

## **Metacognition and the Use of Inner Speech in Children's Thinking: A Tool Teachers Can Use**

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### **Abstract**

Teachers frequently dismiss children's self-directed speech as distracting classroom behavior. Yet, if teachers could envision self-talk as active constructivist activity intrinsic to metacognitive understanding, they could use inner speech as a tool to help students control and enhance their cognitive performance. Inner speech, a component of L.S. Vygotsky's learning theory, plays a self-regulatory and self-instructional role for all types of learners. Studies on inner speech are examined to understand its potential role as a key metacognitive instructional strategy in inquiry-oriented approaches to art, mathematics, and literacy education. These investigations found that inner speech helps students with the self-regulation of cognitive behavior and development. Hence, this paper highlights the application of a metacognitive approach to the instruction of math, literacy, and art, recognizing that inner speech is an underutilized and cost-effective educational resource that teachers can readily incorporate in their pedagogy.

### **Inner Speech: A Neglected Pedagogical Tool**

Pedagogy today envisions teaching writing, mathematics, and art as multi-layered processes rather than mere goal-oriented pursuits (Diehl, 2005; Bean, 2001; Rohrkemper, 1986; Moffett, 1985). In the past several years, literacy and mathematics education in particular, have adopted "writing-to-learn" approaches, in which students note the process of their arrival at a mathematical result or final draft following a progression of revisions that essentially describe their problem solving path (Steele, 2005; Bean, 2001). These metacognitive approaches support the view that the more children know and understand about how they learn the more they can and will learn (Lee & Smagorinsky, 2000; Gardner, 1999; Kozulin, 1998). Contemporary approaches to art, literacy, and mathematics education hold in common an emphasis on the process of inquiry and metacognitive understanding.

### **Inner Speech and Metacognition**

Metacognition can be facilitated by the use of inner speech, a kind of self-talk that enables students to direct and monitor their cognitive processing, and derive a deeper understanding and appreciation of their own thinking processes (Moffett, 1985). It is well known that young children often speak out loud while engaged in demanding activity (Flavell et al., 1997; Berk & Landau, 1993; Englert et al., 1991); less understood is that older children and adolescents, and even adults engage in inner speech for similar purposes (John-Steiner, 1992; Tharp & Gallimore, 1988; Vygotsky, 1978). Yet, teachers frequently view self-directed speech as annoying, distracting classroom behavior. Even when children do not self-talk out loud, they may be seen as inattentive, lost in their own world and absorbed by their own thought processes. But many researchers (Diehl, 2005; Flavell et al., 1997; Berk & Landau, 1993; Englert et al., 1991; Rohrkemper, 1986) believe that if teachers could envision self-talk as active constructivist activity intrinsic to metacognitive understanding, they could use inner speech as a tool to help students control and enhance their own cognitive performance. Hence, inner speech, this no cost underutilized educational resource, can be readily incorporated by teachers into their classroom instruction to improve student performance in many areas.

There are different types and functions of inner speech that transform with proficiency and time. Egocentric speech is an early form of self-talk used by very young children. Although it is audible, it does not exist for the purpose of communicating with others, rather, its function is self-regulatory to help children remain on task and gain control over their actions and their environment. Vygotsky (1978) considered children's verbalized talk to be a natural extension of their activity because he observed, "children solve practical tasks with the help of their speech, as well as their eyes and hands" (p.25). In contrast to Piaget (1974), who believed that egocentric speech simply disappeared in time, Vygotsky (1978) maintained that externally vocalized egocentric speech gradually transformed into abbreviated and partially audible internalized speech, and finally, to completely internalized inner speech or abstract thought, a hallmark of adolescent and adult cognitive development. Older children and adults primarily use inner speech (as opposed to egocentric speech), which can take a partially audible form, to develop their individual capabilities in the face of increasingly complex tasks (John-Steiner, 1992; Tharp & Gallimore, 1988; Vygotsky, 1978).

Inner speech, which is essentially dialogue with oneself (Bakhtin, 1986), facilitates the self-regulation of behavior (John-Steiner, 1997; Diaz et al., 1990; Vygotsky, 1978). Self-regulation refers to the control of processes that enable us to think as well as to monitor the thinking process itself (Kashima et al., 2002). In contrast, cognition, according to Vygotsky (1978), consists of the conscious manipulation of higher psychological tools: logical thinking, developed memory, focused attention, cognitive decision-making, and problem solving directed toward an intended goal. Self-directed speech helps learners to plan and coordinate thoughts and actions, which, aided by self-regulation, enhances learning (Meichenbaum & Goodman, 1971; Camp, 1977) and cognitive development (Vygotsky, 1986).

### **Problems Inherent in the Use of Inner Speech as a Pedagogical Resource**

Inner speech has proven difficult to capture in the laboratory setting despite the support that numerous educators (Lee & Smagorinsky, 2000; Goos & Galbraith, 1996; Diaz et al., 1990) extend to metacognitive learning related to self-talk. Difficulties of quantification stem from the nature of inner speech itself because: (1) it is a subterranean interior function, (2) partly dependent on memory, (3) vacillates in the degree of consciousness, and (4) can change and take different forms. Although formal studies of inner speech employed such accepted pedagogical practices as modeling, role-playing, observation, coaching, scaffolding, and self-verbalization for the purpose of self-regulation, they nevertheless suffered from the methodological difficulties of excavating internalized intellectual processes. While findings vary, many studies (Tharp & Gallimore, 1988; Meandor & Ollendick, 1984; Copeland, 1979; Camp et al., 1977; Meichenbaum & Goodman, 1971) support Vygotsky's (1986) claim that inner speech is a condition of the self-regulation of cognitive functioning and development.

While memory can be seen as a mitigating factor in the use of inner speech as a reliable component of instruction, particularly for novice learners, the literature does not corroborate this assertion (Flavell et al., 1997; Christensen & Cooper, 1992; Englert et al., 1991; Rohrkemper, 1986; Copeland, 1979; Camp et al., 1977; Meichenbaum & Goodman, 1971). Memory, which involves retention, recovery, and reporting, plays a relatively small role in the ability to use inner speech as a self-regulatory tool. In addition, recounting cognitive decision-making while in the presence of an artifact (math problem, writing revision, or artwork) provides a trail of 'evidence,' a record of its own creation. The resulting 'artifacts' created through the use of inner speech facilitate the path of recovery, producing perhaps, the only means of uncovering interior thinking processes essential for metacognitive understanding, particularly true for disciplines that rely on inquiry as a condition of learning.

Memory, moreover, is a factor in all types of instruction, not only metacognitive approaches that rely on inner speech. Research on metacognition tends to highlight the presentation of information, the nature of the information itself, the prior knowledge and experience of the learner, and the pedagogical approach of the teacher as contributing elements to student retention of

learned material. Wylie & McGuinness (2004) investigated recall of textual information and found that the combination of prior knowledge, particularly of advanced learners, and a well-structured text produced the highest amount of recall, underscoring the importance of the nature of the artifact, the experience of the learner, and the kind of knowledge involved. If a well-organized text can be equated with a well-structured artwork or mathematical problem, then recall should also be high. A metacognitive approach ameliorates retention difficulties because student learning is based on self-understanding, self-instruction, and self-constructed inner speech, all of which assist in the memory of content.

The role that cognitive strategies play in effective mathematical problem solving was examined in a study by Christensen and Cooper (1992), which also found that higher level students relied more on memory retrieval to support their mathematical computation than did lower functioning students, arguing that “strategy use facilitates the transition from counting to retrieval of facts from memory” (p.42). Similarly, an investigation by Koroscik (1982) of the effect of prior knowledge on visual art processing, found that more knowledgeable viewers remembered more than did less experienced responders; prior knowledge helps to connect the learning of new information to one’s own schema. These studies show that student experience and prior knowledge as well as the quality of instruction and self-instruction are important to learning and the retention of information.

While it may seem that experienced practitioners have less need of inner speech than novice students, advanced learners may, in fact, be its greatest beneficiaries since high recall of cognitive processing results in an increased ability to retrace and revise intellectual decision-making. In point of fact, Rohrkemper and Bershon (1984) discovered that experienced math students relied on inner speech more than did less experienced students because they realized that self-talk helped them know when and where their understanding was faulty. Inner speech assisted learning is a cyclical, regenerative process because it supports metacognitive functioning while it generates cognitive development and boosts memory retention as an added benefit.

Inner speech is not only an effective cognitive strategy for children, but for older individuals as well. Often considered to exist solely in the domain of very young children, self-directed talk also occupies a place in the cognitive progress of older children, adolescents, and adults. Building on Vygotsky’s (1978) theory of the existence of adult inner speech, John-Steiner (1992) and Tharp and Gallimore (1988) maintained that adults, like children, use inner speech for planning, directing, and monitoring to understand, make meaning, and operate within the higher reaches of their cognitive processing. John-Steiner (1992) considered inner speech to be one of the “strategic cognitive uses of language for the self [that] continue throughout the lifespan” (p.285). Although adult inner speech may occur less frequently than children’s (due in part to societal inhibition), it nevertheless plays an important role in executive functioning, our control-center, that directs and monitors our public and private activities – our thoughts and actions that allow us to meet new challenges.

### **Pedagogical Applications of Inner Speech**

That inner speech reaches across the lifespan to fulfill a self-regulatory function for expert and novice students alike marks it as a potentially significant instructional tool for all learners – from preschool, elementary and middle school to high school, college, and beyond. After all, it is well known that elite athletes use self-talk to operate at an optimum level of ability (Douma & Kazakas, 2000; Highlen & Bennett, 1983). If such highly accomplished athletes require the assistance of inner speech to direct and monitor their physical and mental functioning, certainly less proficient practitioners could also benefit from this practice.

The basic elements of an inquiry-oriented perspective are presented in this section. A metacognitive classroom challenges students to explain their reasoning verbally, in writing, and in the language of a particular discipline. Schoenfeld (1987a, 1987b) posited that effective problem

solving is specific to a particular domain framed by the ongoing discussions within that content area. Teachers create the conditions that allow this discourse to unfold and model the fundamental questions endemic to each discipline. Schoenfeld (1987b) differentiated between modeling in the form of a Socratic dialogue and modeling as facilitator, whereby the teacher's role is to "help the students make the most of what they themselves generate and to help them reflect on how they do it" (p.201) rather than demonstrating pathways to 'correct' answers.

In a metacognitive approach, students learn to track their critical thinking process through journaling, explaining their thinking to their peers, justifying their reasoning through participation in peer debate, and brainstorming best solutions within the dynamic of the group. Students gradually learn how to ask themselves questions that guide their thinking in incremental steps that require both action and evaluation. Schoenfeld (1987b) maintained, in fact, that students who employ effective metacognitive practices are better able to argue with themselves.

Discussion and debate are the tokens of currency in a classroom focused on metacognitive learning. Risk-taking, mistakes, faulty reasoning, disagreements, and incorrect answers are valued for the different lines of inquiry they engender. Different solutions are appreciated for the explanations they inspire. Classrooms that promote freedom and flexibility of thought, welcome the varieties of inner speech that students use as essential components of innovative problem solving. In a classroom where metacognition is valued, the teacher guides students in brainstorming, critical thinking, and creative problem solving activities. Students explore the parameters of a topic or subject, pursue specific lines of inquiry, engage in research, and monitor their thinking through journaling, partner sharing and small group discussion. Teachers engage students in dialogue about their thinking, teaching self-talk strategies in systematic fashion through modeling and discussion that enable students to bring their intellectual decisions to a more conscious level. Students learn how to question themselves and their peers to elicit cognitive decision-making (How did you...? Why did you...? What will you...?). Through explicit coaching (albeit all too often unconscious), students gain insight into their thinking processes, become independent learners, and develop their language skills.

A metacognitive approach focuses on the different components of activity. A critical companion to action is reflection and evaluation. Such activity more consciously connects the learner to the content, and might appropriately be called, "Act/Reflect/Evaluate," or "ARE." In this approach, students become more analytic and self-reflective, and achieve greater control over their actions through analysis of their cognitive decision-making. Additional aspects of a metacognitive approach centered on inner speech include brainstorming, joint collaboration (between teacher and student and among students), feedback, guided questioning, and cognitive structuring (the organization and generalization of information) that should be part of every child's educational experience within age-appropriate expectations. Most of the researchers cited in this paper, in fact, employ these metacognitive strategies within whole class instruction, not only in partnering and small group work.

Metacognitive instruction predicated on inner speech differs from typical good teaching practice in its systematic reliance on inner speech. The "ARE" approach maintains that the steps for thinking through a problem need to be made as explicit as possible for students to identify the problem, brainstorm and select best approaches, avoid errors typically made by the individual, and evaluate their process and progress. The approach is dependent on teacher modeling and incremental scaffolding of students' work process. While the goal of this pedagogical approach is automatic inner speech-facilitated problem solving, it emphasizes process over product, and accordingly takes into account each step of the learning process and the student's pace of learning.

The "ARE" approach always begins with teacher demonstration and modeling, and moves to student participation within the whole group, then peer interaction within small groups, and finally to partner sharing and individual work so that, as Vygotsky (1978) advocated, instruction through social interaction precedes solitary effort. Initially, the teacher models the problem solving

strategies by sharing her step-by-step thinking and inner speech verbalizations, and then calls on students to share their inner speech remarks. The teacher jots down the comments on large sheets of paper followed by class discussion and evaluation on the value of the inner speech remarks using an assessment tool. The procedure is repeated for each stage of the activity.

The “ARE” approach is composed of three interlocking activities: inner speech thinking steps (questions that the learner asks herself), inner speech facilitating comments (inner speech remarks that help the learner to achieve the problem-solving steps), and evaluation of inner speech use (what the learner thinks of her own inner speech comments with regard to task completion). These three inner speech activities can be evaluated using an evaluation instrument termed “The Inner Speech Cognitive Problem Solving Assessment Tool.” The teacher models how to use the tool for the students, and then supports students’ practice using this tool on their own, in small groups and as part of the class. The purpose of the tool is for students to learn an approach to problem solving, note their inner speech use, and evaluate their inner speech commentary. When students are stymied by a particular learning problem, they can review their responses to the tool, which becomes an additional instructional resource.

**Table: Inner Speech Cognitive Problem Solving Assessment Tool**

<b>Inner Speech Thinking Steps</b>	<b>Inner Speech Facilitating Comments</b>	<b>Evaluation of Inner Speech Use</b>
What is this problem about?	I think it’s about...	That was clear.
What is this problem asking for?	OK, it seems to want me to...	What made me think that?
Have I ever solved this kind of problem before?	Oh yeah, yesterday in class.	That’s good, I remembered!
What did I do then?	Wait, I think I...	I stopped and thought again.
What are possible solutions?	I guess I could also...	Did I think of everything?
OK, I have <u>x</u> solutions, which one should I pick and why?	I should probably...	I don’t really understand how to choose here...
I need to watch what I’m doing.	Yeah, I always make the same mistake here, so...	I caught it, good for me!
What do I think about what I’ve done?	I don’t know if...	Well, at least I tried to think this through.
Does it make sense?	I wonder if this makes sense...	Should I know more about this or is this OK?
Let me review the question again.	Yeah, it’s always good to start over to check...	This shows I’m being careful and not giving up.
If I have no solution, what should I do?	I feel like such a dummy.	That doesn’t help at all, it’s just negative thinking.
OK, I’ll reread the problem and look for clues	Aha, I’m a detective now...	I like that!
I think I need to ask for help.	Jeez, I’m just going around in circles now...	At least I know when to ask for help.

In the next three sections, metacognitive approaches are discussed that build on inner speech and contribute to the specific disciplines that rely on inquiry and problem solving. Instructional applications to art, literacy, and mathematics education are explored in these sections. A different

developmental level has been designated for each content area to demonstrate that a metacognitive approach predicated on inner speech use can span the age/grade spectrum.

Accordingly, art is presented at the middle/high school level, literacy at the lower elementary, kindergarten – second grade level, and math at the upper elementary, fourth grade level.

### **Inner Speech, Metacognition and Art Education**

Art education is a field that has traditionally been involved with process (Eisner, 2002; Burton, 1980). Certainly, the artistic process incorporates conceptual and expressive functioning along with cognitive processing. Yet, individual and group critique, long a staple of art instruction, primarily focuses on reflection and evaluation after the fact rather than during the process of engagement; students are rarely encouraged to be aware of their aesthetic decisions when they make them. Even individually tailored art instruction that relies on teacher modeling may lack the specifically tailored mentoring required by metacognitive approaches that incorporate self-talk. Art production, a complex, layered activity that encompasses cognitive, emotional and psychological processing, is particularly ripe for incorporating inner speech into its pedagogical “toolkit.”

Art is also a subject that has proven resistant to formal evaluation (Eisner et al., 1996; Feldhausen & Goh, 1995). Two studies (Koroscik, 1982; Koroscik & Blinn, 1983) examined qualitative contributions to the retention of information as a result of viewing artwork. One investigation (Koroscik, 1982) stressed the importance of viewers’ prior knowledge in relation to time on-task and the nature of the task on-hand, and found that more knowledgeable art students not only remembered more, but the information they recalled was substantively more advanced than that of less experienced students. Another study (Koroscik & Blinn, 1983) discovered that student “verbalization” in response to observations of artworks resulted in “improved retention of both meaning and structural features” of the work (p.29). Together, both investigations make the case for repeated exposure to artwork to build knowledge and critical thinking skills made more conscious and accessible by the purposeful verbalization of new understandings.

While the Koroscik & Blinn (1983) experiment emphasized outwardly verbalized speech, another study (Zakin, 2005) focused on artists’ interior self-talk. In this investigation of the artistic process, inner speech was found to play an important self-regulatory and self-instructional role in artists’ cognitive decision-making during art production. The participating artists used inner speech to understand the aesthetic decisions they made, improve the quality of their art production, and provide a process for reflection. Inner speech fulfilled a variety of functions: to direct, monitor, guide, assist, coach, evaluate, mentor, and instruct the artist during the multi-faceted process of art production. In this investigation, inner speech was conceptualized as an intermediary stage between unconsciousness and the gradual dawning of conscious thought.

These studies connect both the viewing and the making of art with self-directed speech (audible or silent) and show that artistic development and cognitive functioning require a measure of conscious awareness, necessary for productive understanding and use. In other words, inner speech makes interior thoughts known to the learner, and is therefore both a product and instrument of metacognition.

More specifically, in a middle school or high school art class, inner speech helps art students learn how to draw the human figure. Although there are many approaches to figure drawing, it is the rare art instructor who teaches students how to use their inner speech to direct and monitor their artistic process to accomplish the complex and challenging task of drawing the human figure. The instructor first demonstrates the approach, sharing the reasoning behind the strategies, and posts the sketches of the sequenced stages of the figure studies on the wall for reference. Students are taught to internalize the step-by-step guidelines of the approach. The instructor then checks to ascertain that the students are using their inner speech directing and monitoring strategies by having them ask themselves: “Have I checked the position of the body to know where on the page to place the head?” “Have I used directionality to describe the twist of

the body to the higher hip?" "Have I used my pencil as a plumb line to understand the weight of the body to know where the feet are in relation to the head?" "Have I made sure that the standing leg is on a diagonal in an asymmetrical pose?"

Based on careful observation of each student's drawing process and typical pattern of errors, the instructor helps the student adjust the inner speech self-regulatory dialogue to include the student's particular difficulties: "OK, don't start with such a big head," "Make sure to make the torso shorter," "Whoa, that looks like a flamingo's leg, it's got to be diagonal," "Uh oh, I forgot to check the weight of the body, let me use my plumb line." In such a way, students become accustomed to communicating with themselves, maintain better monitoring and control of their artistic process, and understand the incremental decisions they make during the process of making art. Art production, which is based on continual action, reflection, and evaluation, can only benefit from this kind of approach.

### **Inner Speech, Metacognition and Literacy Education**

Approaches to literacy education that conceptualize writing as a process and emphasize the articulation and sharing of cognitive strategies are metacognitive in nature due to a concern with how students think, direct, and understand their thinking. Incorporating inner speech into writing instruction makes sense because both written and spoken languages are process-driven activities. Through a focus on inner speech, students can derive a deeper understanding and appreciation of their own process of thinking through their writing.

Literacy research that examines writing in relation to inner speech is often characterized by whether learners use inner speech to: (1) problem solve (Wylie & McGuinness, 2004; Flavell et al., 1997); (2) enhance their own learning via internalized teacher modeled inner speech (Riley & Ahlberg, 2004; McCafferty, 1994); or (3) direct, monitor, and control their self-talk to regulate their cognitive behaviors. As Diana Steele (2005) noted in a study that used writing to increase comprehension, "Writing is a way of verbalizing to oneself. This self-directed speech becomes inner speech and helps build understanding" (p.143).

One method to incorporate metacognitive functioning into writing instruction is for teachers to help students make their self-guided talk "visible" to themselves on the way to becoming motivated learners. Researchers Annevirta and Vauras (2006) found that students who were actively involved with their own learning and have a measure of metacognitive understanding were more independent and successful learners. They also discovered that the quality of inner speech mattered more than the quantity of inner speech in developing self-reflective thought, which points to the importance of teacher modeling.

The teacher, therefore, is critical to metacognitive instruction. The seminal role of the teacher in fostering students' cognitive behaviors was highlighted in another study reported by Diehl (2005). In this investigation, poor readers were explicitly taught metacognitive strategies based on inner speech modeled and explained by the teacher to promote self-regulation of reading behaviors to facilitate a love of reading. The teacher explained inner speech to the students as "conversation that happens in my head" (p.59), and interrelated inner speech and internal visualization by relating, "When I'm talking back to the text and getting pictures in my mind, I remember more, I understand more" (p.59). He shared with his students that "Good readers have to listen to the voices going on in their heads while they read" (p.62) because these voices help the reader monitor understanding, or lack thereof, maintain focus, and help keep thinking on track. As a result of the exploratory, self-reflective techniques the teacher modeled for the students, they began to enjoy reading, and became better readers and writers.

Literacy education (especially writing) is appropriate for metacognitive approaches predicated on inner speech. Successful student writers, mathematics and art learners are able to direct, correct, and evaluate their work during the process of creating them. While some students naturally possess metacognitive abilities, most need explicit instruction as well as practice to learn how to

internalize teacher modeled metacognitive strategies (Kramarski & Mevarech, 2003; Schoenfeld, 1987b; Rohrkemper & Bershon, 1984).

In a metacognitive approach, literacy teachers would make their cognitive decision-making known, and even transparent to students by sharing the sequence of their step-by-step plan of action (including mistakes) on route to final result. Rather than limit disclosure to a sanitized version of intellectual strategizing, teachers would instead reveal the nitty-gritty back-and-forth self-questioning facilitated by inner speech inherent in effective inquiry, which can be more readily adapted to students' own metacognitive functioning. Teachers could use phrases such as, "Where should I begin?" "What do I know?" "Well, that didn't work, I wonder why not." "OK, what do I know about this that makes sense here?" "What makes this problem different?" "This is probably where I should try another plan... what should I put first?" "What happens next?" "I don't really know what to do but what if I...?" "Now that I've done that, perhaps I should try..." and "OK, now the next step should be..."

Students would be taught to recognize the strengths and weaknesses of their own thinking processes and how to target their common pitfalls. They would learn how to internalize such comments as, "OK, here is where I usually make the mistake of..." "What is the question I need to ask myself here?" and, "I know I often confuse....with ....., so I need to go slow now." Once students feel comfortable with general questioning techniques as well as those that address their specific difficulties, they would engage in partner and small group sharing, scaffolding their peers in self-questioning techniques tailored to individual needs. Ongoing metacognitive training assisted by inner speech would enable students to internalize the self-guiding, self-monitoring, and self-correcting skills required for complex problem solving. The following illustrates how inner speech might be taught in the context of reading a fairytale with young children.

Even very young children, kindergarten age through second grade, can begin to learn to use inner speech thoughts as a problem solving tool given sufficient teacher modeling and support. During discussion time following a reading of the fairytale, "The Little Red Hen," the teacher asks the class questions about the story to scaffold awareness and value of inner speech use: "What was the Little Red Hen's problem?" "What did she want her friends to do?" "How could the Little Red Hen have solved her problem differently?" "What do you think she was thinking inside her mind?" "What kinds of things do you think she could have been saying to herself?" Through modeling and role-playing, the teacher describes the inner life of the Little Red Hen: "Hmmm, my friends won't help me. I feel badly. What should I do? Don't give up! What is the best way for me to get their help? Have I ever had this problem before? What did I do then?" The teacher asks the students in turn, "If you were the Little Red Hen, what would be going on in your mind?" "What would you be saying to yourself?" "Have you ever had a problem like this?" "What did/would you do?" "What did/would you say to yourself?" "How does talking to yourself help you figure out what to do?" The questions are posted on the wall, continually used for reference, and ultimately become the template for an Observation/Assessment tool to understand storybook characters and their actions.

Children not only learn that inner speech is a helpful thinking tool but also that it is a means by which authors reveal the nature of their characters to the reader. Just as actors need to get inside of the mind of the characters they play, so do readers need to get inside the mind of the characters in the stories they read. Harper (1997) asked her writing students to portray the "brain arguments" of their characters, the debates that characters have with themselves "about what is going on and what they should do about it" (p.197). She argued that the reader wants "...to know what this character is thinking...Let me inside!" (p.197). It is important for young children to begin to comprehend that authors want the reader to understand and identify with their characters by sharing the inner lives and thinking of the characters, often through their inner speech. Inner speech provides the reader with an inside view of the characters and of the decisions they make, and eventually helps the reader to make sense of the story's themes and issues. There are many implications of using inner speech as a self-regulatory, metacognitive support for literacy development.

## Inner Speech, Metacognition and Mathematics Education

Mathematics education has long suffered from an overemphasis on rules and right answers, rather than immersion in mathematical thinking and creative problem solving (Schoenfeld, 1989). Alan Schoenfeld, a renowned mathematics educator who studied common problems in mathematical thinking, discovered that students tend to internalize ineffective teaching methods that prevent productive problem solving and metacognitive processing from occurring. He advocated "Think-Aloud" approaches in which students work collectively in small groups to explain and debate their thinking guided by teacher-consultants who share their problem solving tactics with students, including the strategies that end in dead ends as well as those that result in successful resolution.

In Schoenfeld's metacognitive approach, students were taught to think like mathematicians, to create their own knowledge base and to understand and articulate their problem solving strategies to their peers. Schoenfeld (1987b) believed that metacognitive problem solving enables the learner to plan, measure and evaluate progress while acquiring necessarily knowledge. He (1987b) argued that effective learners can accurately reflect on their thinking process because "...good problem solving calls for using efficiently what you know; if you don't have a good sense of what you know, you may find it difficult to be an efficient problem solver" (p.190). His 'Thinking Aloud' approach therefore focused on student sharing of their thinking processes through audibly verbalized inner speech.

A plethora of studies that examined best practices in mathematics education (McAlpine et al., 1999; Goos & Galbraith, 1996; Montague & Applegate, 1993; Christensen & Cooper, 1992; Schoenfeld, 1989) demonstrated that metacognitive instruction that uses self-directed speech improves students' mathematical reasoning. A few bear mentioning. Rohrkemper and Bershon (1984) studied students' inner speech during mathematical problem solving and found that the quality and content of their self-talk directly impacted their cognitive functioning by helping them to attend, decipher, organize and use information to resolve more challenging problems. They maintained that teacher instruction and modeling of inner speech in the classroom environment is essential for students to learn how to use self-directed talk to internalize problem solving techniques. They argued that only teachers can impart to students the critical thinking strategies that sustain functioning in the highest reaches of their learning capability.

Restructuring the mathematics classroom to promote small group work is another important element of a metacognitive orientation. Kramarski and Mevarech (2003) found that metacognitive instruction was more successful within a small group framework than was either individual metacognitive training or group learning alone. They concluded that the combination of metacognitive instruction and cooperative learning created the most conducive environment for learning mathematics, but stipulated that individual participation within the group must be carefully structured to maximize the learning potential of each contributing member. These metacognitive approaches to mathematics instruction emphasize inquiry, process, as well as verbal and written justification within a shared discourse modeled by the classroom teacher.

In an upper elementary classroom, fourth grade students learn how to use their inner speech thinking strategies in a math activity involving pattern blocks to explore tessellations of plain figures. Students first differentiate between regular and irregular shapes and then quadrilaterals and parallelograms. The teacher models questions that students learn to ask themselves: "What is a regular shape?" "What makes a shape irregular?" "What is the definition of a quadrilateral, a parallelogram?" The instructor's inner speech strategizing is shared with students to internalize, followed by a discussion during which they share their own: "Let's see if I can describe these shapes," "Hmm, I wonder what makes these shapes the same and different?" "I should concentrate on what I do know instead of worrying about what I don't," "OK, I've got a definition of a parallelogram, let's see if it makes sense," "Why do I always forget this one?" The teacher notes

the students' comments on large sheets of paper that remain on the wall until the subsequent activity's inner speech remarks take their place.

Students next choose a particular group of shapes to work with, rejecting those that do not satisfy the definitive characteristics of the group. As Schoenfeld (1987b) explained, concept recognition depends on the ability to recognize the attributes that do not fit. Students create complex designs composed of rhombus pattern blocks, for instance that are analyzed and documented in drawing and writing. Students note their inner speech commentary in journals that are evaluated with a partner: "OK, I now have two kinds of bilateral symmetry...hmmm...it's a design but is it a pattern?" "Now, if I put this here, I'll have a design...I like the way it looks...So, it's got an alternating pattern moving around...Oh yeah, that's called rotational symmetry!" "Well, if I move these blocks this way then I've got a flower type shape...Hey, what did you say about this in your journal?" The pair reports back to the whole group and the teacher leads the class in an evaluation of inner speech comments, ultimately using an Inner Speech Cognitive Problem-Solving Assessment Tool.

## **Conclusion**

Metacognitive strategies have increasingly been integrated into diverse pedagogical orientations and become part of the educational lexicon (Perry et al., 2003; Goos & Galbraith, 1996). Art, literacy, and mathematics education currently emphasize process and inquiry. As the studies cited in this paper demonstrate, they are disciplines that are well suited to a metacognitive approach. More teachers, however, need to avail themselves and their students of this important instructional strategy. Learning activities based on inner speech allow students to become more aware of their thought processes in general and their cognitive decision-making in particular. When students are required to explain and justify their thinking predicated on inner speech, they are better able to problem solve, plan, strategize, and evaluate their cognitive behavior. Inner speech develops the mind to think in structured but divergent ways (Moffett, 1985).

The studies cited in this paper also demonstrate that not only do children learn best with individually tailored metacognitive instruction, but also within a community of learners. Vygotsky's learning theory originated within a troika of like-minded researchers (Van Der Veer & Valsiner, 1991), an example of what John-Steiner (1997) called a "thought community." Creative thinkers – mathematicians, scientists, scholars, and artists – tend to form these peer groups to promote the cross-fertilization of ideas to enhance the thinking potential of the group as well as of each participating member. Classrooms need to be designed as "thought communities" in this respect.

Ironically, while most academic intervention focuses on language skills, student inner speech use is rarely identified for training and development by teachers and remains an unexploited resource. In this age of "accountability," it often seems that children are expected to learn metacognitive skills as a byproduct of acquiring content, as opposed to using metacognition to make sense of content. Learning to teach using metacognitive strategies should be at the core of every pre-service teacher education program. Modeling how to tap into one's inner speech should be taught as directly as how to write a lesson plan.

When determining how best to improve student performance, because language is a primary means of constructing meaning and making that meaning known to ourselves, investigating aspects of language like inner speech can help learners to plan, regulate, and solve cognitive problems. Hence, training classroom teachers to model inner speech and engage students in qualitative and evaluative dialogue about their inner speech seems an important instructional technique that can facilitate critical thinking and self-monitoring of student thought processes, outcomes that educators are most interested in developing. A new appreciation of inner speech may help ensure that future classroom 'chatter' is meaningful and even necessary. As Moffett (1985) explained, "Teachers can give no greater gift to their students than to help them expand and master their inner speech" (p.246).

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## References Cited

*Annevirta, Tiina, & Marja Vauras*

2006 Developmental Changes of Metacognitive Skill in Elementary School Children. *Journal of Experimental Education*, 74 (3), 197-225

*Bakhtin, Mikhail M.*

1986 Caryl Emerson & Michael Holquist (Eds.). *Speech Genres and Late Essays*. V.W. McGee (Trans.) Texas: University of Texas Press, 66, 78-79, 92-95

*Bean, John C.*

2001 *Engaging Ideas: The Professor's Guide to Integrating Writing Critical Thinking and Active Learning in the Classroom*. San Francisco: Jossey-Bass, 3-8, 23, 30-31, 19-20, 101-104

*Berk, Laura E. & Steven Landau*

1993 Private Speech of Learning Disabled and Normally Achieving Children in Classroom Academic and Laboratory Contexts. *Child Development*, 64 (2), 571-596

*Burton, Judy*

1980 *Developing Minds: Visual Events*. *School Arts*, (3), 58-64

*Camp, Bonnie W.*

1977 Verbal Mediation in Young Aggressive Boys. *Journal of Abnormal Psychology*, 86, 145-153

*Camp Bonnie W., Gaston E. Blom, Frederick Herbert & William J. van Doornick*

1977 "Think Aloud:" A Program for Developing Self-control in Young Aggressive Boys. *Journal of Abnormal Psychology*, 7, 169-177

*Christensen, Carol A. & Tom J. Cooper*

1992 The Role of Cognitive Strategies in the Transition from Counting to Retrieval of Basic Addition Facts. *British Educational Research Journal*, 18 (1), 37-44

*Copeland, Anne P.*

1979 Types of Private Speech Produced by Hyperactive and Nonhyperactive Boys. *Journal of Abnormal Child Psychology*, 4, 169-177

*Diaz, Rafael M., Cynthia J. Neal & Marina Amaya-Williams*

1990 The Social Origins of Self-regulation. In Moll, Luis (Ed.). *Vygotsky and Education: Instructional Implications and Social Applications of Sociocultural Psychology*. New York: Cambridge University Press, 127-154

*Diehl, Holly L.*

2005 Snapshots of Our Journey to Thoughtful Literacy. *Reading Teacher*, 59 (1), 56-69

*Douma, Irini & Panagiotis Kazakas*

2000 The Effects of Motivational Versus Instructional Self-talk on Improving Motor Performance. *The Sport Psychologist*, 14, 253-272

*Eisner, Elliot W.*

2002 *The Arts and the Creation of Mind*. New Haven: Yale University Press, 178-195

- Eisner, Elliot W., Doug Boughton & Johan Ligtvoet (Eds.).*  
 1996 Evaluating and Assessing the Visual Arts in Education: International Perspectives. New York: Teachers College Press, 293-306
- Englert, Carol S., Taffy E. Raphael, Linda M. Anderson, Helene M. Anthony & Dannelle D. Stevens*  
 1991 Making Strategies and Self-talk Visible: Writing Instruction in Regular and Special Education Classrooms. *American Educational Research Journal*, 28 (2), 337-372
- Feldhausen, John F. & Ban E. Goh*  
 1995 Assessing and Accessing Creativity: An Integrative Review of Theory, Research, and Development. *Creativity Research Journal*, 8 (3), 231-247
- Flavell, John H., Frances L. Green, Eleanor R. Flavell & James B. Grossman*  
 1997 The Development of Children's Knowledge of Inner Speech. *Child Development*, 68 (1), 39-47
- Gardner, Howard*  
 1999 *Intelligence Reframed: Multiple Intelligences for the Twenty-first Century*. New York: Basic Books, 135-182
- Goos, Merrilyn & Peter Galbraith*  
 1996 Do It This Way! Metacognitive Strategies in Collaborative Mathematical Problem Solving. *Educational Studies in Mathematics*, 30 (3), 229-260
- Harper, Laura*  
 1997 The Writer's Toolbox: Five Tools for Active Revision Instruction. *Language Arts*, 74, 193-200
- Highlen, Pamela S. & Bonnie B. Bennett*  
 1983 Elite Divers and Wrestlers: A Comparison Between Open- and Closed-skill Athletes. *Journal of Sport Psychology*, 5, 390-409
- John-Steiner, Vera*  
 1992 Private Speech Among Adults. In Diaz, Rafael M., & Laura Berk, (Eds.) Special Issue. Private Speech: From Social Interaction to Self-regulation. New Jersey: Erlbaum, 285-296
- John-Steiner, Vera*  
 1997 *Notebooks of the Mind: Explorations of Thinking*. (Rev. Ed.). New York: Oxford University Press, 52-58, 87, 117-119, 139, 149, 176-179, 207-209
- Kashima, Yoshihisa, Margaret Foddy & Michael H. Platow (Eds.).*  
 2002 *Self-identity, Personal, Social and Symbolic*. New Jersey, Erlbaum, 126
- Koroschik, Judith S.*  
 1982 The Effects of Prior Knowledge, Presentation Time, and Task Demands on Visual Art Processing. *Studies in Art Education*, 23 (3), 13-22
- Koroschik, Judith S. & Lynn M. Blinn*  
 1983 The Effects of Verbalization on Visual Art Processing and Retention. *Studies in Art Education*, 25 (1), 23-31
- Kozulin, Alex*  
 1998 *Psychological Tools: A Sociocultural Approach to Education*. Cambridge: Harvard

University Press, 80-99

*Kramarski, Bracha & Zemira R. Mevarech*

2003 Enhancing Mathematical Reasoning in the Classroom: The Effects of Cooperative Learning and Metacognitive Training. *American Educational Research Journal*, 40 (1), 281-310

*Lee, Carol D. & Peter Smagorinsky (Eds.).*

2000 *Vygotskian Perspectives on Literacy Research: Constructing Meaning Through Collaborative Inquiry*. Cambridge: Cambridge University Press, 6-13

*McAlpine, Lynn, Cynthia Weston, Jacinthe Beauchamp, Lynn Wiseman & Carol Beauchamp*

1999 Building a Metacognitive Model of Reflection. *Higher Education*, 37 (2), 105-131

*McCafferty, Steven G.*

1994 Adult Second Language Learners' Use of Private Speech: A Review of Studies. *Modern Language Journal*, 78 (4), 421-436

*Meandor, Alice E. & Thomas H. Ollendick*

1984, Fall. Cognitive Behavior Therapy With Children: An Evaluation of its Efficacy and Clinical Utility. *Child and Family Behavior Therapy*, 6 (3), 25-44

*Meichenbaum, Donald & Joseph Goodman*

1971 Training Impulsive Children to Talk to Themselves: A Means of Developing Self-control. *Journal of Abnormal Psychology*, 77, 115-126

*Moffett, James*

1985) Liberating Inner Speech. *College Composition and Communication*, 36 (3), 304-308

*Montague, Marjorie & Brooks Applegate*

1993 Middle School Students' Mathematical Problem Solving: An Analysis of Think-aloud Protocols. *Learning Disability Quarterly*, 16 (1), 19-32

*Perry, Nancy E., Carla J. Nordby & Karen O. Vanderkamp*

2003 Promoting Self-regulated Reading and Writing at Home and School. *The Elementary School Journal*, 103 (4), 317-338

*Piaget, Jean*

1974 *The Language and Thought of the Child*. New York: Meridian, 93-139

*Riley, Nigel R. & Mauri Ahlberg*

2004 Investigating the Use of ICT-based Concept Mapping Techniques on Creativity in Literacy Tasks. *Journal of Computer Assisted Learning*, 20 (4), 244-256

*Rohrkemper, Mary M.*

1986 The Functions of Inner Speech in Elementary School Students' Problem-solving Behavior. *American Educational Research Journal*, 23 (2), 303-313

*Rohrkemper, Mary M. & Barbara L. Bershon*

1984 Elementary School Students' Reports of the Causes and Effects of Problem Difficulty in Mathematics. *The Elementary School Journal*, 85 (1), 127-147

*Schoenfeld, Alan H.*

1987a *Cognitive Science and Mathematics Education*. Chapter in Schoenfeld, Alan H. (Ed.). *Cognitive science and mathematics education*, New Jersey: Erlbaum, 1-31

*Schoenfeld, Alan H.*

1987b What's All the Fuss about Metacognition? Chapter in Schoenfeld, Alan H. (Ed.).  
Cognitive science and mathematics education, New Jersey: Erlbaum, 189-215

*Schoenfeld, Alan, H.*

1989 Explorations of Students' Mathematical Beliefs and Behavior. *Journal for Research in Mathematics Education*, 20 (4), 338-355

*Steele, Diana*

2005 Using Writing to Access Students' Schemata Knowledge for Algebraic Thinking. *School Science & Mathematics*, 105 (3), 142-154

*Tharp, Roland G. & Ronald Gallimore*

1988 *Rousing Minds to Life: Schooling in Social Context*. New York: Cambridge University Press, 28-32, 42-45

*Van Der Veer, Rene & Jaan Valsiner*

1991 *Understanding Vygotsky: A Quest for Synthesis*. Cambridge: Blackwell, 187-241, 289-292

*Vygotsky, Lev S.*

1978 In Cole, Michael, Vera John-Steiner, Sylvia Scribner & Ellen Souberman, (Eds.).  
*Mind in Society, The Development of Higher Psychological Processes*. Cambridge:  
Harvard University Press, 25-30, 45-46, 55-57, 79, 84-91

*Vygotsky, Lev S.*

1986 *Thought and Language*. Cambridge: The M.I.T. Press, 33-36, 86-89, 94-95, 249-250

*Wylie, Judith & Carol McGuinness*

2004 The Interactive Effects of Prior Knowledge and Text Structure on Memory for Cognitive Psychology Texts. *The British Journal of Educational Psychology*, 74 (4), 497-514

*Zakin, Andrea*

2005 *A Vygotskian Approach to Art Education: Cognitive Functioning in the Artistic Process*.  
Doctoral Dissertation, New York University. *Dissertation Abstracts International*, 0-542-  
02001-7, 194-202