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# The Impact of Metacognitive Learning of Reading on Students' Cross Curricular Success

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RUNNING HEAD: The Impact of Metacognitive Learning of Reading on Students' Cross Curricular Success

The Impact of Metacognitive Learning of Reading on Students' Cross Curricular Success

By: Katherine Bretsch

A thesis submitted to the Department of Education and Human Development of The College at Brockport, State University of New York, in partial fulfillment of the requirements for the degree of Masters of Science, Literacy Education B-12.

May 6, 2017

# The Impact of Metacognitive Learning of Reading on Students' Cross Curricular Success

## Abstract

This paper explores the impact of metacognitive learning on students' abilities to apply literacy skills across the curriculum. The research questions led to findings more complex than the idea of metacognition affecting student learning. Moreover, the literature review explores the 'how' while the findings explore the 'why'. Through triangulation and constant comparison of three data sources, I deduced three findings, including; the development of metacognition, the most observable transfer of skills to non-literacy based subjects, and metacognition as it related to classroom management. This qualitative research study digests how routine metacognition supports students in transferring skills specifically related to reading.

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## Introduction

I have the pleasure of working with classrooms full of students every week, and every week, as I follow the detailed plans left for me, I notice something about what I teach. As I transition into a new subject, the students ask me questions about how to do an activity or to explain something, something they had previously practiced in another subject. In math for example, students read a problem and get stuck on a word. Instead of using the skills they learned to identify a word in reading group, they ask an adult instead. Why? Is it a problem of the teacher? Of the students? Students in the United States go to school and learn valuable skills that are designed to support them as they progress in education, take on the 'real world', and get a job.

When I started a long-term substitute job as a 3<sup>rd</sup> grade special education teacher in a large, co-taught classroom, this problem of skills in isolation became even more apparent. A common comment about the United States educational system today is that students learn in isolation and through memorization (Karably & Zabucky, 2009). For many students, they learn skills and gain knowledge in each subject or discipline in isolation (Pacello, 2014). What if educators taught skills in one subject and encouraged students to use the skills across the curriculum? Would students then realize they can use the skills from reading group and apply them as they read a math problem? Do they know it is okay to do that?

The goal of attending school, the goal of my teaching is to make students self-sufficient, to give them the skills and critical thinking abilities to be able to teach themselves. If they do not know something, they will know what they can do to figure it out. If they do not understand something, it is still my job to help them understand, as long as they understand that learning takes work. My goal was to learn more about how metacognitive learning affects students'

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success because it is something I want to be able to use as a guide to my own teaching practices and instruction.

Metacognitive learning is supportive of transition; of the transfer of knowledge across all learning as opposed to learning in isolation. Metacognition is a key element to successful and authentic learning because, “it enables individuals to better manage their cognitive skills and to determine weaknesses that can be corrected by construction new cognitive skills” (Schraw & Dennison, 1994, para. 1). Metacognition is knowing when to use a skill or knowledge so when a student is learning in a subject or outside of the classroom, they can know they can call on information they already know to help support their learning in whatever they are doing. With the high educational standards having an emphasis in literacy, the impact of metacognitive learning of reading on cross curricular success will be my focus. Considering that 50% of adults in the US cannot read a book at or above the 8<sup>th</sup> grade reading level (National Institute for Literacy, 2016), literacy, and specifically reading, is a problem that needs to be addressed.

### ***Purpose & Rationale***

Students should know the purpose of all of their learning so they can continuously work toward reaching or understanding goals. For this reason, objectives or personal learning goals are visible around classrooms, often being posted or stated as reminders to students. When students know their objective, it becomes more attainable (Covington, 2000). Knowing the goal is a practice of metacognitive learning. The goal of teaching is to teach students to use metacognitive practices so that they can help themselves be successful and take ownership of their learning. This study explores how metacognitive practices influences student learning and ability to transfer skills across multiple disciplines, while also thinking critically. “When people think

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critically, they are evaluating the outcomes of their thought processes” (Halpern, 1998, p. 451) which is an action practiced through metacognitive learning.

With that said, the question guiding my research is how might students' metacognitive reflection of their literacy learning in reading support students in using literacy strategies and skills across multiple subjects? From there I constructed sub-questions to further my research. The sub-questions include: How might students demonstrate the use of reading skills and strategies in other curricular areas? Are students aware of their metacognitive thinking and practices? And, are literacy skills evident in standards for other subject areas? The purpose of this research topic is to explore how students are using reading related skills they internalize through metacognitive reflection in non-literacy based subjects. In short, how students might be using metacognitive skills to support the use of literacy skills in non-literacy based subjects. Through this research project and using my guiding research questions, I hope to better understand how using metacognitive practices might support students' abilities to transfer skills, which would support their learning as a whole. Metacognitive practices include describing what is known and unknown, reflecting on learning and the purpose for what they are doing, examine the processes or strategies used, and evaluating themselves and their learning (Eker, 2014).

### **Literature Review**

#### ***Introduction***

For many, metacognition is described as thinking about your thinking, but it is much more than that. It is a strategic way of thinking that leads towards greater academic success (Callan, Marchant, Holmes Finch, & German, 2016). Nuhfer & Wirth (2014) describe it as an, “internal conversation that reflects on one's ongoing thought process while performing a task” (para. 3). We know that, “learning and metacognition are related” (Paris & Jacobs, 1984, p.



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2092) but when students learn to use metacognitive skills as they control their own learning, they are more able to make connections between subjects and learning as opposed to learning in isolation. Metacognition directly relates to cognitive abilities and skills. Students become the boss of their own brain and of their own thinking. Since metacognition requires an awareness and control over knowledge, it is also over knowledge construction, or cognition (Michalsky, Mevarech, & Haibi, 2009).

This literature review will explore and describe relevant theories that support metacognition and the applied skill used with reading. It will also take into consideration the previously published literature surrounding the topic of metacognition, transfer, assessment of metacognition, strategies for use, and possible implementation in the classroom. Also included is a focus on reading skills and how they might be supported based on metacognitive strategies to support learning and application of reading skills transferred across multiple subjects. This includes those that are not literacy based. The analysis of New York State Standards displays how reading related skills, or reading itself, has use across the curriculum.

### ***Theoretical Framework & Historical Background***

Metacognition is a, “long-lasting developmental process” (Eker, 2014, p. 270) and is defined by Swanson (1990) as, “the knowledge and control one has over one’s thinking and learning” (p. 306). Since students often compartmentalize their skills and learning for use in isolation, students are not using metacognitive practices that would better support their learning across the curriculum. Student learning and transfer of skills or knowledge across the curriculum is attainable by regulating their own learning and transference of information or skills (Pacello, 2014). In general, other ways metacognitive thinking might be referred to are; self-awareness, reflective thinking, consciousness, and even problem solving skills.

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For metacognitive thinking and learning to be successful, teachers need to practice gradual release, which dictates that students practice the skill with a more knowledgeable other and move towards being able to practice the skill independently. The support of students' ability to think reflectively is supported by Nuhfer and Wirth (2014) when they explain that, "students need explicit guidance in what they need to be thinking about in the process of thinking about thinking before they can construct informed conversations with the self" (para. 5). Other factors like gender and socioeconomic status (SES) were studied in how they relate to a student's ability to use metacognitive strategies. Callan et al. (2016) found that gender did not play a significant role in students' abilities to use metacognitive strategies but SES did. In fact, students in higher SES were reported to use metacognitive skills and strategies more often and more successfully than those in low SES.

In Gee's theory of Discourse, a skill, an expression, a way of thinking, or value that becomes socially identifiable, shapes environments as well as prompts individuality (Pacello, 2014). Discourse, in relation to a learning environment, supports metacognitive practices so long as the practices have become an integrated part of the learning process. Any classroom must be conducive of this style of learning for it to be effective, and ultimately, that relies on teachers to create that environment. Discourse applies to metacognition by the fact that metacognitive thinking and learning needs to be a classroom norm so that it can be taught, practiced, applied, and used independently by students to support their success. This type of thinking and learning does not always come naturally so it needs to become a natural part of students' individual practices as well as acceptable by peers in the class.

As students gradually use, practice, and apply their metacognitive strategies, it becomes a more natural part of their thinking. According to Discourse theory (Pacello, 2014), this type of

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environment also supports students to become independent thinkers. Independent thinking is the key role of students' metacognitive thinking. To elaborate, if a student is not supported to become an independent thinker, often attained through gradual release, then the student is not practicing independent thought. If a student does not have independent thoughts, then they are not able to reflect on their own thoughts. You cannot reflect on thoughts, if they are absent. Since metacognition requires reflection of autonomous thought, then metacognition, in a way, requires Discourse.

### *Metacognition Looks Like, Sounds Like, and Feels Like...*

Assessing or even identifying when students are using metacognitive practices can be difficult when students are thinking or reflecting only mentally. Evidence of students using metacognitive strategies is observable, so long as students supportively understand how to implement them. According to Halpern (1998), students practicing or learning with metacognition looks like:

(a) willingness to engage in and persist at a complex task, (b) habitual use of plans and the suppression of impulsive activity, (c) flexibility or open-mindedness, (d) willingness to abandon nonproductive strategies in an attempt to self-correct, and (e) an awareness of the social realities that need to be overcome (such as the need to seek consensus or compromise) so that thoughts can become actions. (p. 452)

Although for many students, they show their willingness, habitual routines, and/or awareness in varying degrees. These are better identifiable by a teacher as teachers know their students personally, and know when actions or thinking are changing. Students knowing when they need to call on their metacognitive skills, means they have reached proficiency with their own metacognitive practices. It becomes an innate action and ability. When students combine that with critical thinking skills, "students learn to actively focus on the structure of problems or

arguments so the underlying characteristics become salient, instead of the domain-specific surface characteristics” (Halpern, 1998, p. 453).

As teachers search for students using reflective thinking, which might include students thinking aloud using words that exemplify their reflection, teachers gather information about the level of thinking their students are undertaking. Especially in the early learning stages of incorporating metacognitive learning, students might vocalize what they are thinking. Metacognition sounds like students reflecting. Metacognition, when used accurately, feels like less confusion as metacognitive learning supports academic success. With success comes understanding and the elimination of confusion, but an ability to always be wondering.

### *Metacognitive Strategies and Transference*

There are numerous ways to practice metacognitive thinking and learning in a learning environment but the key is to remember that, “engaging in metacognitive reflection involves taking a pause during a learning task to address, what am I really doing here?” (Nuhfer & Wirth, 2014, para. 4). Reflective learning journals are one popular way to support the development of metacognitive reflection (Nuhfer & Wirth, 2014) because they require students to take physical action, writing, until they can reflect without this step. For students who write in a learning journal, they might write from many angles so long as they are writing what they are thinking. A student might think or wonder about what I know and what I don't know, make a plan and self-monitor, examining their thinking process, or self-evaluate (Eker, 2014).

According to Pacello (2014), “common strategies [of metacognition in reading] include generating questions, monitoring comprehension, summarizing, rereading when comprehension breaks down, thinking about prior knowledge, establishing a purpose for learning, making predictions, and self-questioning” (p. 124). These skills for transfer are skills that involve a pause

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for thinking which supports the effectiveness of metacognitive practices. However, unless course work and proper practicing of metacognitive thinking have been put in place, transference of skills across the curriculum would be rare (Pacello, 2014).

When students ask questions, whether it is about their learning, thinking, or the task at hand, they are showing that they are thinking. According to the TEAL Center (2016), effective instructors of metacognition are constantly engaging learners in questions and asking them questions. A teacher can demonstrate the kinds of questions that students can ask, but ultimately, the goal is to have students ask questions that are genuine so that students become more self-sufficient (Karably & Zabucky, 2009). For example, a question that has a response of yes or no, is not necessarily a 'bad' question. If a student asks him or herself, 'am I meeting my goal by doing this?', it is ok if they initially respond with a yes or no as long as they move towards thinking about what actions they are taking that generated the answer they gave themselves. When students ask themselves how or why questions, they are thinking more deeply and require of themselves to answer with details, more thought, and with support of their own thoughts. (King, 1995).

Regardless of which subject is the focus, having a purpose for what you are doing supports learning. A purpose could come in the form of an objective, goal, standard, or even a personal goal. When students are given that explicit goal or instruction, they are more likely to stay focused and use their own reflection to call on strategies that help them (Karably & Zabucky, 2009). As I have commonly seen throughout classrooms today, are goals posted visually in the form of 'I can' statements, Common Core State Standards, and learning objectives or targets.

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Other common strategies that are thought to support metacognitive thinking are text highlighting, mapping, and visualizing. However, these strategies lean towards cognitive skills rather than metacognitive (Leopold & Leuther, 2015). Highlighting for example, supports processing and identifying but revolves around individual concepts rather than how they can be used in other areas (Leopold & Leuther, 2015). Mapping helps students organize their thoughts but does not help them apply their thoughts or skills to other areas, though the mapping strategy is useful and might be a step in a student's ability to think reflectively (Leopold & Leuther, 2015). Visualizing supports students as they think deeper about a text and but is content based (Leopold & Leuther, 2015). When a strategy, even one that proves useful for students, is content and information based, it doesn't support the transference of skills. In terms of comprehension, the strategies have a positive outcome (Leopold & Leuther, 2015) but do not directly support learning through metacognition or self-regulation. Content based and cognitive strategies are related to metacognitive learning and thinking when they are used a stepping stone to help lay the thought process that are needed to move towards deeper level thinking.

The strategies and skills that support metacognitive thinking are vital for some children to be able to create those thinking pathways. Once a student thinks reflectively, it supports their ability to transfer skills or knowledge to other academic areas moving away from knowledge in isolation (Ertmer & Ertmer, 1998). Ertmer and Ertmer (1998) describe students' ability to gain metacognitive thinking skills as an ongoing process that has different rates of success for each person. In order to have transfer or carryover, students need to be able to self-monitor, which is part of metacognitive thinking. Ertmer and Ertmer (1998) concluded that, "self-monitoring is an important skill for carryover" (p. 73). Critical thinking, which supports metacognitive practices, also promotes trans-contextual learning and thinking (Halpern, 1998). Metacognitive knowledge

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includes cognition and vice versa (Karably & Zabucky, 2009). Cognition, like metacognition, supports strategy transfer when guided instruction is used, another reason for gradual release (Karably & Zabucky, 2009).

### *Assessment of Metacognition*

Children can be assessed on their metacognitive abilities in three categories, “planning, monitoring, and regulation” (Eker, 2014, p. 270). When these three categories are used, and applied, it supports learners as they control their cognitive processing (Leopold & Leuther, 2015). When Swanson (1990) studied students' metacognition, the conducted assessment used a problem-solving approach and determined that students already had some intuitions about problem solving through games and social learning. Swanson (1990) determined that individuals with high problem solving abilities performed better academically and had higher metacognitive skills than those with lower problem solving abilities. Another, more current assessment tool of metacognition of students is a Metacognitive Awareness Inventory (MAI) (Appendix A). A MAI is a true or false self-assessment composed of 52 questions (Schraw & Dennison, 1994). Schraw and Dennison (1994) developed a scoring guide which landed each question in a category of metacognition. The categories include; declarative knowledge, procedural knowledge, conditional knowledge, planning, information management strategies, comprehension monitoring, debugging strategies, and evaluation (Schraw & Dennison, 1994). Based on the information gleaned from the scoring guide, the level of metacognitive awareness an individual attained could be determined.

The Metacognitive Questionnaire and the MAI have pros and cons depending on your use of them, and what you intend to do with the information collected from them. The accuracy

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of any test can be altered when consideration for human error, testing situation, and understanding are taken in consideration. Triangulation is important for this reason.

### ***Reading and Other Subjects***

Reading opens doors to the future and “learning to read is a sign of literacy and a gateway to education” (Paris & Jacobs, 1984, p. 2083). Skilled readers, or high level readers, often partake in learning tasks that require, “planful thinking, flexible strategies, and periodic self-monitoring” (Paris & Jacobs, 1984, p. 2083) which is engrained through their thought processes; much like metacognitive learning. Eker (2014) dictates the importance of reading by saying:

reading is an active process which increases the capacity of human knowledge, gives form to their thoughts and beliefs, brings them in personally. This process is an intellectual activity in which individual's biological, psychological, and physiological characteristics work in an integrity (p. 269).

Several studies conclude that metacognition is supportive of comprehension skills. What makes metacognitive skills effective is when they are implemented with practice, and when they require that students organize their reading process so that students notice the efficiency of organization, make plans, set related targets, and manage their reading and learning (Eker, 2014). These things help student becomes better readers and help them to think using metacognition. Metacognitive thinking supports students' awareness of reading comprehension (Mokhtari & Reichard, 2002) and metacognitive strategies in instruction are also supportive (Ertmer & Ertmern, 1998).

### ***State Standards***

Reading is part of everything we do, and the need for reading is embedded within our standards. According to the *Framework for K-12 Science Education*, (Next Generation Science Standards, 2011) there are goals that parallel those found in the *Common Core State Standards* for Language Arts (Metz, 2012). Meaning, science standards require the use of literacy skills and



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complement the standards required within language arts. According to Metz (2012), the *Framework for K-12 Science Education*, requires students to read, interpret, and produce texts as fundamental practices of science. Across the Common Core State Standards, English language arts and specifically reading skills are required of students in non-literacy based fields. For example, in grade 4 mathematics standards, students are required to, "...describe, analyze, compare, and classify two-dimensional shapes" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). According to standard, CCSS.MATH.CONTENT.1.OA.A.1, students are required to, "use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem" (National Governors Association Center for Best Practices & Council of Chief State School Officers, 2010). For both standards, students need to call on their literacy skills in order to meet the demands of the non-literacy set standards. For students to be able to *solve word problems*, they need to have reading skills, and to read, their metacognitive thinking would allow them to apply known reading strategies to this area in mathematics. If students are expected to use literacy skills to meet standards outside of literacy based curriculum, then it is imperative that students know to use their literacy skills across all subjects.

### ***Summary and Findings***

In general, metacognitive awareness increases with age and is dependent on an individual's own learning abilities (Paris & Jacobs, 1984, and Eker, 2014). Eker (2014) concluded that, "metacognitive strategies are effective and useful in increasing students' academic achievement" (Eker, 2014, p. 276). A child's executive function also contributes to

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their use of metacognitive skills which contributes to their academic success (Bryce, Whitebread, & Szucs, 2015). As students develop their awareness and abilities to reflect on their learning and thinking, it supports the ability to make connections between subjects, as well as between school and personal life (Pacello, 2014). This skill is something that will turn into a permanent way of thinking, a way of being, and will support the individual as they move throughout their life.

### **Methodology**

This research project is a qualitative study exploring how using metacognitive strategies while reading impacts student learning across the curriculum. The theoretical idea behind this research is that students will internalize the skills and knowledge gained through metacognitive practice and the practice of transfer will allow the skills to be used in other areas of academia (Swanson, 1990). Since, “students often compartmentalize their developmental courses, thinking about them in isolation from their other courses and from their overall learning and development” (Pacello, 2014, p. 120), we know that it is a goal to move away from this type of learning through metacognitive practices. Metacognition is described as thinking about your thinking or “the knowledge and control one has over one’s thinking and learning” (Swanson, 1990, p. 306). Some examples of metacognitive practice include: reflecting on how you are learning and if you are reaching your goals, using problem solving strategies before relying on someone else’s thinking, setting goals, critically interpret and plan before starting a task, focus on meaning and purpose, reflecting after learning to improve for next time, evaluate the effectiveness of information, and acknowledge what you do not know so that you can find a way to learn (Schraw & Dennison, 1994).

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### *Participants and Setting*

This project takes place in a 3-5 building in a rural area with approximately 150 students per grade level. The school district encompasses two neighboring and comparable towns in the same county. Approximately 90% of the student population in the intermediate school are white with 4% Hispanic, 3% Multiracial, and less than 1% are African American, Asian, and American Indian. It is evenly split for gender at 51% male and 49% female. There are 36% of students that are classified as economically disadvantaged.

Of this population, one 3<sup>rd</sup> grade classroom was selected with approximately 30 students, 3 teachers, and 1 aide. Another group of participants in this study are 3<sup>rd</sup> and 4<sup>th</sup> grade teachers, who are required to respond to an electronic survey about metacognitive practices in their classroom, and its impacts on student learning. The 3<sup>rd</sup> grade classroom was chosen because of the metacognitive practices that are already implemented in their classroom and used to support student learning. The students in this intermediate building at this point are well adjusted to the school routines, procedures, and rules. The 3<sup>rd</sup> grade students in the selected classroom have become familiar with the teachers and the other students in the class. The environment is important to this study and was a key factor in deciding on the school building and the classroom. The fact that a course must be designed to foster learning and transfer of skills is important to note because without planned design, transfer is rare (Pacello, 2014). During my time in the classroom, I will look for evidence of students using reading skills in other academic areas. Hence, I will be looking for their metacognitive practices or skills to promote transfer.

The participants of the electronic survey are adult participants in the same building where I work. There are approximately 20 adult participants, who are 3<sup>rd</sup> and 4<sup>th</sup> grade teachers in the intermediate building. Included in this population are males and females ranging from 30 to 55

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years old. Some of the educators in this group are general educators and some are special educators. All of the teachers in the building are encouraged to use International Baccalaureate (IB) learning traits. The character traits included in this program develop the learner profile which includes fundamental characteristics of students, such as; communicators, inquirers, caring, risk-takers, reflective, balanced, open-minded, knowable, thinkers, and principled.

The two teachers who are interviewed in person are my co-teachers, who are separate from the electronic teacher survey and interviewed individually. They are both female, Caucasian, general education teachers, and have been teaching together for more than 5 years. Their teaching practices include metacognitive reflection to support learning, using whole brain learning, effective implementation of social thinking and learning, and gradual release while teaching that includes steps like, whole group instruction, guided practice, and finalized with independent practice. These two teachers work well as a team, share ideas, plan together, and consult instructional coaches to ensure that academics and behaviors are being appropriately addressed based on current research and teacher practices.

The student participants are all in 3<sup>rd</sup> grade and are between the ages of 8 and 9 years old. There are approximately 30 students and are all members of one class, where I am the special education teacher. All of the students are either Caucasian or Hispanic. None of the students in this population are African American, Asian, or other. The class is about evenly split in males and females but varies in socioeconomic status. There are students ranging from poor to wealthy, and many in between. 15.5% of the students in the class qualify for free or reduced lunch. Academically, there are students ranging from a 2<sup>nd</sup> grade reading level to a 4<sup>th</sup> grade reading level. There are nine students with IEP's (Individualized Education Plan), and three additional students that receive services not related academically.

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The teachers in the classroom work hard to establish relationships with all the students. One way in which this is attempted is by student writing journals, called steno's. Every week, each student writes a letter to the classroom teachers about a topic they choose in a friendly letter format, uses at least 5 complete sentences, and asks at least one question. Teachers, then, respond to the letters with the same expectations. Another way in which relationships are built in the class is through morning meeting; part of the responsive classroom theory. Teachers and students work together to ensure a safe and supportive working and learning environment where the classroom norm includes everyone following a group plan.

Within the selected classroom, teachers use many resources to help support student learning. Some of the programs include, Math Investigations, NYS ELA Modules, Level Literacy Intervention during reading groups, and Spelling Connections books. Each day in this classroom is structured and students are aware of the daily schedule.

The norms of the classroom and of the school building support metacognitive practices as well. Some of the norms of the building culture include: problem solving questions posted on the walls of the school to promote critical thinking skills, reflection as a tool for behavior management and student learning, and encouragement of investigation and independence. Every week the teachers in each grade level are allotted a time to discuss curriculum, assessments, behaviors, and school wide activities that students are encouraged to participate in. The teachers share materials and resources to help others, promote teamwork, and share the common goal of success for all students. Often during this time, teachers share how they are incorporating the learner profile character traits in their classroom, which is often through a social learning lesson and is supportive of metacognitive learning.

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The whole intermediate building has embraced social learning. In my classroom, every week we integrated a 20-minute mini-lesson about social thinking. These lessons usually supported classroom norms, like following a group plan, being responsible with materials, and being kind to others so that it is a safe environment where everyone can learn. These lessons required students to reflect on how they had acted before and how they will act after the lesson. For some, they concluded that they would change an action, for others, they made a plan on how they could improve, and as a class, we made a pack to be openminded as well as helpful in supporting others to reach their goals.

### *Positionality*

Prior the start of this research project, I spent approximately 6 months in the intermediate building as a substitute teacher which provided me with insight on the school, the selected classroom, the teacher practices, and norms. Currently, I am the special education teacher in the 3<sup>rd</sup> grade classroom and work with two other co-teachers and a classroom aide. My background helped shape how I ended up in this role, and how I came to this point in my life.

I attended St. John Fisher College for my undergraduate work and graduated with a Bachelor's in Childhood Education and Special Education. From there I went on to study at The College at Brockport and am working to obtain a Master's degree in Literacy Education B-12. While I was in college, I worked in an Early Learning Center that helped me apply what I was learning in the classroom to my practice. This opportunity, combined with my field experiences, made me eager and prepared to take on student teaching in, at the time, the number one elementary school in Monroe County. What I learned in my 16 week student teaching placement was far more than I had ever anticipated. I learned about classroom management, student accountability, working with other staff members, involving parents, flexibility, and how to

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differentiate to make the curriculum fit the needs of your students. I made many connections through student teaching and was able to secure substitute teaching jobs in many surrounding districts. I was able to work in multiple settings, with other teachers, ranging classroom sizes, and varying socioeconomic backgrounds, which helped me learn what 'works' in classrooms. To be more specific, I was able to observe the vocabulary, teaching practices, and classroom layouts that teachers use with students, which also support my philosophy of education.

My philosophy of education is complex in the simple idea that all students can learn given the correct support and resources. Sometimes that includes giving students more support on a task than others, helping students recognize when they need support, using technology and other devices that reach all kinds of learners, giving students purposeful activities, and lead by example to set students up for success. All of my previous experiences helped me to determine my own philosophy of education, which in turn, I brought with me to my current position as a special education teacher in a populated, co-taught classroom.

Some of the practices I support and the values I have as a teacher are used in the position I am in currently. Working with not just one, but two other experienced teachers, in one classroom has allowed me to create my own voice, so to say, in my teaching practices.

Metacognitive practices in the classroom implement reflective thinking, risk taking, and openness to the ideas of others. Since I joined the classroom, I was able to introduce a few more to students in my reading and spelling groups. Expecting that students reflect was used similarly to an exit ticket during math and social studies, as well as in the realm of behavior management. I was able to bring the metacognitive practices to a deeper level by using the reflection the students were already doing, and having them apply their reflection to other subject areas.

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Another practice that is being used is that have students stop and think before an activity, not just after, so that they can think, “what would make sense here?” as well as, “does that make sense?”.

Throughout my research, my position as the teacher researcher while working in the classroom is as a special education teacher and as an observer. Even though I am a long term special education teacher in the room, I will be an observer of the students. As students work, even while they work with me, I will note the actions, behaviors, and words they using when they are exemplifying metacognitive practices, something similar to what I do as a teacher now. At times, I may engage in instructional conversations with students to help them reflect on their learning or explain their thinking process, again, something similar to what I do as a teacher now. I am also an interviewer via electronic survey for 3<sup>rd</sup> and 4<sup>th</sup> grade teachers, and in-person interview with my co-classroom teachers. These data sources allow me the ability to triangulate accurate data points.

### ***Methods and Procedures***

The interview questions for the two classroom teachers are designed to be fluid so they change with the information learned during the interview (Appendix B). The interviews are audio recorded and later transcribed on an electronic document. The purpose of the created interview questions is to explore how each teacher feels about using metacognitive practices, how they observe it being used by students, how they teach metacognitive thinking and learning, and how they encourage students to use it to help them achieve. Each of my co-teachers are interviewed separately.

The electronic survey for all 3<sup>rd</sup> and 4<sup>th</sup> grade teachers included questions pertaining to the use of metacognitive practices in their classrooms and how teachers feel it impacts their students' learning (Appendix C). The created surveys will be sent through Google Forms, where



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responses will be kept. This electronic survey supports my triangulation of data and accuracy of information as I gather data from multiple sources. The purpose of the online survey is to gather information on how the teachers use metacognitive practices in their classrooms, what evidence they see, if any, of students using metacognitive practices, and how it impacts student learning. No participants will be able to see the responses of other participants.

Student observations are collected approximately 5 times per week for 5 weeks. The observations will not interfere with the regular class time, classwork, or classroom expectations. As I observe students, I will look for their use of reading and metacognitive skills and take note of how they are using skills and/or knowledge related to reading. Observations will be noted in a spiral notebook dedicated to my notes and observations of this project. Detailed information including the time, location, and setting of each observation will also be noted with each period of observation. To gather accurate data, instructional conversations with students take place in the classroom based on what I observe of them. These conversations will require students to reflect aloud on their learning, their thinking process, and if applicable, how they made connections to other learning. To ensure accurate information was collected, a Metacognitive Questionnaire (Appendix D) was used to guide my research observations. The Metacognitive Questionnaire was obtained from Swanson (1990) and is a series of questions that gets at the heart of what students deem smart, their view of intelligence, and problem solving abilities. As I have instructional conversations with students, I know which types of questions allow me the most accurate responses.

The information and data collected for this research project are secure and accurate. All information is kept out of attainability of students or other teachers. Pseudonyms are used for all participants whose information is used in this study. Multiple methods of data collection are used

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as well as documentation of that data. Hand written notes that will be electronically converted, audio recordings of interviews that are also transcribed, and the electronic survey are used to ensure the security of the information. Ultimately, this research will be reviewed and approved by my capstone project advisor. The findings of this qualitative study were derived from a constant comparison (Clark & Creswell, 2015) of the data collection. Triangulation of the data from multiple sources allowed for the accuracy of the findings. The data sources include an electronic survey of 3<sup>rd</sup> and 4<sup>th</sup> grade teachers, interviews with two teachers, and observations of students.

Through constant comparison and anecdotal notes, I identified emerging theme and later created my codes for my major findings. Some of the themes that emerged, were not directly related to the research questions guiding my study. Themes such as, metacognition is developmental and corresponds to the cognitive development of each student, spelling is the most observable practice of metacognitive thinking in its application to other subjects, and lastly, reflective thinking as a management tool supports student's abilities to practice self-reflection.

### **Data Analysis**

The organization of this section is by initial findings of research questions and emerging themes. Then, the major findings are emphasized and explained to highlight the information I gleaned from my research study, as guided by research questions and literature. Through coding and data analysis, it became evident that the emerging themes were not directly addressing the guiding research questions, but were highlighting new concepts. To be clear, my findings address why metacognition affects student learning as opposed to how it affects student learning. The literature review section more clearly iterated how metacognition affects student learning and transfer of literacy skills.

## *Initial Analysis*

The themes emerging through initial analysis of data led me to the following findings:

- 1) Metacognition is developmental and corresponds to the cognitive development of each student
- 2) Spelling is the most observable practice of metacognitive thinking in its application to other subjects
- 3) Reflective thinking as a management tool supports students' abilities to practice self-reflection.

The question guiding my research was how might students' metacognitive reflection of their literacy learning in reading support students in using literacy strategies and skills across multiple subjects? In short, when students were aware of what they were thinking and doing during literacy based instruction, the skills became more applicable because the thoughts entered their conscious mind. During the interviews of my co-teachers, I found that they also believed that skills, once students become accustomed to reflective thinking, are internalized. One teacher described the application of reading skills in other subjects, as difficult to identify because she felt that students were either using the skill automatically or not using it all.

One sub-question that relates to my guiding research question was how might students demonstrate the use of reading skills and strategies in other curricular areas? For this, students showed their use of skills in a variety of ways; most were difficult to identify since as students became comfortable using skills in reading group, they applied the skill independently. Table 1 shows oral statements made by students while being observed during their regular classroom routine.

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Observations of Students		
Student	Setting	Observation
Owen	Completing morning work of a word ladder attempting to figure out the word <i>mule</i>	“Oh, I know! It’s mule. There are donkeys in Minecraft and a donkey is like a mule and it starts with m.”
Emari	Reading an independent level book	“I don’t know what that means and I already tried rereading the section.”
Emari	Reading the lunch menu to make her lunch choice, trying to decode ‘macaroni and cheese’. Prompted with, “what parts of the words can you identify?”	“I can see that is ‘mac’ and then, ‘and cheese’. Oh! Macaroni and cheese!”
Emari	Working on story problems in math. Prompted with, “[Emari], how did you know that word?”	“I knew it was ‘void’ because I knew the ‘v’ sound and the middle part is ‘oi’. So, when you put it together, it’s ‘void’”.
Guy	Asked for the unit of measure to label his math problem. Prompted to go back to the question.	“It’s like finding key details in the text, like we did in Peter Pan.”

Table 1 Clip of data collection of student observations while in the classroom setting.

The above chart shares examples of student observations of the thinking process students verbalized while using reading skills outside of guided reading. Owen made a connection to personal knowledge of his game, Minecraft where he was able to use clues and word knowledge to make the connection that the word he was trying to figure out was, *mule*. In this case, Owen’s learning and practice of skill was based off of his personal experiences. This is an example of Discourse, where learning corresponded to personal experiences and his environment shaped his learning. In all three cases for Emari, she was able to verbalize what her thought process was in decoding a word using strategies that she practices in guided reading, as well as in spelling. Emari used rereading, identifying known parts of words, phonics, and letter sound combinations to read with success. The skills are ones practiced in guided reading using gradual release to ensure that students can use the skills independently. When Emari was decoding the word *void* she had become experienced in the ‘oi’ sound because that was the spelling pattern for the week.

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Although Emari did not reflect on the fact that the 'oi' sound was being studied in spelling, she still reflected on the fact that it was a known letter combination. Lastly, Guy made the connection between math and ELA that an action he took in math was much like an action used during ELA. This practice was known, allowing Guy to make the connection to another subject, as well as to know that he could use the skill of finding text evidence in more than just literacy based subjects.

During the interviews of my co-teachers, both teachers revealed they felt they knew students were using reading skills in other areas when students would 'Turn The Question Around', a method that is used in reading groups to make sure students know what the question is asking and that their writing will be in a complete sentence. When asking teachers in the electronic survey, what evidence do you notice of students using learned reading skills in other subject areas? One teacher response included, "I see students using marginal notes, highlighting important texts, and context clues to find the meaning of unknown words in multiple subjects." Another teacher answered the same question by saying, "they use learned reading skills in science and social studies in vocabulary, main ideas, and details when answering questions, especially short responses."

Another sub-question that relates to my guiding research question was, are students aware of their metacognitive thinking and practices? This question was best answered through the electronic teacher survey when 75% of teachers felt that students were not aware of their metacognitive thinking in relation to reading.

Additionally, another sub-question that relates to my guiding research question was, are literacy skills evident in standards for other subject areas? The importance of this question relates to the fact that if students are expected to use skills across the curriculum, then are they also

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evident in the standards that are set for them? During the time of my data collection, in math, students were expected to read story problems, identify the type of problem it was, and solve. Students needed to use reading skills to be able to solve the math story problem, if students could not read the problem, they would be unable to solve. The unit of study in social studies was types of government. The district standards did not explicitly state that students needed to use literacy skills, but they did require that students use various documents to answer questions about types of government. Some of the documents included, political cartoons, newspapers, diary entries, and videos. Without literacy skills, students would not have been able to read the provided newspapers or diary entries and therefore, would have been unable to answer the questions to prove their understanding of types of government.

As stated previously, according to Halpern (1998), students practicing or learning with metacognition is a:

(a) willingness to engage in and persist at a complex task, (b) habitual use of plans and the suppression of impulsive activity, (c) flexibility or open-mindedness, (d) willingness to abandon nonproductive strategies in an attempt to self-correct, and (e) an awareness of the social realities that need to be overcome (such as the need to seek consensus or compromise) so that thoughts can become actions. (p. 452)

The metacognitive practices and observable behaviors correlated with the findings from my data collection. I noticed that some students had an eagerness to share and participate in class, even when their answers were incorrect. The eagerness and willingness to take a risk shows their reflective thinking and metacognitive abilities. Other students, however, when faced with a challenging task, or a task that they perceive as challenging, shut down before making an attempt. Basing my observations off what metacognition looked like, I deduced three major findings, metacognition is developmental, the application of spelling skills to other subjects is

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most observable, and reflective thinking as a management tool provides support in practicing metacognition.

### ***Finding 1: Metacognition corresponds to cognitive development***

Through this research process, I began noticing that metacognition seemed to present itself differently based on the level of thinking a student was doing. Even though students aren't verbalizing a skill they were using in their head, I knew students are using the skill because it was taught to them, practiced, and I could see a slight pause before the student would continue reading. Now, this is difficult to prove without knowing for certain what the child was doing mentally, but as their teacher, I knew the depth of thinking was there. In a classroom full of 30 students, there is a wide range of abilities and skills, as well as varying levels of cognitive development. Since metacognition does in fact rely on developmental abilities, teachers practice gradual release to support students in developing these skills. Kobayashi and Kataoka (2009) describe this in saying:

not only do children have self-monitoring skills, but the development of skills to control self-monitoring is also, of course, important in the development of metacognitive knowledge in education. Judgments pertaining to the ease or difficulty of learning, judgments on the learning itself, and judgments on how acquired knowledge is related develop gradually from childhood. (p. 40)

This applies to students in my classroom because the varying level of metacognition greatly affected student perception. For some, they can pick out an appropriate level book, for others, they judged the appropriateness of a book on the quantity of the pages. This shows their metacognitive abilities in evaluating their own skills in strengths and weaknesses, as well as their willingness to engage in something new.

When I ask Matthew why he chose a certain book, he responds with an answer that did not reveal an eagerness to read or to take risks. When I ask Ryan, a higher-level reader, why he

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chose a certain book, he would respond with, "because I read the back and it looks cool". The difference in choosing a book highlighted for me the difference not only in student academic abilities, but also in their cognitive and metacognitive development. Ryan read the back of the book, could do so successfully enough to know that book was an appropriate level, and had an interest in reading the book. Matthew judged the book on the length, saw reading as a challenge, and saw unknown words and thought the book would be too difficult for him. The impulsiveness of the decision on which book would be appropriate for the two boys also lend to support that metacognition corresponds to cognitive development. Ryan, did not show impulsivity in his decision, and correspondingly, he is also a higher-level reader. Matthew, who did make an impulsive decision, is a lower-level reader. Students who have more control over their impulses, who stop to think about possible outcomes or perspectives before acting, are students that have higher levels of metacognition. Ryan took the time to read the back of the book, think about the words that he was reading, even unknown words, whereas Matthew did not try to read a page of the book. Instead, he saw a page full of words that he did not know automatically and resulted in his impulsive decision that the book was not appropriate for him.

One way variation in metacognitive skill and cognitive skill was seen through reading groups. Reading groups were determined for this class based on reading comprehension, reading fluency, and reading accuracy. The students that are in the higher-level reading group seemed to also have higher order thinking, like inferring and synthesizing. The students in the lower-level reading group were cognitively equivalent to their metacognitive practices, looking at texts more literally and reading texts that required less analyzing.

Likewise, the students in higher-level reading groups, were using more metacognitive reflection, although the students in lower-level reading groups were more vocal about their



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metacognitive reflection. If we consider the gradual release theory, the students at the lower-level reading groups are more verbal about their thinking because they are still transitioning towards independence, and therefore, relying on some teacher feedback to ensure their accuracy. On the other hand, students in higher-level reading groups have already reached independence with their reading and literacy skills for the grade level, and do not need assurance from the teacher that they are using skills correctly; they already know they are doing it right.

For example, one student in the highest reading group would comment while reading including;

- I wonder...
- I think...
- That reminds me of...
- What if...
- It was important for the author to include [event] because...

These sentence starters are ways children show thinking; their metacognition, and show connection outside of reading. The student making these comments while reading has an above grade level reading score and often is able to solve daily problem solving problems. The student's ability to read, make connections, and reflect, corresponds to their higher order thinking patterns across all subjects. This student is one example of many high readers and high thinkers. During teacher prompted discussions, students in higher-level reading group make connections, organize thoughts on paper, and attend to social conventions of conversation while also being open-minded to others' ideas. Not only did their thinking reveal that these students can do this level of thinking independently, but it also showed their level of thinking corresponded to their high cognitive development. During book conversations in higher level

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reading groups, students take turns speaking, listening and responding to the ideas shared by others, and reflecting on their own thoughts. One student made the comment, "I like that, I didn't think of that before". The students making such comments are reflective, patient, and open-minded.

In lower-level reading groups, student responses were limited to literal responses and discussions. Some of the sentence starters heard during this level of discussion includes;

- The character did that because...
- [character] was [adjectives] because...
- The problem in the story was...
- The solution in the story was...
- My favorite part was...

These students show their understanding but need more direct instruction to reveal their thoughts. More times than not, a student in the lower reading group needed a direct question, shared planning opportunities, and provided singular thoughts that did not often extend beyond the reading; restricting the possible connections to outside materials. Book discussions in this level reading group are responses to teacher prompted questions, as opposed to responding to the ideas shared by peers. In one instance, the teacher wanted to give an informal assessment of students' comprehension of the chapter. The teacher asked one question to the group, in order to receive a response from each student, the teacher had to ask the same question to each student. The ability to reflect on what a peer was sharing, add to it, or respectfully disagree was not portrayed. This exemplified the level of thinking and listening the lower-level readers were capable of at this time, and can be seen in their thought processes across multiple subjects.

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When my co-teachers were interviewed, one revealed that she thought metacognitive thinking was difficult to identify because for so many, “it goes on in their heads”. She went on to elaborate that, “it’s hard to tell when they are using reading skills because they are doing it in their head, but I know they are because they can do it while working independently too.” That is to say, while monitoring students during independent work, they use the skills practiced. When students are engaged in higher level reading, they are simultaneously engaged in higher level thinking, and therefore, higher level metacognition.

One example occurred during a shared reading activity. My co-teacher had a copy of the book that she was reading from and required that students follow along with the reading in their own books. The higher-level readers followed along in their books while the lower-level readers watched the teacher as she read. The lower-level readers had a more difficult time following along in their own books because the book was not an instructional level for them, nor was it read at a pace that allowed them to follow along with words they might have known. Ella, a higher-level reader, would follow along with the teacher, flipping the page even a word or two before the teacher had read them. During discussion points, Ella was eager to offer her response or thoughts, which often included literal interpretations, predictions, and wonderings. Isabelle on the other hand, watched the teacher as she read because reading along in her book posed as a challenge. Isabelle is one of the lowest readers in the class, during discussion points she was not actively engaged in conversation about the book with others. When she was required to, she was only able to provide literal interpretations or retelling of the text. Both Ella and Isabelle understood the reading, however their level of understanding differed because their cognitive and metacognitive development differed. Both girls were engaged in the same level of reading and

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were asked the same questions, but their cognitive reading development were at different levels, which resulted in their varying level of metacognitive behaviors and thoughts during the activity.

Students in higher level reading groups were able to make plans, more willing to read, use skills or abandon a strategy if it was not working in order to try a new one. While compared to lower level reading groups, students required more support to make plan, identify when to use a different strategy if one was not working for them, and often needed more support in reading in general.

According to the TEAL Center (2016), “successful learners have a repertoire of strategies to select from and can transfer them to new settings” (para. 6). The main reason students become high level thinkers is due to the fact that they can call on strategies, try new methods, acknowledge when something is wrong or not working, and identify with their strengths (TEAL Center, 2016). The skills that higher-level thinkers possess are the defining characteristics of metacognitive learning. Since metacognition corresponds to deep thinking and higher order thinking, it is concluded that metacognitive leaning corresponds to cognitive development. As the skills, abilities, and level of thinking develop in students, their ability to use strategies, identify their strengths and weaknesses, plan, and evaluate for themselves develops as well. It was notable in the data collection process that students on the lower end of cognitive development needed more assistance or guidance in their planning, thinking, and evaluating while students at the higher end of cognitive development for this age range were automatically engaging in metacognitive skills with less teacher support; an independent action.

Kuhn (2000) determined that metacognition occurs early on and in foundational ways that build to metacognitive developments of adults. Also, identified by Kuhn (2000) was that explicit instruction or guidance aids in metacognitive development, and as this development

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grows, students' thoughts become more powerful and effective because students become more aware of their thinking. In comparison between high and low level reading groups, students with higher-level thinking, including drawing conclusions, planning, making connections, and reflecting on the text, were also more fully cognitively developed. Comparatively, lower reading groups did not show potential connections to other academic areas or personal knowledge. The students in higher reading groups showed that their thoughts held stronger bonds internally and could be drawn on in other realms of thinking. Students with less cognitive and metacognitive development are not less intelligent than others, but more of their thinking occurred in isolation.

### ***Finding 2: Spelling is the most observable behavior in the practice of applying a skill to other subjects***

Based on my teaching career, I have noticed that students are most able to make observable connections to other learned 'things' when it comes to spelling. Considering the age of the students I observed, they are transitioning from learning to read, to reading to learn. Since reading, writing, and spelling are interrelated (Rapp & Lipka, 2010), students are also transitioning from learning to spell, to using correct spelling. The students in my class use the spelling program, Spelling Connections, and practice in their daily routine for approximately 20 minutes. Throughout my time in data collection and observation, I noticed that students were resourceful in their spelling habits as well as reflective. Table 2 exemplifies some of the ways in which students referred to spelling outside of their spelling lesson.

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Observations of Students		
Student	Setting	Observation
Ryan	Working in small groups on Social Studies: types of government	"Oh, I know how to spell that" *Looked to poster of the presidents to spell the word 'president'
Owen	Reading aloud in reading group	"That's one of our spelling words this week"
Evelyn	Math mini lesson about greater than and less than	"Hey, that's one of our spelling words"
Lizzy	Writing in her journal about made-up language used between her and her sister	"Oh, I know how to spell slinky, so I know how to spell that"
Breanna	Asked how to spell 'subtraction' and prompted to use her math book	"Wait, I can use my agenda, it's in there too"

Table 2 Clip of data collection of student observations while in the classroom setting.

Many of the student examples listed in Table 2 highlight their resourcefulness, which is encouraged in the classroom and during spelling instruction. Ryan and Breanna, for example, both used a resource they had come to identify to support them. Owen and Evelyn both identified a spelling word outside of spelling instruction, which shows that they processed the word during instruction time, and could call on that knowledge later. Lizzy, however, used known spelling words, and therein, the spelling pattern, to spell a previously unknown word.

The verbal comments made by students, highlighted examples of their thinking, whether a connection they made to something already known, or a connection to a resource. The connection, revealing their thinking, is an example of metacognitive thinking because to make the connections they did, first they had to internalize the initial information.

Spelling is based in stages of development (Bear, Invernizzi, Templeton, & Johnston, 2012) and it was to my findings that although spelling in relation to learning, did impact metacognition, the small range of spelling development did not differ in its effect on

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metacognition. Spelling does correlate to word meaning, and ultimately meaning making (Rapp & Lipka, 2010), so it did support some students in their abilities to develop metacognitively. Students had to make connections to words and identify spelling patterns, use resources on their own and drawn from their conscious thought, evaluate their own spelling in their writing, and prepare in order to meet classroom spelling goals. Rapp and Lipka (2010) defined the ability to transfer words to spell to words that have meaning in writing as words taking action. Meaning, the words hold meaning and move away from a perception of what the combination of letters mean. It was not clear why spelling was the most observable skill set, or thinking pattern, to apply to other subjects, but it is notable that spelling, like reading, required students to have a certain level of metacognitive ability. Common Core State Standards ensure that spelling knowledge is “inseparable” from reading and writing standards and instruction (Templeton, n.d.) which is why the connection and integration of the subject is priority. When students spell words correctly, they are demonstrating understanding of phonics and spelling patterns that have been learned and applied. When they are still inventing and misspelling words, they are demonstrating what concepts still need to be practiced, what they have not noticed yet, or what they have not yet learned. The ability for students to use resources and learned skills demonstrates their metacognition, while oppositely, when students are not demonstrating skills, it lends to the belief that metacognition has not yet been mastered and quite possibly, the student(s) needs more guidance that supports their spelling knowledge.

Nikki is proficient in spelling as determined by her graded, weekly spelling tests. She practices her words every week and is able to complete the word study and phonics activities around the words for week. In her writing, Nikki spells grade-level words correctly, even after the words are no longer current. Sean is also a proficient speller, as determined by his graded,

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weekly spelling tests. Like Nikki, Sean studies his spelling words every week and is engaged in word study and phonics activities revolving around the weekly spelling list. The difference, though, is that Sean incorrectly spells current and previously current spelling words in his writing. Regardless of writing abilities, the ability to spell the words correctly that are being spelled correctly during spelling instruction, shows a lack of transference. This problem is defined by the fact that Sean's studying includes memorization of the words as opposed to Nikki's internalization of the words. The metacognitive thinking behind Nikki's proficiency in spelling allows her to understand the words, their meaning, and identify with the words outside of a set instruction time.

### ***Finding 3: Metacognition, as a classroom management tool, supports the practice of students' metacognition***

Reflection as management tool for classrooms usually depends on how the teacher implements it in the classroom, and on the student. Reflective classroom management is a current pedagogical practice and supports the practice of metacognition. Since metacognition is a practice in this classroom, students are accustomed to reflecting. One of the many ways in which teachers require students to reflect is through social learning; how their actions affect others. This is also a management tool, as teachers require that students have some executive functioning.

During my conversational interviews with my co-teachers, it was clear that they had not previously thought of metacognition in relation to behavior because one teacher exclaimed, "I hadn't thought of it that way". The conversation led to the topic of student practice becoming beneficial to their application of knowledge and independent use of skills to transfer across multiple curricular subjects. On this note, one teacher made the remark saying, "well, what we



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practice with them, we hope transfers to all parts of their life. Not to be cliché, but learning is part of life. Everything students do gives them experiences that, hopefully, support their learning". This led the conversation with my co-teacher towards the direction that helped shape my finding. Students, in my classroom at least, are using metacognitive thinking and practices in relation to their behaviors and actions.

Of the 3<sup>rd</sup> and 4<sup>th</sup> grade teacher participants, 100% of the participants of the online survey said they do encourage students to use skills across the curriculum. Of those teachers, all of them listed ways in which they use metacognition in their classroom, and all listed some form of management or behavior tool. Some of the examples included;

- Thumbs up or thumbs down
- Behavior reflection sheet
- 'Take a break' method
- Stop sign for reflection
- Model what the expected behavior should look and sound like

These examples were listed as ways in which teachers use metacognitive practices in their classroom, and all are management practices. The management tools listed above are also supportive of creating a classroom conducive to learning and may include academic reflection as well. Among numerous other ways that teachers use reflection, planning, and evaluating, the above listed items relate specifically to student behavior. The examples listed are also current teaching practices, like modeling behavior and classroom activities. If we set the expectation high for students, and we want them to reach them, then we must give them the tools to be successful. We often do this through gradual release and the first step in this is teacher modeling. So, we need to model and use this thinking, learning, and transference in our classroom. When

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teachers model metacognitive learning, there is greater chance for students to use it as well (Emmer & Stough, 2010). According to Emmer and Stough (2010), whole class instruction and modeling highlight teacher expectations, and it requires that teachers plan and organize classroom activities and behaviors based on the modeled expectation. In general, when students see what they should be doing and how they should be doing it, they will be more successful in meeting the expectation. Going further, when an entire school fosters the same learning style, there are many outcomes associated with positive behaviors (Emmer & Stough, 2010).

During student observation, I noted that some students would plan through a social interaction, by saying, "I'm going to ask [name] to play", while others would reflect on why another student did not want to engage in an activity. These are examples of metacognitive practice through social domains. During recess, Gabby tells a peer, "I'm going to ask Celina if I can play with her doing that ghost game. The worst she'll say is no". Triton on the other hand, often reflects on why a student would not play with him, asking himself, "I wonder why they didn't let me play". The social reflection is a practice in the ability to reflect on academics. Thinking, 'I wonder why they didn't let me play' could transpose academically by thinking, 'I wonder how I got that question wrong'. Whether students recognize this thinking as metacognitive or not, the fact remains that they are engaging in reflective thought, meaningful planning, and analysis of their actions in relation to the effect it has on others. The students in my classroom were required to reflect on their actions as a result of both positive and negative behavior choices. This action became an independent and automatic thought process for some due to the repetition, ultimately, the thought process became instinctive in their conscious mind. As with any development, metacognitive development requires modeling, practice, and support for students to be successful independently.

## Discussion

This section is organized through the expansion of the ideas and themes brought about by the preceding section; Data Analysis. Also included are clarifications of findings and overall conclusions. Generalizations found from my study are included and based on previous literature. I found that metacognition of reading was not necessarily what led students to use reading related skills in other subjects. Instead, reflective thinking, which is part of metacognitive thinking and learning, was a tool that helped students across subjects in their ability to reflect on behaviors, which also directly effects metacognitive learning.

Metacognitive development corresponds similarly to cognitive development. Both processes move toward deeper thinking, but also effect students mentally, emotionally, and psychologically. Students learn to identify with themselves, make choices in their own learning, and persist in activities that might seem challenging. When students are more aware, and therefore more comfortable with their learning, they become more willing to take risks, share their thoughts, and listen to other ideas. This finding is noticeable in guided reading groups. The students who were more aware of their thoughts, performed higher academically because they;

- are more willing to try something new
- listen to a new perspective
- admit when they need to abandon something and start with something new
- maintain accountability for their work
- agree or disagree with opinions with their own thoughts

Since cognition develops with experience and learning (Fountas & Pinnell, 2011), then student's metacognition develops similarly. Students are dynamic as they progress through the school year. The thinking and the ability to think about thinking changes, developing gradually over

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time. Teachers practice gradual release to ensure that students are working towards independence. When students are using skills self-sufficiently, reflecting, and applying what they know, then they can make connections, draw on skills for use in other areas than where they were learned, and ultimately have cross curricular success.

Some educators believe that spelling has no direct impact on students' literacy achievement. In fact, there is some research to suggest this, however, spelling, in relation to spelling programs, proves to be ineffective (Pant, 2016). Teaching spelling in conjunction with work word, writing, and reading, which also provide extra practice, is supportive of student growth. Any subject taught in isolation will have a lower success rate than if taught in conjunction with others (Fountas & Pinnell, 2011). Spelling, in this study, was the most observable way students demonstrated applying one subject to multiple others. Students showed resourcefulness, as practiced in spelling, knowledge of spelling patterns, and reflection of already known information to support the unknown.

Students demonstrated resourcefulness by using posters, books, and other materials in the classroom that could help them in spelling or identifying the unknown. This highlights the fact that students were thinking and reflecting on private information for the application to what was still unknown. Although, as described in finding one, some students were further developed in this ability than others. Likewise, students used their knowledge of spelling patterns, as practiced through daily spelling instruction, to help guide them in reading in areas outside of literacy subjects. The mere fact that students used this knowledge is proof that they have internalized the skill, because they were required to think deeply about what they were learning, and apply it outside of spelling instruction.

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Metacognition, in relation to behavior, is like students' executive functioning, in the sense that metacognition required that students lessen impulsivity and practice self-control. Doing this ensures that students are thinking before acting or speaking. To expand on what students might be thinking about prior to actions could include; reflecting on possible outcomes, how actions affect others in the classroom/community, or which action has the best probability of success. A child's executive function also contributes to the use of metacognitive skills, which contributes to academic success (Bryce, Whitebread, & Szucs, 2015). Many teachers in this study used metacognition in their classroom. Whether teachers realized it or not, many used it as a form of classroom management. Practicing metacognition as a classroom management tool meant that teachers required that students think about their actions, how it affected their learning, and even to think about how their behaviors could affect the classroom. Though there were multiple paths to this type of classroom management, like reflection sheets, modeling, or a designated reflection chair, the metacognitive practice was present. Since the practice was there, and, in any introduction of a classroom management tool, implementation occurs through teacher modeling and gradual release. The more practice a student has with a certain way of thinking or doing, the more likely they are to be successful.

### ***Conclusion 1: Learning occurs in stages***

As educators, we know that writing occurs in stages, reading in stages, spelling in stages, and even social skills develop in stages. It is safe to conclude that metacognition develops in stages as well, because learning in general, progresses through developmental stages. Kuhn (2000) concluded that as students develop and their metacognition enters their consciousness, their thinking becomes more definite, powerful, and effective. This is an important concept for students because it increases the ability to transfer skills, reflect on

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personal learning, evaluate a problem or strategy, and apply learned information to support success and continue growing academically.

Metacognition and metacognitive learning occur in stages. According to Edway (2017), metacognition has five cyclical stages. Since the stages have not been addressed previously, the five progression stages of metacognition include; understanding, identifying strengths and weaknesses, planning, applying, and reflecting or evaluating. Then the cycle continues as the learning continues. This cycle is important to student learning because it deepens understanding of the information, allows students to evaluate the effectiveness of such, and provides students with the ability to decide what will work for them and what they might have to do to better support themselves (Edway, 2017). The fact that learning occurs in stages, supports that students have different levels of metacognitive development, as explained in finding one. All students can learn, if a student is a lower level learner, it does not mean they will be forever, it simply means they have only currently reached a certain point in their learning development (Fountas & Pinnell, 2011).

### ***Conclusion 2: Application & transfer of learning while utilizing metacognition is different for everyone***

For much of the same reasoning that learning occurs in stages, the learning itself is different for everyone. Every individual brings their own experiences and background knowledge to their current learning environment and situation. Gee's theory of Discourse supports this claim because environment shapes learning and learning shapes environment (Pacello, 2014).

Students can transfer skills based on how they internalize them; how they process the information. As students process the information, assimilating it to personal background and

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experiences, it results in the application of information based on where personal associations to either one subject or multiple areas. Comparable to the fact that everyone learns differently, the fact that everyone learns at different rates means that their metacognition will support their learning at different times. It comes down to the experiences a person has and the connections to learning an individual can make. Think about 'ah-ha' moments when reflecting on a lesson, well after the lesson was taught. The point is, time allows people to understand because of the reflection or connection made as the information is processed (Rowe, 1987). This helps comprehension, where it will then call on previous information to apply or use as a connection when it would be supportive of new information. Students can hold accountability of personal success during application and transfer of skills and information, which reflects metacognition.

### ***Conclusion 3: Impulsivity extinguishes thinking***

Metacognition is frequently defined as, 'thinking about your thinking' but it goes beyond that. It's thinking about how you did something, how you could do something, possible outcomes, connections to other experiences, experimenting with your own methods until you find something that works for you, resisting urges or impulsivity, and more. When students are acting on impulse, they are not demonstrating control of one's actions or thinking. When a student calls out an answer in class, they have acted on impulse and, ultimately, taken the thinking away from others. When a child is upset because a peer took their toy, and responds by yanking their toy back or fighting with the other child, they have acted on impulse and did not take the time to plan, evaluate effectiveness, or reflect on how their action could affect the imminent outcome. Impulsivity extinguishes thinking, and impulsivity contradicts metacognitive practices.

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Metacognition includes students' capability to have self-control and to suppress impulses. Reflecting on finding three, metacognition does include student behavior. Actions and attitudes towards learning greatly affect learning (Owocki & Goodman, 2002), which is why metacognition affects learning primarily. It also affects students emotionally, physically, and relationally with other people. Metacognition is a practice that is applicable to daily life. The more metacognition is used, the more in-tune and automatic it becomes. When metacognition is used in educational settings, it supports students in applying skills across the curriculum, making learners that are more successful. A goal for many teachers is to give students the tools to be successful life-long learners, metacognitive learning supports that goal, and can be accomplished through gradual release.

### *Implications*

Metacognition is an important classroom tool, if you will. It supports engagement, willingness to take risks with learning, lessens impulsivity, builds better relationships with others and self, and helps bridge connections to other subjects (Halpern, 1998). When utilizing metacognition in classrooms, and encouraging students to practice it using gradual release, students will better understand lessons, know personal strengths and weaknesses, plan using known information, apply strategies, and continue to reflect to build comprehension (Halpern, 1998). The cycle continues. Using metacognition in conjunction with routine classroom practices builds more rounded learners, communicators, & thinkers. Students will have better relationships with people and themselves, take risks, and have a positive mindset (Nuhfer & Wirth, 2014). All of the above listed traits will help students become successful life-long learners. Students will always possess these skills and thinking pathways, even after school. The value of these skills will carry on with students into future college or career endeavors. Allowing students to reach



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college and career readiness is part of the standards set in NYS Common Core. Educators be warned, metacognitive learning in classrooms takes guided practice and gradual release to be successful. Prior researchers have noted the important of gradual release, but used in conjunction with metacognitive learning for both behavior and academics, will result in productive, successful, resourceful, risk-taking, life-long thinkers.

### ***Limitations***

To take this study one step further, I first need to note what limited my study. First, the fact that I observed in only one classroom, where I was an expert, only allowed me to see the practices of one educational setting. Had I observed others, my findings might have revealed different findings or conclusions. Observing in multiple education settings might also have provided concrete results, stemming from various data points. Similar to this limitation was the fact that I had only one grade level. Different grade levels with different levels of development could have provided more information for finding one and my conclusions.

Another key factor in this study was the limited demographic variation of both the student and teacher participants. Although I had enough student participants, most belonged to middle-class Caucasian families. The teacher participants also belonged mostly to the category of middle-class Caucasian, adding also that approximately half of the invited participants did not choose to participate.

### ***Further Research***

Stemming from the guiding research questions, findings, conclusions, and limitations, there are several research directions I could investigate further. Concerning my data collection process, to address my research question of, 'are students aware of their metacognitive thinking and practices', I would use an additional data collection tool. One idea is to implement a student

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survey or assessment to gauge their feelings of metacognition as well as do they know they are using it, say to complete an activity. Another direction includes examining a wider range of demographics, which was fairly limited for this setting. The further research directions could lead to other possible findings stemming from this study.

Mimi Estrada said, “every day is a learning process. Life is a marathon that needs a lot of perseverance” (Wiesen, 2014). Learning is a process, in every sense of the word. Every part of what we learn is a process, and in that process, develops growth and understanding. Metacognition supports all individuals in their learning process as it deepens understanding, allows learners to better identify with themselves, and lessens impulsivity. Traits of metacognitive learners allows for the application and transfer of learning. Throughout this qualitative research study, these facts have proven advantageous to all learners. Reading is a skill that affects all other areas of learning (Paris & Jacobs, 1984), so combined with metacognitive style of learning, students will form thinking patterns that will transfer to a multitude of other ways of learning. Applying this thinking, as it becomes automatic, ultimately applies to everyday life. Metacognition is more than simply, ‘thinking about thinking’. Metacognition, is knowing yourself, knowing when to use a skill or strategy, being able to admit when something isn’t working in order to try something new (Schraw & Dennison, 1994), and being confident in thoughts so they can drive actions and choices. The time to think, the ability to reflect, and the ability to apply, sanctions life-long learning.

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Appendix A: Metacognitive Awareness Inventory (MAI)

Metacognitive Awareness Inventory (MAI)

Mark each of the statements below True or False as appropriate.

1. I ask myself periodically if I am meeting my goals.
2. I consider several alternatives to a problem before I answer.
3. I try to use strategies that have worked in the past.
4. I pace myself while learning in order to have enough time.
5. I understand my intellectual strengths and weaknesses.
6. I think about what I really need to learn before I begin a task
7. I know how well I did once I finish a test.
8. I set specific goals before I begin a task.
9. I slow down when I encounter important information.
10. I know what kind of information is most important to learn.
11. I ask myself if I have considered all options when solving a problem.
12. I am good at organizing information.
13. I consciously focus my attention on important information.
14. I have a specific purpose for each strategy I use.
15. I learn best when I know something about the topic.
16. I know what the teacher expects me to learn.
17. I am good at remembering information.
18. I use different learning strategies depending on the situation.
19. I ask myself if there was an easier way to do things after I finish a task.
20. I have control over how well I learn.
21. I periodically review to help me understand important relationships.
22. I ask myself questions about the material before I begin.
23. I think of several ways to solve a problem and choose the best one.
24. I summarize what I've learned after I finish.
25. I ask others for help when I don't understand something.
26. I can motivate myself to learn when I need to
27. I am aware of what strategies I use when I study.
28. I find myself analyzing the usefulness of strategies while I study.
29. I use my intellectual strengths to compensate for my weaknesses.
30. I focus on the meaning and significance of new information.
31. I create my own examples to make information more meaningful.

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32. I am a good judge of how well I understand something.
33. I find myself using helpful learning strategies automatically.
34. I find myself pausing regularly to check my comprehension.
35. I know when each strategy I use will be most effective.
36. I ask myself how well I accomplish my goals once I'm finished.
37. I draw pictures or diagrams to help me understand while learning.
38. I ask myself if I have considered all options after I solve a problem.
39. I try to translate new information into my own words.
40. I change strategies when I fail to understand.
41. I use the organizational structure of the text to help me learn.
42. I read instructions carefully before I begin a task.
43. I ask myself if what I'm reading is related to what I already know.
44. I reevaluate my assumptions when I get confused.
45. I organize my time to best accomplish my goals.
46. I learn more when I am interested in the topic.
47. I try to break studying down into smaller steps.
48. I focus on overall meaning rather than specifics.
49. I ask myself questions about how well I am doing while I am learning something new.
50. I ask myself if I learned as much as I could have once I finish a task.
51. I stop and go back over new information that is not clear.
52. I stop and reread when I get confused.

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Schraw, G. & Dennison, R.S. (1994). Assessing metacognitive awareness. *Contemporary Educational Psychology*, 19, 460-475.



Appendix B: Interview with classroom teachers

**Semi-Structured Interview Questions with Co-Taught 3<sup>rd</sup> Grade Classroom Teachers:**

**\*Note:** I will prompt participants to expand/elaborate on their answers to questions.

-How can you tell when a student is using a skill you have been practicing during reading groups?

-How can you tell if they are using those skills in other areas?

-Do you have them practice reflecting on what they are thinking & learning throughout the day?  
If yes, how do you do that?

-Do you think students recognize their use of reading skills in other academic areas? If yes, what evidence do you notice that supports that?

-In what ways do you encourage students to reflect on learning and/or activities that would cross the curriculum?

**Instructional Conversation Questions with 3<sup>rd</sup> grade Students:**

Based on observations I have made, I will ask students questions about their learning, strategies, and thinking process. These types of questions are already used in the classroom as part of routine teaching practices from all three teachers, including myself. Students are accustomed to being asked questions that are geared to enhance and deepen student understanding, such as the ones listed below;

-How did you figure that word out?

-I saw that you did [action], is that something you do throughout the day?

-Can you tell me how you figured that out?

-Could you explain your thinking for doing that?

-What were you thinking when you did [action]?

## Metacognition Survey

The information from this study will be used in a research study about metacognitive practices in the classroom. Specifically, what you notice about your students' thinking and ability to reflect on their own learning. Your personal information will not be shared. The results of this survey will be not be seen by anyone but myself, the researcher.

Thank you!

\* Required

Email address \*

Your email

---

Do you use metacognitive practices in your classroom?

Examples may include: asking students to reflect on their learning, encouraging students to describe what they do and do not understand, keeping student learning journals, or practice of self monitoring

- All the time!
- Half the time
- Sometimes or infrequently
- Never

If you use metacognitive practices in your classroom, please describe what you use and how.

Your answer \_\_\_\_\_

How would you describe the learning style of your classroom from the options listed below?

- Social Learning & Collaboration
- Independent
- Reflective
- Dependent (on teacher)
- Other: \_\_\_\_\_

Metacognition is described as thinking about thinking or being the boss of your own brain. Would you say students in your class are the boss of their own brain?

- Yes
- No
- Other : \_\_\_\_\_

Do you encourage your students to use skills or knowledge from one subject in other subjects or areas of learning?

- Yes
- No

If so, how do you encourage students to use skills learned in one subject, in other areas of learning? Please use details.

Your answer

---

How do you think using metacognitive practice(s) influences your students' learning? Explain.

Your answer

---

What evidence do you notice of students using learned reading skills in other subject areas? Please explain. If none, leave blank.

Your answer

---

**SUBMIT**

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Appendix D: Metacognitive Questionnaire

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Table 1  
*Items of the Metacognitive Questionnaire*

- 
1. What makes someone really smart?
  2. The other day I talked to a person who was really good at solving problems. Then I asked him (or her) if he (or she) was a good reader. What do you think he (or she) said? Why?
  3. Jim was asked to read a detective story and to solve a murder. The book was approximately 1,000 pages long. Tom read a mystery that was 100 pages long. Which boy had the most difficulty finding out who did the murder? Who do you think was more correct in solving the mystery? Why?
  4. A group of individuals was going to solve a problem on a computer. One individual in the group owns a computer at home. Do you think the ability to solve the problem will be easier or harder for someone who does not own a computer? Why?
  5. Jim can play the piano, draw pictures, and figure out math problems better than anyone else in the class. Do you think he's the smartest person in the class? Why?
  6. Sally owed somebody some money. She told the person she owes money to that she was too poor to repay. The other day she bought something to eat for one of her friends. Does Sally have a problem to solve? Why?
  7. Who is smarter, someone who knows the answer to a math problem without having to figure it out or someone taking some time to figure out the problem? Why?
  8. Suppose Jeff had 50 eggs on his head in a sack. One egg is brown and all the others are white. Jeff walks across a log on a river with the sack of eggs on his head. Suddenly while he's in the middle of the log, somebody says, "Show me the brown egg before you can pass." The person says, "I want to see the brown egg immediately." What do you think is Jeff's problem?
  9. How could he solve that problem? Why?
  10. Ann was lost in a forest and she came to a town in which there were two kinds of people, "truthtellers" and "liars." Truthtellers always tell the truth and liars always lie. The first person Ann talks to gives her directions to get home. The second person she talks to gives her different directions. Does Ann have a problem to solve? Why?
  11. How can Ann solve this problem?
  12. Which problem is easier to solve, Jeff's or Ann's? Why?
  13. How do children figure out things, like how to do something?
  14. There was a man (or woman) who put a new heater in his (or her) house so he (or she) could save money on fuel bills. He (or she) found that he (or she) saved money because the fuel bills were cut in half. He (or she) was happy, so he (or she) decided to put another new heater in thinking he (or she) would bring the fuel bill to zero. Do you think the man (or woman) solved the problem? Why?
  15. Who is smarter, Jerry who draws a picture to sell or John who does math problems for a company store? Why?
  16. Is there any reason why adults are smarter than children? Why?
  17. Ryan is 5 years old and knows all about dinosaurs. Ryan's father does not know a lot about dinosaurs. If both Ryan and his father read a book about dinosaurs, who would remember the most? Why?
- 

Swanson, H. L. (1990). Influence of metacognitive knowledge and aptitude on problem solving.

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