of cognitive skills before, during and after the art object is made. Teachers might use the mask problem, for example, to have students generate a list of occupations or situations in which masks are worn; explore the universality of masks by comparing masks from different cultures (primitive to modern); speculate on the purposes of various types of masks and categorize them by form and function; interpret how specific masks portray certain feelings and meanings (such as those designed to transform the personality of the wearer); determine criteria for evaluating the success of masks made by members of the class; and, so forth. Of course, such extended learning opportunities may require considerable time. As already suggested, if fostering student thinking is desired, teachers must insure that adequate time for thinking is available. (See Rush (1989) for a discussion of the need for "conceptually focused" instruction when presenting students with aesthetic problems to solve in art.)

A third strategy involves trying to infuse opportunities for reflection in virtually every art activity with children. As often as possible, we should ask students to consider how they arrive at their conclusions, decisions and solutions. Reflection, in this case, means thinking about past learning and thinking. Its purpose is to make students more aware of what they know and don't know; what's going on inside their head; how one mental activity relates to another; and, how their thinking relates to their learning. It involves helping students to initiate a dialogue between their metacognitive processes and other cognitive processes through questioning. For example, students might be asked to consider questions such as the following when they are looking at works of art. What do I know about this work of art? What would I like to know? How is this work like those I've seen before? How is it different? What does this work mean to me? How did I arrive at this interpretation of this work? What criteria should I use to make a judgment of this work?

Gardner (Brandt, 1987) suggests that reflection should be linked intrinsically to perception and production in planning arts activities for children. According to Gardner:

Perception means learning to see better, to hear better, to make finer discriminations, to see connections between things. Reflection means to be able to step back from both your production and your perceptions, and say, "What am I doing? Why am I doing it? What am I learning? What am I trying to achieve? Am I being successful? How can I revise my performance in a desirable way?" (p. 32)

If given enough practice, eventually students will internalize this type of reflective dialogue so that there is no need for the teacher to start the dialogue for them. It becomes automatic.

Besides the three strategies discussed above, there are several other approaches that appear to be equally effective in enhancing thinking through classroom instruction (Resnick, 1987; Costa, 1985; Nickerson et al., 1985). One of these other alternatives combines explicit directions in how to execute a specific thinking skill such as analyzing, comparing, classifying, or

inferring with opportunities to practice the skill (Beyer, 1987). Students could certainly benefit from direct instruction that shows them how to analyze or interpret a work of art more skillfully than they otherwise do. For such instruction to be worthwhile it should provide procedural advice and independent practice in applying the skill to other works of art as well. Generalizing the skill in this way increases the likelihood that students will use it in meaningful ways when they encounter works of art on their own.

Principle 5: Art instruction should help children transfer their thinking and knowledge to a variety of contexts.

Finally, one thing that probably all experts concerned with thinking in education agree on is that any organized program designed to foster thinking in students must address the problem of transfer (Glaser, 1988; Nickerson et al., 1985). Studies have shown that skills or knowledge learned in one context do not automatically transfer to contexts that differ from the setting in which they were initially developed. For transfer to happen, research suggests, an individual must recognize the wide applicability of a particular skill, principle or concept and when a particular situation calls for the use of them (Khun, 1986). Researchers refer to this as *conditional knowledge* or “knowing when” and where to access certain facts, apply particular rules and use specific cognitive strategies (Bransford & Vye, 1989; Alexander & Judy, 1988). There is general concern today that we need to do a better job of helping children “conditionalize” their knowledge by teaching them how to transfer their learning from one subject area to another and from inside the classroom to outside the school.

The issue of transfer has been a matter of some importance in art education over the years. Some thirty years ago it was widely believed that creativity exhibited and nurtured in art classes would transfer to other subject areas in the school curriculum. It was presumed, for instance, that the development of a child’s artistic creativity would influence his or her capacity to think and learn in science. We now know, however, that creativity manifests itself more often

in specific contexts rather than across several disciplines. It is unlikely that children encouraged to think creatively in art class will do so in other classes as well unless teachers in each subject area work toward achieving this goal.

At a 1977 conference titled “The Arts, Cognition, and Basic Skills,” participants generated such questions as: what are the identifiable transformational processes that link thinking, perceiving, knowing, and expressing in the art? Are there relationships, similarities, or connections between artistic skills and other kinds of communicative and expressive skills? Are there ways to describe these relationships so that they will have applicability to the instructional process? In regard to facilitating transfer among the arts, conference participants indicated the need for research to determine the degree to which making the underlying cognitive strategies explicit in one symbol system might influence a student’s learning capacity in other domains. It was suggested that skills and knowledge might transfer from one artistic medium or discipline to another when there is an overlapping or sharing of certain “schemata” (i.e. knowledge structures) in the symbol systems involved (Madeja, 1978).

The work that comes closest to addressing the above issues is that done by Howard Gardner and his colleagues at Project Zero (see, e.g., Gardner, 1989; Winner, 1982). In short, this research suggests that similar psychological processes and skills may be called upon in the perception and production of all forms of art; but, that the development of these cognitive capacities appears very much tied to the context in which they are initially embedded. Thus, children’s cognitive development in each of the arts may be more distinct than previously assumed. Gardner (1988) recently put it this way:

Development of skills in one artistic symbol system, say music, occurs in a systematic way, but the facts of such development cannot simply be applied to other artistic systems. In fact, each artistic area exhibits its own characteristic developmental paths.

(p. 159)

From the foregoing, we may conclude that transfer of learning does not naturally happen. If we want children to be able to effectively apply their knowledge in dealing with new information, subjects, and settings, it is clear that we are going to have to teach them “how to” and “when to” do it. In order to maximize the possibility that transfer will occur, a variety of tactics should be employed (Beyer, 1987; Sternberg, 1987; Nickerson et al., 1985).

First, ensure that a high degree of correspondence exists between the context within which students learn and the situations that they will eventually encounter outside of the classroom. This means that teachers should select content and skills for students to study and practice with an eye toward application outside of school. In this respect, it is questionable how much of the knowledge that students acquire in learning to analyze classical works of art would transfer automatically to analyzing contemporary works of art. Prior experiences with both would possibly exert a more powerful influence on students’ thinking.

Second, help students apply their thinking and knowledge to the widest variety of contexts possible. To illustrate, art historians and art critics typically classify (i.e., categorize or group) works of art according to similar characteristics. Classifying things helps us to make sense of a very complex world. It is an important cognitive skill that students could practice doing in a variety of ways in art. For example, small groups of students could be given a pile of art reproductions and asked: *Put works together that you think ought to go together based on a good reason.* Following the sorting activity, each group is given a chance to share the strategies they used and to compare their tactics with those used by other groups. On other occasions, students could practice grouping art reproductions according to various standard classification schemes (e.g., subject matter, style, period, media and so on) and sorting other kinds of data into categories (e.g., words related to the art elements and principles). In order to generalize this skill beyond the classroom, students could also be asked to identify ways the things they

encounter in their daily lives are classified (e.g., names in a telephone book, baseball cards, clothes in a bedroom, sections of a supermarket, and so on).

Third, stress the importance of transfer and offer specific guidance and encouragement with respect to it. In art, for example, students could be shown how the principles of design (e.g., balance, variety, rhythm, and so on) permeate the arts and the world around them. To make this learning more long lasting, students should be encouraged to find these relationships themselves (e.g., in magazine pictures, natural forms, in architecture, and so on). What else is this like? Can you find an example of this? How is this like something you've seen before? As often as possible, teachers need to help students make connections between what they learn in art class and what they experience in other academic and practical settings.

Lastly, encourage students to think about their own thinking and how they go about doing it. Experts agree that one of the best ways to facilitate transfer of learning is by increasing students' awareness of their own cognitive processes and of their own performance as thinkers. This points, once again, to the importance of encouraging reflection in art. Asking children to step back and look at what they are doing engages them at a metacognitive level, thereby increasing the chances that they will develop self-control of their intellectual processes and recognize when to use them later on.

Summary

In recent years, much attention and debate in art education has been focused on the nature of knowledge in our field. Advocates of discipline-based art education have affirmed that well-chosen content is crucial to the advancement of art programs in our schools. In this chapter, I have argued that content can not be separated from the way it is taught and learned. Content must be taught in ways that mentally engage the learner. Along this line, a review of the literature in cognitive psychology suggests certain instructional principles underlying improvement of the mental processes involved in thinking and learning. By infusing these

principles into an elementary art curriculum, it might be possible to improve the thinking of children as they engage in learning about art. Accordingly, it has been proposed that there are at least five interdependent needs to be addressed by art instruction designed to foster thinking in learners. These are: (1) attending to children's present knowledge and beliefs about art; (2) helping children build an adequate knowledge base in art; (3) promoting intrinsic motivation and autonomy in children; (4) providing children with opportunities to practice their thinking; and (5) helping children to transfer their thinking and knowledge to other contexts. From a cognitive perspective, teaching art content and teaching thinking are not seen as in opposition to one another. Rather, they complement one another.

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References

- Alexander, P. A. & Judy, J. E. (1988). The interaction of domain-specific and strategic knowledge in academic performance. *Review of Educational Research*, 58(4), 375-404.
- Amabile, T. M. (1983). *The social psychology of creativity*. New York: Spring-Verlag.
- Anderson, J. R. (1985). *Cognitive psychology and its implications*. New York: Freeman and Company.
- Anderson, J. R. (1982). Acquisition of cognitive skill. *Psychological Review*, 89, 369-406.
- Anderson, R. C. (1984). Some reflections on the acquisition of knowledge. *Educational Researcher*, 13(9), 5-10.
- Bamberger, J. (1978). Intuitive and formal musical knowing: Parables of cognitive dissonance. In S. S. Madeja (Ed.), (1978). *The arts, cognition, and basic skills*. (pp. 173-209. St. Louis: CEMREL, Inc.
- Beyer, B. K. (1987). *Practical strategies for the teaching of thinking*. Boston: Allun and Bacon, Inc.
- Brandt, R. (1987). On assessment in the arts: A conversation with Howard Gardner. *Educational Leadership*, 45(4), 30-34.
- Bransford, J. D. & Vye, N. J. (1989). In L. B. Resnick & L. E. Klopfer (Eds.), (1989). *Toward the thinking curriculum: Current cognitive research*. (pp. 173-205). Yearbook of the Association for Supervision and Curriculum Development. Alexandria, VA: ASCD.
- Bruner, J. S. (1968). *Toward a theory of instruction*. New York: W. W. Norton & Company.
- Bruner, J. S. (1963). *The process of education*. New York: Random House.
- Clark, G. A. & Zimmerman, E. (1988). Professional roles and activities as models for art education. In S. M. Dobbs (Ed.), (1988). *Research readings for discipline-based art education: A journey beyond creating*. (pp. 78-97). Reston, VA: National Art Education Association.

- Clark, G. A., Day, M. D. & Greer, D. W. (1987). Discipline-based art education: Becoming students of art. *Journal of Aesthetic Education*, 21(2), 129-193.
- Cohen, M. W. (1986). Research on motivation: New content for the teacher education curriculum. *Journal of Teacher Education*. May-June, 24-28.
- Costa, A. L. (1985). (Ed.) *Developing minds: A resource book for teaching thinking*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Costa, A. L. (1984). Meditating the metacognitive. *Educational Leadership*, 42(3), 57-62.
- De Bono, E. (1976). *Teaching thinking*. London: Temple Smith Ltd.
- Dewey (1916). *Democracy and education*. New York: The MacMillan Company.
- Dewey, J. (1910). *How we think*. Boston: D. C. Heath and Company.
- Duckworth, E. (1987). "*The having of wonderful ideas*" and other essays on teaching and learning. New York: Teachers College Press.
- Eaton, J. F., Anderson, C. W., & Smith, E. L. (1984). Students' misconceptions interfere with science learning: Case studies of fifth-grade students. *The Elementary School Journal*. 84(4), 365-379.
- Ecker, D. W. (1973). Analyzing children's talk about art. *Journal of Aesthetic Education*. 7(1), 58-73.
- Eisner, E. W. (1983). The kind of schools we need. *Educational Leadership*. 41(2), 48-55.
- Eisner, E. W. (1981). The role of the arts in cognition and curriculum. *Phi Delta Kappan*. 6(1), 48-52.
- Feldman, D. H. Developmental psychology and art education: Two fields at the crossroads. *Journal of Aesthetic Education*. 21(2), 243-259.
- Felding, R. (1989). Socio-cultural theories of cognitive development: Implications for teaching theory in the visual arts. *Art Education*, 42(4), 44-47.

- Gardner, H. (1989). Zero-based arts education: An introduction to arts propel. *Studies in Art Education*. 30(2), 71-83.
- Gardner, H. Toward more effective arts instruction. *Journal of Aesthetic Education*. 22(1), 157-167.
- Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.
- Gardner, H., Winner, E., & Kircher, M. (1975). Children's conceptions of the arts. *Journal of Aesthetic Education*. 9(3), 60-77.
- Gerhart, G. L. Effects of evaluative statements on artistic performance and motivation. *Studies in Art Education*. 27(2), 61-72.
- Getty Center for Education in the Arts (1985). *Beyond creating: The place for art in America's schools*. Los Angeles: J. Paul Getty Trust.
- Glaser, R. (1988). Cognitive science and education. *International Social Science Journal*. 40(1), 21-44.
- Goodman, N. (1968). *Languages of art*. Indianapolis: Bobbs-Merril.
- Hagaman, S. (1990). The community of inquiry: An approach to collaborative learning. *Studies in Art Education*. 31(3), 149-157.
- Johnson, N. R. (1982). Children's meanings about art. *Studies in Art Education*. 23(3), 61-67.
- John-Steiner, V. (1985). *Notebooks of the mind, explorations of thinking*. New York: Harper & Row.
- Kirchener, K. S. (1983). Cognition, metacognition, and epistemic cognition: A three-level model of cognitive processing. *Human Development*, 26, 222-232.
- Koroscik, J. S. (1988). The formation of art understanding: A theoretical view. In A. Swann (Ed.), (1988). *Arts and learning research*. Vol. 6 (1). (pp. 11-21). American Educational Research Association.

- Kuhn, D. (1986). Education for thinking. *Teachers College Record*. 87(4), 495-512.
- Lankford, L. E. (1990). Preparation and risk in teaching aesthetics. *Art Education*. 43(5), 51-56.
- Madeja, S. S. (Ed.). (1978). *The arts, cognition, and basic skills*. St. Louis: CEMREL, Inc.
- Machotka, P. (1966). Aesthetic criteria in children: Justification of preference. *Child Development*, 37, 877-855.
- May, W. T. (1989). *Understanding and critical thinking in elementary art and music*. Elementary Subjects Center Series No. 8. East Lansing, MI: Michigan State University, The Center for the Learning and Teaching of Elementary Subjects. (ERIC Document Reproduction Service No. ED 308 982).
- Mattil, E. L., et al. (1961). The effect of a depth vs. a breadth method of art instruction at the ninth-grade level. *Studies in Art Education*. 3(1), 75-87.
- Nickerson, R. S., Perkins, D. N. & Smith, E. E. (1985). *The teaching of thinking*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Nussbaum, J. & Novick, S. (1982). Alternative frameworks, conceptual conflict and accommodation: Toward a principled teaching strategy. *Instructional Science*, 11, 182-200.
- Parsons, M. J. (1987). *How we understand art*. New York: Cambridge University Press.
- Perkins, D. N. (1987). Art as an occasion of intelligence. *Educational Leadership*. 45(4), 36-43.
- Piaget, J. (1976). *Judgment and reasoning in the child*. Totowa, NJ: Littlefield, Adams & Co.
- Presseisen, B. Z. (1987). *Thinking skills throughout the curriculum*. Bloomington, IN: Pi Lambda Theta, Inc.
- Resnick, L. B. & Klopfer, L. E. (Eds.). (1989). *Toward the thinking curriculum: Current cognitive research*. Yearbook of the Association for Supervision and Curriculum Development. Alexandria, VA: ASCD.

- Resnick, L. B. (1987). *Education and learning to think*. Washington, DC: National Academy Press.
- Rush, J. C. (1989). Coaching by conceptual focus: Problems, solutions and tutored images. *Studies in Art Education*, 31(1), 46-57.
- Rush, J. C. (1984). Bridging the gap between developmental psychology and art education: The view from an artist's perspective. *Visual Arts Research*. 10(2), 9-21.
- Shuell, T. J. (1986). Cognitive conceptions of learning. *Review of Educational Research*, 56(4), 411-436.
- Sternberg, R. J. (1988). *The triarchic mind, A new theory of human intelligence*. New York: Penguin Books.
- Sternberg, R. J. (1987). Questions and answers about the nature and teaching of thinking skills. In J. B. Baron & R. J. Sternberg (Eds.), *Teaching Thinking Skills: Theory and practice*. (pp. 251-259). New York: W. H. Freeman and Co.
- Stockrocki, M. (1986). Expanding the art world of young, elementary students. *Art Education*. 39(4), 12-16.
- Szekely, G. (1988). *Encouraging creativity in art lessons*. New York: Teachers College Press.
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological processes*. Cambridge: Harvard University Press.
- Wilson, M. & Wilson, B. (1982). *Teaching children to draw*. Englewood Cliffs, NJ: Prentice-Hall, Inc.
- Winner, E. (1982). *Invented worlds, the psychology of the arts*. Cambridge, MA: Harvard University Press.
- Wittrock, M. C. (1987). Students' thought processes. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (3rd ed.) (pp. 297-314). New York: Macmillan.

Wood, D., Bruner, J. & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of Child Psychology and Psychiatry*. 17, 89-100.