JTAR

Journal of Teacher Action Research

Peer-reviewed articles and lesson plans written by teachers and researchers to inform classroom practice.

Production Editor: Chase Young

 www.practicalteacherresearch.com

A SENSE OF POSSIBILITY: CULTIVATING PERSEVERANCE IN AN URBAN MATHEMATICS CLASSROOM

Samantha A. Marshall

Vanderbilt University

Abstract This study explores promotion of perseverance on mathematics tasks in an Algebra II class. Influences of interventions on perseverance are investigated through qualitative action research. Students' beliefs about their own mathematical ability are traced through a pretest, intervention, and posttest over the course of the school year. Observation data, surveys, and students' written comments were analyzed to identify how students' beliefs shape their reactions to challenges in mathematics, as well as how these beliefs might be influenced through mindset interventions. Findings suggest that interventions can influence students' mindsets toward challenge, and may impact tendency to persevere in the face of adversity in mathematics. This study bridges the gap between nascent research and praxis, suggesting that brief interventions hold promise in supporting underserved students toward mathematical tenacity.

Keywords: perseverance, mathematics, grit, non-cognitive, mindsets, action research

Introduction

Students who withdraw from mathematics in secondary years close doors to economic access and career opportunities (Schoenfeld, 2002). Those without quantitative skills face limited access to higher education and higher-paying jobs. Although encouraging persistence into higher mathematics is a clear imperative of schools, the factors contributing to mathematical attrition are complex. In examining the reasons students desist in mathematics, many researchers have concluded that the culprit cannot be intellectual ability alone (Wechsler, 1943; Duckworth & Allred, 2012).

Researchers are increasingly turning to non-cognitive factors, such as perseverance, to explain differences in academic performance (Duckworth, 2006; Duckworth, 2009;

Duckworth, Peterson, Matthews, & Kelly, 2007; Lepper, Ross, & Lau, 1986; Rosen, Glennie, Dalton, Lennon, & Bozick, 2010; Shechtman, DeBarger, Dornsife, Rosier, & Yarnall, 2013). Researchers at the University of Chicago called academic perseverance "a critical factor for students' long-term educational attainment" (Farrington et al., 2012, p. 9). Of course, school performance is a result of myriad factors. However, the ability to persist on problems—in the face of confusion and complexity—is essential for success and advancement in mathematics (Dweck, Walton, & Cohen, 2011).

Literature Review

This tendency to persist may have psychological roots. Carol Dweck's epochal work has demonstrated a clear connection between mindsets that students hold and academic behaviors affecting achievement (Dweck, 1986; Dweck & Leggett, 1988; Dweck et al., 2011; see also Oyserman, Bybee, & Terry, 2006). She proposes two distinct mindsets held by students: fixed-intelligence and malleable-intelligence. Students with a fixed-intelligence mindset "readily pass up valuable learning opportunities if these opportunities might reveal inadequacies or entail errors—and they readily disengage from tasks that pose obstacles," because of fear that struggle on obstacles reveals a limited amount of intelligence (p. 3). Students with a malleable-intelligence mindset, even those with low confidence in their intelligence, tend to stick with difficult tasks, believing that their intellectual abilities can be increased. Additionally, these students tend to attribute poor academic performance to poor showing of effort, rather than to intelligence or ability (Dweck, 2000). In other words, students equipped with the knowledge that ability can grow tend to exhibit effective strategies in the face of challenge; while students who are unaware of this fact may believe success is not possible, and consequently give up. In fact, students often *equate* working hard with inability (Dweck & Leggett, 1988; Bandura, 1986). This has serious detrimental consequences for many students as mathematics increases in complexity.

Wilson and Linville (1985), in a classic study, identified and challenged another important mindset—beliefs that students do not belong. In this study, struggling freshmen were shown videos of interviewed upperclassmen describing their transitions to college, and attributing their poor performance to temporary causes, such as lack of familiarity with college classes. The purpose was to expose students to the idea that struggles were not indicative of a lack of innate ability. The interviewees described that their early poor grades improved over time. One week after the intervention, students in the treatment group outscored students in the control group on practice GRE questions. A year later, students in the treatment group had higher GPAs than the control group (Wilson & Linville, 1985).

No matter how intelligent an individual is, at some point she will encounter a mathematical challenge. Success in mathematics requires more than ability. It requires sustained hard work in the face of frustration. Although the research illuminating best practices to promote perseverance in math is limited, some studies have shown

advances in facilitating productive mindsets through brief interventions (Dweck, 1986; Diamond & Lee, 2011; Blackwell, Trzesniewski, & Dweck, 2007; Yeager & Walton, 2011). The literature suggests that mindsets and beliefs are a crucial factor in how students react to difficult academic tasks.

Methodology

Research Questions. Despite apparent consensus on the impacts of mindsets on perseverance, much remains unknown about whether these mindsets and their related behaviors might be malleable. Farrington and colleagues (2012) highlight that many claims about non-cognitive factors have little or no research literature to inform educational practice. Drawing on the above literature, I designed this study to fill a gap in the present body of research. Researchers have not directly examined methods for cultivating perseverance in a high school mathematics classroom, despite increasing calls for in-classroom practices to foster this attitude. This study aimed to explore three interventions to help students persevere on challenging mathematics problems. This project sought to answer: How do mindset interventions influence secondary mathematics students' behavior on mathematics tasks? How do mindset interventions influence secondary mathematics students' attitudes toward challenging tasks?

Methods. This study took place in a public school in New York City where the previous year only 32% of students attained the Math College Readiness Standard (NYC Department of Education, 2013). The student body is 99.5% Black or Hispanic, and 100% of students qualify for free/reduced lunches. The study focused on one Algebra 2 class of 18 students. As I observed these students over a school year, in field notes I commonly recorded low engagement and a tendency to withdraw effort before tasks were complete. For example, on October 22, at 8:41am I noted, "Cervando has had his head between his hands, staring at his paper since 8:30. He looks very frustrated." (For the purposes of this study, all participants have been given pseudonyms.) Entries such as this led me to choose this class as my case study.

Data Sources. Data came from three sources: (a) a survey, administered both before and after the interventions (Appendix A); (b) a field journal of observation notes; and (c) students' written comments during intervention lessons. Multiple data sources offered "differing vantage points from which to view the research question and the data generated" (Anderson, Herr, & Nihlen, 2007, p. 152). I conducted observations of the entire class-period three days per week for the majority of a school year, recording notes in my field journal each time.

Survey questions were designed to measure students' confidence in mathematical ability, beliefs about the nature of intelligence, and reactions to struggle in mathematics. The survey was comprised of 15 items with a Likert-type range of responses and open-ended items. The survey provided baseline information on students' thinking about effort and perseverance.

In addition to the 15 ranged-response questions, I included three open-ended questions. One fill-in-the-blank read "complete the equation: 'intelligence = _____% effort + _____% ability'" (Dweck, 2000, p. 62). This question implicitly indicates that both components are present in intelligence. Dweck (2000) used responses to this question to determine students' theories of intelligence. Students who hold a malleable theory of intelligence will put more weight on effort, while students with a fixed theory of intelligence will complete the equation with more weight on ability

Another open question asked, "Which statement do you agree with more: 'When I have to struggle on a math problem for a long time, I see it as an opportunity for learning' or 'When I have to struggle on a math problem for a long time, I see it as proof that I'm not good at math'? Why?" This question was devised to illuminate students' reactions to and thoughts about struggle within mathematics. These questions shed light on students' feelings about challenging mathematics and beliefs about the nature of intelligence.

Additional data comes from three interventions—lessons of five- to ten-minutes that I taught during a unit on logarithms. The first lesson provided data in the form of field notes, in which I documented salient features of students' discussion throughout the lesson and in observations following it. Data from the second and third lessons included students' written responses to the lesson in addition to field notes.

Observations recorded on an observation protocol accompanied data from the interventions, to specifically connect observed behavior with reflections related to the literature. The protocol provides space for my observations side-by-side with reflections (Anderson, Herr, & Nihlen, 2007). I described student behavior, documenting time and duration of described behavior, and made reflections connected to the literature.

As I documented the amount of time spent on problems, I specifically recorded behaviors of *returning to* or *quitting* problems students had not yet succeeded at and noted when students kept working if classmates had given up. I recorded comments and conversations, in tandem with observed behaviors as students worked on problems. This allowed me to connect any mindset-revealing comments with perseverant behavior exhibited. Some of these observations were descriptive, requiring no inference on my part, but others necessitated my making a judgment call (e.g., The student seems frustrated) (McKnight et al., 2000). To mitigate the subjectivity of my descriptions, I defined a set of criteria for identifying perseverant behavior prior to conducting observations (Appendix B).

Data Analysis. In my initial phase of data analysis, I read the student surveys twice to process the data (McKnight et al., 2000). I analyzed comments on open-ended items using an iterative (alternating emic/etic) approach (Tracy, 2013). I examined student comments line-by-line, using the vocabulary of the participants themselves to assign phrases that captured the essence of each (Strauss & Corbin, 1998). In my secondary cycle of coding, I critically analyzed identified codes, and synthesized them into hierarchical categories (Tracy, 2013). I coded my observation notes with the same iterative approach. An iterative analysis includes reflection on the literature as well as the active project, repeatedly revisiting the data, connecting it to literature, and refining insights (Srivastava & Hopwood, 2009). I followed this same process with all written data. Finally, I organized data chronologically to see changes from beginning to end (Kawulich, 2004). This afforded me a glimpse into students' perseverant behavior and attitudes over the course of the school year.

Interventions. After giving the initial survey, I designed three interventions. The goal was threefold: (1) to show that struggle in mathematics is not a unique experience; in fact, many successful mathematicians had to persevere through periods of confusion; (2) to show students that intelligence is malleable; (3) to boost students' self-regulatory skills through a goal-setting exercise.

In the first intervention, in line with Wilson and Linville's work (1985), students were taught that struggle is a natural and temporary part of learning. When students experience difficulty, they are more likely to work hard if they can attribute their difficulty to part of learning rather than to personal inability (Yeager & Walton, 2011). Students in this study were shown a video of successful college graduates telling personal stories. One graduate told of experiencing confusion while learning logarithms. She noted that her 11th grade teacher told her that she was terrible at math, and that she shouldn't take any more math. She described her decision to do what she liked although it was hard for her at that time, rather than listen to her teacher. The story ended with a note of hope—she graduated cum laude with a degree in mathematics. Another graduate stressed that the mistakes she made in the course of learning logarithms helped her learn. She related wondering if she had what it took at times. This intervention targeted students' sense of capability and belonging, showing that challenges are common in mathematics.

The second intervention followed in the footsteps of Blackwell, Trzesniewski, and Dweck (2007), who found that middle school students who were taught that the brain grows similar to muscular growth showed significant increase in achievement for the duration of the school year. Students read an article by Blackwell (2002), describing the brain's process of growing as difficult tasks are worked on. The article concluded with the message that learning makes you smarter.

Intervention three was modeled after work by Duckworth, Kirby, Gollwitzer, and Oettingen (2013). Students were asked to visualize a desirable goal regarding this course. They elaborated this goal on paper, along with obstacles that might arise. Duckworth and colleagues (2013) found that the conjoint mental imagining of a desired future with the real obstacles could turn wishes into "strong commitments with subsequent goal striving and goal attainment" (p. 6). Students wrote a detailed description of their goal, potential hurdles, and how they intended to overcome these hurdles.

Results

On the survey given at the beginning of the unit, a portrait of students' mindsets began to emerge. There were several answer trends that signified counterproductive mindsets. On the item "When I have to work hard at math, it makes me feel like I'm not very smart" one-third of students selected "agree" or "definitely agree." Researchers have shown that students who think having to work hard throws their intelligence into question tend to quit when tasks become difficult (Dweck, 2000; Dweck & Leggett, 1988). Of greater concern, one-third of the students answered "disagree" or "strongly disagree" to the prompt "When I fail to understand something, I become discouraged to the point of wanting to give up." Additionally, only 50% of students said they agree or definitely agree with the statement, "I try very hard in math, even after experiencing failure."

Question 17 posed the dualistic, "Which statement do you agree with more: 'When I have to struggle on a math problem for a long time, I see it as an opportunity for learning' or 'When I have to struggle on a math problem for a long time, I see it as proof that I'm not good at math'? Why?" Although a majority of students tended to agree with the first statement, six students did not see struggle on math in this productive light. Four students said they agreed with the second statement more than with the other. An additional two students were unsure which statement they agreed with more. A salient theme arose within the responses of students who agreed more with the second statement: belief that being bad at math was insurmountable, even inextricably bound with identity. Janet describes her experience:

I agree with the fact that when I find something really hard I get discouraged because I feel like maybe I'm not cut out for math. And I feel like maybe I can learn this but maybe I can't. I feel like this because throughout my whole life of school I've always struggled with math. As she points out, these feelings did not arise in high school; rather, years of schooling experiences have left her wondering if she is "cut out for math."

Valerie acknowledges a similarly debilitating mindset in her comment, "I agree with the second statement because I try really hard to understand a concept and if I still don't understand it must be something in my system isn't compatible to math." While she describes trying really hard, it is clear that she attributes her frustration to inability, to something in her "system." As found by Licht and Dweck (1984), this attribution of failure to students' very *identity* will often preclude continuation of effort in the face of challenge. One student identified *when* she agrees with this statement—when she sees

other people not struggling yet she is. "I agree with the second statement because I do feel like am bad at math [*sic*] mostly when I struggle and see other people not struggling." This contrast between herself and others implies a belief that she is not as able as her peers.

As I observed this class over a school year, in my field notes I recorded off-task chatting and students appearing frustrated to the point of giving up. I commonly observed students putting their heads on their desks when they got stuck on math. For example, on October 22, at 8:50 am I noted, "Josue—who has completed two math problems in 35 minutes—raises his hand. 8:52 am: The teacher hasn't seen him; he gives up and puts his head back down."

Intervention #1. In the first lesson, students connected the graduates' stories to the idea of intelligence being a combination of effort and ability. One claimed, "Effort matters more than anything else. If you put in effort it will pay off." When another student disagreed, arguing, "If you are not gifted with this ability you won't be able to do it," he was quickly contradicted by Alejandro, "It's not like I was born knowing how to do two plus two; I had to work at it." These comments reflect the divergence also present on the pre-intervention survey.

Two days later, 16 students stayed on task; however, I noted the behavior of two students who gave up almost immediately. Cervando was staring for eleven minutes, then I wrote, "8:59am- Cervando lays his head down." I also observed Alejandro looking at his neighbor's work, without lifting a pencil. These descriptions highlight two students who were not persevering through confusion on mathematics. In coding my notes from the observations between the first intervention and the next, I noticed that many of the frustrated behavior codes (e.g. "covers face," "loudly sighs and crosses arms") were associated with multi-step problems.

Intervention #2. After reading the article, students were asked to write down their reactions. Some of the content of the article was new to students. Kimberly wrote, "I think I agree and am surprised because I never thought that making mistakes was getting you smarter [*sic*]." She considers the learning value of making mistakes, which could be a beneficial takeaway for her future encounters with challenging mathematics (Blackwell et al., 2007; Dweck, Walton, & Cohen, 2011).

Even though it was not the most common notion in students' comments, the central message of the article emerged three times—intelligence as a malleable rather than congenital entity. Two students tied this idea to specific actions. Josue elaborated:

> I completely agree with what the author says about this because while you're watching TV, some other student is revising what they learned in class, you'll think that they were just born smart, and you'll let yourself down and it'll be difficult to get by that.

Additionally, two students focused on the concept of the brain as a muscle. Marcos wrote, "I believe that it was interesting to know that my brain is lifting weights as I

learn. I wonder if my brain could get 10% heavier." Three students specifically named effort or challenging oneself as a means for increasing intelligence. Michael's comment captures the theme, "I do believe that we as people choose to get smarter. Like in the article said, 'When we challenge our self than [*sic*] our brain cells grow!' Which this can expand our intelligence." These students affirmed a mindset that putting forth effort on challenges will lead to greater gains in intelligence.

A week after the second intervention, I observed students working consistently, consulting notes and asking peers questions throughout class. One logarithm word problem took two students 11 minutes to complete, which was notably longer than the time spent on problems documented on previous observations (the maximum to this date was 7 minutes).

The next day, students were asked to work independently for four minutes before asking for help. On my observation protocol, I wrote, "8:25 am - All but two students are actively looking through notes to determine mistakes on quiz." As soon as independent work time was over and students were allowed to ask those seated around them for help, those two joined the rest of the class in work. My next note reads, "8:29 am – All students now asking peers to explain and continuing engaging with logarithms." Only once during that period did I note that one student quit working. Most notably, at 9:15 am I recorded, "Not one student gave up on the 'Bringing it all Together' problem, an 8-step word problem. All have been reading, working, and asking questions of peers for a solid ten minutes." In the week following the second intervention, students stuck with work even when it required searching for help in multiple places in order to understand, and even when students publicly acknowledged being confused. Observation data and students' written response data converge to provide evidence that perseverance indeed increased after this intervention.

Intervention #3. The most commonly described obstacle to students' goal attainment on the third intervention was lack of effort. Janet, for example, wrote, "Being lazy might get in the way because I might be overwhelmed." An additional obstacle, described by three students was a noisy home. Bianca wrote, "One thing that might get in the way is my house, my house in generally is really, really, really loud and there's always people coming in and out, really hard to concentrate in an area like this." Four students cited a lack of focus; Michael, in a typical response, stated, "I get distracted, and I don't really like to study." Also to this prompt, three other students described struggling with mathematics. For example, Valerie responded, "Some teachers tell me I can't because I need sertain [*sic*] type of math classes in my previous years that I was struggling with." Overall, these comments show that students saw insufficient effort, insufficient focus, external factors, and struggle with mathematics as potential impediments. What stands out is that students saw achieving their goals as within their control: a matter of greater effort or greater focus.

The final prompt asked students to write an action they could take to overcome their obstacle and achieve their goal. Responses matched the roadblocks listed on the previous prompt. Ten students' answers referenced the amount of time one spends

studying. In a typical comment, Maria answered, "Put time in studying and ask question [*sic*]." Four students wrote about focusing in spite of noisy or distracting surroundings. For example, Alejandro answered, "What I can do is just lock myself in my parents room [*sic*] and study independently." The emphasis on time spent studying or working on math—spoken of by more than half the students—shows that students believe keeping up their efforts over time will result in goal achievement. In analysis of students' comments overall, what stands out is that no student mentioned lacking mathematical ability: a contrast to data from the initial survey.

Post-intervention Survey. Comparison of data from the post-intervention survey to the pre-intervention survey showed notable shifts in mindset. On the pre-intervention survey, one-third of the class answered "definitely agree" or "agree" to the prompt, "When I have to work hard at math, it makes me feel like I'm not very smart." On the post-intervention survey, *no* students selected "definitely agree," and only two agreed. Kimberly, who admitted at the beginning of the unit that she felt bad at math, initially answered, "definitely agree" to this question, but changed her answer to "disagree" following the interventions.

The prompt, "Effort won't do much for you if your ability level isn't high," received 4 fewer "neither agree nor disagree" answers. As evidenced by Tables 1 and 2, "disagree" and "definitely disagree" were the most common answers on the post-intervention survey. The change here indicates that students began to see effort as a potential catalyst for success. This emphasis on effort over ability is precisely what Dweck (1986) identified as increasing striving toward goals. If students believe the possibility of achievement rests upon effort rather than ability, they are much more likely to persist.

Table 1: *Pre-intervention Survey, Question 3: "When I have to work hard at math, it makes me feel like I'm not very smart."*

Answer	*n*	Percent of Total
Definitely agree	1	6%
Agree	5	28%
Neither agree nor disagree	2	11%
Disagree	8	44%
Definitely disagree	2	11%

Table 2: *Post-intervention Survey, Question 3: "When I have to work hard at math, it makes me feel like I'm not very smart."*

Answer	*n*	Percent of Total
Definitely agree	0	0%
Agree	2	11%
Neither agree nor disagree	2	11%
Disagree	11	61%
Definitely disagree	3	17%

Question 10 measured a similar mindset: "My mathematical ability grows with hard work." Prior to the interventions, 28% of students neither agreed nor disagreed with the statement, and 6% definitely disagreed. After interventions, 100% of students agreed or definitely agreed with the idea that mathematical ability grows with hard work.

Table 3: Pre-intervention Survey, Question 10: "My mathematical ability grows with hard work"

Answer	*n*	Percent of Total
Definitely agree	4	22%
Agree	8	44%
Neither agree nor disagree	5	28%
Disagree	0	0%
Definitely disagree	1	6%

Table 4: *Post-intervention Survey, Question 10: "My mathematical ability grows with hard work"*

Answer	*n*	Percent of Total
Definitely agree	8	44%
Agree	10	56%
Neither agree nor disagree	0	0%
Disagree	0	0%
Definitely disagree	0	0%

The fill-in-the blank equation, "intelligence = _____% effort + _____% ability," was also written with the intent that it would reveal whether students' conceptions of intelligence tended toward a fixed or a growth mindset. However, four students left the question blank on one or both surveys, and an additional three students gave nonsensical answers such as "intelligence = 100% effort + 10% ability." Of the answers that summed to 100, four showed a change that placed more emphasis on effort than ability at the end of the unit. The majority (*n* = 7) answered the same as on their pre-unit surveys. Although most students' answers remained static or only changed negligibly, this question showed a slight change for a small number of students, for whom this might make a difference since exerting effort no longer threatens intelligence (Dweck, 2007b). If these students continue to strive when problems become tougher now that they believe the difficulty is not due to lack of ability, they are more likely to be successful in mathematics.

In addition to the questions measuring mindset, some questions asked students to report their own behavior. Question 6 read, "When I fail to understand something, I become discouraged to the point of wanting to give up." Post-intervention, three fewer students agreed or definitely agreed with the statement.

Table 5: Pre-intervention Survey, Question 6: "When I fail to understand something, I become discouraged to the point of wanting to give up."

Answer	*n*	Percent of Total
Definitely agree	3	17%
Agree	5	28%
Neither agree nor disagree	4	22%
Disagree	4	22%
Definitely disagree	2	11%

Table 6: Post-intervention Survey, Question 6: "When I fail to understand something, I become discouraged to the point of wanting to give up."

Answer	*n*	Percent of Total
Definitely agree	1	6%
Agree	4	25%
Neither agree nor disagree	3	19%
Disagree	7	44%
Definitely disagree	1	6%

These results show that even as the work increased in challenge level, students were less inclined to become discouraged to the point of wanting to give up.

Responses to the question, "Even if understanding a math concept took hours of study, I would keep working at it" reveal consequential changes on every answer. The majority of those who initially neither agreed nor disagreed with the statement selected definitely agree or agree on the post-intervention survey. These shifts were consistent with students' responses throughout the interventions. Jaime, for example, identified a strategy for achieving his goals as "study during the weekends until understanding the notes." His behavior across my observations was consistent with that of a conscientious worker, but his comments began to indicate a more deliberate effort to persevere in achieving his goals. This question's results are harmonious with students' comments and behavior in class.

Table 7: Pre-intervention Survey, Question 12: "Even if understanding a math concept took hours of study, I would keep working at it."

Answer	*n*	Percent of Total
Definitely agree	2	11%
Agree	7	39%
Neither agree nor disagree	5	28%
Disagree	1	6%
Definitely disagree	3	17%

Table 8: Post-intervention Survey, Question 12: "Even if understanding a math concept took hours of study, I would keep working at it."

Answer	*n*	Percent of Total
Definitely agree	4	22%
Agree	8	44%
Neither agree nor disagree	2	11%
Disagree	3	17%
Definitely disagree	1	6%

Two-thirds of the class definitely agreed or agreed with the statement after the interventions, contrasted with half of the class prior to intervention. Not only have more students displayed a belief that hard work for a time will result in goal attainment, on this question more students also confirmed a willingness to act on that belief.

Another prompt that showed noteworthy changes was "I am a hard worker." As evidenced by the data, students were much more likely to select "agree" or "definitely agree" with the statement after the interventions. Since hard work is implied in perseverance (Farrington et al., 2012), this finding is consistent with students' increased perseverance as observed throughout the unit.

Table 9: Pre-intervention Survey, Question 13: "I am a hard worker."

Answer	*n*	Percent of Total
Definitely agree	2	11%
Agree	7	39%
Neither agree nor disagree	7	39%
Disagree	2	11%
Definitely disagree	0	0%

Table 10: Post-intervention Survey, Question 13: "I am a hard worker."

Answer	*n*	Percent of Total
Definitely agree	4	22%
Agree	10	56%
Neither agree nor disagree	4	22%
Disagree	0	0%
Definitely disagree	0	0%

Similarly, on the pre-intervention survey, 50% of students agreed or definitely agreed with the statement "I try very hard in math, even after experiencing failure." Post-intervention, 67% of students agreed or definitely agreed with the statement, and no students disagreed or definitely disagreed.

Analysis of open-ended questions further indicated changes in mindsets. Question 17 read, "Which statement do you agree with more: 'When I have to struggle on a math problem for a long time, I see it as an opportunity for learning' or 'When I have to struggle on a math problem for a long time, I see it as proof that I'm not good at math'? Why?" On the pre-intervention survey, four students agreed more with the second statement, and two were unsure. On the post-intervention survey, one student disagreed with both statements, one student left the question blank, and 16 students indicated that they agreed more with the first statement. Coding of students' comments allowed three primary themes to emerge: (a) a view of persistent effort (e.g., "If you are not good at something you have to keep on trying to get it right.") as the most successful strategy when struggling with math; (b) a view that struggle increases learning; and (c) the view that struggling should trigger escalated effort.

Persistent Effort. Four students expressed a view that persistent effort will be beneficial when struggling with a math problem. Nayle responded, "I agree with the first statement, because if I give up on an equation I'm not learning how to work through a problem." Magaly explained:

I agree with the quote 'when I have to struggle on a math problem for a long time I see it as an opportunity for learning' because if your [*sic*] struggling with a math problem, obviously more help is needed for the concept and if more help is needed, more studying will get done increasing the understanding level of the math problem.

Struggle is How Learning Occurs. Six students' responses expressed a view that learning comes from struggle. Bianca, in a typical comment, said, "[I agree more with] the first one because either or – struggling means learning." It is noteworthy that she wrote on her pre-intervention survey, "The second statement, 'When I have to struggle on a math problem for a long time, I see it as proof that I'm not good at math' because its [*sic*] easier to believe."

Struggling Should Trigger Escalated Effort. Six students described a view that they should increase effort when faced with a math problem on which they struggle for a long time. For example, Yessenia wrote, "For the first one, I agree with it the most because if you were to try harder, it'll show results." Similar student responses included, "think harder on the problem," and "pay more attention." Kimberly commented, "The first one because I pay more attention towards the mini-lesson when I see that I'm having trouble." Kimberly, by contrast, wrote on her pre-intervention survey, "I agree with the second statement because I do feel like am bad at math mostly when I struggle and see other people not struggling."

Other revealing responses include Janet's answers from the pre- and post-intervention surveys. Before the interventions, she agreed with the second statement and described herself as "not cut out for math." Following the interventions, she wrote, "I agree with the first one," acknowledging "but sometimes it can be difficult." Although still maintaining that mathematics can be difficult, she no longer agreed that struggle meant proof she was bad at mathematics. Additionally, Valerie, who claimed at the beginning of the unit, "I try really hard to understand a concept and if I still don't understand it must be something in my system that isn't compatible to math," wrote on the post-intervention survey,

> "I agree more with the first statement because if you don't know something very well, then you obviously have the opportunity to learn more about it. It's just up to said person if they want to learn more or not."

These students, who initially viewed struggle on math as proof they were not good at math, began echoing the views encouraged by the interventions—that struggle is an opportunity for learning and with perseverance success is possible.

Discussion

These findings allow me to suggest some particular experiences that may support students' perseverance in secondary mathematics classrooms. Findings reveal insights into how students drew upon malleable intelligence theory, stories of others' successful

struggles in mathematics, and a goal-setting exercise as they encountered challenges in mathematics. I argue that three brief interventions influenced students' perseverant behavior and mindsets toward difficult mathematics. As an example, on the initial survey, forty-four percent of students referenced discouragement and wanting to give up when they had problems with understanding the material. However, as students began to frame struggle as part of the growing process, and intelligence as malleable, they began exhibiting more perseverance in class, in addition to responding with more perseverant statements about challenging mathematics.

Mindsets Impacted. A close look at the nature of students' responses to questions about their mindsets suggests that for those students who viewed struggle on math as proof they were not good at mathematics, these interventions may have provided an alternate narrative. The interventions, I contend, allowed students to see this struggle as productive, thereby enabling them to grapple with mathematics without questioning their intelligence.

Students' Feelings about Challenging Tasks. Congruous with students' evolving mindsets, students' feelings about challenging tasks were also shifting throughout the study. Students were less likely to feel that they were not very smart when they had to work hard at math, as reported on the survey. They also self-reported less discouragement when they fail to understand something. Moreover, students began expressing the belief that challenge augments learning. By the end of the unit, no student saw having to struggle with math for a long time as proof that she is bad at math. This can have substantive consequences for students' mathematical achievement (Blackwell et al., 2007).

Perseverance Promoted. Observation data showed a marked improvement in perseverance over time. Across the school year, I documented observed behaviors including: continuing to work on a problem on which students have experienced failure before, continuing to work on a problem which takes longer than the previous problems to complete, and completing a problem that requires more than five steps to complete. The volume of perseverant behaviors documented increased from an average of 12 per week to 27 per week at the end of the study. My observation data indicates, in keeping with students' self-reported behaviors, that these behaviors increased after the interventions. Since many topics in mathematics take time and tenacity to understand, this could expand students' future achievement trajectories.

Implications

This study suggests that even brief interventions may foster the mindsets that can enable students to persevere despite mathematical challenges. Although a few researchers have focused on the effects of specific interventions, this study highlights how three accordant interventions may impact students' perseverance in a secondary mathematics classroom. Results from this study suggest that teachers should attend to

students' mindsets in building supportive classroom environments. These findings will help practitioners make decisions in implementing similar interventions in their own contexts.

Although this study provides empirical evidence that students' feelings and behaviors toward challenging mathematics may be influenced through interventions in this particular context, researchers should further investigate interventions across an array of settings and with diverse students, to enable practitioners to leverage this research in everyday practice. Replication of this study in multiple contexts would enable educators to adapt the interventions for specific settings. Educators need research-based methods for supporting academic mindsets and academic perseverance in praxis.

This work explored effects of interventions within the context of one unit; researchers should also examine lasting effects as students show progress longitudinally. This study's participants were students of color with low socioeconomic status—subgroups that historically trail in mathematics achievement; future research should explore the potential for similar interventions to affect achievement gaps.

Limitations

At the same time that I report new insight into how perseverance may be fostered through mindset interventions, I also recognize limitations of this study. First, my presence may have changed the dynamic of the classroom. McKnight and colleagues (2000) describe this phenomenon: "The subjects may attempt (consciously or unconsciously) to increase behaviors they believe the observer desires and to decrease undesirable behaviors" (p. 77). In other words, I may have changed the situation simply by observing it.

Additionally, students may have become more perseverant in part because as the year went on, they practiced working self-sufficiently and experienced success. Thus, they had seen that hard work paid off in passing grades. Although direct references to growth of ability seem to stem from the interventions, it is probable that perseverant behavior resulted from multiple factors. Interviews of students to gain insight into subjects' perspectives on the effects of interventions would be a profitable exploration for future research.

Conclusion

As perseverance surfaces in the field of non-cognitive academic skills, a new challenge is raised: empowering students on the margins without shifting the blame for achievement gaps onto their shoulders. Often, as educators, we know that if students would work harder, they could succeed. A natural conclusion, then, is that they underperform because they are lazy or do not care. As the literature makes clear, however, students who cannot see the possibility of success—either because they believe their ability level is fixed, they do not belong in mathematics, or that failure at

one task precludes success in the course—may be being crippled by fixed mindsets. As I conducted the literature review for this study, these beliefs were exposed as important factors in shaping students' experiences in mathematics classrooms. As I analyzed data from this study, it became evident that students' mindsets may be responsive to interventions as well. Students who initially thought they were not cut out for math began to internalize and express the importance of trying hard after failure. They then identified factors within their control—framing success as graspable. Students answered questions about struggle with mathematics in noticeably more tenacious terms. Rather than blaming students for not working hard enough, this study provides evidence that students can rise to the challenge and even change mindsets when teachers attend to these mindsets.

About the Author

Samantha Marshall is a Ph.D. student at Vanderbilt University. She earned her B.S.E. in mathematics from Oklahoma Christian University, and her M.A. in Curriculum & Teaching from Teachers College, Columbia University, with a concentration in mathematics. She has taught high school math in a variety of settings, from Oklahoma to New York. Most recently she served as an instructional coach, crafting and leading professional development for pre-service and in-service teachers in Tennessee and Mississippi. Her interests center around issues of equity: classroom environments and tools that foster equitable mathematics learning, and how in-service teachers' supports become influential in their work. Email: samantha.marshall@vanderbilt.edu

---

Reference List

Anderson, G. L., Herr, K., & Nihlen, A. S. (2007). *Studying your own school: An educator's guide to practitioner action research*. Thousand Oaks, CA: Corwin Press.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice Hall.

Bandura, A. (1997). *Self-efficacy: The exercise of control.* New York, NY: W.H. Freeman.

Blackwell, L. (2002). *You can grow your intelligence.* Retrieved from http://www.mindsetworks.com/websitemedia/youcangrowyourintelligence.pdf

Blackwell, L., Trzesniewski, K., & Dweck, C.S. (2007). Implicit theories of intelligence predict achievement across an adolescent transition: A longitudinal study and an intervention. *Child Development, 78*(1), 246-263.

Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4-12 years old. *Science*, 333(6045), 959-964.

Duckworth, A. L. (2006). *Intelligence is not enough: Non-IQ predictors of achievement.* (Order No. 3211063, University of Pennsylvania). *ProQuest Dissertations and Theses,* pp. 1-128. Retrieved from http://eduproxy.tc-library.org/?url=/docview/305257845?accountid=14258. (305257845).

Duckworth, A. L. (2009). (Over and) beyond high-stakes testing. *American Psychologist, 64*(4), 279-280.

Duckworth, A. L., & Allred, K. M., (2012). Temperament in the classroom. In M. Zentner & R. L. Shiner (Eds.), *Handbook of temperament.* New York, NY: Guilford Press.

Duckworth, A. L., & Carlson, S. M. (2013). Self-regulation and school success. In B.W. Sokol, F.M.E. Grouzet, & U. Müller (Eds.), *Self-regulation and autonomy: Social and developmental dimensions of human conduct*. New York: Cambridge University Press.

Duckworth, A. L., Kirby, T., Gollwitzer, A., & Oettingen, G., (2013). From fantasy to action: Mental contrasting with implementation intentions (MCII) improves academic performance in children. *Social Psychological and Personality Science.*

Duckworth, A. L., Peterson, C., Matthews, M. D., & Kelly, D. R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 92*(6), 1087-1101.

Dweck, C. S. (1986). Motivational processes affecting learning. *American Psychologist, 41*(10), 1040-1048.

Dweck, C. S. (2000). *Self-theories: Their role in motivation, personality, and development*. Great Britain: Psychology Press.

Dweck, C. S. (2007a). Is math a gift? Beliefs that put females at risk. In S. J. Ceci & W. M. Williams (Eds.), *Why aren't more women in science? Top researchers debate the evidence* (pp. 47-55). Washington, DC: American Psychological Association.

Dweck, C. S. (2007b). The secret to raising smart kids. *Scientific American Mind, 18*(6), 36-43.

Dweck, C. S., & Leggett, E.L. (1988). A social-cognitive approach to motivation and personality. *Psychological Review, 95*(2), 256-273.

Dweck, C. S., Walton, G.M., & Cohen, G.L. (2011). *Academic tenacity: Mindsets and skills that promote long-term learning.* Retrieved from http://howyouthlearn.org/pdf/Academic%20Tenacity,%20Dweck%20et%20al..pdf

Farrington, C. A., Roderick, M., Allensworth, E., Nagaoka, J., Keyes, T. S., Johnson, D. W., & Beechum, N. O. (2012). *Teaching Adolescents to become learners. The role of noncognitive factors in shaping school performance: A critical literature review.* Chicago: University of Chicago Consortium on Chicago School Research.

Kawulich, B. B. (2004). Data Analysis Techniques in Qualitative Research. *Journal of Research in Education, 14*(1), 96-113.

Lepper, M. R., Ross, L., & Lau, R. R. (1986). Persistence of inaccurate beliefs about the self: Perseverance effects in the classroom. *Journal of Personality and Social Psychology, 50*(3), 482.

Licht, B. G., & Dweck, C. S. (1984). Determinants of academic achievement: The interaction of children's achievement orientations with skill area. *Developmental Psychology, 20*(4), 628-636.

McKnight, C., Magid, A., Murphy, T. J., & McKnight, M., (2000). *Mathematics education research: A guide for the research mathematician*. Providence, RI: American Mathematical Society.

NYC Department of Education. (2013). *Progress Report 2013*. Retrieved from http://schools.nyc.gov/Accountability/tools/report/default.htm#FindPR

Oyserman, D., Bybee, D., and Terry, K. (2006.) Possible selves and academic outcomes: How and when possible selves impel action. *Journal of Personality and Social Psychology, 91*(1), 188-204.

Rosen, J. A., Glennie, E. J., Dalton, B. W., Lennon, J. M., & Bozick, R. (2010). *Noncognitive Skills in the classroom: New perspectives on educational research.* Research Triangle Park, NC: RTI International.

Schoenfeld, A. H. (2002). Making mathematics work for all children: Issues of standards, testing, and equity. *American Educational Research Association, 31*(1), 13-25.

Shechtman, N., DeBarger, A. H., Dornsife, C., Rosier, S., & Yarnall, L., (2013). *Promoting grit, tenacity, and perseverance: Critical factors for success in the 21st century.* Retrieved from http://www.ed.gov/edblogs/technology/files/2013/02/OET-Draft-Grit-Report-2-17-13.pdf

Srivastava, P., & Hopwood, N. (2009). A practical iterative framework for qualitative data analysis. *International Journal of Qualitative Methods, 8*(1), 76-84.

Strauss, A., & Corbin, J. (1998). *Basics of qualitative research: Techniques and procedures for developing grounded theory.* Thousand Oaks, CA: Sage.

Tracy, S. J. (2013). *Qualitative research methods: Collecting evidence, crafting analysis, communicating impact*. Malden, MA: Wiley Blackwell.

Walton, G. M., & Cohen, G. L. (2007). A question of belonging: Race, social fit, and achievement, *Journal of Personality and Social Psychology, 92*(1), 82-96.

Wechsler, D. (1943). Non-intellective factors in general intelligence. *The Journal of Abnormal and Social Psychology*, *38*(1), 101-103.

Wilson, T. D., & Linville, P. W. (1985). Improving the performance of college freshmen with attributional techniques. *Journal of Personality and Social Psychology, 49*(1), 287-293.

Yeager, D. S., & Walton, G. M. (2011). Social-psychological interventions in education: They're not magic. *Review of Educational Research*, *81*(2), 267-301.

Appendix A: Student Survey

	definitely agree	agree	neither agree nor disagree	disagree	definitely disagree
1. I feel confident about my ability in mathematics.	○	○	○	○	○
2. You have a certain amount of intelligence, and you really can't do much to change it.	○	○	○	○	○
3. When I have to work hard at math, it makes me feel like I'm not very smart.	○	○	○	○	○
4. If you're not very good at math, working hard won't make you good at it.	○	○	○	○	○
5. If you have to work hard on some problems, you're probably not very good at them.	○	○	○	○	○
6. When I fail to understand something, I become discouraged to the point of wanting to give up.	○	○	○	○	○
7. Effort won't do much for you if your ability level isn't high.	○	○	○	○	○
8. No matter how hard it gets, I will succeed in Algebra 2.	○	○	○	○	○
9. The harder you work at math the better you will be at it.	○	○	○	○	○
10. My mathematical ability grows with hard work.	○	○	○	○	○
11. Everyone has a hard time with something in math; it doesn't mean they won't be successful.	○	○	○	○	○
12. Even if understanding a math concept took hours of study, I would keep working at it.	○	○	○	○	○
13. I am a hard worker.	○	○	○	○	○
14. When the math I am studying is difficult, I try harder.	○	○	○	○	○
15. I try very hard in math, even after experiencing failure.	○	○	○	○	○

16. Complete the equation: intelligence = _____% effort + _____% ability.

17. Which statement do you agree with more: "When I have to struggle on a math problem for a long time, **I see it as an opportunity for learning**" or "When I have to struggle on a math problem for a long time, **I see it as proof that I'm not good at math**"? Why?

18. Do you plan to take another math course after Algebra 2?

Additional comments:

Appendix B: Criteria for Identifying Perseverant Behavior

Observed Behavior 1	Student continues to work on a problem on which (s)he has experienced failure before
Observed Behavior 2	Student continues to work on a problem which takes longer than the previous problems to complete
Observed Behavior 3	Student continues to work on a problem which seems to frustrate him/her
Observed Behavior 4	Student comes back to a problem on which (s)he has previously given up
Observed Behavior 5	Student completes a problem that requires more than five steps to complete
Observed Behavior 6	Student continues to work on a problem on which classmates have quit

MORE THAN WORDS: STRUGGLING READERS' COMPREHENSION OF WORD PROBLEMS

Leanna R. MacDonald and Leslie C. Banes

University of California - Davis

Abstract Before they are able to solve mathematical word problems, students must be able to read and comprehend the problems. Although challenging for all students, struggling readers face additional cognitive demands when solving word problems that proficient readers do not. In this action research study, four focal students, including two English learners and two native English speakers, were given a multiplicative comparison problem and prompted to retell it in their own words, solve the problem using a selected strategy, and then retell the problem again. A retell rubric was used to analyze students' comprehension by measuring the completeness of the retell, while a drawing and writing rubric measured students' visual representations and metacognitive strategies involved in comprehension. Results suggest discussion provided opportunities for students to learn from one another and drawings especially helped English Learners' who communicated their understanding through symbols and visuals. Writing supported students' metacognitive skills leading to greater comprehension, but may be problematic for students at the beginning stages of English acquisition. It is imperative for teachers to provide opportunities for struggling readers to discuss, draw, and write about word problems to support their comprehension and to extend these skills to math in the real world.

Keywords: elementary math, word problems, reading comprehension, English learners

Introduction

This article describes an action research project conducted by a first-year teacher with the goal of increasing her understanding of how struggling readers comprehend mathematical word problems. Suggestions and implications for instruction are discussed.

Literature Review

Substantial research in the field of mathematics has been conducted on the use of discussions and thinks-alouds to comprehend mathematics. Researchers have found that when students are provided with opportunities to engage in meaningful mathematical dialogue, students' comprehension of a mathematical situation increases as so does their mathematical justifications (Bargh & Schul, 1980; Chi, 2000; Franke et

al., 2009; King, 1992; Rogoff, 1991). Therefore, discussion can provide another way for students to interact with text, hopefully leading to more understanding of a presented mathematical situation in a given word problem.

Other researchers have found that the use of pictures and drawings supports students' comprehension and conceptual understanding of mathematics (Marino et al., 2010; O'Connell et al., 2005). Drawing a picture might help students connect what they think or say in a retell to a tangible representation in their solution process. It also allows students to communicate their comprehension of a word problem in multiple ways. Giving students opportunities to provide a mental model to a math problem allows them to internalize and contemplate a mathematical situation (Dexter & Hughes, 2011). Edens and Potter (2008) found that drawings can reduce the linguistic demand commonly found in word problems—an important finding when contemplating strategies for ELs who are struggling readers to use. Therefore, using drawings as a strategy to support students' comprehension of word problems is important to explore.

Writing has also been found to be a useful strategy as it supports students' metacognition (Artz & Armour-Thomas, 1992; Carr & Biddlecomb, 1998; Powell, 1997; Pugalee, 2001), an important thought process for students' comprehension. Although the test subjects from these research projects are much older in age (which seems questionable to use writing for fourth graders) Juliet Baxter and her colleagues (2005) found that 7th graders with writing and reading disabilities, operating at least two years below grade level, showed multiple instances of students' comprehension and conceptual understanding of problems when giving opportunities to journal their mathematical thinking. Accordingly, students who faced additional academic challenges, which affected their ability to write, still benefited from writing about their mathematical thinking. For this reason, providing opportunities for students to write about their thinking is important to investigate as writing could foster their comprehension.

Methodology

Context. This inquiry project was conducted in a fourth grade classroom at a public Title 1 school located in a suburban neighborhood known for gun and gang violence. About 86% of students at Applegate Elementary (pseudonym) receive free and reduced lunch, an indicator of high levels of poverty. Forty –two percent of students are ELs (English Learners) and Applegate is a program improvement school that has a strong focus on literacy.

The classroom consisted of 29 students, of which 14 were ELs. According to the California English Language Development Test (CELDT) that measures students' English proficiency on a scale of 1-5, the average EL level in the class was 3, representing an intermediate level English proficiency. Of the EL students in the classroom, 13 students' native language was Spanish and one students' native language was Hmong. Fifteen

students were Hispanic, six white, five African American, and the remaining three were Pacific Islander, Alaska Native, or Hmong. Twenty-two students were reading below grade level, with 13 students reading one or more years behind grade-level norms.

For this inquiry project, four focal students were selected for in depth data analysis. These focal students were either reading at a first or second grade level, and were chosen because they represent the reading levels of a large portion of the class. Two of the focal students were ELs with CELDT levels 1 and 2 (beginning and early intermediate) and two students were EOs (students who speak English only). A combination of EL and EO students were chosen in order to explore how particular instructional strategies may support students with different linguistic needs. The four focal students are usually passive and their voices go unheard in group discussion. They are usually hesitant when solving word problems independently and wait for others to provide suggestions or answers. A primary goal of this project is to provide students with more opportunities to share their ideas and gain the confidence needed to attempt word problems. Prior to this study, the teacher primarily had students attempt word problems as a whole class with guiding questions to scaffold students thinking. However, the teacher desired a more student-centered approach by providing her students with strategies they could use to engage in mathematical thinking.

Purpose. In the field of mathematics, comprehension is crucial for students' success in word problems and in real world applications. Not only must students understand what a word problem is asking in real-life contexts, they must also be able to interact with the text of word problems to solve them. In a mathematical text, reading becomes even more difficult as text is not always read from left to right (depending if students need to also interpret and reference graphs/tables) and it is usually visually complex as there are callouts, sidebars of graphs, historical facts, and/or practice problems (Barton et al. 2002). These tasks become especially difficult for struggling readers as they face additional cognitive demands that proficient readers do not. When reading word problems, struggling readers are asked to simultaneously decode text, already an area of difficulty, while comprehending and relating these words to mathematics. Reading comprehension is strongly correlated with students' success on mathematical word problems (Vilenius-Tuohimaa, Aunola, & Nurmi, 2008). Therefore, finding strategies that students can use to help lessen the cognitive demand of word problems is important to provide educational equity for our struggling readers in order for them to reach standards and use these skills in the real world.

Hegarty and colleagues (1995) define comprehension in mathematics on a tiered scale which involves (1) understanding the problem, (2) forming a plan to solve the problem and (3) carrying out the plan by solving it. For the purposes of this project, comprehension is defined as understanding the mathematical situation described in a word problem and being able to form a plan to solve it.

Multiplicative Comparison Problems are defined as "involving a comparison of two quantities in which one is described as a multiple of the other" (Carpenter, Fennema,

Franke, Levi, & Empson, 2015, p. 66). These problems were emphasized in this inquiry project because they include language that can be particularly difficult for students (Stern, 1993), such as understanding the meaning of "twice as many," and they are prevalent in 4th grade math curricula and assessments.

As documented by state and district reading assessments, the current fourth grade class at Applegate struggles with reading and comprehending text. Moreover, at the beginning of the year, students completed a third grade math test containing word problems, many of them multiplicative comparison problems. The class average on this test was only 51%, indicating a need for additional support with this kind of problem. Multiplicative word problems have the added advantages of offering a window into students' understanding of the problem, because it is difficult to get a correct answer simply by "number grabbing" (Littlefield & Rieser, 1993)—where students pick the numbers seen in a word problem and randomly chose an operation without fully understanding the mathematical situation described.

The following research questions guided the design of this inquiry project:

1.) What strategies can struggling readers use to better comprehend multiplicative comparison word problems?

2.) Do ELs and EOs comprehend word problems differently, and if so, how?

3.) What parts of word problems are students struggling with?

Data Collection and Analysis. The effectiveness of retells to monitor and aid comprehension is well known throughout the literacy research community (Brown & Cambourne, 1987; Hoyt, 1999; Mowbray, 2010). Therefore, for each of the three rounds of data collection, students were prompted to (1) retell a presented word problem in their own words, (2) solve the problem using one of the three strategies, and (3) retell the problem again. The teacher conducted all three rounds. Students' retells were evaluated with a Retell Rubric (Ambrose & Molina, 2014), which unpacks word problems into their component elements, indicating the parts of the problem students understood or attended to, and the parts they did not. The elements of each word problem that were analyzed are the numbers, the units, the mathematical relationship, and the question. For each element, students who correctly retold that part of the problem received a score of 2, students who retold an element differently from how it was stated in the problem received a score of 1, and students who omitted an element completely received a score of 0 (Appendix A).

For Round 1, students were given a handout of the following problem: *Thomas built a fence that was 12 times as long as Terry's. Terry built a fence that was 4 feet long. How long was Thomas's fence?* They were prompted to retell the problem in their own words after rereading the problem as many times as they needed. For each retell, students worked with me one-on-one so that their peers did not influence their responses. Then,

in partners (ELs and EOs were partnered together), students were prompted to discuss the word problem to one another, noting similarities or differences in thinking about the problem (a classroom norm). Here, students' conversations were audio-recorded and transcribed. Independently, students solved the problem on their handout. The teacher took field notes of students' explanations to their solutions. Lastly, students were again prompted to retell the word problem in their own words, rereading the problem as many times as they needed. The teacher reread the transcribed discussion and compared what students said in their explanations to the written work on the handout. This allowed themes to emerge about the match and mismatch between students' oral discourse and their written solution strategies.

For Round 2, students were given a handout of the following problem and prompted to retell it in their own words after rereading: *The giraffe in the zoo is 3 times as tall as the kangaroo. The kangaroo is 6 feet tall. How tall is the giraffe?* The teacher then asked students to solve the problem by drawing a picture of it. Once they reached a solution, the teacher took field notes of students' explanations for their answers. Students were then prompted to retell the problem in their words again. To analyze students' drawings, an iterative process of creating codes was used by researching the necessary components in a drawing needed to comprehend a word problem (Dexter & Hughes, 2011; Edens & Potter, 2008) (Appendix B). Van de Walle's (2012) four-point rubric was modified by adding another category titled "Outstanding," indicating no errors in the drawing. This rubric, (Appendix C), allowed students' work to be analyzed against a set of desired learner responses and to place their understandings on a developmental continuum. Students were not expected to receive a perfect score on the drawing rubric as students' drawings were intended for them to make sense of the problem—not to present to an audience.

For round 3, students retold the following word problem in their own words: *Jill lived 5 times as many miles as Leo did from the ocean. Leo lived 20 miles from the ocean. How many miles did Jill live from the ocean?* The teacher then asked students to solve the problem by journaling, or writing their thoughts, about it. The teacher emphasized that their grammar and spelling was not important. After students journaled on their handout and arrived at a solution, students retold the problem again. Students' writing was analyzed in two different ways. First, using Ambrose and Molina's (2014) retell rubric was used to assess students' writing. This was analyzed to determine if students' retells were different when they were written from when they were spoken.

Second, students' writing was analyzed by going through a deductive process of creating a Metacognitive Strategies Rubric (Appendix D). Metacognitive strategies were analyzed because research indicates a strong correlation between metacognitive skills and students' comprehension (Lippmann & Linder, 2007). Drawing on the work of Tanner (2012), who suggests teachers support the development of metacognition by asking self-reflective questions for planning, monitoring, and evaluating, the teacher created a rubric to assess students' metacognition within their mathematical writing. Students received of score of 1 for "yes" and a score of 0 for "no." A total possible score

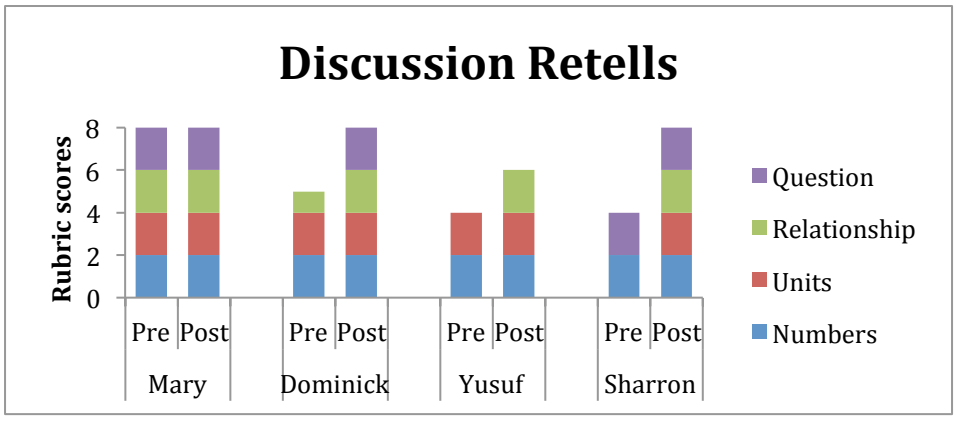
was 3, although it was not expected students would receive a maximum score as they were asked to journal about the problem only for themselves and were not told their writing would be read by a distant audience.

Results and Discussion

Findings from Round 1 suggest the focal students' comprehension of word problems improved when they were given opportunities to discuss a problem with their peers. First grade level readers improved the most significantly, as seen in the figures below. For example, Sharron's ability to include elements of the original word problem during the second retelling increased by 50%, and Dominick's second retelling increased by 38%. Yusuf and Sharron were able to identify the relationship of the problem after their peer described it in the student discussion. These students who initially struggled with the concept learned from their peer once given opportunities to discuss. This finding is supported by other research studies as students learn from one another when engaging in student-talk (Franke et al., 2009).

Although Mary was able to correctly restate the problem in her own words with 100% accuracy during the pre and post-discussion retellings, there was a misalignment between what she said and how she solved the problem. The other three students' retell matched how they solved the problem. This finding may indicate the limitations of using retells as a way to gauge whether students understand word problems. Perhaps as a compensation strategy for low reading ability, some students are able to memorize and restate a problem without really understanding the presented mathematical situation.

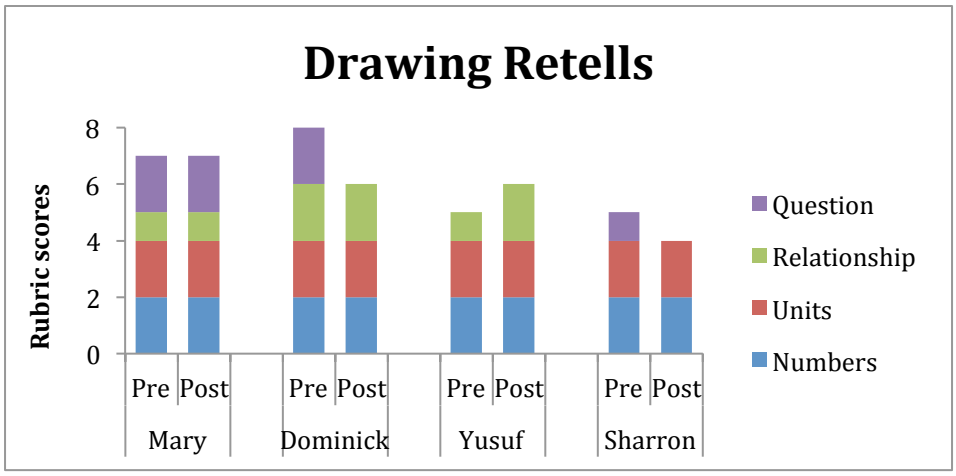
Figure 1: Graph of Pre- and Post- Discussion Retell Scores.



A similar phenomenon occurred in Round 2 when students' retells appear to worsen after the use of the drawing strategy, seen in Figure 2. However, three students solved the problem correctly and were able to explain their solutions, demonstrating their comprehension. The average score on the Drawing Rubric was 3.5 out of 5. No student included a representation of the unknown, which is mirrored by their retells. However, the drawing was intended to support students' comprehension, not to present a full picture to an audience. Drawings provided focal students with an alternative means to communicate their comprehension of the word problem. This was especially beneficial

for the EL students (Dominick and Yusuf), perhaps due to a reduction in linguistic demand through drawing. Dominick represented the relationship between the animals' heights with an arrow and Yusuf drew a bar indicating differences in height. These samples are found in Appendix E. Students often pointed to their drawings to contextualize what they were explaining to the teacher in their planning process to solve the problem, a finding which is affirmed by prior studies of communication via drawing in mathematics (Dexter & Hughes, 2011; Edens & Potter, 2008). Although their retells were incomplete, students' comprehension of the word problem was represented through their drawings and explanations.

Figure 2: Graph of Pre- and Post- Drawing Retell Scores.



Findings from Round 3 suggest students benefited from writing about the math problem, displayed in Figure 3. Comparing the pre- and post-retells, we see that Yusuf and Sharron had similar difficulties retelling the relationship involved in this problem. This suggests that interpreting relationships in comparison word problems are equally difficult for EO and EL students. Both EL students, Yusuf and Dominick, also share similar improvements in their post-retell as both students were able to correctly identifying the numbers in the problem. This suggests that their writing might have helped them internalize the problem and associated numbers at deeper level than verbally speaking. This is supported by Baxter and colleagues' (2005) who found that students' comprehension of word problems was more evident in their writing than in their oral discourse. Sharron's and Yusuf's writing included more elements of the word problem than their previous retell, suggesting that writing gave students an opportunity to think about the problem more deeply. However, this pattern is reversed for Dominick, who included only the relationship in the problem in his writing and no other elements of the problem, as seen in Figure 4. This suggests that for CELDT level 1 students, writing may not be as effective a strategy to support students' thinking and comprehension of a problem. This finding is affirmed by researchers Edens & Potter (2008) who found that linguistic demands are decreased for EL students when pictures are utilized but are increased when writing tasks are required. It appears that writing may have encouraged students to formulate a plan to solve (Appendix F). However, when verbally prompted, students illustrated even more metacognitive skills. For

example, Yusuf wrote, "you can do add up" but when asked by the teacher why would we add he stated, "Uh! No! You're suppose to times! Cause it says 5 times. So multiply!" This suggests that especially when paired with teacher questioning, writing can help students think about their justification for solving a problem in a particular way.

Figure 3: Graph of Pre- and Post- Writing Retell Scores.

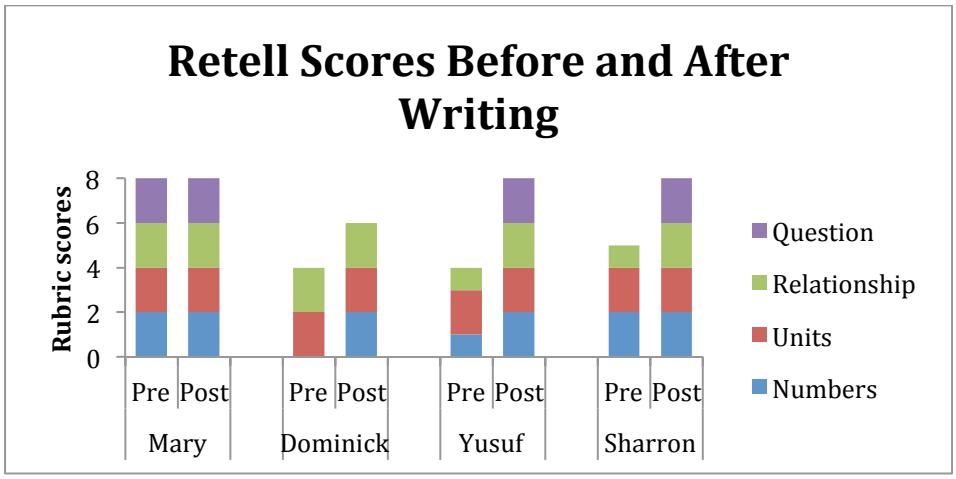
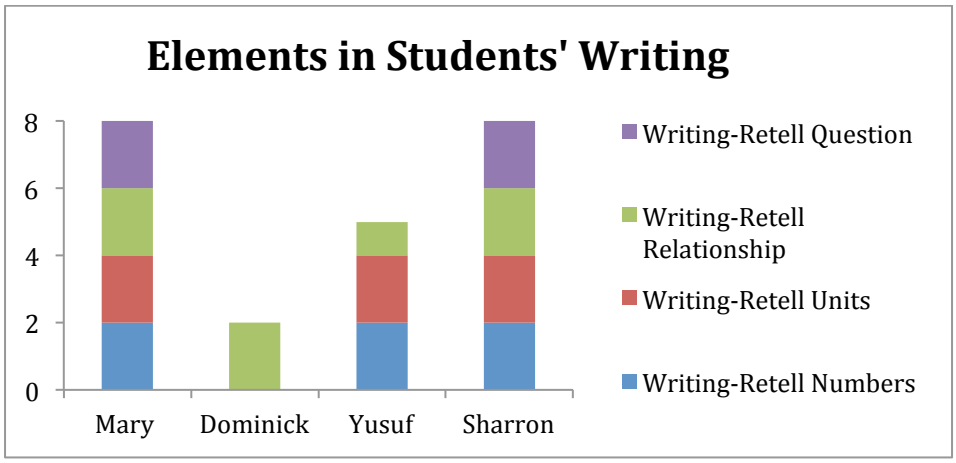


Figure 4: Graph of Elements Included in Students' Writing.



Conclusion and Implications

This action research project investigated struggling readers' comprehension of word problems utilizing three different strategies: discussing with a partner, drawing, and writing. Students with the lowest reading scores showed the most improvement after discussing the word problem with a partner. This suggests teachers should partner students of different reading levels together because struggling readers seem to benefit when partnered with higher-leveled reading partners. Drawing and writing about word problems can also be effective strategies for struggling readers, especially those who are English learners. Drawing was especially helpful for EL students perhaps because it

offers an opportunity to communicate mathematical understanding through symbols and visual representations. Writing also seemed to support students' comprehension of word problems, although it created additional challenges for Dominick, an EL with beginning level English proficiency. Thus, teachers may want to be cautious when using writing-to-learn strategies with students who are at the beginning stages of English development. Beginning ELs may be better able to communicate their understanding through other modes, such as drawing, discussion, or using manipulatives.

Multiple and varied measures of assessment may help teachers gain a deeper understanding of their students' comprehension of word problems. Although they provide valuable information about students' understanding of a problem, using retells alone may be misleading. For example, Mary retold the problem with 100% accuracy but there was a misalignment between what she said and how she solved the problem. Furthermore, across all three rounds Mary's pre and post retell scores remained unchanged, although she did not always solve the problems correctly. This suggests retells alone are not enough to determine whether a student understood the problem. Multiple assessments, such a using a combination of retells, drawings, writing, and oral discussion, can offer a broader, perhaps more accurate view of students' comprehension of mathematical word problems. Future research can explore how different kinds of prompts for writing can elicit differences in students' mathematical writing, and whether it is more beneficial for students to draw a picture of the mathematical situation before or after discussing the problem with peers.

About the Authors

Leanna R. MacDonald teaches fourth grade in a Title I public school. She received her credentials and master degree in education from UC, Davis and is interested in research and instruction that helps her gain a deeper understanding of her students' mathematical thinking. Email: leanna.macdonald@twinriversusd.org

Leslie C. Banes is a former bilingual elementary school teacher. She is an instructor for the MA Education program at UC, Davis in California and collaborates with teachers to explore the relationship between mathematics and language learning. Email: lcbanes@ucdavis.edu

---

Reference List

Ambrose, R., & Molina, M. (2014).Spanish/English bilingual students' comprehension of arithmetic story problems texts. *International Journal of Science and Mathematics Education, 12* (6), 1469-1496.

Artz, A.F. and Armour-Thomas, E. (1992). Development of a cognitive-metacognitive framework for protocol analysis of mathematical problem solving in small groups. *Cognition and Instruction 9*(2), 137–175.

Bargh, J. A., & Schul, Y. (1980). On the cognitive benefit of teaching. Journal of Educational Psychology, 72, 593-604.

Barton, M. L., Heidema, C., & Jordan, D. (2002). Teaching reading in mathematics and science. Educational Leadership, 60(3), 24–28.

Baxter, J. A., Woodward, J., & Olson, D. (2005). Writing in mathematics: An alternative form of communication for academically low-achieving students. *Learning Disabilities Research & Practice, 20*, 119–135.

Brown, H. & Cambourne, B. (1987). Read and retell: A strategy for the whole language/natural learning classroom. Portsmouth: Heinemann.

Carpenter, T.P., Fennema, E., Franke, M.L., Levi, L., Empson. (2015). *Children's Mathematics: Cognitively Guided Instruction (2nd ed.). Portsmouth, NH:* Heinemann.

Carr,M. & Biddlecomb, B. (1998). Metacognition in mathematics: From a constructivist perspective', in D.J. Hacker, J. Dunlosky and A.C. Graesser (eds.), *Metacognition in Educational Theory and Practice,* Lawrence Erlbaum Associates, Mahweh, NJ.

Chi, M. T. H. (2000). Self-explaining expository texts: The dual processes of generating inferences and repairing mental models. In R. Glaser (Ed.), Advances in instructional psychology: Educational design and cognitive science (pp. 161-238). Hillsdale, NJ: Lawrence Erlbaum.

Dexter, D. D., & Hughes, C. A. (2011). Graphic organizers and students with learning disabilities: A meta-analysis. *Learning Disability Quarterly, 34*(1), 51–72.

Edens, K., & Potter, E. (2008). How students "unpack" the structure of word problem: graphic representations and problem solving. *School Science & Mathematics, 180*(5), 184-196.

Franke, M., Webb, N., Chan, A., Ing, M., Freund, D., Battey, D. (2009). Teacher questioning to elicit students' mathematical thinking in elementary school classrooms. *Journal of Teacher Education, 60*(4), 380-392.

Hegarty, M., Mayer, R.E., Monk, C.E. (1995). Comprehension of word problems: A comparison of successful and unsuccessful problem solvers. *Journal of Educational Pyschology, 87*(1), 18-32.

Hoyt, L. (1999). Revisit, Reflect, Retell: Strategies for Improving Reading Comprehension. USA: Heinemann (Portsmouth).

King, A. (1992). Facilitating elaborative learning through guided student generated questioning. *Educational Psychologist*, 27, 111-126.

Lippmann, R. K., & Linder, C. (2007). Metacognitive activity in the physics student laboratory: Is increased metacognition necessarily better? *Metacognition and Learning, 2*(1), 41-56.

Littlefield, J., & Rieser, J. J. (1993). Semantic features of similarity and children's strategies for identification of relevant information in mathematical story problems. *Cognition & Instruction*,11, 133-188.

Marino, M., Black, A., Hayes, M., Beecher, C. (2010). An analysis of factors that affect struggling readers' achievement during a technology-enhanced STEM astronomy curriculum. *Journal of Special Education Technology, 25* (3), 35-47.

Mowbray, T. (2010). The power of read and retell. *Practically Primary 15*(2), 10-12.

O'Connell, S. R., Beamon, C, Beyea, J. M., Denvir, S. S., Dowdall, L. A., Friedland, N. G., et al. (2005). Aiming for understanding: Lessons learned about writing in mathematics. *Teaching Children Mathematics, 12*, 192-199.

Osman, M.E., & Hannafin, M. J. (1992). Metacognition research and theory: Analysis and implications for instructional design. *Educational Technology Research and Development, 40*(2), 83-99.

Powell, A.B. (1997) Capturing, examining and responding to mathematical thinking through writing. *The Clearing House 71*(1), 21–25.

Pugalee, D.K. (2001). Writing, mathematics and metacognition: Looking for connections through students' work in mathematical problem solving. *School Science and Mathematics 101*(5), 236–245.

Rogoff, B. (1991). Guidance and participation in spatial planning. In L. Resnick, J. Levine, & S. Teasley (Eds.), Perspectives on socially shared cognition (pp. 349-383). Washington, DC: American Psychological Association.

Stern, E. (1993). What makes certain arithmetic word problems involving the comparison of sets so difficult for children? *Journal of Educational Psychology*, *85*(1), 7-23.

Tanner, K.B. (2012). Promoting Student Metacognition. *CBE-Life Sciences Education, 11*(2), 113-120.

Van de Walle, J. A.; Karp. K.S.; Bay-Williams, J. M. (2012). *Elementary and Middle School Mathematics: Teaching Developmentally* (8th ed.). USA: Pearson.

Vilenius-Tuohimaa, PM; Aunola, K.; Nurmi, JE. (2008). The association between mathematical word problems and reading comprehension. *Educational Psychology*, *28*(4), 40.

Appendix A: Retell Rubric

Element	**Same** **(2)**	**Different** **(1)**	**Missing** **(0)**
Numbers	Contains both numbers from original problem.	Contains two numbers. At least one number is different than original.	At least one number in the problem is missing.
Units	Unit is identified in problem.	Unit is different from original problem.	Unit is missing.
Relationship	Relationship is consistent with word problem.	Relationship differs from what was described in word problem.	Relationship is missing.
Question	Contains a question consistent with word problems.	Contains a question with meaning different from original.	Question is missing.

Appendix B: Elements Within Drawing

Student	Kangaroo	Giraffe	Kangaroo's height	Giraffe's relationship	Unknown	Rubric Score
X	X	X	X	X	X	X

Appendix C: Drawing Rubric

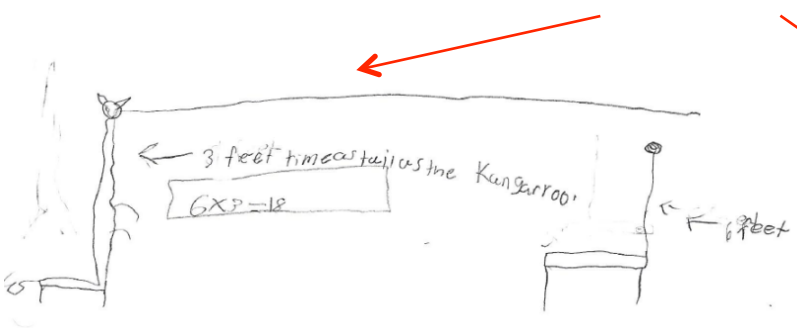
No Attempt **0**	**Unsatisfactory** **1**	**Marginal** **2**	**Proficient** **3**	**Excellent** **4**	**Outstanding** **5**
The task is not completed. No elements in drawing are correctly indicated.	Fragments of accomplishment, but little to no success. Only one element in drawing is correctly indicated.	Part of task is accomplished, but lack of evidence of understanding. Two elements in drawing are correctly indicated.	Could work to full accomplishment with minimal feedback. Three elements are correctly indicated.	Drawing meets demands of task. May have minor errors. Four elements are correctly indicated.	Drawing meets demands of task with no errors and all five elements are correctly indicated.

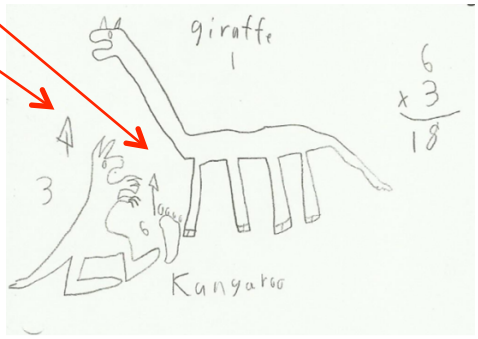
Appendix D: Metacognitive Rubric

Student	**Planning** Does the student write about a kind of plan to solve the problem?	**Monitoring** Does the student write about any contemplation they are having about the problem?	**Evaluating** Does the student check to make sure an answer makes sense, or double check their thinking?
X	X	X	X

Appendix E: Drawings

Yusuf's Drawing **Dominick's Drawing**





IMPROVING READING WITH TARGETED STRATEGIES FOR A RELUCTANT ELEMENTARY READER

Amanda Bright

Indiana State University

Abstract When elementary school children struggle with reading skills, teachers and parents worry. When young children are reluctant to even engage in the act of reading, the situation becomes a dire. This action research project focused on a single first-grade male student who, despite support in the home and in the classroom, was averse to participating in any type of reading. Using a mixed methods approach, three research-based reading strategies were introduced to this learner to engage his sense of self-efficacy for the task, and both his responses, as well as the reactions of his parent, were analyzed. The action research found that through choice-based, interactive methods of reading instruction, the perception of ability regarding reading improved slightly for both the learner and the parent. Although limited in scope and sample, this action research provides support for both the usefulness of individual, responsive reading interventions as well as the application of self-efficacious strategies meant to help motivate a reluctant elementary reader.

Keywords: reading, strategies, reluctant learner, self-efficacy

Introduction

The words and phrases can be found throughout educational literature: reluctant, disengaged, unmotivated, falling behind, at-risk. More students are wearing these labels in schools and feeling both the stigma and effects of their meaning. The research is particularly pointed surrounding beginning readers. From kindergarten to first-grade, the foundation of basic literacy is supposed to be laid as a larger access skill for nearly every area to follow. “Reading difficulty is a particularly salient marker for achievement in young children because it is a primary focus of early education and a principal predictor of current and later achievement” (Grills-Taquechel, Fletcher, Vaughn, & Stuebing, 2012, p. 36). But often, young students are failing to engage with the printed word at this early stage, which puts their future in peril.

According to several researchers, the reluctant elementary reader occurs in specific varieties. Teacher Leah Moorefield noted that "reluctant readers may be divided 'into three categories: those who can't read, don't read, and won't read'" (as cited in Earl & Maynard, 2006, p. 163). By saying this, Moorefield has tapped into one of the most frustrating aspects of underachieving readers – their reason for struggling is unpredictably multi-faceted. Some children have a specific learning problem that prevents their ability to read, others have no interest and therefore do not gain the crucial practice they need to develop, while still others are smart enough to read well but simply choose not to (Ahmad Al-Saleem, 2012). In order to understand what is at the heart of a reluctant – and therefore struggling – reader, research, observation, and analysis needs to become personal. Acknowledging that unengaged readers are commonplace is a good first step, but will the analysis of an individual elementary reader in order to uncover and combat his status – cannot, will not, or do not – be applicable to other students in his situation? It stands to reason that it will, simply because even though there are three types of reluctant or unengaged learners, there is one common underlying cause: a lack of intrinsic motivation.

Although I am a college instructor, I have had many informal conversations with the mother of an incoming second-grader where these ideas are clearly echoed. He is a capable learner and reader, but he is uninterested and disengaged. He also makes numerous comments about his lack of ability. Although he sees the fault in himself, it surely does not rest there alone. Somewhere along the way, perhaps during his rocky kindergarten year, he deeply internalized the idea that he was below average in ability as a reader – and has continued to act on it. Although research speaks to the educational environment and learning opportunities that he received as the main culprit, the purview of this study was to focus on this student as an individual in order to ascertain if his internal perspective as a reader could be bolstered at this juncture. The purpose of this action research project was to look at how self-efficacy elements interact in a general education first-grader in order to find out what would motivate him to both engage in reading activities and then perhaps read more on his own. Although only a few reading activities and techniques were used, it was the commonality of the self-efficacious aspects of each that were measured and evaluated for effectiveness at this student's ability to gain self-confidence and therefore be willing to engage in reading.

Literature Review

This action-based research for Kyle is not, of course, a unique endeavor. Struggling learners have existed since the beginning of education, and particularly in the years following the 1980s and its emphasis on failing schools and falling scores, teachers and parents have worried. Historically, school was not for everyone, so the readers who likely would have been most reluctant simply were not asked to read or engage in the process far beyond a basic level. However, today's society and educational needs are dramatically different, and "compounding the challenge is the reality that today's classrooms are filled with students with increasingly diverse needs, stemming from differences in their home languages, learning abilities, and literacy experiences" (Ganske, Monroe, & Strickland, 2003, p. 118). The literature tends to fall on one side or

the other of the paradigm: either authors talk about theoretical abstractions or specific lesson plans regarding motivation for readers. It seems like fewer studies work to marry the general behavior or disposition of the student with a precise methodology.

Intrinsic Motivation and Self-Efficacy. It is the ideas of Jean Piaget that first took the desire for motivation inward from the primarily extrinsic notion of motivation until then. "[W]e often seem to stifle the child's natural curiosity. In school, children become disinterested, lazy, rebellious, and frightened of failure. The major task of education, it would seem, would be to liberate the bold curiosity with which children enter life" (Crain, 2011, p. 150). Albert Bandura, in the 1960s and 1970s, altered the natural curiosity concept by applying a more social and observational context, noting that when students "see value" in learning, intrinsic motivation and therefore engagement will follow (Daniels, 2010).

Other researchers start from the student instead of the teacher as well, when analyzing intrinsic motivation. Joseph Sanacore (2008) built his argument for creating motivated and self-led readers around personal relevance. Through an extensive set of surveys, Sanacore prescribed strategies about fostering a desire to read for the rest of students' lives because of a personal investment and therefore personal choice. This overarching theory, however, begs the question of what students will find personally relevant. Individual associations are often difficult for teachers to manage with many students, so some educators are moving toward text choice in order to spur engagement and independence. Idit Katz and Avi Assor (2007) noted that self-determination was a crucial factor in moving reluctant readers to become self-sufficient readers because of self-efficacy. Personal relevance is even more punctuated when goal-setting is involved, and research published in *The Reading Teacher* noted the power of inviting struggling readers to name what they will achieve (Cabral-Marquez, 2015). However the students' own views and perspectives are involved, a number of researchers assert that self-efficacy, and therefore, intrinsic motivation, comes from a relationship to the personal.

Addressing of Internal Psychological Needs. Whether it is through the establishment of relevance, choice, or goals, there are still real challenges to getting to the core of a student and his or her struggle to read. The issues of self-confidence and anxiety come to mind, and for educator Erika Daniels (2010), students cannot be made to want to learn. Daniels (2010) asserted, "another, even simpler, strategy for increasing motivation is acknowledging students' fears, worries, and anxieties. By honoring their feelings and listening to what they are going through, motivating teachers indicate that the feelings are legitimate" (p. 28). Once students know that struggling is acceptable, they are less reluctant and more willing to engage of their own volition to improve, Daniels (2010) claimed. As a next step after the proactive address of the psychological components and personal relevance, a number of educators have also outlined methods both inside and outside the classroom to propel intrinsic motivation for struggling readers.

A Path Toward Becoming a Motivated Reader. The theorists and the pragmatists rarely meet in the middle, instead prescribing a single concept or activity to solve the problem of the reluctant reader. When multiple methods are employed, in the form of reading programs, they pull from so many ideologies and incorporate so many variables that it is challenging to tell what is working and what is not. However, many studies, whether implicitly or explicitly, came back to one idea echoed in the work of Annette Earl & Sally Maynard (2006). Earl and Maynard surveyed 14 readers at length and saw it was a lack of confidence in their ability that drove the reticence. The authors found that when children were given responsibility for their own progress as readers (and therefore valued the process) they improved and succeeded. They also added the component of enjoyment to self-efficacy: "If reading is associated with being fun, it is automatically granted a purpose and requires no further justification; it is given status and becomes something the child wants to do" (Earl & Maynard, 2006, p. 178). Therefore, three strategies selected for this action research project were pulled from literature and focused on facilitating intrinsic motivation in students through building their self-confidence.

Methodology

Research has illustrated that self-efficacy and self-confidence are crucial to becoming a successful reader, and this positive self-perception can then mean a "lifetime zest for learning" (Sanacore, 2008, p. 43). However, having influence over intrinsic motivation for another individual is a tall order. This action research project combined several research-based strategies that aimed to create an inward sense of competence. The directional hypothesis was that a seven year old, and his mother, would see an increase in reading engagement due to an intentional focus on strategies meant to build self-efficacy in reading.

The target for this action research project was a seven-year-old Caucasian male named Kyle, a pseudonym in this action research study. He was from a middle-class family with educated parents, both with advanced degrees, and he lived in a mid-sized town in the Midwest. The data from this research could be more widely applicable to other first-grade students in a similar environment, particularly those who do not see themselves as good readers. The mother in this action project was also a component of the research for her knowledge of both his struggles and successes as a reader, both in the classroom and in the home.

Since the goal was to measure and demonstrate self-efficacy, a mixed methods approach was used. It is a challenge to illustrate a more positive sense of self-confidence for a reader with only data, so through triangulation, a general and valid trend appeared regarding Kyle's feelings about his ability and enjoyment for reading from the beginning to the end of the study.

Procedures for Data Collection. The framework of the research happened in three stages: a pre-assessment, followed by three specific learning tasks, and finally a post-assessment.

Pre-Assessment. The action research project began with a pre-assessment to establish quantitative data that assessed both Kyle and his mother's disposition and attitude toward Kyle's reading. Four questions were assessed on a Likert-type scale rating from 5 = excellent to 1 = not good at all. The questions were asked in order to understand feelings about reading, how good he believed he was at reading (self-efficacy), and the quantifiable future prediction of the ability to improve reading independently. Also, Kyle's mother was given an additional qualitative questionnaire for the purposes of providing background knowledge and artifact-style details about Kyle's reading perceptions. That questionnaire asked for comments or characterizations from former teachers and the mother's hopes for Kyle's feelings toward reading in the future.

Learning Tasks. For the second stage of research, Kyle was asked to engage in three separate learning activities, a few days apart, in which he read and either talked about or wrote about what he read. During the learning tasks, observational field notes were be collected, along with some audio recordings. After the conclusion of each of those activities, Kyle was asked to complete a qualitative questionnaire regarding his experience with the reading task that included questions regarding enjoyment of the reading task, how it differed from previous reading experiences or assignments, and a self-perception component that ascertained how well Kyle believed he did on the assignment.

Reading Task No. 1. Kyle explored the picture book strategy that allowed for both creativity and choice on the part of the student. This technique was based on the idea that to enhance narrative reading skills students should be "provided with diverse and complex narratives that demand particular cognitive skills for engagement, such as keeping track of numerous possibilities, and understanding that it isn't always 'necessary to think in a straight line to make sense'" (Pantaleo, 2009, p. 205). The children's book *Does a Kangaroo have a Mother, Too?* by Eric Carle was the basis for the task. Kyle looked at a number of images from the book, four of his choice, and then developed a two- to three-sentence narrative in writing of his own creation. He read his writing aloud for others. Then, a final illustration from the book was chosen, and a fully developed narrative was verbally dictated and recorded about the picture. Kyle, again, read the full narrative (a full page in length), and a printed copy was created for him to keep as further encouragement of achievement. As an extension of the activity, he was asked to read the full narrative from the last illustration aloud for another family member at a later time.

Reading Task No. 2. Kyle participated in "Readers Theater," where he and a friend chose from a selection of one-page scripts that were at a second-grade reading level (Clementi, 2010). Once a script was chosen, they chose roles and read through the script one time

aloud together. Once unsure words were clarified, the two went to a separate room to practice reading through the scripts at least five times to gain fluency. The performance aspect of the strategy for a struggling reader is key: "The activity culminates in a performance, where even the most reluctant readers are stars" (Clementi, 2010, p. 85). When they felt prepared, Kyle and his friend performed the script as theater in front of a small audience two to three times to work through staging. The scripts had humorous aspects, and although movement was up to the performers, they had to stay within the script and were encouraged to read straight from it. As an extension of the activity, Kyle was given two copies each of the script used and two others scripts that were not selected to act out with family and friends at a later time.

Reading Task No. 3. Kyle participated in the Imagine, Elaborate, Predict, and Confirm (IEPC) strategy (Wood & Endres, 2005). This strategy sparked intrinsic motivation because "by closing their eyes and using their senses to imagine a scene, character, event, or object, students have the potential to become active, eager, and engaged participants in a reading lesson" (Wood & Endres, 2005, p. 346). A sheet that had a category for each letter of the strategy drove the activity: IEPC. The first stage of the activity involved Kyle seeing the multiple pieces of artwork in the first chapter of the first book of *The Dragon Masters* series. He was asked to use sensory details and closed-eyes imagination to associate, predict, and guess what could be involved in that chapter. Question probes were also used, along with a few key words from the text to spur answers, which were recorded in the *I* column. The elaboration phase was next, where Kyle took his initial sensory perceptions and added to them with as much detail as possible from the artwork and his own thoughts. Again, extra-texutal questions were used as prompts at this stage for assistance, although creativity and open-endedness was encouraged; findings were then recorded in the *E* column (Wood & Endres, 2005, p. 349). The third stage was prediction, in which Kyle created a few predictions based on the imagining and elaborating regarding the text, noting that proof of his predictions would be tracked. We then dove into the text to see if those imaginative, elaborated upon predictions were accurate, circling the ones that were correct from the sheet, or amending other predictions as needed. The purpose of the activity was not to "get it right" as much as it was to explore – incorrect predictions ended up as useful for discussion as correct ones. As an extension of the activity, the entire book, and the others in the series, were left with Kyle and his mother to continue the pattern.

Post-Assessment. After the three learning tasks and qualitative responses were complete, Kyle and his mother completed the post-assessment, which was a mirror of the pre-assessment, using the Likert-type scale and the same questions. Both Kyle and his mother were also asked to provide anecdotal detail in a semi-structured interview form on each question that was recorded through field notes or on the post-assessment itself.

Results and Discussion

The action research project procedure was implemented in three sessions. All sessions took place in Kyle's home, with a seven-year-old friend also participating in the activities, as needed by the strategy.

Pre-Assessment Data. Kyle's mother was given an artifact collection document in order to gain narrative-style information for background and context regarding Kyle's reading. Also, both Kyle and his mother were given the quantitative pre-assessment using the Likert-type scale to create a baseline for both perspectives and dispositions regarding reading.

Qualitative. In the qualitative questionnaire completed by Kyle's mother, she identified a dual nature to Kyle's ideas about reading. She noted that he "loves to be read to every night" and exhibits a "fun, happy, and imaginative" demeanor when someone reads to him. However, she said he does not like to read on his own, and she listed the adjectives "difficult," "forced," and "mad" to describe his reaction to being asked to read independently. Regarding his former teachers' responses, again, his mother acknowledged a duality. In kindergarten, "he started off very slowly and after receiving extra help improved very much. The confidence he gained was noticeable." In first grade, his teacher "always said he did well, but [he] struggled with [letter] blends. He didn't take time to sound out words, just guessed." As an outpouring of these facts, his mother noted that Kyle has not, under any circumstances, "pursued reading on his own." However, her hope is that Kyle can "enjoy reading as a hobby. He has a great imagination, and I think he can grow that even more by reading. But, he currently sees reading as punishment/work."

Quantitative. For the Likert-style scale pre-assessment, both Kyle and Kyle's mother were asked to rate, on a 1-5 scale, and their responses to four questions are shown in Table 1 and Table 2.

Table 1: Student Pre-Assessment on Perception of Reading Skills

Scale: 1=not good at all; 2=only a little good; 3=good; 4=very good; 5=excellent	*Kyle's responses*
1. How do you feel about your reading ability?	1
2. How good are you at reading?	4
3. What are the chances that you will get better at reading?	5
4. What are the chances that you will start reading more on your own?	1

Table 2: Parent Pre-Assessment on Perception of Student Reading Skills

Scale: 1=not good at all; 2=only a little good; 3=good; 4=very good; 5=excellent	*Kyle's mother's responses*
1. How do you feel about Kyle's reading ability?	3
2. How good is Kyle as a self-motivated reader?	1
3. What are the chances that Kyle will improve greatly with his reading capability?	3
4. What are the chances that Kyle will start reading more on his own?	2

Learning Tasks Data. All of the data collected during all three reading tasks was qualitative in nature, including observational field notes, audio recordings, and an open-ended questionnaire after each activity.

During Reading Task No. 1. For this task, Kyle listened to the directions of the picture book-driven activity devised by Pantaleo (2009) and asked: "Can I answer whatever I want?" He shouted "yay" when the answer was yes, and he specifically chose the four images from the picture book that the writing would be focused upon. As he worked, Kyle giggled as he looked at the Eric Carle (2000) book regarding his own sentence construction. He was focused for at least five minutes for each image and its corresponding writing. After each set of two to three words, Kyle re-read his sentence, but didn't make any changes. He laughed throughout and completed the task by writing both legibly and inside the lines. When asked to share his sentences for each picture from the book, he complied, but did stumble over some of his own writing as he read. The actual written expression was unclear. One reproduction stated the following: "big kanwroo have goo goo babe. Big thige have babs. Do you were shad. Penqawin have fligrs evne I know that." As the task went on, he started to ask fewer questions about the task (from four for the first photo, to no questions for the last one). For the second half of the assignment, Kyle chose an elephant picture from the book, and he verbally constructed a narrative entitled "The Diary of Mr. Elephant Guy Who Gets Hurt Very Badly." During the writing of the story, an incorrect set of verbal grammar was employed, so leading questions were asked as to the correct form of verb tenses when they went awry: "Do you mean 'land' or 'landed' here; which sounds right?" Each time, Kyle self-corrected himself. The full story was then typed up and both emailed and printed out for Kyle, who was asked to share it with his father by reading the full text of the story to him aloud.

After Reading Task No. 1. Directly after the first reading activity was complete, Kyle filled out a questionnaire (although part became semi-structured interview) regarding the task. His answers to three of the questions (what he enjoyed most, what was different than other reading assignments, and why he would like to do the activity again) were all "being silly." When asked how well he thought he did on the reading assignment, Kyle answered "grat" (great). His mother reported that Kyle did indeed read the full story to his father that night from the printed copy, and he said he wanted to take the electronic version of the elephant narrative and make a full book out of it with pictures. In her after-reading task questionnaire, Kyle's mother noted he had "a lot of fun" doing the task, which was in juxtaposition to his normal disposition with reading because he "usually despises writing and doing any 'work.'" His mother also noted that during the course of the activity, which she observed, she felt that Kyle "had confidence in himself" and that she thought he would like to engage in this type of activity again.

During Reading Task No. 2. The second activity employed the technique of Reader's Theater (Clementi, 2010). Out of three second-grade level scripts, Kyle chose *TV Repair Person* (2016), which is a short, two-person play about a television repairman who comes to another man's house to fix his set, only to pull everything out of the set before realizing it was not plugged in – and charging $87 for the house call. During the activity, Kyle said he was "excited" to start. When he fully understood the nature of the task, he maintained his focus for approximately ten minutes. Once he and his peer selected roles, they read the script out loud. Kyle had a few stumbles when reading, but he continued the script from beginning to end. The boys then went into another room to practice, where they read the script through at least five times. For the performance, Kyle requested a larger audience and to do the entire reading twice. The first read-through had two inaccurate lines, but Kyle noticed and corrected the errors on the second read-through. Then, the third through fifth read-throughs, now incorporating staging, were completely accurate. Kyle was willing to read aloud in front of others for this activity, and he was given the scripts he practiced along with two other sets of scripts, which he was encouraged to do with other family members.

After Reading Task No. 2. In his after-reading task questionnaire and semi-structured interview, Kyle again reported that "being silly" was his favorite aspect, although this time, he asked for specific direction on how to spell silly and then corrected it in two places on his questionnaire. The difference in this reading activity, in his mind, was the ability to "walk around," and he noted the value of movement and independence when a follow-up question was asked as to why that was important to him. Again, Kyle noted that he would be willing to engage in this type of reading activity again, and he described the activity itself as "great" – using correct spelling this time because he asked for guidance. Following this activity, his mother noted that Kyle enjoyed himself and that acting out plays and scripts is something he has always liked to do, so he was involved in the activity. However, Kyle did not do the scripts later in the week with family members. He read a few lines on one of the scripts, deemed it too difficult for him, and stopped, according to qualitative responses from his mother.

During Reading Task No. 3. With a series by Tracy West (2014) called *The Dragon Masters*, the Imagine, Elaborate, Predict, and Confirm (IEPC) reading strategy was used to engage Kyle in independent reading (Wood & Endres, 2005). At the beginning of the session, Kyle was reminded that he was a good reader (as evidenced by the two previous activities). Using the first chapter in book one, Kyle looked at each of the five drawings in the chapter closely. For each drawing, he was asked to do each of the first three stages of the strategy. For imagine, he was asked to talk about how the scene in the book smelled, felt, sounded, tasted, etc., using sensory detail to explain what it would be like to be in that drawing. For elaborate, he was asked to dive deeper into explanation or description about that initial detail. Then, in predict, he was asked to postulate what was happening in the story based on that image. Kyle spent approximately 15 minutes on the task in total, without any breaks. In the first image in the text, he saw a boy holding a worm and smiling. In the imagine phase, he said the boy was feeling the worm in his hands. In the elaborate phase, he said the worm felt "disgusting and slimy," but that the boy liked it. In the prediction phase, Kyle said the boy probably "felt good" at home with his friend the worm "guy". The qualitative collection of IEP then continued with the four other images until the ultimate predictions were made.

After the first three sections of the chart were complete, Kyle read the first chapter to confirm or deny his predictions. His friend read the first paragraph, but then Kyle read the next two paragraphs of text out loud on his own. There were four places where he didn't know the word so he just guessed, but he read the entire assigned section. He then continued to alternate reading several paragraphs at a time with his friend until the chapter was complete. Throughout, he used the chart to confirm predictions, noting with a smile when one of his ideas happened just the way he thought it would in the book, as seen in Table 3.

Table 3: Qualitative Data for Reading Task No. 3

Imagine	Elaborate	Predict	Confirm
"Feeling worm"	"Disgusting and slimy"	"Boy feels good at home"	"Boy IS happy at home"
"Feeling onion"	"In field"	"Boy poor and lives in country"	"Boy is from onion farm in small village"
"Feels hot outside	"He might faint	"He try to find water"	
Smell of horses and manure, barn"	Yucky smell"	"Mommy doesn't want boy to leave but boy leaves (with man)"	"Soldier did arrive on a horse; mother did plead for her son to stay"
"Traveling in a maze"	"Feels lost an scared; could fall in the river"	"Going to castle at the end or death in a snowy place"	"Trip to castle was long"
"Feel door made of wood"	"Scared and man running up the stairs"	"He is scared and alone"	"Boy was very alone and scared behind the door (down the stairs)"
"Breaking glass of a window"	"Burning of fire and smoke there"	"Dragon broke out of the place; magic door?"	"Red dragon broke through (using magic!) and breathed fire"

After Reading Task No. 3. In his after-reading task questionnaire, Kyle had similar answers about this activity as the previous two, but he also noted that this assignment was different because it had "reading" – a traditional book concept instead of other tools. His mother asked him if he would continue to read the books, with both the strategy and on his own, and the response was noncommittal. The four books in the series were left with him, and both the strategy sheets, as well as models for the parents.

Post-Assessment Data - Qualitative. After the self-efficacy strategies employed, Kyle noted that he enjoyed the activities. Although during the next few weeks he did not pick up a book on his own to read, he did ask to try the reading activities again, according to his mother. He described the reading tasks as "fun" and was willing to do more because they allowed him to "be silly." For his mother, she has not seen substantial change in his desire to be independent due to a growing self-efficacy. She noted he "never on his own [reads]; I have to be with him." In much the same vein, she believes at the end of the project that "if Kyle finds something that fascinates him, I think he will find that he loves reading. But he isn't patient enough yet nor interested in sitting down to 'relax' with a book."

Post-Assessment Data - Quantitative. Using the same Likert-type scale at the end of the learning tasks, Kyle and his mother produced the following responses, as noted in Table 4 and Table 5.

Table 4: Student Post-Assessment on Perception of Reading Skills

Scale: 1=not good at all; 2=only a little good; 3=good; 4=very good; 5=excellent	*Kyle's responses*
1. How do you feel about your reading ability?	5
2. How good are you at reading?	5
3. What are the chances that you will get better at reading?	5
4. What are the chances that you will start reading more on your own?	2

Table 5: Parent Post-Assessment on Perception of Student's Reading Skills

Scale: 1=not good at all; 2=only a little good; 3=good; 4=very good; 5=excellent	*Kyle's mother's responses*
1. How do you feel about Kyle's reading ability?	3
2. How good is Kyle as a self-motivated reader?	1
3. What are the chances that Kyle will improve greatly with his reading capability?	4
4. What are the chances that Kyle will start reading more on his own?	3

Looking at the qualitative and quantitative data together, using triangulation, it seems clear that the techniques may have slightly improved Kyle's reading comprehension abilities and motivation to engage in reading activities.

Mixed Methods Data Discussion. For a seven-year-old boy who was reluctant to read and lacked apparent intrinsic motivation to do so, Kyle was willing to engage in reading-centered activities through the process of this research. He demonstrated his increased self-motivation through both his focused engagement in activities (increasing time on task with each activity) and desire to continue learning using the research-based strategies, in our assessment sessions and afterward.

Qualitative. As evidenced through his questionnaire answers, Kyle is looking for fun to be a component in reading; however, he is also interested in open boundaries and creativity. His favorite aspects of the learning tasks were the chances to express himself, have choice, and see reactions to *his* thoughts and theories. He was increasingly willing to engage in the reading. His mother did not see a real change in his willingness to read independently, but she did note that after each reading task, he was engaged and happy to be participating and reading. Particularly in the second and third reading tasks, Kyle was more confident in his ability to read – enough to perform in front of others and read from a novel aloud, as well as through his more careful consideration and effort during reflection on qualitative responses. This exposure to strategies meant to promote self-efficacy for Kyle did provide some progress toward motivation to continue reading – there were no external rewards for doing so. Ultimately, however, the goal of picking up a text himself – because he believes he can just sit and read it – was not reached within a few weeks of the conclusion of the research.

Quantitative. For the pre- and post-assessments, the goal was to see a numerical change from the beginning to the end when measuring Kyle's self-efficacy and perception of himself as a reader. The quantitative change in Kyle is seen in Table 6.

Table 6: Kyle Data from Pre- to Post-Assessment

Scale: 1=not good at all; 2=only a little good; 3=good; 4=very good; 5=excellent	*Kyle's responses (Pre-Assessment)*	*Kyle's responses (Post-Assessment)*
1. How do you feel about your reading ability?	1	5
2. How good are you at reading?	4	5
3. What are the chances that you will get better at reading?	5	5
4. What are the chances that you will start reading more on your own?	1	2 (1 at first)

The data above illustrates a change for Kyle. Although his day-to-day behavior of independent reading has not developed, he has – at some level – gained a more positive view of his own reading ability through the reading tasks. He still seems dubious about reading on his own (even to the extent of changing his self-ranking mid-answer), but otherwise, all of the numbers that represent the possibility of reading independence and self-efficacy demonstrate growth. This was after only three reading tasks, but his enjoyment for these types strategies were a win on some personal level.

For Kyle's mother, the data is a bit more realistic, as she is viewing external behavior rather than just internal disposition regarding reading in a learning environment, noted in Table 7.

Table 7: Kyle's Mother's Data from Pre- to Post-Assessment

Scale: 1=not good at all; 2=only a little good; 3=good; 4=very good; 5=excellent	*Kyle's mother's responses (Pre-Assessment)*	*Kyle's mother's responses (Post-Assessment)*
1. How do you feel about Kyle's reading ability?	3	3
2. How good is Kyle as a self-motivated reader?	1	1
3. What are the chances that Kyle will improve greatly with his reading capability?	3	4
4. What are the chances that Kyle will start reading more on his own?	2	3

There was either a slight increase or a status quo finding for each area, which in the short time frame that this project was completed, is understandable. It is particularly notable that although her view on Kyle's current ability is unchanged, her prospects for his reading future have improved through the observation of the reading tasks.

Limitations

Modern research on reluctant readers comes from a variety of perspectives and philosophies, but most acknowledge that for long-term investment and success – in addition to the role of a high quality school reading environment – intrinsic motivation through self-efficacy is important. Although a longitudinal study would be the most appropriate for Kyle to truly judge this, the strategies that emphasized the intrinsic elements through these reading strategies, such as autonomy, creativity, and choice, did interest Kyle – to the point where he was asking for another reading task. Therefore, the findings of this action research, however limited, are evidence for the greater body of work on particular strategies and how they can promote motivation and perhaps later more self-efficacy for reluctant readers.

Conclusion

Although this research project was based on a single first-grade reader who struggled with the motivation to pick up a book, his reluctance is indicative of a larger trend. "Experts in the field of reading motivation identify the lack of student engagement with

literacy as one of the most severe crises of our schools. That makes finding ways to increase reading motivation a top priority" (Cabral-Márquez, 2015, p. 471). The goal of this project was the same – to help Kyle choose to read of his own volition because he felt capable to do so. Yet, although the data suggested that Kyle's general disposition toward reading had improved – particularly regarding his self-perception and willingness to engage, the research project was not a complete success. In the weeks following the implementation of the strategies, his mother did not see a large change in his reluctance or his feelings about himself as a reader. However, during the reading comprehension activities themselves, and in the post-assessment, he did improve in willingness to practice, so there is hope for forward movement. It was a breakthrough, particularly from his mother's perspective, when he asked to do more reading, or work with a text longer, because the request was counter to his normal learning disposition regarding reading.

Educational Implications. Even with a number of complicating factors, the findings have some applications and implications for the educational community. It is clear to researchers that reluctant readers vex teachers. According to Ganske, Monroe, & Strickland (2003) in a large-scale study of educators, both new teachers and veterans said struggling readers were one of their biggest concerns. "Their questions focused overwhelmingly on their need to learn instructional strategies and skills to improve students' literacy" (Ganske, Monroe, & Strickland, 2003, p. 471). As an educator, I know that it is much easier to rely on extrinsic strategies for engaging reluctant readers, rather than strategies that are simply about reading itself. It should be noted that, in this specific study, the reliability and validity of the questionnaires used are not scientific in nature, but as an educator, the qualitative data does support the notion that both reading ability and confidence were improved for this student through these reading comprehension activities. This project then did breathe more life into the premise that by providing self-efficacious strategies, motivation to read can be improved for a reluctant reader. Of particular note are the activities that were used in this action research and their success with this learner in this environment, especially when paired with individual intervention. Indeed, with this learner, it was the personal attention, creativity, and direction that created a motivation to read, which is notable. The complicating factor is, of course, time and the ability to work with individual learners, but it is a goal to which both educators and parents should strive.

About the Author

Amanda Bright is a former professional journalist who later spent a decade as a scholastic journalism adviser and English teacher in Illinois. Currently, Bright is a journalism instructor at Eastern Illinois University and a doctoral student in Curriculum, Instruction, and Media Technology at Indiana State University, where she also serves as the Media Content Coordinator for Indiana State Online. Bright serves as the Social Media Director and Web Co-Administrator for the Illinois Journalism Education Association and is on its Board of Directors. Email: amandabright2002@gmail.com

Reference List

Ahmad Al-Saleem, B. I. (2012). Encouraging reluctant readers to read. *European Scientific Journal, 8*(21), 1-8. Retrieved from http://ezproxy.indstate.edu:2048/login?url= http://search.proquest.com/docview/1316918736?accountid=11592

Brown, K. J. (2000, January). What kind of text: For whom and when? Textual scaffolding for beginning readers. *The Reading Teacher, 53*(4), 292-307. Retrieved from http://www.jstor.org/stable/20204794

Cabral-Márquez, C. (2015, March). Motivating readers: Helping students set and attain personal reading goals. *The Reading Teacher, 68*(6), 464-472. doi:10.1002/trtr.1332

Carle, Eric. (2000). *Does a kangaroo have a mother, too?* New York, NY: HarperCollins, Inc.

Clementi, L. B. (2010, February). Readers theater: A motivating method to improve reading fluency. *Phi Delta Kappan, 91*(5), 85-88. Retrieved from http://www.pdkintl.org

Crain, W. (2011). *Theories of development: Concepts and applications.* Upper Saddle Hall, NJ: Prentice Hall.

Daniels, E. (2010, September). Creating motivating learning environments: What we can learn from researchers and students. *The English Journal, 100*(1), 25-29. Retrieved from http://www.jstor.org/stable/20787687

Earl, A., & Maynard, S. (2006). What makes a child a reluctant reader? *New Review of Children's Literature and Librarianship, 12*(2), 163-181. doi:10.1080/13614540600982959

Ganske, K., Monroe, J. K., & Strickland, D. S. (2003, October). Questions teachers ask about struggling readers and writers. *The Reading Teacher, 57*(2), 118-128. Retrieved from http://www.jstor.org/stable/20205331

Grills-Taquechel, A. E., Fletcher, J. M., Vaughn, S. R., Stuebing, K. K. (2012). Anxiety and reading difficulties in early elementary school: Evidence for unidirectional- or bi-directional relations? *Child Psychiatry and Human Development, 43*, 35-47. doi:10.1007/s10578-011-0246-1

Irausquin, R. S., Drent, J., & Verhoeven, L. (2005, December). Benefits of computer-presented speed t raining for poor readers. *Annals of Dyslexia, 55*(2), 246-265. Retrieved from http://www.jstor.org/stable/23765316

Katz, I., & Assor, A. (2007). When choice motivates and when it does not. *Educational Psychology Review, 19*(4), 429-442. Retrieved from http://www.jstor.org/stable/23363842

Pantaleo, S. (2009). The influence of postmodern picturebooks on three boys' narrative competence. *Australian Journal of Language and Literacy, 32*(3), 191-210. doi:10.1177/1086296X10397870

Sanacore, J. (2008). Turning reluctant learners into inspired learners. *The Clearing House, 82*(1), 40-44. Retrieved from http://www.jstor.org/stable/30182002

TV repair person. (2016). Retrieved from http://www.timelessteacherstuff.com/ readerstheater/TVRepairPerson.pdf

West, T. (2014). *Dragon masters: Rise of the earth dragon.* New York, NY: Scholastic Press.

Wood, K. D., & Endres, C. (2005, January). Motivating student interest with the Imagine, Elaborate, Predict, and Confirm (IEPC) strategy. *The Reading Teacher, 58*(4), 346-357. Retrieved from http://www.jstor.org/stable/20205488

Zucker, T. A., Ward, A. E., & Justice, L. M. (2009, September). Print referencing during read-alouds: A technique for increasing emergent readers' print knowledge. *The Reading Teacher, 63*(1), 62-72. Retrieved from http://www.jstor.org/stable/40347652

"SO WHAT ARE WE WORKING ON TODAY?": PRESERVICE TEACHERS' USE OF ASSESSMENT DATA IN A READING DIAGNOSIS COURSE

Bethanie Pletcher and Danielle Tefft

Texas A&M University – Corpus Christi

Abstract Instructors of university reading diagnosis courses are charged with preparing preservice teachers to administer and analyze literacy assessments and plan subsequent instruction for children based on those assessments. Recently, several instructors of this course at a South Texas university have noticed that the planned instruction during tutorial lessons matches the information gleaned from the assessments most, but not all, of the time. The purpose of this action research study was to investigate the ways in which the undergraduate tutors used the assessment data they collected to plan instruction for their students. This study followed seven tutors as they worked with children over the course of eight sessions in two sections of an undergraduate reading diagnosis course. Findings suggest that all seven tutors used some of their assessment data effectively; however, there were instances where the assessment data and instruction were mismatched. These results point to the need for course instructors to make adjustments of weekly in-class proceedings.

Keywords: preservice teachers, reading diagnosis course, literacy assessment, qualitative research

Introduction

As part of their studies to become teachers, undergraduate students often take a course where they learn to administer and analyze literacy assessments and utilize the data obtained to plan instruction. Professors of such courses strive to create future teachers who are sensitive observers of children's reading and writing habits and who are truly responsive to the needs of their students (Clay, 2005). Duffy and Atkinson (2001) assert the purpose of the "tutoring experience is to help [undergraduates] learn how to teach diagnostically and reflectively, and the principles of instruction that they learn through the work with one struggling reader [can] be modified and adapted to their work in the classroom setting" (p. 96). Problems surface when instructors of this course notice that the undergraduate students struggle to create meaningful lesson plans based on the responses of their tutees during assessment administration.

Recently, several instructors of this course at a South Texas university noticed that, while some of the undergraduate students', also preservice teachers', lesson plans matched the assessment results they had obtained, others were incomplete and consisted of activities that had little or no basis in the assessment information of the children they were tutoring. It is hoped that, by carefully studying several undergraduate tutors' work in this course, those who teach the course will be able to make lasting changes that will result in more rigorous instruction for both undergraduate students and children involved in the tutorials.

Literature Review

Diagnosis of Reading Problems Courses. Many university-based teacher certification programs offer literacy assessment courses, some of which include an in-house tutorial component. In courses such as these, education students are expected to learn how to conduct several reading and writing assessments and analyze the results. They are then to use the information they gather to build a sequence of study for their tutees. This is a crucial skill to have, one that they will use every day as classroom teachers.

Instructors who teach undergraduate courses with a tutorial component work to help preservice teachers learn how to problem-solve. Assaf and Lopez (2012) advocate preservice teacher tutoring because it creates a "community of practice" that helps to prepare them for their classrooms. Future teachers, under the guidance of a more experienced reading educator, are given the opportunity to practice assessment and plan appropriate instruction.

One-to-one Tutorials. During the regular school day, the children who are served in the diagnosis course tutorial sessions are taught mostly in a whole group setting, where often, the teacher to student ratio is one-to-22. Research indicates one-to-one teaching is preferred by both teachers and students (Baker, Rieg, & Clendaniel, 2006; Christensen & Walker, 1991; Hedrick, McGee, Mittag, 2000; Juel, 1996; Mokhtari, Hutchinson, & Edwards, 2010). Students have distinct needs, and a one-to-one setting allows teachers to better address these needs. The tutors get to know themselves as teachers and employ their own teaching styles (Assaf & Lopez, 2012; Jones, Stallings, & Malone, 2004). One-to-one settings are often less intimidating for preservice teachers and can help them become more confident as they begin teaching (Bier et al., 2012; Mallette, Kyle, Smith, McKinney, & Readence et al., 2000). Many preservice tutors have not only claimed to learn more about themselves in a one-to-one setting, but they also grow stronger bonds with their students (Assaf & Lopez, 2012; Lane, Hudson, McCray, Tragash, & Zeig, 2011; Malone, Jones, & Stallings, 2002).

Using Multiple Kinds of Assessments. Several studies have highlighted the success of preservice teachers in learning how to effectively administer literacy assessment tools during reading diagnosis courses (Massey & Lewis, 2011), as well as how to use them to

inform instruction (Duffy & Atkinson, 2001; Morgan, Timmons, & Shaheen, 2006). Some preservice teacher-tutors demonstrate that they are able to closely analyze data and work with students on specific skills (Massey & Lewis). For example, novice tutors might indicate that their students struggle with comprehension, and as they grow familiar with the reading process, they are able to discuss students' needs in terms of inferring or visualizing. Massey (1990) also discovered, rather than using one formal assessment to drive instruction for all tutoring sessions, tutors continued to assess across lessons, both formally and informally, and use the results during the subsequent tutorial sessions.

Some course instructors have found preservice teachers base the instruction of their tutees on observations they make while teaching, resulting in "reflection-in-action" (Schön, 1987). After spending time getting to know their students' learning styles, interests, and needs, tutors record this as observational data and use it to raise their students' reading and writing (Hedrick et al., 2000; Leal, Johanson, Toth, & Huang, 2004; Worthy & Patterson, 2001). This process allows them to rely on more than a textbook to plan activities (Stump, 2010), since "creative responsiveness, rather than technical compliance, characterizes the nature of effective teachers" (Anders, Hoffman, & Duffy, 2000, p. 732). Also, as students' needs change, some preservice teachers adjust their instruction (Fang & Ashley, 2004; Hedrick et al.), which is also a highly desirable skill.

Preservice Teachers' Reflections. Diagnosis course instructors often ask preservice teacher tutors to take detailed notes during tutoring sessions and reflect on these at a later time (Morgan et al., 2006). The reflections help them to process instructional strategies that worked and what made them work, as well as those that did not and why they did not (Hedrick et al., 2000; Leal et al., 2004). Morgan et al. discuss the importance of tutors finding patterns in the information they record in order to understand how their children progressed as readers. During these reflections, students are to also consider how the tutoring process helps them develop instructional routines, not only for use during tutorial sessions, but also in future teaching situations (Massey & Lewis, 2011; Worthy & Patterson, 2001). Duffy and Atkinson (2001) noticed that, in their reflections, preservice teacher tutors expressed they valued their experiences tutoring young readers and that it was a good opportunity to become familiar with one child as a reader and writer.

Methodology

In this cross-case qualitative action research study, the researchers analyzed the assessment results of seven preservice teachers enrolled in a diagnosis of reading problems course and considered these results as they examined the subsequent lesson plans that were to be based on the assessment data obtained. The purpose of this study was to examine the relationship of the assessment data and the resulting instruction of undergraduate preservice teachers enrolled in a diagnosis and correction of reading problems course at a South Texas university in order to improve the teaching and

learning in this course. The goal of a reading diagnosis course is to produce teachers who understand how to effectively use literacy assessment data. However, there is little mentioned regarding exactly *how* this is accomplished. As teachers, they will be expected to engage in the constant cycle and integration of assessing and teaching. So the question remains: how do literacy teacher educators help novice future teachers link assessment and instruction? The researchers decided, before this question can be answered, they must examine the lesson planning practices of these future teachers.

Findings yielded from this study will inform the teaching and structure of the diagnosis course as well as several of the other literacy teacher education courses at the university. This will be particularly important in the areas of adjusting instruction and choosing instructional activities for children to boost strategic reading and writing. Preservice teachers will, in turn, provide teaching materials and activities that match students' current levels of processing, rather than basing instruction on unsupported instincts. Because reading diagnosis courses are offered at many academic institutions as part of teacher preparation programs, the effects of this study may reach beyond this particular institution. The question that guided this research was: In what ways do preservice teachers use information obtained from a reading assessment protocol and a writing assessment protocol to plan a course of instruction for their students?

Role of the Researchers. The lead researcher is an assistant professor at the university where this study occurred. She teaches sections of the undergraduate reading diagnosis course; however, she did not teach either of the sections in which the undergraduate student participants were enrolled. She had previously taught several of the undergraduate participants in another course at the same university, so they knew her and were comfortable working with her. The lead researcher also knew the instructors of these two diagnosis course sections, so they were comfortable with her working within the context of their classrooms. The second researcher, at the time of this study, was an undergraduate student pursuing a high school English teaching certificate at the same university. She was accepted into the McNair Scholars program, a highly selective program at the university that requires students to participate in research with faculty mentors. She had taken the diagnosis of reading problems course during her undergraduate program a year prior to this study and therefore held a unique perspective while taking a close look at the link between assessment, diagnosis, and instruction. She was not, however, at the time of this study, a student in either of the sections studied and had already finished the majority of the coursework for her degree.

Participants and Setting. Seven undergraduate female students participated in this study. They were purposefully selected because they volunteered to participate in the study and agreed to have their work and lessons more closely examined than is usually done by one instructor during the semester, as there are usually 25 students enrolled in each course section. These undergraduate students attend a four-year regional university in South Texas that serves about 12,000 students. They were enrolled in two

sections of a course titled Diagnosis and Correction of Reading Problems, which is a required course for students seeking any teaching degree.

The first five sessions of the course are taught traditionally, as the instructor disseminates information about children who are reading and writing below grade level and the assessments that might be used to determine who these students are as readers and writers and how to best provide interventions. In the following eight class sessions, traditional class is held for one hour, and each undergraduate student then tutors an elementary-aged child, ranging in age from six to twelve on the university campus for one hour. The course instructor is present during this time, moving throughout the classroom and stopping every few minutes to listen in on lessons. Tutoring sessions consist of instruction in the areas of reading comprehension, fluency, vocabulary, word study, and writing. Of the seven children who participated, four were female, three were male, and they ranged in age from six to ten.

Data Collection. Three types of artifacts were collected for this study: literacy assessment protocols and accompanying observational notes, lesson plans and accompanying observational notes, and interview transcripts.

Literacy Assessment Protocols and Observational Notes. The preservice teachers enrolled in the course administered, scored, and analyzed several formal and informal literacy assessments over the course of the tutoring sessions. They turned in photocopies of the completed assessments to the researchers. These are relevant pieces of data because the tutors used these tools for both on-the-run and later instruction. It should also be noted that this process of gathering assessment data is a required part of the course assignments. Although tutors administered other assessments during the tutorial sessions, the assessment protocols collected for this study include the Bader-Pearce Informal Reading Inventory (2013) and an informal writing inventory. The graded reading passages in the informal reading inventory allowed the preservice teachers to determine at which grade level their tutee read by assessing their reading accuracy and comprehension of short stories at various levels of difficulty. The informal writing inventory allowed the undergraduate students to assess their tutees' writing by having the tutee copy, transcribe, and compose short stories.

Lesson Plans and Observational Notes. Each participant submitted hard copies of the six lesson plans (the first two sessions are used largely for assessment administration) used during tutorial sessions. Each plan consisted of the topic to be addressed, the activity used to address it, the child's response to the activity, and the tutor's anecdotal notes for each activity. Each tutor also wrote a brief reflection paragraph about her teaching after she finished teaching each lesson.

Interview Transcripts. After the eight tutoring sessions concluded and all assessment data sets and lessons were coded, the researchers conducted a 20-minute, semi-structured interview with each participant using a short set of guiding questions (Appendix A). The patterns and codes obtained from the assessment protocols and lesson plans were used to create the interview questions. Interviews were audiotaped and transcribed so that they could be analyzed for comments that supported the work each tutor did with her student.

Data Analysis. After all data was collected at the conclusion of the eight-week tutorial period, the researchers used the following steps to analyze the data. Each tutor's hard copy assessments were coded using *a priori* coding. This type of coding was chosen as the researchers pre-determined areas of instruction by which to group the data. These areas are comprehension, reading accuracy, fluency, vocabulary, and writing. The researchers then took this information and considered each tutor's lesson plans, including activities and anecdotal notes, alongside the assessments and coded lesson plans. Finally, the interview transcripts were coded alongside each tutor's assessments and lesson plan sets for similarities and differences in what the tutors said they did and what they actually did during lessons. Information from the interviews is interwoven in the "results and discussion" section. The researchers were looking for gaps per the research question: In what ways do preservice teachers use information obtained from a reading assessment protocol and a writing assessment protocol to plan a course of instruction for their students?

Trustworthiness. To ensure trustworthiness of the data collected, two measures were utilized. First, three kinds of data were collected in the form of assessments that were administered by the tutors and their observational notes during the assessments; lesson plans and observational notes during tutorial sessions; and interview transcripts. Second, member checking was employed by sending the participants their interview transcripts to ensure accuracy of responses and guarantee that they were represented fairly. Third, the researchers worked closely throughout the entire data analysis process by checking on one another's observations.

Ethical Issues. Participation in the study was completely voluntary on the part of the undergraduate students, children, and parents. Each participant consented to being a part of the study. The researchers were not instructors for this course, and the study did not affect the preservice teachers' grades or standing at the university in any way. The researchers obtained assent from the children whose tutors participated and consent from the parents of these same children, thereby having the consent and assent of seven trios (tutor, child, and parent).

Results and Discussion

The analysis of the preservice teachers' assessment protocols, lesson plans, and interview transcripts revealed two categories of findings. First, in some areas, the tutors used their assessment data effectively by aligning instructional activities to observed and recorded assessment data. Second, in other areas, they either had solid assessment data and missing lessons to address that data, or they had planned instruction for areas in which they had no recorded data.

Tutors' Effective Use of Data to Plan Instruction. Each of the seven tutors had evidence to show they had used the assessment data they gathered to plan instructional activities to address their tutees' specific areas of need. The areas discussed here are comprehension, fluency, writing, and reading accuracy.

Comprehension. Three of the tutors used their students' results on the informal reading inventory to focus on areas of comprehension where extra work was needed and provided a matching set of instruction during tutorial sessions. One tutor, Stacy (all names are pseudonyms) commented that this is the area "where the big struggle [for my student] was" (5/5/2015 interview). Tutors recorded that their students had difficulty retelling texts and that they either retold events out of order or left out big ideas from the text. To address this, one tutor taught her student how to do a "five-finger retell," a strategy in which the student uses each finger and thumb to recall the story elements. Another tutor used short texts in order for the student to practice retelling an entire story in one sitting. Yet another utilized a graphic organizer in the form of a story map to help her student correctly sequence events.

The preservice tutors also responded to the data they collected concerning their tutees' difficulties answering comprehension questions administered at the end of each selection on the informal reading inventory. Some tutors attended to this concern by playing games with students, such as "Quiz-Me Can," in which the student draws general questions from a can and answers them with the tutor's help. Others created foldables with their students to work on story elements and making predictions.

Fluency. Two tutors, Karen and Allison, recognized that reading fluency needed to be addressed with their students and made appropriate accommodations for this in their lesson plans. One tutee's lack of expressive reading prompted her tutor to create word strips, each with a sentence that ended with a different punctuation mark. She demonstrated how to read each sentence strip, and then gradually released the task to her student. Because of another child's choppy phrasing when reading, her tutor chose to use several poems during each tutorial session, reading each one chorally or through echo-reading to encourage her student to hear the rhythm of the poetry.

Writing. After administering the informal writing inventory, five tutors observed their students' various difficulties with writing. When interviewed, Maxine said, "We would have conversations [about the photograph prompt], but it was just the pen to the paper where he struggled" (5/1/2015 interview). Other tutors indicated that their students did not write much, rushed, were frustrated, or were unsure of punctuation and spelling. In order to motivate students to write, tutors made tasks novel by playing "roll-a-story," an activity where the child rolls a cube with six events and puts them together to form a story. They also wrote responses to texts, friendly letters, and alternate endings to stories they read together. Since these tutors also noticed that their students were not writing much, they included instructional activities such as using graphic organizers and writing in response to informational texts through the use of KWL (What I Know; What I Want to Know; What I Learned) charts.

Reading Accuracy. All seven preservice teacher tutors carefully recorded miscues on the informal reading inventory, and all observed that their students demonstrated some difficulty with decoding sight words, short words, or multisyllabic words, depending on the child's reading level. Tutors used a miscue analysis chart to guide their word study instruction and several commented during their interviews that using this chart helped them determine which particular phonics skill to teach. For example, one tutor noted that her student had difficulty reading multisyllabic words, so they did some Making Words (Cunningham & Hall, 2008) activities and played games that focused on working with affixes and base words. Two of the participating tutors documented that their students often confused beginning sight words, so they included the following activities in their lesson plans: flash cards, word identification BINGO, and using magnetic letters to bring words to fluency by forming them several times.

Missing Connection Between Data and Lessons. In addition to effectively linking assessment data to instruction, all seven tutors grappled with the task of analyzing all data carefully and planning purposeful activities based on their observations. It was noticed that tutors either had data but were missing corresponding lessons or planned lessons without the data to support the need for those lessons.

Data and Missing Lessons. Two tutors, Stacy and Anna, indicated that their students needed fluency instruction. Stacy stated that her student "would run through punctuation marks [and] wouldn't pause in between" (5/11/2015 interview). As lesson plans were reviewed, however, it was discovered that there was no evidence that fluency was addressed during tutorial sessions. Similarly, Stacy and Cassandra noticed that their students were unmotivated to write during administration of the informal writing inventory. Upon inspection of their lesson plans, there were no planned activities that focused solely on writing motivation. So, while the preservice teachers documented that these were issues on the assessments, there were no indications in their lesson plans that they addressed these particular deficits.

Lessons and Missing Data. All seven tutors who participated in this study planned some instructional activities for their students that, while many were research-based and high-quality activities, were not related to the information they collected about their students during the administration of the assessments required for the course. Vocabulary instruction is one area six of the tutors chose to devote time and resources to without having the assessment data to back up the instruction. Students participated in such activities as looking up the definitions of words, working with vocabulary word cards, using word banks, and playing games with vocabulary words. There were no notes included about vocabulary on the informal reading inventories of these tutors' students.

Limitations

There are several limitations to consider regarding this study. The sample of preservice teachers was small, part of only two course sections, and was located at one university; therefore, there exists a small degree of generalizability (Merriam, 1998). Also some of the participating undergraduate preservice teachers had been previous students of the first researcher, and this may have affected the way they responded during the interviews. Lastly, the preservice teachers' performance in the course may depend upon who their instructor is and their course preparation up to the point of taking the reading diagnosis course.

Conclusion

The results of this study have pointed to the need for some restructuring of this course, as well as some possible refinements that need to be made to other undergraduate reading courses in the same program. A large portion of this course is devoted to teaching education students how to administer and score several assessments, some of which they can learn to do by reading about them and analyzing examples on their own. Perhaps some of the time would be better utilized by not only discussing, but demonstrating exactly what to do with the assessment data that is collected during the first few tutorial sessions, as Baker and colleagues (2006) suggest, and then engaging tutors in "structured practice" (Wasserman, 2009, p. 1049). It seems that the preservice teachers need practice in "noticing" and "naming" (Johnston, 2004) their tutees' performance on both assessments and activities. Instructors might conduct live teaching sessions in which they model the processes of analyzing assessment data, choosing a skill, planning instruction for that skill, and teaching a student. This can be videotaped and voiced over with commentary for subsequent viewings. After observing and taking notes on this process, students in the course can debrief with one another and with the instructor. Then, in ensuing class sessions, instructors can individualize this process by closely observing tutors as they work with children and "step in to model and reteach as necessary" (Massey & Lewis, 2011, p. 128).

Success in the reading diagnosis course on the part of preservice teachers is crucial, as it is often one of their first experiences with the formal teaching of children. They will take what they have learned into their field experiences and student teaching.

Instructors of this course build the foundation of assessment data collection and the resulting responsive teaching. They help their tutors know what to say and do when their children ask, "So what are we working on today?"

About the Author

Bethanie Pletcher, Ed.D. is an Assistant Professor of Literacy Education and the Undergraduate Reading Program Coordinator at Texas A&M University – Corpus Christi. Dr. Pletcher's research interests include teacher and student discourse during reading instruction, early literacy, and literacy coaching. Email: bethanie.pletcher@tamucc.edu

Danielle Tefft is a graduate student in the Master of Science in Reading program at Texas A&M University – Corpus Christi. Ms. Tefft currently teaches English in the Corpus Christi Independent School District. Email: danielle.tefft@ccisd.us

---

Reference List

Anders, P. L., Hoffman, J. V., & Duffy, G. G. (2000). Teaching teachers to teach reading: Paradigm shifts, persistent problems, and challenges. *Handbook of Reading Research, Vol III,* 719-742.

Assaf, L. C., & Lopez, M. (2012). Reading rocks: Creating a space for preservice teachers to become responsive teachers. *Journal of Early Childhood Teacher Educators, 33*(4), 365-381.

Bader, L., & Pearce, D. (2013). *Bader Reading & Language Inventory* (7th ed.). New York, NY: Pearson.

Baker, J. D., Rieg, S. A., & Clendaniel, T. (2006). An investigation of an after school math tutoring program: University tutors + elementary students = a successful partnership. *Education, 127*(2), 287-293.

Bier, M. L., Horn, I., Campbell, S. S., Kelley-Petersen, M., Stevens, R., Saxena, A., & Peck, C. (2012). Designs for simultaneous renewal in university-public school partnerships: Hitting the "sweet spot." *Teacher Education Quarterly, 39*(3), 127-141.

Clay, M. M. (2005). *An observation survey of early literacy achievement* (2nd Ed.). North Shore, New Zealand: Pearson Education.

Cunningham, P. M. & Hall, D. P. (2008). *Making words, third grade: 70 hands-on lessons for teaching prefixes, suffixes, and homophones*. New York City, NY: Pearson.

Duffy, A. M. & Atkinson, T. S. (2001). Learning to teach struggling (and non-struggling) elementary school readers: An analysis of preservice teachers' knowledge. *Reading Research and Instruction, 41*(1), 83-102.

Fang, Z. & Ashley, C. (2004). Preservice teachers' interpretations of a field-based literacy block. *Journal of Teacher Education, 55*(1), 39-54.

Hedrick, W. B., McGee, P., & Mittag, K. (2000). Preservice teacher learning through one-on-one tutoring: Reporting perceptions through email. *Teaching and Teacher Education, 16*(1), 47-63.

Johnston, P. H. (2004). *Choice words: How our language affects children's learning*. Portland, ME: Stenhouse.

Jones, B. D., Stallings, D. T., & Malone, D. (2004). Prospective teachers as tutors: Measuring the impact of a service-learning program on upper elementary students. *Teacher Education Quarterly, 31*(3), 99-118.

Juel, C. (1996). What makes literacy tutoring effective? *Reading Research Quarterly, 31*(3), 268-289.

Lane, H. B., Hudson, R. F., McCray, R. D., Tragash, J. R., & Zeig, J. L. (2011). Tutoring opened my eyes: Tutor experiences in the America Reads challenge. *Mentoring & Tutoring: Partnership in Learning, 19*(2), 199-218.

Leal, D., Johanson, G., Toth, A. & Huang, C. C. (2004). Increasing at-risk students' literacy skills: Fostering success for children and their preservice reading endorsement tutors. *Reading Improvement, 41*(1), 75-96.

Mallette, M. H., Kile, R. S., Smith, M. M., McKinney, M., & Readence, J. E. (2000). Constructing meaning about literacy difficulties: Preservice teachers beginning to think about pedagogy. *Teaching and Teacher Education, 16*(5), 593-612.

Malone, D., Jones, B. D., & Stallings, D. T. (2002). Perspective transformation: Effects of a service-learning tutoring experience on prospective teachers. *Teacher Education Quarterly, 29*(1), 61-81.

Massey, D. D. (1990). Preservice teachers as tutors: Influences of tutoring on whole-class literacy instruction. In C. Fairbanks, J. Worthy, B. Maloch, J. Hoffman, & D. Schallert (Eds.), *52nd Yearbok of the National Reading Conference* (pp. 259-271). Oak Creek, WI: National Reading Conference.

Massey, D. D. & Lewis, J. (2011). Learning from the "little guys": What do middle and high school preservice teachers learn from tutoring elementary students? *Literacy Research and Instruction, 50*(2), 120-132.

Merriam, S. B. (1998). *Qualitative research and case study applications in education.* San Francisco, CA: Jossey-Bass.

Mokhtari, K., Hutchison, A. C., & Edwards, P. A. (2010). Organizing instruction for struggling readers in tutorial settings. *The Reading Teacher, 64*(4), 287-290.

Morgan, D. N., Timmons, B., & Shaheen, M. (2006). Tutoring: A personal and professional space for preservice teachers to learn about literacy instruction. In J. Hoffman, D. Schallert, C. Fairbanks, J. Worthy, & B. Maloch (Eds.), *55th Yearbook of the National Reading Conference* (pp. 212-223). Oak Creek, WI: National Reading Conference.

Schön, D. A. (1987). *Educating the reflective practitioner.* San Francisco, CA: Jossey-Bass.

Stump, S. L. (2010). Reflective tutoring: Insights into preservice teacher learning. *School Science and Mathematics, 110*(1), 47-54.

Wasserman, K. B. (2009). The role of service-learning in transforming teacher candidates' teaching of reading. *Teaching and Teacher Education, 25*(8), 1043-1050.

Worthy, J., & Patterson, E. (2001). "I can't wait to see Carlos!": Preservice teachers, situated learning, and personal relationships with students. *Journal of Literacy Research, 33*(2), 303-344.

Appendix A: Interview Protocol

1. How do you feel about the overall tutoring experience and what did you learn from it?
2. What did you observe and what patterns did you see when administering the assessments?
3. In what ways did the assessment results help you plan your lessons?
4. Which lesson activities resulted in thoughtful responses from your students?
5. How do you feel the tutoring experience helped you grow as a teacher?

INVESTIGATING MASTER LEVEL K-6 READING TEACHERS' ATTITUDE TOWARD TEACHING CONTENT-AREA LITERACY STRATEGIES

Kay Hong-Nam and Susan Szabo

Texas A&M University - Commerce

Abstract Students need help using literacy strategies effectively so they can become strategic readers while reading informational books. Thus, it is important to study teachers' attitudes toward teaching content area literacy strategies (CALS), as research has shown there is a strong correlation between teachers' attitudes and their teaching practices. This pre/post action research study examined the attitudes of 50 K-8 classroom teachers who were enrolled in a graduate-level content area literacy course and were working on their master's degree in reading. The findings revealed that the participants' attitudes about implementing content literacy strategies changed over the course of the semester.

Keywords: Content Area Literacy, Literacy Strategies, CALS

Introduction

The plethora of informational texts has increased in elementary school classrooms (Young, Moss, & Cornwell; 2007). This is good news, as researchers have continuously pointed out that content area literacy is not only important at the middle and high school grade levels but also at the elementary level (Williams, 2009). Further, the National Center for Education Statistics (2011) found that 50% of fourth-grade tests were based on reading informational texts. Finally, the new literacies of online reading and the increased use of Internet technologies found in every classroom demands advanced reading, writing, and technical proficiency as well as the ability to understand and synthesize information obtained from a variety of sources (Castek, Leu, Coiro, Gort, Nenry & Lima, 2007). Thus, purposefully planning to incorporate content area literacy strategies (CALS) into lessons is important in every classroom to ensure that students achieve content comprehension.

Literature Review

Theoretical Framework. This action research study was grounded in several theories: Adult Learning Theory and Cognitive Learning Theory. First, the adult learning theory states that adult learners are reflective problem solvers, and motivated by internal factors to achieve their learning goal (Knowles, 1984). This theory implies that all the participants in this study, who were classroom teachers, were taking course work to find ways to become more effective in helping their students learn while reading content texts. Second, the cognitive learning theory (Piaget, 1936) explains why these teachers purposefully enrolled in a reading content course so they could learn more about the plethora of content area strategies and their importance in the learning process in order to purposefully plan and implement these strategies into their everyday lessons in order to promote better understanding of the content being read by their students.

Moving from Narrative Text to Expository Text. As students move through their school years, their reading changes from narrative text, which tells stories to expository text which relays information and ideas. However, expository text can be challenging, as these informational text are written above grade-level reading, can use more than one pattern at a time, are disorganized, have unfamiliar vocabulary words and are not reader friendly. All of these factors have led to what is commonly known as the fourth-grade slump (Chall, 1983). Additionally, fourth-grade is a critical transition grade level, as students move from learning-to-read by sounding out familiar words to reading-to-learn where many words are unknown (Chall, Jacobs, & Baldwin, 1990; Willingham, 2009).

Therefore, students' need to learn signal words that will help them determine the text structures they are dealing with, as this will help determine the correct strategy to use while reading. Additionally, if students are to do this well, they need direct instruction in the process of looking for signal words and knowing the strategies that work with each structure (Ryder , Burton, Silbert, 2006; Vacca, Vacca, & Mzra, 2013). Direct instruction and practice in reading and analyzing the five most common text structures is important, as Common Core Standards state students should be reading and working with expository or informational text 80% of the time.

Content Area Literacy Strategies. Research has shown that when students receive content area literacy strategies (CALS) instruction, students become more likely to improve their comprehension skills and teachers feel their instruction is more successful (Hawkin, Hale, Sheeley, & Ling, 2011). Thus, students' content comprehension can be improved when they are shown how to use signal words to pick and use the correct strategy for the text structure they are reading. Furthermore, it has been found that reading strategy instruction offers significant reading level gains even for those students who already have high reading levels (Fountas & Pinnell, 2012).

Despite such benefits, research done with K-6 preservice teachers while they were completing their student teaching showed they struggled with incorporating literacy strategies into their content instruction (Hong-Nam & Swanson, 2011; Hong-Nam & Szabo, 2012; Raine, Szabo, Linek, Jones, Sampson, 2007; Szabo, Sinclair & Boggs, 2008). This could be due to the fact that the current education students have only experienced "teaching to the test" learning approach and have not really used content area learning strategies themselves. However, few studies have investigated K-6 inservice teachers' attitudes toward teaching literacy strategies as part of their content area practices.

Purpose of Study

Even though positive gains have been observed for students whose teachers utilize content area reading strategies (CALS) instruction, it has been found that only 14% of elementary and secondary teachers employ CALS in their classroom and "Unless avenues of teacher training and professional development convince teachers of the value of reading comprehension instruction, content coverage may trump the explicit strategy instruction which promotes students' understandings of text" (Ness, 2016, pg. 78). Thus, this action research study examined a subset of the K-8 inservice teacher population. These K-8 inservice teachers were working on their master's degree in reading and the researchers wanted to determine their attitudes toward using content areas literacy strategies (CALS) in their elementary classrooms. In addition, two questions guided this study:

1. What attitudes do K-8 inservice teachers, who are working on their master's degree in reading, have about teaching reading strategies for expository text?
2. How do K-8 inservice teachers' attitude change about using content reading strategies after completing a semester-long content-area master level reading course?

Methodology

Design. This action research used a pre/post design to find out what attitudes these K-8 teachers had about CALS before and after completing a content area literacy strategy (CALS) course. Action research is used by educators to learn more about their student's background and understanding in order to improve their instructional practice, enhance student learning and become more reflective about their teaching practices (Efron & Ravid, 2013).

Participants. A total of 50 female participants, who were working on their master's degree in reading, were enrolled in a content literacy course. Participants' ages ranged from 23 to 62 years with an average age of 39. The majority of the participants were Caucasian (78%) followed by Native American (18%), Hispanic (2%), and African American (2%). All the participants taught at the primary level (k-6). The participants' teaching experiences included: 19 participants (38%) had taught in the classroom for less than 3 years; 6 participants (12%) had taught for 4 to 6 years; 11 participants

(22%) had taught for 7 to 10 years; and 14 participants (28%) had taught for more than 10 years.

Instrument. The questionnaire used was comprised of two parts. The first part contained questions to elicit participants' background information, such as age, gender, ethnicity, number of years as a teacher, and grade currently taught. The second part included the *Scale to Measure Attitudes toward Teaching Reading in Content Classrooms* (Vaughan, 1997) asking teachers' opinions about teaching reading strategies in content area classrooms. The researchers created an online survey for students to complete. This allowed the students anonymity. The participants were asked to read the 15 statements and respond to each using a Likert-scale of 1 (Strongly Disagree) to 7 (Strongly Agree).

Context. The purpose of this course is to help teachers understand the relationship between literacy instruction and content area study. Particular emphasis was given to the reading and study of expository materials at all levels of the curriculum. The major areas of study include levels of thinking and questioning, textbooks, assessments, factors in learning, reader strategies, and teacher strategies. The textbook used for this course is Content Area Reading: Literacy and Learning across the Curriculum (Vacca, Vacca, & Mraz, 2013).

Additionally, the course was designed to help teachers reflect upon, understand, and learn about more about CALS. The course assignments included: 1) classroom discussion of each textbook chapter, 2) creating a strategy notebook that contained CALS that can be used by the students while reading the text and each teacher/participant will demonstrate how to use one strategy, 3) completing 2 professional journal article critiques by reading, writing a reflection on their learning and reporting their learning to class peers, and 4) developing an integrated literacy project which had students examine 5 lesson plans. The participants were asked to highlight any CALS used as well as other resources used such as children's literature and/or websites to enhance the lessons. They were then asked to purposefully add these items to create a more effective group of lessons.

Data Collection and Analysis. The collected data were analyzed via several statistical techniques. Descriptive statistics (means, standard divisions, and frequencies) were computed for summarizing the reported demographic information and for describing inservice teachers' attitudes toward teaching reading and implementing reading strategies in content areas. Paired *t*-tests were calculated for testing the statistical significance of any changes in the inservice teachers' attitudes between the pre- and post-surveys.

Results

To answer research question #1, "What attitudes do K-6 inservice teachers, who are working on their master's degree in reading, have about teaching reading strategies for expository text," the pretest results on the *Scale to Measure Attitudes toward Teaching Reading in Content Classrooms* (Vaughan, 1997) was used. The inservice teachers' overall mean scores revealed an already fairly high positive attitude toward implementing content literacy strategies (Pre: $M = 4.47$). Thus, it appears that these teachers were already familiar with the importance of using CALS in their lessons. This is not surprising as these students were working on a master's degree in reading.

To answer research question #2, "How do K-6 inservice teachers' attitude change about using content reading strategies after completing a semester-long content-area master level reading course," the postsurvey results were compared to the presurvey results above (Post: $M = 4.55$; M Difference = .05). As the mean changed a t-test was run but the change was not statistically significant ($t = -1.00$, $p = 0.32$). However, the change did put their fairly high mean scores even higher.

But, to understand how these teachers' thinking changed throughout the course, a closer exploration of the questions where conducted (Table 1). Teachers mean scores for each item increased on 10 items and decreased on 5 items. Seven items had very high means, as they ranged from 5.5-7.0. This showed that these teachers believed 1) content teachers needed to help improve their students' reading ability (Item 1) by

- helping them improve their technical vocabulary knowledge (Item #2); and
- helping students set a purpose while reading informational text (Item #12);
- helping their students think on both a literal and interpretive level (item 10)

Additionally it showed that they believed K-6 teachers need to know how to teach information strategies (item 6) as it is important that all content teachers should be knowledgeable in both content and reading strategies used while reading content (item 13 & 15).

Table 1: Differences in Participants' Attitudes between Presurvey and Postsurvey by Item

	Survey	*M*	*SD*	*M* Diff.	*T*	*p*
1. A content area teacher is obliged to help students improve their reading ability.	Pre	6.22	1.23	0.18	-1.03	0.31
	Post	6.40	0.86			

2. Technical vocabulary should be introduced to students in content classes before they meet those terms in a reading passage.	Pre	5.98	1.94	0.30	-1.28	0.21
	Post	6.28	0.82			
3. The primary responsibility of a content teacher should be to impart subject matter knowledge.	Pre	4.76	2.14	0.06	-0.22	0.83
	Post	4.82	1.95			
4. Few students can learn all they need to know about how to read in six years of schooling.	Pre	4.56	3.80	0.36	-1.02	0.31
	Post	4.92	3.10			
5. The sole responsibility for teaching students how to study should lie with reading teachers.	Pre	1.96	1.20	-0.16	0.58	0.56
	Post	1.80	1.47			
6. Knowing how to teach reading in content areas should be required for K-6 teaching certification.	Pre	6.42	1.27	0.06	-0.34	0.73
	Post	6.48	0.66			
7. Only English or Reading teachers should be responsible for teaching reading in K-8 classrooms.	Pre	1.80	2.20	-0.10	0.39	0.69
	Post	1.70	1.19			
8. A teacher who wants to improve students' interest in reading should show them that he or she likes to read.	Pre	5.96	1.51	0.32	-1.63	0.11
	Post	6.28	0.86			
9. Content teachers should teach	Pre	1.64	0.93	-0.14	-	0.45

content and leave reading instruction to reading teachers.	Post	1.50	0.83		0.77	
10. A content area teacher should be responsible for helping students think on an interpretive level as well as a literal level when they read.	Pre	6.22	0.83	0.12	-0.67	0.50
	Post	6.34	0.60			
11. Content area teachers should feel a greater responsibility to the content they teach than to any reading instruction they may be able to provide.	Pre	3.40	2.77	-0.38	1.28	0.21
	Post	3.02	2.10			
12. Content area teachers should help students learn to set purposes for reading.	Pre	6.44	0.62	0.12	-0.83	0.41
	Post	6.56	0.41			
13. Every content area teacher should teach students how to read material in his or her content specialty.	Pre	6.20	1.22	0.08	-0.39	0.70
	Post	6.28	1.06			
14. Reading instruction in K-6 content area classrooms is a waste of time.	Pre	1.36	0.85	-0.02	0.10	0.92
	Post	1.34	1.27			
15. Content area teachers should be familiar with theoretical concepts of the reading process.	Pre	6.04	1.71	0.16	-0.68	0.50
	Post	6.20	1.17			

In addition to the items that had positive growth, there were five items with a negative progression from pre to post. However, this negative progression supports research, as the participating teachers disagreed that English or Reading/Literacy teachers bear all of the responsibility for teaching reading (Items 5, 7 & 9). Further, teachers believed that content area teachers in K-6 classrooms should purposively teach both content and

provide reading instruction (Item 11), although they felt the primary responsibility of a content teacher should be teaching subject matter (Item 3). Furthermore, the participants agreed that reading instruction was not a waste of time in the content area classroom (Item 15).

Discussion

This pre/post quantitative action research study showed that these inservice teachers reported that their attitudes had changed toward the importance of purposefully teaching content reading strategies even though they began with high attitudes. For instance, four items (2, 4, 8, & 11) showed the greatest change from pre to post. At the end of the semester, more participating inservice teachers recognized that vocabulary, especially technical terms, should be introduced to students before they encounter the terms when reading content text (Item 2). As research underscored word study and vocabulary should be an important part of instructional planning (Tyner, 2012), the participants of the study also conceded that early introduction of technical vocabulary is important for ensuring comprehension, as lack of vocabulary can contribute to poor comprehension of text.

These inservice teachers recognized that reading is developmental by agreeing that learning to read takes more than 6 years of education (Item 4). This finding supports reading development as a continuum based on students' experiences and not based on grade level or age (Fountas & Pinnell, 2012). The developmental stages of learning to read help teachers plan for all students' instructional needs, so all students can become self-regulated learners (Szabo, 2007).

The next item that showed the greatest increase was related to the importance of teachers demonstrating to students that they like to read (Item 8). The inservice teachers also agreed that content area teachers should have a greater role in their students' literacy development (Item 11). Teachers need to realize that "the lack of motivation students experience is grounded in an inability to successfully read and understand what is read" (Tyner, 2012, p. 87). Thus, teachers must model appropriate content literacy strategies to support the optimal learning model (Hong-Nam & Swanson, 2011). The participants also strongly agreed that teachers may be the only adults in children's environments who can model reading and learning as exciting and fun.

The participants also saw the importance of integrating literacy strategies into all content instruction in order to support students' content area learning (Item 1). This integration allows literacy to become a content area learning tool rather than a stand-alone subject. Embedding language/literacy standards into content subjects areas shows readers, from gifted to struggling, how literacy skills apply to reading any type of text (Ness, 2016).

Thus, effective content teachers carefully plan their lessons with consideration for how they can show students to use literacy strategies that make learning content more effective. It is important that teachers apply professional judgment about their students' reading abilities in relationship to the reading assignments used in their classes in order to provide varied and appropriate instruction. Teachers should not only include in their lesson plans the content they will teach but how they will teach the content along with the strategies most likely to facilitate all of their students' ability to learn the content.

Limitations

This study had some positive finding. However, the following limitations should be kept in mind as results and implications are discussed. First the study was conducted with teachers working on their master's degree in reading. So, they already viewed literacy instruction and the use of CALS as an integral part of their content area instruction. The results would be different with different types of participants. Second, although there were 50 participants, this is a small sample size. Third, all the participants were inservice teachers working on a reading master's degree at a large university in the southwest US who had various teaching experience and different years of experience. Fourth, all the data was self-reported. Fifth, action research is looking at solving problems in a particular setting and is not generalizable to other settings.

Conclusion

Teacher's attitudes toward CALS did improve, as they moved from a fairly high score of 4.47 (pre) to 4.55 (post). However, this change was not statistically significant. So, if k-8 teachers, who are working on a master's degree in reading, have a hard time learning new ways of implementing CALS into their lessons, then it could be assumed that other K-8 teachers would also experience difficulty in implementing content area literacy strategies. Williams (2009) found that CALS was difficult for teachers at all levels to implement. Since then, we have made progress but university faculty members still need to work diligently to provide professional development that impacts both teachers' knowledge and their skills of learning about the plethora of before during after content literacy strategies and purposefully implementing them into their classrooms, as K-8 still appear to need more direct instruction, time, practice, and positive feedback in order to implement CALS in the classroom while reading expository texts. Additionally, further studies need to look at how middle level and secondary level teachers are currently using CALS.

Course Changes. Action research allows teachers to look at classroom happenings more closely to see if they are working and to what extent they are working. After examining the findings, the course will change in several ways. First, another textbook will be added to the course readings: Content Literacy: An Inquiry-based Case Approach (Sturtevant & Linek, 2003). This textbook will allow a new assignment to be added to have students analyze various case studies to help teachers look at various lessons and problems in order to create more effective lesson plans using before, during and after content area literacy strategies (CALS) in their current lessons. Second, another assignment will have students create an annotated bibliography of 12 book titles and 3 internet resources that can be used while teaching specific content information.

About the Authors

Kay Hong-Nam, Ph.D. is an Associate Professor of Reading in the Department of Curriculum and Instruction at Texas A&M University-Commerce in Commerce, Texas. She teaches reading courses and her research interests include content area literacy, ESL literacy development, teacher education, and metacognition. Email: Kay.hongnam@tamuc.edu

Susan Szabo, Ed.D. is a Professor of Reading in the Department of Curriculum and Instruction at Texas A&M University-Commerce in Commerce, Texas. She teaches reading courses and her research interests include teacher education, content area literacy, and ESL education. Email: Susan.szabo@tamuc.edu

---

Reference List

Castek, J., Leu, D., Jr., Coiro, J., Gort, M., Henry, L., & Lima, C. (2007). Developing new literacies among multilingual learners in the elementary grades. In L. Parker (Ed.) *Technology-mediated learning environments for young English learners: Connections In and out of school.* (111-153). Mahwah, NJ. Lawrence Erlbaum Associates. Found at: http://www.newliteracies.uconn.edu/pub_files/Developing_new_literacies_among_multicultural.pdf

Chall, J. (1983). *Stages of reading development*. New York City, NY: McGraw-Hill.

Chall, J., Jacobs, V., & Baldwin, L. (1990). *The reading crisis: Why poor children fall behind*. Cambridge, MA: Harvard University Press.

Efron, S. & Ravid, R. (2013). *Action research in education*. New York City, NY: Guildford Press.

Fountas, I. & Pinnell, G. (2012). Guided reading: The romance and the reality. *Reading Teacher*, 66(4), 268-284.

Hawkins, R., Hale, A., Sheeley, W., & Ling, S. (2011). Repeated reading and vocabulary previewing interventions to improve fluency and comprehension for struggling high school readers. *Psychology in The Schools*, 48(1), 59-77.

Hong-Nam, K. & Swanson, M. (2011). K-8 preservice teachers' attitude, knowledge, and confidence in application of content literacy strategies. *National Teacher Education Journal*, *4*(4), 23-34.

Hong-Nam, K., & Szabo, S. (2012). An investigation of changes in preservice teachers' attitudes and confidence level in teaching reading during a yearlong student teaching program. In Martin, L., Morrison, T., Boggs, M., & Szabo, S. (Eds), *The Joy of Teaching Literacy*, (pp. 111-122). Louisville, KY: Association of Literacy Educators and Researches.

Knowles, M. (1984). The adult learner: A neglected species (3rd Ed.). Houston, TX: Gulf Publishing. National Center for Education Statistics, (2011). *The nation's report card: Reading 2011 (NCES 2012-457)*. Washington, DC: Institute of Education Sciences.

Ness, M. (2016). Reading comprehension strategies in secondary content area classrooms: Teacher use of and attitudes toward reading comprehension instruction. *Reading Horizon, 55*(1), 59-85.

Piaget, J. (1936). *Origins of intelligence in the child.* London: Routledge & Kegan Paul.

Raine, L., Szabo, S., Linek, W., Jones, A. & Sampson, M.B. (2007). An investigation of the knowledge base and use of content instructional strategies in primary grades by elementary preservice teachers. In Sampson, Foote, Falk-Ross & Szabo (Eds.) College Reading Association Yearbook: Multiple Literacies in the 21st Century, (pp.128-141). College Reading Association: Texas A & M Commerce, Texas.

Ryder, R., Burton, J., & Silberg, A. (2006). Longitudinal study of direct instruction effects from first through third grades. *Journal of Educational Research, 99*(3), 179-191.

Szabo, S., Sinclair, B. & Boggs, M. (2008). Reading Strategy Awareness of Student Teachers. *Academic Exchange Quarterly* 12(1), 131-135.

Szabo, S. (2007). The KWL strategy: Helping struggling readers build evidence of their learning. *Thinking Classroom, 8*(2), 32-39.

Tyner, B. (2012). *The literacy jigsaw puzzle: Assembling the critical pieces of literacy instruction*. Newark, DE: International Reading Association.

Vacca, R., Vacca, J., & Mraz, M. (2013). Content area reading: Literacy and learning across the curriculum. Boston, MA: Pearson Publishing.

Vaughan, J. (1997). A scale to measure attitudes toward teaching reading in content classrooms. *Journal of Reading, 20*(7), 605-609.

Williams, L. (2009). A Framework for Nonfiction in the Elementary Grades. *Literacy Research and Instruction,* 48(3), 247-263.

Willingham, D. (2009). *Why students don't like school: A cognitive scientist answers questions about how the mind words and what it means for the classroom*. San Francisco, CA: Jossey Bass.

Young, T., Moss, B., & Cornwell L. (2007). The Classroom Library: A place for nonfiction, nonfiction in its place. *Reading Horizons* 48(1), 1-18.