

INTEGRATION OF SOCIAL STUDIES, SCIENCE AND LANGUAGE ARTS

STANDARDS

By

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DEDICATION

To my husband, Jake, and my beautiful children, Lucy and Sam. Thank you for all the time and love you gave me to finish my Masters in Literacy Education. I will forever be in debt to the three of you for all the time we sacrificed together as a family in pursuit of this degree. We will always know that it isn't the amount of time spent together, but the quality of that time that matters to us the most.

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CHAPTER 1

INTRODUCTION

Rationale

My first year as a classroom teacher, I found myself with three separate texts: a nonfiction article on cell phones, a fictional diary entry about a visit to the White House and a nonfiction article on dolphins. All of these pieces of text were supposed to be used to teach the reading skill of identifying the text structure. I know that the ultimate goal for teaching any reading skills, such as identifying text structure, is for a student to be able to read any article and use that strategy. However, I couldn't help to think that learning a little bit about cell phones, a little bit about the White House and a little bit about dolphins in the effort to master a reading skill wasn't best serving the students. I wanted students to be able to fall in love with learning and realize that reading is one key way to gain new knowledge about something they felt passionate about. I think that if teachers give students the opportunity to immerse themselves in a content topic, then students will see the authentic reason for learning those reading skills and as a result, their comprehension of text will increase.

The idea behind the immersion of content topics would be to integrate both language arts (reading, writing, listening and speaking) standards with social studies and/or science standards. Through the review of the literature, I am hoping to confirm a positive correlation on student's reading comprehension and integration of the subjects. I

am then hoping to build a thematic unit of studies that relate to both reading and writing standards.

Personal Experience

I will always consider teaching to be my second career because I returned to it after being away from the profession for ten years. When I first went through my bachelor's program for education at both Montana State University and Minnesota State University-Mankato in the early 1990s, we focused heavily in my elementary education classes on making thematic units of study. Thematic units are units of study based on one topic that weave multiple subjects, such as social studies, science, math and reading into those units. I remember planning a very detailed thematic unit on the ocean for second graders in one of my college classes. In general, even before implementation, thematic units made sense in regards to motivation, engagement and comprehension because it gave students multiple exposures to make connections and practice transferring what they were learning in new ways or disciplines. I did get one year of experience using thematic units teaching second grade, but a move had me on the job hunt again and teaching careers were hard to find in 1997.

After not being able to find a teaching job, I switched careers to work at Mayo Clinic followed by being a stay-at-home mom. Although I loved both careers, I felt like teaching was calling me back so I pursued an online degree to get both my reading and ESL license at Hamline University. My first teaching job back was a Title One position in an elementary school located in a small rural town in Minnesota in 2012. My primary responsibilities were to deliver Tier 2 intervention strategies in a pull-out method to

kindergarten, first graders and second graders in both reading and math. The schedule was arranged so that I would grab a small group of students immediately after whole group instruction was done so I could reteach the same skill with more scaffolding. The students were identified at the beginning of the year as below-level on a measurement of academic progress standardized test. This re-teaching of skills to below-grade level students is one definition of Tier 2 intervention. My groups were nearly consistent all year, changing only after the standardized test was administered again in the winter.

In my teaching role as the Title One teacher and in my Hamline reading and ESL program, I noticed that thematic units were no longer a trend in education. The entire school day focused primarily on reading, writing and math skills and strategies using a curriculum. But the seeds of my research question, *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?* were planted. Because my instruction focused on the exact same concepts as the classroom teacher, our students showed an increase of both reading and math scores on standardized testing. The teacher and I worked in tandem and those K-2 students who were teetering on the edge of “are they special education or they not?” were able to transfer skills from classroom to Title One room and vice versa. This was my first “aha” moment in how important it is to tie together learning from classroom to classroom. Instead of a new concept, students were encouraged to deepen their understanding of the skill because they had twice as much time to practice the skill in the school day.

My next teaching job was working as an English as a Second Language (ESL), Response-to-Intervention (RTI) and Language Arts teacher at a middle school in a large town in southern Minnesota. The demographics of this middle school are currently 51% White, 22% Hispanic and 21% Black or African-American and 15% English learners, 15% special education and 60% free/reduced lunch (Minnesota Department of Education, 2019). In my role as the RTI teacher, I did my best to coordinate with their language arts teachers, but that was difficult to do because none of the language arts teachers collaborated what they did together. I knew from my success of my students as a Title One teacher that collaboration between RTI teachers and classroom teachers was integral to the success of students, so I was at a loss of what to do with my RTI students. I ended up just reading novels with my RTI students after I assessed they had little to no positive experiences with reading a book from start to finish.

Also, in that role of the RTI teacher, I was responsible for administering reading inventories to assess reading levels to students. Every single time, if English was a student's second language, they would never be able to pass the reading inventory at their grade level because of the Tier 3 vocabulary words. Tier 3 vocabulary words are identified as vocabulary words specific to a content-specific subject. For example, students who have never been exposed to the Pyramids of Giza would not know the Tier 3 words such as Egyptians, Egypt, mummification, tombs, etc. If students get enough Tier 3 vocabulary words wrong on a reading inventory test, they will fail the test. The failure actually has nothing to do with the mechanics of reading, but represents the lack of background knowledge and vocabulary.

In addition to the two sections of RTI, I also taught one section of language arts that year. My favorite part of the year was when I taught the novel “Broken Blade” by William Durbin. It is a novel about a 13-year old boy who had to paddle in a canoe his way across the Great Lakes to make money for his family. In the process, the 13-year old boy’s perceptions of Native Americans changes as he grows into a man. While I taught this novel, the social studies teacher taught about Minnesota Native Americans which had a direct tie-ins to the novel. Students were able to add background knowledge from the novel to social studies class and from social studies class to my language arts class. Students also felt comfortable with the vocabulary needed to understand the story. This personal experience of integration of social studies and language arts was another seed planted for my research question, *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?* I would only teach one year in that school before being offered a position as a fifth-grade classroom teacher back in the same district I worked in as a Title One teacher.

My first year back in that district, I attended a workshop by one of my fifth-grade colleagues. As part of her love of social studies, she volunteered to be part of a study that focused on the reading comprehension skills of students if teachers focused on providing background knowledge of social studies concepts during reading instruction. She shared with us the study concluded that building background knowledge was an important precursor to passing a reading comprehension test, therefore it was worth a teacher and

student's instruction time to not only teach social studies but to also integrate language arts with social studies.

Although another seed had been planted for my research question, I felt like I was barely holding my head above water my first year as a classroom teacher, so I went with the status quo. Our instructional focus during our reading workshop was to focus on the language arts standards, one by one, without any chance to integrate those skills in social studies or science. After that first year, I started to feel like my students weren't engaged with reading when we were using articles that did not support a common theme or topic to teach a strategy or a skill. Looking at the common book interest in my classroom, I noticed students couldn't get enough of World War II (WWII) books. I decided I would pilot my own integration unit by teaching my students about the facts of World War II, while they simultaneously read WWII books in book clubs. My students were so engaged weaving in the information they learned reading non-fiction with the information they were learning in their historical fiction books. For example, if their book's settings were on the home front, they made the connection of a ration card and victory gardens. Students were finally making the connection that Pearl Harbor was the same war that Hitler orchestrated horrible acts against the Jews. My students were asking more questions, making more inferences based on their developing schema, strengthening their connections and understanding theme and main-idea in an integrated authentic way that I had never seen before.

My reading scores for year-end Minnesota Comprehensive Assessments (MCAs) were off-the-chart that year (as were my language arts students in the large town in

southern Minnesota) and I strongly believe that's because I focused heavily on integrating non-fiction (social studies) with historical fiction (language arts) in both classes. I made a commitment to be more purposeful in the articles I was pulling. I've gathered bullying articles in our non-fiction units to talk about text structures. I've continued WWII articles with book clubs, along with curating non-fiction articles that relate to our read-alouds. I'm more convinced that integration of language arts with content subjects will give the necessary background knowledge and vocabulary to be successful in transferring learning from class to class, grade to grade, or school to world.

This year I have the highest number of special education students (SPED) of my career in my class. Over one-third of my class is reading two-three years below grade level. I have a strong teaching philosophy that *all* fifth-graders need to be taught the same concept and it's my job as their teacher to scaffold as necessary to make sure those who are below grade level can get that same content knowledge. At the beginning of the year, I decided to pre-teach reading skills to my SPED students so they could actively participate in our whole group discussions. I purposely wanted to give them the background knowledge and vocabulary needed to be successful. It's been fun watching those very shy students come alive in the whole group or small group conversations.

In addition to making sure my SPED students were able to participate in whole group, the final seed for my research question was planted when I decided to teach the reading skill of main idea and detail using the non-fiction article "Saving America's Wolves" from the StoryWorks October-November 2018 issue. At the same time, I was using that article, my colleague was teaching my students about animals in the food chain

during their science block. My students came alive when they knew and were able to use the Tier 3 vocabulary words such as extinction, endangered, apex predator, habitat, ecosystem, etc. My higher readers were making so many good connections you could see the synapses firing in their brain. My lower readers were able to engage in conversation because they learned the information in science class, and also learned it with me in small group in a pre-teach lesson. They felt like their voice mattered. I have been increasingly convinced that the more teachers integrate the subjects, the more success our English learners (ELs) and SPED students will have.

Conclusion

In summary, I have outlined my rationale and personal teaching experiences that led me to my research question, *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?* From the achievement of my Title One students in making gains on reading skills, to the positive experience integrating the social studies of the Minnesota state social studies standards on Native Americans with the novel “A Broken Blade”, and finally, to my most recent teaching moment where I empowered my lower students to become part of the classroom conversation by purposely integrating the Minnesota state science standards of human interactions with natural systems with the language arts standard of main idea and details. All of these experiences led me to a time and place where I can study the literature on the integration of subjects.

Chapter Two will outline the literature on the integration of subjects by examining the different methods of integration and the results of studies done on those integration

methods. The chapter will also include the primary factors of why integration has demonstrated positive outcomes on reading comprehension. Those primary factors are building background knowledge and increasing vocabulary exposure. And finally, chapter two will seek to synthesize the literature on integration to answer the research question, *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?*

CHAPTER TWO

Literature Review

Chapter One included my experiences as a learner and an educator throughout my life. For the past four years, I have seen a steady decline of reading motivation and conversely, reading comprehension in my fifth graders. Part of me has to wonder if this is because we are teaching reading as independent reading skills with random articles. This has resulted in students not being shown that one of the authentic reasons for reading is to continue to find out new information about the world and to be able to apply that new information in productive methods, such as creating and writing. Learning new information in the elementary classroom happens primarily in the social studies and science content classes. Unfortunately, social studies and science time has been reduced to focus on teaching reading comprehension skills in literature and nonfiction texts. However, there are methods used in some schools that integrate authentic reading of social studies and science content while teaching reading comprehension skills. In-Depth Expanded Applications of Science (Science IDEAS), Concept-Oriented Reading Inventory (CORI), multiple intelligence, and project-based learning as some of those

methods of integration. These methods are successful because they focus on readers making connections which increases their background knowledge and vocabulary and therefore increases their reading comprehension. My goal in this literature review is to investigate the research question: *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?*

Integration Methods

Four methods of integration instruction were examined for this literature review. In-Depth Expanded Application of Science (Science IDEAs) is a model that integrates reading and writing with science concepts replacing the traditional language arts instruction model. Concept-Oriented Reading Instruction (CORI) is another model that integrates all of the language arts standards of reading, writing, speaking and listening with science instruction. Multiple-intelligence theory is a theory that could be used to integrate not only language arts standards with science, but with any content subject. Finally, project-based learning is a model that integrates language arts with any content subject as well, but it starts with a student inquiry activity at the beginning and ends with a project-based assessment.

Science IDEAS. The In-Depth Expanded Applications of Science (Science IDEAS) was an integration method developed by researchers Vitale and Romance in 1992 in response to their research work on the integration of science and language arts on reading comprehension. Vitale and Romance (2016) suggested schools spend more time

on science instruction while integrating reading strategies. In addition to spending more of the school day on the integration of science and literacy, this integration model was devoted to integrating both time and subjects fully by committing to literacy strategies such as reading comprehension, discussion, and writing, along with science strategies such as experiments, science process, and concepts.

In 2016, Vitale and Romance reported the findings of their multiyear study of the Science IDEAs program. The purpose of the five-year study was to see if the Science IDEAs integration method of science and literacy would have a positive effect on student's reading comprehension achievement and improved student science achievement in grades 3-4-5. The study was also interested in seeing if those same students would be able to transfer that increase to grades 6-7. In this study that was done in 2003-2008, there were two groups of students - an experiment group and a control group. The experiment group received reading and writing instruction along with in-depth science instruction around science concepts for two hours every day, along with an additional half-hour literature instruction. The control group received up to two hours of district-approved language arts/reading curriculum and spent half an hour several days per week on district-approved science curriculum. The study used the Iowa Test of Basic Skills to measure results of reading comprehension and science knowledge in both the control and experimental group.

The results of the study indicated that this integration method increased reading comprehension skills of students while also teaching science standards. The experiment group yielded a +1.08 grade equivalent increase in science achievement and a +.57 grade

equivalent increase in reading comprehension achievement compared to the control group. To quote the researchers, “In addition, through content-area learning in science in which reading/language arts was integrated, the Science IDEAS model also had a positive effect on student reading comprehension achievement in grades 3–5 and, through transfer, to grades 6–7 as well” (Romance & Vitale, 2016). That transfer of achievement directly impacts the necessary background knowledge to be successful in later grades.

In summary, the integration method of Science IDEAS has proven to have a positive effect on reading comprehension skills, science strategies and retention of science knowledge. Another science-literacy integration method that is similar to Science IDEAs is the Concept-Oriented Reading Instruction program.

Concept-Oriented Reading Instruction (CORI). CORI is another method of science and literacy integration. CORI is a program developed by John Guthrie and Allan Wigfield which found its roots in a 7-year collaboration project between the University of Maryland and the Frederick County Public Schools. The goal of the project was to increase both reading comprehension and motivation, along with science knowledge (University of Maryland, 2000-2019).

CORI’s instructional methods began a science unit by having students complete a hands-on activity and then begin to ask questions about the scientific concept illustrated in the hands-on activity. Then, students began researching the answers to the questions with a wide variety of texts, including narratives and poetry, with the reading goal to increase comprehension through synthesis, which is the process of combining information from several articles and forming your own opinion on that combined

information. Finally, the unit ends with a project at the end where students demonstrate what they have learned (Guthrie, Wigfield, & Vonsecker, 2000). Guthrie (1999) stated “The goal of the CORI program is to increase reading engagement and improve reading achievement through integration with content-area learning” (as cited in Cervetti, Barber, Pearson, & Goldschmidt, 2012, p. 633).

CORI is very similar to Science IDEAS in that it shares the same principles. However, CORI emphasizes discussion as paramount to this instructional method and its results on comprehension. Through discussion, CORI provides the framework for time to share gained knowledge, clarify, problem-solve and construct new understanding. CORI’s primary goal is to demonstrate that science is all about revision, which means posing a question, seeking the answer through a method or experiment and then posing a new question based on that method or experiment. (Pearson, Moje, & Greenleaf, 2010).

In addition to the discussion piece of the CORI lesson plan, the application of reading comprehension skills in the CORI format of integrated instruction is also easily seen in the structure of this method. In the first part of this instruction method of “inquiry”, “predicting, inferring, and questioning are as central to ‘inquiry’ in the discipline of science as they are the core of the “comprehension” in the literacy domain” (Cervetti et al., 2012, p. 635). As the students seek to find the answer to their inquiry, they must begin to use other comprehension skills and “CORI provides explicit information in reading strategies, such as questioning, activating background knowledge,

searching for information, summarizing, and synthesizing information in order to communicate with others” (Pearson et al., 2010, p. 461).

The explicit instruction of those reading strategies is most important to below-grade level readers. Those readers struggle in content classes, such as science or social studies, because oftentimes traditional education relies on textbooks only to convey new information. The integration method of CORI suggests in this quote that below-grade students actually benefit from this method of instruction because:

At a time when struggling students are likely to be taken out of their science class to attend remedial reading classes, these findings suggest a better option may be to attend to the needs of struggling readers within science class, where they simultaneously acquire subject-matter knowledge and inquiry skills, and even perhaps even improve their literacy skills” (Pearson et al., 2010, p. 462).

Perhaps this is because the very heart of CORI is for students to discuss science, while traditional education focuses on a teacher and textbook as the dispenser of all knowledge. CORI honors the full paradigm of literacy: reading, writing, listening and speaking. For too long, traditional education with lecture format has not even integrated those four critical components at the expense of all different kinds of learners because it primarily focuses on reading and/or listening. In reference to both CORI and Science IDEAS, Cervetti et al. (2012) stated, “The model of integration investigated here involves a central role for student-to-student talk as a way of making sense of science investigations and gaining into the nature of scientific reasons” (p. 635).

Integration for the purpose of increasing knowledge and reading comprehension aside, CORI has also demonstrated a positive mode of instruction that also increases motivation. Deci et al. (1991) stated CORI is “the theoretical justification for these practices come in part from self-determination theory, which emphasizes development of intrinsic motivation by support for individuals’ autonomy, competence and relatedness” (as cited in Guthrie et al., 2000, p. 331). Based on this theory of motivation, Guthrie et al. (2000) conducted a research study based on the hypothesis that stated students with CORI instruction would display higher levels of intrinsic motivation and have greater use of cognitive strategies. Through the use of a two CORI groups at third and fifth-grade levels and comparable groups of traditional science education, the hypothesis was tested (Guthrie et al., 2000, p. 332). The results of the study showed that while the CORI students displayed a positive and strong association with curiosity, both groups of students showed no difference in involvement. However, CORI students showed a significant increase of cognitive strategy use compared to the traditional education students.

In summary, CORI has proven through the integration of science and literacy to have positive effects on comprehension, content knowledge and motivation. Another pedagogical idea to show the same results, while not a prescribed program like CORI or Science IDEAs, is the theory of multiple intelligences. However, the multiple intelligence theory does not just focus on science and literacy, but all of the content subjects.

Multiple Intelligences. According to the Harvard Graduate School of Education, the multiple intelligence theory was developed by Howard Gardner in his 1983 book *Frames of Mind*. Gardner hypothesized that humans generally favor one or two styles of intelligence and schools have long catered to only two of them: logical-mathematical and verbal linguistic. Gardner's 1983 book focused on eight of the multiple intelligences: verbal-linguistic, mathematical-logical, musical, spatial, bodily-kinesthetic, interpersonal, intrapersonal, and naturalist (Harvard Graduate School of Education, 1983). In regards to this capstone project, the theory of multiple intelligences could be used to systematically engage students and their preferred intelligence style to integrate reading comprehension and knowledge of concepts.

The article, “Standards-based, thematic units integrate the arts and energize students and teachers” narrated how one urban Midwestern middle school restructured their middle school using the theory of multiple intelligences to integrate the subjects. The school started with thematic units which incorporated standards from language arts, social studies, science, math and the arts (music, creative movement, visual arts, and drama). Students were given choice boards to demonstrate learning of the standards (Bolak, Bialach, & Dunphy, 2005).

Student motivation, family involvement and teacher engagement were reported as high, but in addition to that, tests scores were also referenced. According to Bolack et al., (2005), “On the Stanford Achievement Test, a national norm-referenced test, students’ achievement scores rose by 15% in reading and 18% in our math, compared to previous school year” (p. 19). This echoed the school’s initial research information on The Project

on Schools Using Multiple Intelligences Theory (SUMIT), twenty of the 41 schools improved in standardized testing scores, 22 of the schools improved in discipline and 25 improved with parent participation (Bolak et al., 2005, p. 19).

Additional literature research was also looked at to validate the use of multiple intelligences in the classroom. A study done in the state of Maryland to measure the effectiveness of multiple intelligences being used in the classroom reported “a 20% increase in students’ scores on the Maryland School Performance Assessment after just one year of implementation of Multiple Intelligence techniques across the curriculum” (McMahon, Rose, & Parks, 2004, p. 43). In a paper that discussed the longevity of the multiple intelligence theory in education, Phyllis Adkock (2014) stated, “The educational process needs to involve learning that is authentic and has real value for all those involved. If educators take an approach of blending multiple intelligence with direct instruction, teaching will be more effective” (p. 54).

Although the use of the multiple intelligence theory is not a prescribed method for integrating literacy with contents, it could be implemented with the purpose of teaching reading comprehension, increasing knowledge of content and motivation. The multiple intelligence theory could be implemented in a school where the administration does not want to buy-in to the programs like Science IDEAS or CORI. Another literacy-content method that also could be used in a classroom without needing administrative support could be the idea of project-based learning.

Project-Based Learning. While CORI and Science IDEAS lend itself more to science standards, project-based learning is another method to integrate any content

subjects with literacy. To define project-based learning, Baron & Darling-Hammond (2008) and Thomas, Mergendoller and Michaelson (1999) said (as cited in Chen & Yang, 2019), “Project based learning is a systematic and learning method, which engages students in complex, real-world tasks that result in a product or presentation to an audience, enabling them to acquire knowledge and acquire life-long skills” (p. 71). Basically, project-based learning is the student creation of a project that is driven by a student’s question around a topic with guidance from the teacher. The students become active participants, rather than passive receivers, in their learning while the teacher becomes a facilitator to answer the student’s question. Project-based learning could center around a theme or a concept and easily integrate literacy comprehension skills. According to Thomas (2000), project-based learning should be central to curriculum, focus on the questions that drive learning, construction and transformation of student’s knowledge, somewhat student-driving and authentic or real-world projects (as cited in Halvorsen et al, 2012, p. 200-201).

Some of the literacy comprehension skills could be asking questions, inferring, synthesizing, making predictions, or identifying the main idea and details. All of the comprehension skills correlate with the Common Core State Standards for English Language Arts. However, project-based learning shows students how to authentically use those skills while learning new concepts, within the entire scope of the state-wide social studies and science standards. Dole, Bloom and Doss (2017) confirmed “some of the greatest things about PBL (project-based learning) are that it forces students to think of and develop engaging questions, to muddle through a series of questions and answers

and continue to use critical thinking skills throughout the entire learning experience to analyze, synthesize, and evaluate their findings and outcomes” (Results: Learning Attitude section, para 5). Dole et al., (2017) determined this when they looked at the impact on engagement of students while simultaneously examined how project-based teaching changed teacher’s pedagogy.

In reference to all learners, Chen & Yang (2019) did a meta-analysis research project on all of the available research to date on project-based learning and determined that project-based instruction model “had a medium to large effect on student’s academic achievement compared with traditional instruction” (p. 71). This coincides with Thomas (2000) who said, “Research on the impact of project-based approaches on both achievement and affective dimensions such as attitude, engagement, and motivation is quite positive overall” (as cited in Halverson, et al., 2012, p. 201).

But does project-based learning engage itself to one kind of student over another? The literature on project-based learning is both geared to gifted students or students with learning difficulties. Because the research question for this capstone project is centered around increasing comprehension, the literature on how project-based learning directly correlates to low-readers is compelling. Okolo and Ferretti (1996) did a study on project-based learning and determined that as a result of that model of instruction there was an “increase in content knowledge and motivation on American Revolution War for student designated with learning difficulties” (as cited in Halversen et al., 2012, p. 201-202). Cornell and Clark (1999) reported lower performing students were allowed to

perform at their own pace in project-based learning while developing their unique skills to complete the projects (as cited in Flippatou & Kaldi, 2010, p. 18). The very nature of the collaborative work on project-based learning is taking the competition out of the classroom and the necessity to finish “on time”. Elements of competition and deadlines can be stressful to a child with academic difficulties. In contrast to traditional instruction, Instead, project-based learning lets students ask questions of each other, therefore getting the necessary kid friendly explanation that can help them comprehend the content (Flippatou & Kaldi, 2010). This idea suggests that project-based learning also enhances the metacognition of students and the idea that students become teachers in this metacognitive capacity.

Fillaptou and Kaldi (2010) conducted a research study on project-based learning and its outcomes on students with learning difficulties. The study was administered to six fourth grade classrooms in the country of Greece while receiving instruction two-three hours a week of instruction in an eight week project-based learning unit on sea animals. Both a pre-test and post-test were administered with the end goal of looking at the differences of typical students and ones with learning difficulties. The researchers were looking at specific differences in academic performance, self-efficacy in terms of environment studies, task value, group work and teaching methods. Twenty-four students were identified as students with learning difficulties by identification from a teacher questionnaire and a standardized screening for learning skills and weaknesses. The results of the study showed that students with learning difficulties who participated in the project-based instruction model scored higher on the knowledge test of sea animals

on their post-test compared to their pre-test. In addition to students increasing their background knowledge, students also reported a higher level of motivation and engagement by believing they could perform better, score higher than they did before, like working in teams better than working alone and found the group work to enhance their learning.

But this study was done in Greece, which does not have the same educational system or structure that the United States does nor demographics. Would the study on project-based learning yield the same results here in the United States? Researchers Halvorsen et al. (2012) conducted a study on project based learning in the state of Michigan. The study was hoping to answer the question that if second grade students from low socio-economic schools (SES) were taught with a project-based integration model of social studies and literacy would those students make significant gains on standards-based assessments in social studies and literacy. They also wanted to know if those students would also be able to meet the benchmarks set forth by a higher-SES school. The researchers propositioned that if project-based learning could help students from low-SES schools achieve the same as students from a high-SES school that project-based learning may narrow the achievement gap.

Halvorsen et al. (2012) developed unit and lesson plans grounded in project-based pedagogy that were administered by teachers in the low-SES schools. The two main projects that students worked on were an economic project and a civics project, lasting 20 and 21 lessons respectively for 45 minutes each day. After the study, the results showed

that through the use of project-based learning second-grade students from low-SES schools not only scored higher on their post-tests compared to their pre-tests in the domains of reading, social studies and writing, but those same students achieved statistically equivalent levels of achievement as their counterparts in the high-SES schools in reading and social studies.

In summary, project-based learning has proven to increase reading comprehension, increase content knowledge and also have a positive impact on student motivation and engagement. Through research, studies have also proven that project-based learning has a greater impact on students with learning difficulties, as demonstrated in the study in Greece and in Michigan.

All four models of integration share several components: increasing teacher and student engagement; sharing an authentic purpose for both literacy and learning; and a multitude of shared skills and strategies in both the content subject and language arts. In regards to the research question *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?* the two most outstanding components directly related to increased reading comprehension are background knowledge and vocabulary. By analyzing the studies of the integration model, it was determined that students were primarily successful because they were afforded multiple opportunities to dwell and work in a content subject increased background knowledge and vocabulary knowledge.

The rest of the literature review will be on the two components of student learning that have positive outcomes on reading comprehension: background knowledge and vocabulary. The purpose of this is to set the framework for the Chapter 3 teacher workshop capstone project idea, which is to develop a teacher professional development workshop that demonstrates the ease of integrating content subjects with English language standards to have a positive impact on reading comprehension skills.

Background Knowledge

Background knowledge is an essential component of all curriculum. Open up any good reading curriculum, and the first part of any lesson will have a video, infographic or related short text to build a little bit of background knowledge to help all readers understand the context of the story or concept better. But where did the idea come from? Many educational research articles point to R.C. Anderson, who was a respected educational psychologist. Anderson (1984) developed the schema theory, which would later evolve into what educators commonly known as “background knowledge” or “prior knowledge”. R.C. Anderson (1984) developed his schema theory on “this learning theory views organized knowledge as an elaborate network or storage system of abstract mental structures that represent an individual’s understanding of concepts related to experiences and knowledge” (as cited in Little & Box, 2011, p. 24). This schema theory is still relative to today’s learners, if not even more so, as the diversity and home lives of our students tend to vary even greater every year.

The phrase schema theory has become interchangeable with the phrase background knowledge in the world of education. In an online article, dated as late as

March 7, 2019, background knowledge is one of the top five things every reading teacher should know about when it comes to the science of reading. Students' background knowledge is essential to reading comprehension. Myracle, Kingsley and McClennan (2019) suggested curriculum should be built around acquiring content knowledge in history and science to build reading success. This is a strong suggestion that literacy and content subjects need to be integrated to ensure that all students are growing in terms of reading and knowledge. "There is a virtual consensus that background knowledge is essential for reading comprehension" (Neuman, Kaefer, & Pinkham, 2014, p. 145).

This is in direct contrast to how reading comprehension is taught in some schools, where reading skills are taught in isolation of each other to focus on the English Language Arts state standards or the Common Core State Standards. Instead of isolation of skills, reading skills should be embedded in the instruction of content subjects so background knowledge and vocabulary becomes the center of reading comprehension (Hirsch, 2006).

Teaching inference is one of the many reading skills that is hammered throughout the upper elementary years. Inferring requires a student to use existing schema, or background knowledge, by incorporating it with the new information the student is learning (Neuman et al., 2014). The more students read, the more background knowledge they will have to use to infer. Students who have a rich background knowledge due to life experiences or reading volume are able to quickly identify what is new and what is old. Hirsch (2006) stated, "For instance, cognitive scientists agree that reading comprehension requires prior domain-specific knowledge about the things that a

text refers to, and the understanding the text consists of integrating that prior knowledge with the words in order to form a ‘situational model’ (The Wrong Ideas section, para. 1) It is an educator’s responsibility to include as much background knowledge as possible in the pre-reading and during-reading sections of lesson planning to ensure that all students are on the same playing field.

Another reason why the time and dedication to building background knowledge is because the differences in student’s reading volume. Reading volume is a strong indicator of a student’s comprehension, vocabulary and background knowledge. The more students read, the more they know (Lupo, Strong, Lewis, Walpole, & McKenna, 2018). The integration methods described earlier – Science IDEAS, CORI, multiple intelligence theory and project-based learning all require that students read to find out new information. This increases students’ reading volume and therefore increases comprehension and vocabulary. It’s easy to want to give students the information through lectures or videos, but schools and teachers must never lose sight of the fact that students need to read to become better readers.

Readers will often grow in their comprehension of literature versus informational text when reading stories that reflect their own culture and world. Humans are drawn to stories and stories are often woven through the fabric of the day. Think of the bus ride, the movies watched, the half-hour sitcoms, the shorts on YouTube, or even the video games. Of course, background knowledge is needed to understand the meaning of literature, but it is more difficult for students with limited background knowledge to fully

understand new concepts because often times information text requires so much background knowledge to comprehend (Neuman et al., 2014). Also, student's background knowledge of vocabulary must be adequate enough to process the greater density of concept words in information text (as cited in Price, Bradley & Smith in Neuman et al., 2014). As a student moves from lower elementary to upper elementary, it becomes a pivotal turning point to provide as many opportunities for a student to read and learn about a concept to build that necessary background to be successful in the secondary school levels.

The problem with not having enough background knowledge to infer while reading informational text is best seen with low-ability readers. Garner, Gillingham, & White (1989) wrote, "Studies have shown, they can get caught on the "seductive details" of a text – highly interesting and entertaining information that is only tangentially related to the topic – which can distract the reader and disrupt the comprehension of a text" (as cited in Neuman et al., 2014, p. 146). This "seductive detail" concept is reiterated in a study done on the importance of background knowledge by Recht and Leslie (1988). Upon analyzing their results of their study, they determined "Greater knowledge also resulted in better recognition of important ideas in text and the incorporation of those ideas into a summary of the important goal-based action." (Recht & Leslie, 1988, p. 19). In other words, students with higher background knowledge know when to recognize the important details and bypass the fascinating, but not relative to the main idea, ideas. As science and social studies knowledge builds on each other through the Common Core

Standards through the grade levels, background knowledge is necessary to focus on those main ideas and leave the interesting facts that are not related to the side.

In addition to determining the main idea, research has also supported the idea that filling in background knowledge may be part of the answer to closing the achievement gap. Recht and Leslie (1988), determined through their study on prior knowledge on reading comprehension that “knowledge of content domain is a powerful determinant of the amount and quality of information recalled, powerful enough for poor readers to compensate for their generally low reading ability” (p. 19).

To illustrate the power of background knowledge on children as young as preschool, a four-year study on the importance of background knowledge on comprehension was conducted by Neuman et al. (2014). The study was done on four-year olds from different socio-economic status. Using birds as the topic, the first part of the research on background knowledge determined students from low-SES families has significantly limited background knowledge compared to their middle-class peers. The second part of the research involved the creation of a story where four birds went on adventures. This second part showed students from low-SES backgrounds scored lower on the comprehension test.. For the third part, the researchers wanted to see if they could create a story that would take background knowledge out of the equation. The story they created involved a made-up creature. “When we held background knowledge constant by introducing an unknown topic, there were no significant differences between SES groups in children’s word learning, comprehension, or ability to

make inferences” (Neuman et al., 2014, p. 146). In other words, their study confirmed that student’s background knowledge did have a big impact on reading comprehension.

While the Neuman, Kaefer and Pinkham (2014) study was based on background knowledge on socio-economic status, Recht and Leslie (1988) based their study on the influence of background knowledge on good and poor readers’ recall of text. In their study, Recht and Leslie picked 32 students from each 7th and 8th grade class of a metropolitan middle school who were identified as high and low-ability readers and also screened for their knowledge about baseball, as the researchers chose baseball as the subject. Recht and Leslie (1988) designed a test that would measure a student’s ability to reenact the story, verbal retell details from the story, summarize the story, as well as rate the sentences as importance to the story. In addition, the two researchers also had three semi professional baseball players take the test for another element of expert comparison.

The findings of the study concluded, “On all measures, children with greater knowledge about baseball recalled more than did children with less knowledge, and what they recalled was more similar to what the experts recalled” (Recht & Leslie, 1988, p. 19). The results of this study alone showed how important it is to incorporate background knowledge into lesson plans.

As in so many things in the education world, there are some tried and true methods to teach background knowledge. Neuman, Kaefer and Pinkham (2014) encouraged topic-focused wide reading. This teaching strategy is directly related to the

capstone question, “*How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?*” because integration encourages students to dive deeply into informational topics, building more background knowledge and increasing vocabulary based on domains. As suggested by Hirsch (2016):

An optimal reading early reading program will exploit this characteristic of word learning by ensuring that topics of class read-alouds, independent reading, and discussion are consistent over several class periods, so that the topic will become familiar to the students and thus accelerate word learning” (Why Building Background Knowledge is Vital section, para. 3).

Another way to teach background knowledge is to embrace multimedia (Neuman et al., 2014). As suggested in the book “Subject Matters” by Harvey “Smokey” Daniels and Steven Zemelman (2014) text sets are a great way to embrace multimedia to teach a topic. Text sets are the compilation of texts on one subject and include media, texts, primary resources, articles, books, magazines, novels and poetry, etc. By stepping away from just using one textbook and one teacher as the source of all content knowledge, there is the added benefit of teaching critical literacy to students. “Whether it is intentional or not, it is unacceptable for schools in a democracy to teach young people that only one view is sufficient –of science, of mathematics, of literature, of history, or any subject” (Daniels & Zemelman, 2014, p. 56).

An alternative to multimedia to increase background knowledge would be the use of the quad text set framework developed by Lewis and Walpole (2016) cited in Lupo et al., (2018). Lewis and Walpole's quad text framework consisted of four different types of texts: one target text that was both challenging and above grade level and three texts to build background and motivation" (Lupo et al., 2018). The goal of the quad text set framework was to get students to read while simultaneously building background knowledge. The use of texts in this quad set framework suggests that all students deserve access to the same high level text and grade-level standards regardless of reading ability. Multimedia and text sets are an integral part of the integration of content standards in the reading block.

Topic immersion is another method to increase background knowledge and is particularly beneficial for younger children as well. Hirsch (2016) recommends reading aloud several books on the same topic to younger pre-literature children and offering good discussions around that topic. Hirsch (2016) also stated:

There is every scientific reason to predict that an intensive focus on oral development during the classroom reading period in early grades will not only raise reading achievement for all the students, it will also narrow the gap between social groups (Oral Language Development/Reading Aloud section, para. 2).

In both the CORI, multiple intelligence theory, Science IDEAs and project-based learning, collaboration and discussion are an integral part of the instruction and construction of knowledge for students. Oral development in the early grades through

literacy and content subject integration is a necessary foundation for building more background knowledge.

Activating prior knowledge in pre-reading activities to set students up for success. Recht and Leslie (1988) determined that “With adequate prior knowledge, those students who are comprehending below the 30th percentile on the SRA are comparable with those above the 30th percentile in reenactment, verbal recall, and the ability to summarize text” (p. 19).

Finally, the use of graphic organizers would be beneficial to capture student’s existing background knowledge and a quick way to add more information to a learner’s schema. By providing students with visual links of their background knowledge with the new concepts, students are able to see the actual connections they are making (Little & Box, 2011).

In summary, integration models of instruction provide students with multiple exposure to concepts and topics, therefore systematically building new knowledge onto a student’s previous background knowledge. Paying attention to background knowledge in pre-reading activities helps narrow the achievement gap, which was documented in two studies done in Greece and in Michigan. There are a variety of ways to weave background knowledge into a lesson plan, such as topic-focus reading, embracing multimedia, using text sets and through topic immersion. The following section will discuss vocabulary because it is another reason why reading comprehension increases in integration models of instruction.

Vocabulary

As established in the section of this capstone project “Background Knowledge”, limited background knowledge is one of the primary reasons students are not able to comprehend text. Lack of background knowledge strongly correlates to vocabulary knowledge as well, which leads to low comprehension scores. Rupley & Nichols (2005) stated, “Not having access to meanings word limits the readers’ ability to make connections with their existing background knowledge, inhibits their capacity to make coherent inferences, and affects their ability to reason thoughtfully about the text” (p. 241). If students don’t have enough background knowledge to understand the new meaning of the words and they don’t have enough understanding of the word to fill in their background knowledge. This is further proof for the capstone question, *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?* because integration gives students multiple opportunities to use the topic words and enhance their vocabulary in reading, writing, speaking and listening.

Rupley and Nichols (2005) define vocabulary, or word knowledge, as two different entities. One of them is known as definitional knowledge, which is word knowledge based on the definition from the dictionary. The other one is contextual knowledge, which is word knowledge based on the context of the sentence or passage. Neuman et al., (2014) suggested that contextual knowledge is determined by a student’s background knowledge because it helps them to pick the correct meaning for words that

have multiple meanings. Both categories of vocabulary, definitional and contextual, still require a great deal of background knowledge to fully comprehend the meaning of the word and how it relates to learning of new concepts. “Without greater efforts to enhance background knowledge, differences in children’s knowledge base may further exacerbate the differences in children’s vocabulary and comprehension” (Neuman et. al, 2014, p. 148).

A study that questioned whether a vocabulary intervention would help negate those differences in children’s vocabulary was done by Coyne et al. with the results published in 2019. These researchers determined through previous research work that quality vocabulary instruction done in a whole group setting still resulted in at-risk students learning less words than their students who were not at risk. The researchers were operating on the theory of vocabulary development called the Matthew Effect. The Matthew Effect is a theory that says students with larger vocabularies have the necessary word knowledge to build even bigger vocabularies, while those students with limited vocabularies do not possess enough work knowledge and fall even further behind than their peers (Stanovich, 1986, as cited in Coyne et al., 2019, p. 164).

Coyne et al., (2019) designed new research to see if vocabulary instruction intervention, which is instruction taught by a teacher to a small group of students, would have an impact on at-risk students on vocabulary and comprehension and accelerate their learning to be comparable to not-at-risk students. Two studies were done, an efficacy study and a replication study. Kindergarten teachers in 48 elementary schools located in

the eastern and northwestern part of the United States would provide whole group instruction, 20 minutes a day on vocabulary words for twenty-two weeks. The chosen words focused on high-utility vocabulary words. Half of the at-risk students were assigned a vocabulary intervention instruction, along with a reference group for not-at-risk students was formed. The intervention instruction focused on the same words used during whole group instruction, but were offered again with explicit instruction and multiple opportunities for students to practice the words.

The results of this study showed at-risk kindergarten students who received Tier-2 vocabulary intervention that supplemented Tier-1 whole-class instruction outperformed the at-risk students who received only the Tier-1 classroom instruction on measures of target word learning and listening comprehension of passages that included target words. Additionally, at-risk students who received both Tier-1 instruction and Tier-2 intervention demonstrated greater target-word learning than their not-at-risk peers who received Tier-1 instruction.

However, it was noted in the study that there were still differences among the at-risk kindergartners, with those students who came in with a higher-word knowledge for that category still outperformed those who came in with lower-word knowledge. This confirms the Matthew effect again even in a vocabulary intervention setting. It was also determined that the at-risk students who received the vocabulary instruction intervention still showed no difference on the standardized measures of vocabulary knowledge.

Even the results of the study didn't garner the hopes of the researchers to neutralize the vocabulary differences among peers, the results did show that explicit instruction and giving students multiple opportunities to interact with vocabulary does work. Below are a few instructional strategies that emphasize activating background knowledge, making connections and discussion. Each of these ideas give students multiple opportunities to use the words and strengthen the connections (Rupley & Nichols, 2005).

Concept Wheels. Using a pre-made list of vocabulary words, teachers introduce a topic first with the intentions of brainstorming everything that is known about that topic. Second, the pre-made list of words is introduced to the students who then brainstorm everything about the words. The brainstorm list is documented either on paper or technology. "Brainstorming is the critical part of this lesson because it stimulates students to ask questions about words and concepts they don't know, which should be encouraged because it promotes the understanding that word knowledge is essential to comprehension" (Rupley & Nichols, 2005, p. 247). A concept wheel is then created to provide a visual of the word. The concept wheel can have a picture, definition, antonyms, synonyms, sentences, connections, just to name a few (Rupley & Nichols, 2005). An example of a concept wheel for the vocabulary word adaptation would have a giraffe with a long neck, the synonym, antonym, the antonym maladaptation, and possible a sentence explaining why the giraffe needed a long neck to survive.

Semantic Mapping. This strategy is recommended as pre-teaching strategy. A semantic map is a visual diagram to show students how words related to each other.

Rupley and Nichols (2005) share:

Such visualization is extremely beneficial to the struggling reader, who often feel overwhelmed and under the impression that each object or event encountered in their reading is unique to what they are reading, and that each concept is independent and not related to other textual concepts (p. 248).

Similar to the concept wheel, the teacher introduces the topic and students are encouraged to brainstorm everything that is known. But, instead of listing the words on a document, the words are then broken into labeled categories. As reading continues, more is added to the semantic map.

Concept of Definition. Rupley and Nichols (2005), also shared the concept of definition strategy which asks students to consider three questions when studying a concept: 1. What is it? 2. What is it like? 3. What are some examples? This is a before-during-and after-reading activity that lets students construct as they learn about a new concept. During this exercise, students are making associations and relationships with known words.

Summary

In 2017, Minnesota still faced an achievement gap problem between white students and seven groups of minority students. The reading proficiency percentage of

white students was 68.8% and black students was 34% (Magan, 2017, Percent of students proficiency in reading). Researchers Coyne et al. (2019) pointed out that students who continue to have negative learning experiences avoid reading, which therefore increases the achievement gap. Clearly, traditional ways of teaching are not reaching all students and we cannot in good conscious continue on in those traditional manners. The integration of literacy with content subjects, such as science and literacy, could close the achievement gap by creating positive learning experiences by depending heavily on inquiry and collaboration.

All four integration methods, Science IDEAS, CORI, multiple intelligence theory and project-based emphasized the shared literacy skills with the content knowledge all while increasing engagement and motivation of the learner. Asking questions, questioning, making connections, summarizing, comparing and contrasting, identifying the main idea, opposing perspectives and persuading are just a few of those shared reading comprehension strategies that find greater meaning when the upper elementary literacy workshop model also focuses on content knowledge. In addition for students using those reading comprehension strategies for an authentic purpose of reading, it also encourages deeper learning of several topics versus wide reading of multiple topics with no cohesion.

Although shared reading comprehension strategies, authentic reading and increased engagement and motivation of the learner are key components on why integration could be a favorable instructional method to increase reading comprehension

for all learners, the underlying skills of building background knowledge and vocabulary are the real reason why integration works. The research and literature review showed that limited background knowledge and limited vocabulary were a big factor in a student's ability to process new information and learning. To synthesize a quote by Judy Willis (2006) on why integration may work it is because when every student gets to make connections about the relationships of new information to old information, then that new information lodges in the memory storage area of the brain. Integration may be the answer to not only increase reading comprehension, but to build more background knowledge and increase vocabulary to better prepare students for the next step in their education.

Chapter Three will focus on how the research on integration methods can be utilized to create a teacher professional development workshop designed to incorporate integration instructional models and reading comprehension strategies in the upper elementary reading workshop model. I will use the research to educate teachers on the benefits of integration, while also providing a modeled lesson plan of integration to meet the needs of adult learners. I will also use my own background knowledge as a reading teacher to integrate as many literacy skills as I can into the teacher professional development workshop. Finally, I will also be developing a website for resources for teachers for integration. The audience for this teacher professional development workshop will be for teachers to implement in their classroom who desire a need to be more consistent and theme-driven in their instruction.

CHAPTER THREE

Project Description

The purpose of this project was to develop an effective teacher professional development workshop geared to upper elementary teachers that would give an alternative to the reading workshop model that integrated social studies, science with reading and writing. Literature suggested that students who have multiple exposure to a topic through various interdisciplinary instructional strategies have demonstrated increased comprehension (Bolack et al., 2005; Chen & Yang, 2019; Fillaptou & Kaldi, 2010; Guthrie, 1999; Guthrie et al., 2000; Halvorsen et al., 2012; McMahon, Rose & Parks, 2004; Romance & Vitale, 2016) Therefore, I looked back at my research question: *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?* After reviewing the research, I believed that teachers can simultaneously teach science and/or social studies content while teaching reading comprehension strategies. By doing this, reading comprehension should increase because it gives multiple exposures of topics that provide students the opportunity to delve deeper into those topics.

The focus of the following chapter was to give an overview and a description of the project that gave an umbrella view of the capstone project and then a more detailed picture of the teacher workshop professional development. I also discussed briefly the method I chose to share my capstone project with other teachers.

Next, research paradigms were discussed with my final choice of completing a teacher professional development workshop as my capstone project. For this teacher professional development unit project, I incorporated the principles of effective teacher professional development outlined by Linda Darling-Hammon, Maria E. Hyler and Madelyn Gardner (2017) in the article “Effective Teacher Professional Development”.

Then, the setting and participants were outlined to get a general feel of what demographic and audience would best be served with this teacher professional development workshop. Finally, the chapter concludes with a timeline to finish and implement the project.

Project Overview

The teacher professional workshop was designed around the integration of the Minnesota state science, social studies and language arts standards for third through fifth-grade. The workshop included an introduction, analysis of reading comprehension test scores, an overview of the integrated instruction models, an activity to integrate content standards with English language arts standards, suggested integration schedules for both the school day and the reading workshop, and finally a modeled integrated lesson plan that incorporated my own research on background knowledge and vocabulary.

Project Description

The teacher professional development workshop started with a hands-on activity of why readers read and how that doesn't always align with the current standards-based approach of teaching reading. Then, time was spent in an analysis of the flatline of

current reading comprehension scores assessed by the state of Minnesota using the Minnesota Comprehension Assessments. We looked at both state and district wide test scores, as they are very similar in non-growth.

After the introduction and analysis, I shared briefly the Concept-Oriented Reading Instruction (CORI) and the In-Depth Expanded Applications of Science (IDEAs) models of integration because both models served as the inspiration on a suggested alternative to the literature workshop model. The next part of the workshop, I shared suggestions on how to alternate the school day schedule to allocate more time to the integration of content subjects with English language arts along with a subschedule that mapped out the reading workshop block of time. The next part of the workshop was a hands-on activities where teachers combined informational text reading standards with science or social studies curriculum and standards for their grade level.

Before I started the next section of modeling an integrated lesson on animal adaptation, I asked teachers to do an activity where they had to examine their content standards with English language arts standards for their grade level. Next, I modeled the integrated lesson on animal adaptation while breaking down the parts of the lesson with the research I found during my literature review on the link between missing background knowledge and inadequate vocabulary knowledge to low reading comprehension scores. I purposely broke up the modeled lesson with research to provide a balance of reception and production of the adult learner. Included in the modeled lesson plan were examples on learning targets, text sets, vocabulary, activating prior knowledge, close reading, reading comprehension strategy, small group, independent work, closing circles. The

modeled lesson ended with a suggestion of book clubs for the time earmarked as “literature” in the schedule.

After teachers went through the modeled integrated lesson with me while learning the background research on the reasons why each part of the lesson was important to a child’s learning, I started to end the presentation with two precepts. The first precept is that in order for students to become better readers, they need to learn more. The second precept was the equity matters and integration is one proven method to reach the needs of all learners. After the precepts, I ended the presentation by asking teachers to make one commitment to the school year by making a goal that I would be able to follow up on through the use of a Google Form.

I put my teacher professional development workshop on a Google Site so that my work can be available to anyone who has an interest in using, seeing or taking ideas of an integration instruction workshop model. Included on that website was the Google Slides presentation, a resource page for pdfs used in teacher professional development workshop and a page for suggested book clubs.

In summary, in the project description I described the different parts of the teacher professional development workshop and the method I shared my final project. I gave a brief outline of my plans to build a workshop that included an introduction, analysis of current trends in reading scores, shared reading strategies, an alternative workshop model and finally a suggestion on how to teach literature in an integrated model. In the section following, the research which the design of the teacher professional development workshop was rooted in will be discussed.

Research Paradigm

Through the literature review, the idea that students need multiple opportunities to learn new content kept manifesting. It has so much to do with building new schema so that when new ideas are presented, students already have the building blocks to establish new connections and create new and authentic ways to use that knowledge. The teacher professional development workshop overview and description is supported by the neuroscience of learning because it will stress authentic reasons for learning by redesigning the reading workshop model that will support the research of building background knowledge and vocabulary to increase comprehension. Judy Willis (2006), a licensed neurologist stated learning and unit design should include opportunities to see how old material fits in with new material, hands-on activities to promote engagement and finally, multiple and varied exposure to content (as cited in Wiggins and McTighe, 2011, p. 6). Integration of science and/or social studies standards in the upper elementary literacy workshop model is a clear example of how the science of learning matters when designing instruction.

In addition to leaning on the principles of neuroscience of how students learn, I also utilized the principles of adult learning in the article “Effective Teacher Professional Development” by Darling-Hammond, Hyer and Gardner (2017) when designing the teacher professional development workshop. Darling-Hammond, Hyer and Gardner (2017) suggest that effective professional development include topics that are content-focused, incorporates active learning, supports collaboration, models of effective practice, provides coaching and support, gives feedback and reflection and has a

sustainable duration. The workshop that was designed was content focused because it focused on language arts standards and content area standards that the school does require teachers to teach. It also incorporated nicely with the current balanced literacy model and therefore wouldn't necessarily be an add-on, but rather a very complementary process. The workshop also incorporates several opportunities for active learning by activities for collaboration to integrate standards. The workshop will also provide models of effective practice by doing a modeled integrated lesson plan on a science standard with informational text standards. Because the workshop is designed as both professional development for teachers, there will not be an opportunity to provide coaching and expert support, but I planned on adding a website as part of this workshop so teachers have something to reference.

In summary, the teacher professional development workshop project was supported in research paradigms by the emerging research of neuroscience and the principles for working with adults. In the section following, the setting and audience for the curriculum unit project will be shared.

Setting and Audience

This teacher professional development workshop was specifically designed for teachers who do not have a purchased curriculum in either social studies, science or literacy. It is also designed with the teachers in mind who would like to try an alternative to the literacy workshop model but who may not have official district approval. I think of myself as a teacher when I have been given random reading resources that are not connected in the hopes to teach a reading skill or strategy. This teacher professional

development workshop turned that idea around by giving an alternative to the reading workshop that will simultaneously build both content knowledge and reading skills and strategies.

This teacher professional development workshop was presented in the fall of 2019 in an elementary school in a rural community southwest of the Minneapolis-St. Paul metro area. The school's student population is 92% White, 3% Hispanic and 2% two or more races. The English learners population is 1.7%, while 15.1% of the student population have the special education label and 7.6% of students receive free or reduced lunch. The majority of these students have been provided with rich life experiences outside of the school day. The Minnesota Comprehension Assessment (MCA) test results in reading show that 78.4% of students in 2016 passed, 78.3% in 2017, and 73.2% in 2018. Although those scores are envious by other districts, it did show a decrease of students passing the MCAs every year indicating there should be a needs analysis of what is working and what is not working in literacy instruction for all students. At the time, I believed the answer may be in a change of instruction methods to integrate content and literacy.

In summary, the setting and audience for this curriculum unit were noted. Also, important information about the demographics was described, including the reading MCA test scores that indicated a year-by-year decrease in reading comprehension scores. In the section following, a timeline will be discussed as to the completion of the capstone project. **Timeline**

I completed the teacher professional development workshop as part of my capstone project class in the summer of 2019. During this process, I worked with my content reviewer to make sure I incorporated the necessary components of the reading workshop model. I also worked with my fifth grade team to check the feasibility of the project within our scope and sequence along with the constraints of the schedule. My understanding was that capstone projects need to be completed in one semester, so my deadline will be August 24, 2019. I had a goal of presenting the teacher professional development workshop in the fall of 2019 to the upper elementary staff at my school. I, personally, wanted to implement the alternative schedule of the literacy workshop model within the first months of school to monitor the effectiveness of the integration of reading, science and social studies standards. If the effectiveness was gauged as positive, I hoped to maintain the integration through the school year as much as possible. I was particularly interested in the impact this has on our special education students.

In summary, my plans for completion of the project were detailed, along with my plans to implement the project in my classroom.

Summary

Chapter Three outlined the project overview, description and details of the teacher professional development workshop for the capstone project. This chapter also included the research used for decisions made in the design of the teacher professional development workshop. Also included were the setting and audience the workshop would benefit from. Lastly, a timeline for the project was described. Chapter Four will be a

reflection and conclusion on the design of the teacher professional development workshop.

CHAPTER FOUR

Reflections and Conclusion

Introduction

Throughout my years teaching upper elementary in Minnesota, I found myself increasingly frustrated with teaching reading skills and strategies as isolated skills with little or no concern about engaging readers as learners first and foremost. This frustration was offset when I started to develop small units around a central topic to teach those reading skills and strategies. Through these small units, I observed increased participation, engagement and comprehension with all my students. Especially noted was the self-efficacy of my special education students in these units.

The challenges and frustrations led me to my research question *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?* Through the review of recent research and literature, I identified key models of integrated instruction and key theories of learning that had a positive impact on reading comprehension. Using that research, for my capstone project I developed a teacher professional development workshop that included both an activity-filled presentation and accompanying website for resources. The purpose of the capstone project was to educate and inspire teachers, while giving them the tools to begin integration of content subjects, such as science or social studies, with their language arts standards.

The following chapter will examine key learnings about myself as a researcher, teacher, writer and a learner. It will also revisit the literature to examine the models of integration instruction and the key reasons on why integration impacts comprehension. It will also speculate possible future research of project-based learning and examination of the importance of curriculum. The chapter will also address implications and limitations of policy the project may have. Finally, it will conclude with the different ways I plan to share my capstone project with teachers. I will begin this next section with reflections on what I learned about myself during this process.

Key Learnings

The capstone project changed my perception of myself as a researcher, teacher, learner and writer. In my capacity as a researcher, I really struggled initially to find research on thematic units, so I decided to find a few similar capstone projects and started using their reference pages to help me guide my research. I quickly realized I had to use different terms to get the answer to my research question. I did start out identifying a few key models of integration that were backed up with research and studies. However, I didn't want my entire paper to be just about models of integrated instruction, so I started to research the reason behind why those integration models were successful. I identified both background knowledge and vocabulary as key components to increased comprehension, which challenged and confirmed my thoughts as a teacher.

As a teacher, I have long thought our pacing guide spends too much time teaching comprehension strategies in isolation. All of my formative assessments were telling me the majority of our students do not struggle with comprehension strategies, but struggle

with the content information or higher-order thinking skills. If students do struggle with comprehension strategies, odds are those students primarily struggled with decoding and fluency. Through the research, I learned that what students are really struggling with is often times lack of background knowledge or vocabulary they need in order to comprehend the text. Researcher, Daniel T. Willingham (2006) confirmed that students benefit from brief instruction of reading comprehension strategies, citing that six sessions per year is as effective as fifty. Willingham (2006) went on to add that students who are good decoders but don't know the strategies are truly the only students who benefit from explicit instruction of those reading strategies. As the result of my research, I feel a greater responsibility to my students to incorporate what I have learned about the time spent on reading comprehension strategies to balance that with the time students spend engaging in content materials. I also hope to share my findings with my colleagues.

My passion for writing was notched up to another level by working on meeting the demands of academic writing. Because I hope to share my findings with my colleagues, I knew that my writing was going to be a reflection on all my hard work and time. I grew not only as a writer in this process, but more so as an editor in this process. Working with the writing center and my four peer editors showed me how to achieve clarity in my own writing. Conversely, reading and editing my peers' capstone papers also reinforced the reading and writing relationship because by reading their papers, I became a better writer. The literature review was the most difficult writing I have ever done, but true to most things in life, it was through the lens of difficulty that I have

learned the most. The next section will share with you my key findings in that literature review.

Revisiting the Literature

The key findings of the literature identified four methods of integrated instruction, including the Concept Oriented Reading Instruction (CORI) model, the In-Depth Expanded Application of Science (Science IDEAS), project-based learning and Gardner's theory of multiple intelligences. Vitale and Romance (2016) developed a model to integrate science and social studies entitled the In-Depth Expanded Application of Science (Science IDEAs). This integration model allotted two hours per day to the science processes of experiments, science processes and concepts integrated with the language arts processes of comprehension, discussion and writing. A half-hour of the day was devoted to literature in the Science IDEAS model. The Concept-Oriented Reading Instruction (CORI) model was an integration model developed by Guthrie and Wigfield. The model started with students working on a hands-on activity or experiment, asking questions, researching the answers with the questions with a wide variety of texts including narratives and poetry to increase comprehension through synthesizing. It ended with a student completing a project where students demonstrated what they learned (University of Maryland 2000-2019). The theory of multiple intelligences was also researched because of the studies of schools who used the theory as a research paradigm to integrate subjects. The theory of multiple intelligences states that there are eight different types of intelligence with humans generally favoring one or two styles, therefore integration of subjects would allow students to use their favored style (Harvard Graduate

School of Education, 1983). The final model of integration researched was project-based learning. Project-based learning starts with students asking a question, researching through reading and completing an end project to share (Chen & Yang, 2019). The integration occurs through identifying sharing comprehension strategies while seeking the answers to the questions.

All four models of integration supported the research question *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?* In the school that used the multiple intelligence theory as their research paradigm to restructure their curricula, students rose 15% in reading and 18% in math on norm referenced tests (Bolack et al., 2005). In a project-based learning (PBL) study, Halverson et al. (2012) reported second-graders from low socio-economic-status (SES) schools who were instructed in the PBL method achieved statistically equivalent levels of achievement as their counterparts in the high SES schools in reading and social studies scores. The experiment group of the Science IDEAS yielded a +1.08 grade equivalent increase in science achievement and a +.57 grade equivalent increase in reading comprehension achievement compared to the control group (Romance & Vitale 2016). Finally, CORI students showed a significant increase of cognitive strategy use compared to the traditional education students (Guthrie et al., 2000). I felt positive looking at these numbers that an integrated model of instruction for upper elementary students had a positive impact on their reading comprehension.

The review of the literature also led to an understanding of how these models of integration impact reading comprehension in students. Quite simply, it is because those models of integration increased the number of times or depth a student spent learning about a topic, therefore increasing background knowledge and vocabulary. Lack of background knowledge and vocabulary significantly impact a student's ability to comprehend, regardless of the comprehension strategies they may possess. Stanovich (1983) used the biblical term Matthew Effect to explain students with larger vocabularies have the necessary background knowledge to build more knowledge, while students with less word knowledge and background knowledge fall even further behind than their peers.

In regards to my research project, I used the Science IDEAs and project-based integration model to design my teacher professional development workshop. Part of the workshop has teachers redesigning their schedule to give more time to the content subjects, similar to the Science IDEAs model. I also developed a lesson plan template that reinforces the idea of building background knowledge and vocabulary as central tenets to the recursive lessons. Finally, I used the research on neuroscience that says best-remembered information is learned through various and multiple exposures to content by designing meaningful writing, listening, speaking and reading activities in the lesson plan format and model (Willis, 2006).

Future Research

Although I didn't incorporate all of the project-based learning lesson components in my teacher professional development workshop, I can see the value of this type of

integration model to the lesson template I developed. If students start a unit with an inquiry of a particular topic and thus work towards completing a project to share their findings, then this model of integration really encompasses the neuroscience of learning because students are constantly revisiting topics to gain more knowledge. Therefore, I would like to do more research on the benefits of project-based learning for not only general education students but in particular the special education student population.

I also was driven to this research topic and project out of frustration of the lack of aligned resources that the school district did not provide for me. I know that there are many teachers who do not like using a prescribed curriculum, but I have been convinced through my research that curriculum does matter. If not curriculum, at least resources that are aligned and vetted for rigor at the grade level. I would like to do more research on if curriculum does matter and what is a curriculum's measurable impact on comprehension.

In summary, in the future I would like to research ways to incorporate project-based learning in my lessons and I would also like to research the impact a curriculum has on curriculum. The next section will be on policy implications of my capstone project.

Policy Implications

The teacher professional development workshop was developed with two intents. The first intent was to be able to share with teachers, who do not have a purchased curriculum, the research on integrated instruction models and then also demonstrating for teachers how easy it is to fit into their daily schedule and/or their reading workshop

model. The mentor lesson that I demonstrated in the workshop made sure to touch on the important parts of the workshop model such as vocabulary, comprehension strategy, writing responses, discussion and small group all while rooted in a content class.

The second intent of the teacher professional development workshop was to convey the message that failure to ignore the importance of sequentially building content knowledge is impeding the growth of our young readers. By using random texts and articles to teach reading strategies, teachers are ignoring the cognitive and neuroscience research that says students need to have multiple exposures to master something. That same intent is also meant to share with teachers that reading strategies can be overtaught and the ultimate goal should be to increase background knowledge and vocabulary, which will spur the growth of our young readers. It can't be overstated that failure to be mindful in developing reading units within thematic sets props up our most vulnerable learners, such as our English language learners and our special education population.

As our district is in the process of determining the importance of a curriculum and subsequently reviewing and possibly purchasing a curriculum, I will also be using this teacher development workshop as a means to persuade my colleagues and administrators that we purchase curricula that is centered in science and social studies thematic units. Pearson's MyView Literacy and ReadyGen Literacy are two K-6 reading curricula programs that center English language arts standards inside grade-level science and social studies standards, alternating (Pearson, n.d.). Next I will discuss the limitations of my capstone project.

Limitations

While this teacher professional development workshop presented many learning opportunities for teachers, it also had some limitations. One limitation was teacher buy-in to the idea of integrated instruction because of the very fact we have been teaching reading as isolated skills for a very long time. Prior to this, we have had several workshops and two years of dedication on balanced literacy training where it was modeled that students have separate books to model reading skills and strategies. It can feel like the antithesis to my suggested project. Another limitation for teachers is the required work up front to develop the units that are complete with text sets and integrated content. After spending the last four years without a curriculum, we already have procured texts that match the desired reading skill or strategy that we teach each year so this would be like starting from scratch. A final limitation that occurred was lack of buy-in from administration, so that is why I stressed in the end of my presentation that teachers take one thing they can implement and try that in their classroom. The following section I will explain how I plan to communicate my project.

Communication

I plan on sharing my teacher professional development workshop presentation with my team, along with third and fourth grade teachers in my building, during workshop week of the 2019-2020 school year. I will also be sharing my capstone project with the district during our June 2020 staff development days and I hope to have the results and anecdotal evidence on the impact of reading comprehension by using the proposed integrated instruction model.

Summary

In summary, Chapter 4 gave me the opportunity to reflect on the capstone process and project development to answer my research question *How does the integration of science and/or social studies standards with language arts standards impact the reading comprehension of upper elementary students?* Through the process, I became a better teacher, a better writer, and continue to fan the flames of the science behind our profession of education that I find so fascinating. I look forward to not only sharing my findings with teachers in the form of my capstone project of a teacher professional development workshop, but I also look forward to using the research and lesson design template I developed with my own students. I believe that the project design will have a positive impact on comprehension as well as motivation and engagement for all of my students.

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APPENDIX A

Link to Professional Development Workshop:

<https://docs.google.com/presentation/d/1rffejxrh1FK4vmA2jrifqDehWNjFLMEqoJDTlqXhUwY/edit?usp=sharing>

Link to Professional Development Workshop Website:

[Professional Development Website for Resources](#)