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FRAMEWORK FOR IMPLEMENTING METACOGNITIVE REFLECTION TOOLS
TO FACILITATE STUDENT LEARNING

by

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A capstone project submitted in partial fulfillment of the
requirements for the degree of Master of Arts in Education.

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CHAPTER ONE

Introduction

School mindsets and policies have been slowly shifting over the past decade from pushing for endless teacher-centered lessons based on compliance and the delivery of material to those that try to focus on learner agency and the purposeful application of skills. Schools have discovered an appropriate goal to foster learning, but proactive learning has become the burden of teachers, not those who are supposed to be learning. Educators are being taught how to grade and how to give feedback. Educators are constantly being told to encourage students through intrinsic motivation and to make the learning centered on student engagement. Instagram and other social media outlets show the motivators as flashy classroom makeovers, printables, and engaging gamification. Educators do not need to be flashy to foster intrinsic motivation and agency, though. Educators can empower students and allow students to take ownership of the learning process through creating reflective and self-assessment experiences. My capstone project will answer the research question: *How can educators use reflection tools with students to increase student understanding of their own level of course mastery?*

This question will help provide secondary teachers with options for opportunities and tools that students need to reflect on formative feedback to acknowledge necessary remediation and to ensure learning growth and personal accountability for their learning. It will assist students in understanding their own areas of growth versus holding teachers accountable. A framework that involves reflection tools, activities to foster students' self-reflective thinking, and ideas on how to scaffold self-assessment will provide teachers with a plan to help students make connections between their work,

understanding, and measurable success. A greater awareness of self will allow students to internalize their success more and take more responsibility in their learning. Educators' roles will evolve into a support system for autonomous learners when teachers are given the tools to both explicitly teach reflection and to provide quality reflective opportunities for their students to truly hold students accountable for their own learning.

Throughout this chapter, I will provide the broader trends of 21st century education and how significant student reflective practices are in today's world of education. I will also describe my own professional context and rationale for developing a system for student reflective practices in secondary classrooms, explaining how my own context fits into the bigger context of educational practices.

Historical Context

From the beginnings of modern American public education, when education became a state-sponsored institution, schools have been used as “engines of community development” and devices of social change (Rury, 2005, pg. 182). American education systems are reflections of society because schools have been used to impart value systems and change them when necessary. Education trends in the 19th century focused on compliance and obedience as massive industrialization began. Schools pushed for passive learners and direct, teacher-led learning because society needed passive workers who would follow employer's instructions and be punctual to work. Standardized tests also revealed the mechanization of schools along with society. As John Dewey stated, “Our mechanical, industrialized civilization is concerned with averages, with percents” (National Education Association, 2020). As the Progressive Era began and urbanization reached new heights, American society became more complex with more diversity and a

wider division of labor. As jobs became more specialized, so did education, through the implementation of differentiation. In the post-War era, as the United States was focused on fighting communism, so were schools. Educational policies became anti-progressive and focused on American traditions (Rury, 2005).

Schools as both reflections and agents of societal reform have not changed. Society has changed, though, yet many of the historical educational practices mentioned above remain. Society's needs in the 21st century have shifted, and so schools must shift too. Society no longer needs to focus on punctuality, compliance, or the mechanization of student masses. "One of Albert Einstein's famous quotes is, 'the significant problems we face cannot be solved with the same thinking we used to create them'" (Cloud, 2017, pg. 10). In a world that continues to make recurring problems worse and in a world where technology can, in many instances, match the abilities of humans, today's educational commitment must focus on forming creative problem-solvers who can think critically about not only others' past errors, but their own. Compliance in a society that does not have the answers will not work. The process of self-reflection will develop critical thinking skills and the results will cultivate individuals who are aware of societal needs and who are motivated and able to hold themselves accountable to meeting those current needs.

Importance Of Critical Self-Reflection

Reflective practices can aid in the creation of goals, develop the skills to reach them, and help one assess the mastery of the goal in the end. The process of reflection and metacognition models problem-solving and critical thinking, two cognitive skills needed for citizens of the 21st-century. The result of that reflection leads to a better

understanding and awareness of how to acquire the goal at hand. Reflection “bridges gap between intention and accomplishment” (Yancey, 1998, pg. 6). Providing opportunities for self-reflection in the classroom pushes students to use higher order thinking skills, preparing them with problem-solving skills for this world with a lot of problems to solve. Individualized and student-centered classrooms focused on reflection will provide opportunities for deeper, more engaged learning as students understand and are held accountable for their own levels of mastery. Classrooms that allow students to self-reflect and guide their own learning will develop individuals able to improve upon error and find creative solutions for unknowns, mastering their learning objectives at a greater level.

In summary, the process of reflection is one in which learners develop learning goals, find strategies to reach those goals, and determine if those goals have been met. It allows learners to take learning into their own hands, finding a deeper understanding of and investigating their learning process (Yancey, 1998).

Professional Context

Having taught in the context of several different educational cultures as I approach my tenth year of teaching professionally, I have experienced teacher and student roles in Central Africa, the Middle East, East Asia, Central America, and now the United States. Two trends in the educational relationship between teachers and students stand out to me when I reflect on my current teaching context in Western schools. Teachers are overburdened with the responsibility of student success, while students lack the knowledge and skills to hold themselves accountable for their own learning.

I have attended numerous meetings on how I can help my students get their grades up, whether it is more grades in the gradebook, making grades focused on

different measures, or changing the weights of my gradebook. I have been to multiple professional development sessions on how I can help raise standardized test scores through the implementation of different teaching strategies. It is required of me to provide ungraded feedback before every assessment and to offer retakes on every assessment. I have gone to training sessions on using escape rooms and other extravagant simulations to encourage motivation in my classroom. While I agree with all of these practices, if autonomous, they place the responsibility of learning solely on teachers. I have left many meetings and training sessions feeling overwhelmed with how much I need to do if I want to fulfill my duty as an educator. If these practices that guide teachers on how to teach are unaccompanied by the training of students on how to learn, the focus on what teachers can do differently to foster student motivation are ineffective. These practices are placing the responsibility of learning on the teacher. They are not encouraging learner agency in students, nor teaching them how to grow in areas where they need improvement, a necessity in the learning process.

I am currently an Advanced Placement (AP) World History teacher in Minneapolis, Minnesota. AP World History is a course focused on historical writing skills and document analysis, two higher level tasks for tenth-grade students. I spend hours a week outside of class time with student work, leaving both written and audio recorded feedback with suggestions on how to improve their writing and thinking. No matter how much time I spend on feedback, though, I am either consistently met with questions like, “Why did you give me that grade?” or “How can I get my grade up?” or finding myself looking at assessments showing little growth. My students are not utilizing the feedback I give them and are expecting measurable success without looking

back at their past work. I am often left feeling defeated at the end of the day having put hours into my student's learning growth with little positive results and evidence that my work was used superficially or disregarded.

When I first realized that my students did not have the knowledge or skills to use feedback to reflect on their work, I started allotting time in my class for them to do so. I thought that since they were not taking the time outside of class to learn from their mistakes, I just needed to provide the time for it myself. I even began to provide self-assessment tools. Even with these practices, reflection was present, but it was superficial and still not useful. I ended up having to restate what I meant in my comments in many ways. Essays saturated with comments were as overwhelming to them as they had been for me while I was writing the comments. Students were also still asking questions about why they received a lower grade when they worked so hard. My feelings of defeat turned into frustration with my students. Both feelings were unfair to both myself and my students because my students had never been taught or provided the appropriate tools to do what I was expecting of them.

What I have learned throughout my own teaching and attempts at cultivating autonomous learners is that self-reflection not only needs to be provided with the time, but it needs to be taught. Reflection is a skill in itself that my students do not have. Like any other skill, it needs to be modeled, guided, and practiced with the appropriate scaffolds. It is unfair to my students and me to expect them to have a skill without exposure or training. That unfair expectation resulted in unhealthy frustration on both ends. Without reflection, teachers are overburdened, and students are feeling helpless and lost in their learning. Using reflection effectively can displace many ineffective burdens

on teachers, by encouraging learner agency. I will be designing a professional development framework for secondary educators to lighten this burden and bring more student reflection into classrooms.

Conclusion

Reflection in the classroom is an essential part of education, especially in the 21st century, which is why I ask the question: *How can educators use reflection tools with students to increase student understanding of their own level of course mastery?* Teachers need to be given the tools to both explicitly teach this skill and to provide quality reflective opportunities for their students. Not only does reflection hold students accountable for revising and applying new knowledge in order to better master the standards of a course, but it also teaches critical thinking and problem-solving skills throughout the process.

Roles in the classroom need to be reallocated to be healthier and more conducive to learning. Reflection can help do this. Teachers should no longer be spending time on unread or unused feedback. Teachers should not be held accountable for grades. Learners should hold the responsibility for their results. Students should understand where their measures of success are coming from and be provided the tools to reach their end goals and the levels of success that they expect of themselves. Without reflection, teachers are overburdened, and students are feeling helpless and lost in their learning. Reflection can displace many ineffective burdens on teachers, by encouraging learner agency.

Chapter 2 reviews current literature around the use of reflective practices, including the effects of metacognition, teacher feedback guiding reflection, and specific reflection tools and systems that can be used to help students both understand their

learning and act upon their specific learning needs. Chapter Three will offer a detailed description of the framework for teachers to utilize student reflection in the classroom and justification for its design. Chapter Four will provide an overview of the capstone process and a reflection on the creation of the framework created.

CHAPTER TWO

Literature Review

Educational books, articles, online texts, and professional development sessions today emphasize how crucial student-led learning is and how impactful and engaging classrooms centered around students are on learning and long-term success. Educators know that content is understood at a deeper level when students are engaged and when students are provided with strategies and scaffolding to aid them in regulating their own learning. Reflection is one of the strategies that allows for a learner to look at their own beliefs and abilities with a critical lens, in order to progress in knowledge and understanding (Koole et al., 2011). Educators know that these skills are necessary in 21st century classrooms when skills have to take priority over the knowledge of facts. These are widely known and accepted ideas, but this well-researched evidence is not effective if it is not applied (Boulware-Gooden et al., 2007). Classroom teachers know the importance but are failing to implement reflective practice into their curriculum and classroom structures. The lack of student self-regulation and reflection on learning is what led to the following question: *How can educators use reflection tools with students to increase student understanding of their own level of course mastery?*

This literature review first provides a definition of reflection and its relationship with metacognition and learning, focusing on what reflection might look like in a classroom setting. Secondly, it will discuss the positive effects of reflective and metacognitive strategies that accompany reflection on both improving student learning and motivation and the retention and transfer of knowledge. Lastly, recommendations for classroom systems that ensure effective reflection will be provided. Several types of

activities to facilitate introspective practice throughout lessons will be suggested and explained. All systems will aid teachers in guiding students in their reflection and ensuring that it is effective.

Defining Reflection

Reflection can be defined in a variety of ways because the process can be used in a plethora of different contexts. Reflection can involve conceptualizing one's emotional state or involve the generalization of multiple perspectives. A common physical symbol of reflection is a mirror, something that simply duplicates what it sees (Boud et al., 1985). Reflection in the context of learning, though, has an action goal of self-development. It is the process of finding awareness, analyzing one's new level of awareness through metacognitive processes, and developing new perspectives based on that analysis. Reflection to learn is not simply a review or summary of an experience. It has to contain an aspect of interrogation in order to facilitate progress in thought (Koole et al., 2011). Students must go beyond identifying their knowledge and skill during the reflection process. They must work with and critically examine it in order to develop new, sophisticated thought. Reflections need to be integrated into student thinking to ensure learning.

The development of the definition of reflection with the purpose of learning has been influenced by a variety of contributors. John Dewey was one of the first educational theorists to advocate for educators to focus on the need for students to interact with their learning in order to progress their thoughts. Dewey (1910) argued that reflection goes beyond a simple observation or noting of a fact. He stated that reflection has to involve conscious consideration of the significance of the fact or there is no thinking involved.

Other educational theorists focus on how teachers often put all of their efforts into the learning activities that they do not spend enough time on what needs to be done after students have been through a learning experience. They state that reviewing the activities is not enough. For instance, writing a report on what happened during class is not effective reflection. Students must reconstruct a learning experience by breaking down things left undone, working through any emotions they had throughout it, and identifying connections between different parts of the experience and previous experiences (Boud et al., 1985). David Kolb, whose theories on experiential learning are widely received by educators today, added steps to the definition of reflective learning when he stated that reflection goes beyond recitation of an experience. He argued that reflection needs to then progress to abstract thinking about the experience and then action based on what was learned through the beginning of the reflection process in order for students to learn (Kolb, 1984).

Though all of these theories on reflection differ slightly, they all contain the central idea that just simply describing an experience is not necessarily effective reflection. Awareness of an experience is important, but so is critical analysis of that awareness to inform future experiences. An effective reflection process has new output of its own, new discoveries and perspectives and possibly informed behaviors based on that output (Koole et al, 2011). The assumption has been made that reflection is a necessary step in the learning process, especially the steps of critically analyzing learning experiences and producing something new from that analysis. It is important for teachers to realize how crucial that metacognitive step is in the classroom in regards to furthering students' understanding and skills.

Effects of Metacognitive Reflection

Metacognition is the analysis of one's own thought processes. Metacognitive reflection is revisiting one's own learning process to critically examine mistakes and successes and find relationships between initial understanding and the learning outcome (Howe, 2019). The metacognitive aspect of reflection is the component that most educational theorists have argued is crucial for effective reflection in the learning context because of its short and long-term positive effects. The use of metacognitive reflection, that goes beyond a simple summary of a learning experience, can aid in student success. Metacognitive reflection expands students' understanding and retention of the specific learning activities targeted, engages them in the practice of higher order thinking, pushes for the transfer of knowledge into different contexts, and aids in their accountability and motivation.

Retention & Comprehension

Enhancing the retention and comprehension of knowledge is the first benefit of metacognitive reflection. Being provided the opportunity and having the ability to think metacognitively is the distinguishing factor between students who are able to retain and comprehend knowledge and those who cannot (Pogrow, 2004). Students must reflect on their internal mental processes and adapt based on that reflection. Adapting to one's needs based on personal reflection can help students adapt their thinking to improve their learning and retention of knowledge (Howe, 2019). Research has shown that the achievement potential of students who are not given the opportunity for consistent, higher-level, metacognitive thinking is limited. While traditionalists have focused on

remedial work and test preparation because it shows success, that success plateaus and educational gains are restricted to test scores, not a true understanding (Pogrow, 2004).

As Pogrow (2004) acknowledges, some success can be achieved through remediation and maintenance rehearsal, practicing skills over and over. Some comprehension exists because of simply experiencing. A psychological study by Gardiner et al. (1994) reveals, though, that elaborative rehearsal, finding an association between new and existing knowledge, helps learners retain knowledge. The study used different timing to ensure different types of memory rehearsal were used to learn and remember a list of words. After returning one day later, after exposure to the words, the learners remembered more of the words that were supposed to elicit elaborate versus maintenance rehearsal. Higher order thinking and active reflection on existing schemas through metacognition is necessary for learners to retain information beyond the day learning activities occur.

The push for using metacognitive reflection to aid in expanding understanding is based on learning theories of constructivism. Constructivist learning theory states that learners do not acquire knowledge by passively taking in stimuli. They must build their own understanding by reflecting upon their experiences with the world and accommodating and assimilating new information with their preexisting schemas (White & White, 2011). Because constructivism believes that the individual learner must build their own understanding, metacognition is at the root of the theory. Metacognitive experiences allow learners to develop goals, add, delete, or revise knowledge, and monitor knowledge to inform action, all actions requiring an individual learner to construct (Flavell, 1979). Constructivism relies on metacognitive thinking as the means

to learning new concepts. Students must be involved in the learning process and its center in order to gain a true understanding, and metacognition is a necessary component of that process.

Critical Thinking

Modern American schooling has been an effective device to produce social change and develop society based on its current needs since the start. From the end of World War II, schools shifted to focus on building human capital, valuing human skills that can add to society (Rury, 2005). As society's needs continue to evolve at a rapid pace, with more complex problems needing more complex solutions, the skills learners need to develop are higher order, critical thinking skills that promote decision-making and problem-solving in real-life applications (Dwyer et al., 2014). Human capital now requires more complex thought. Not only does this broader context reveal a need for critical thinking, but people also need to critically think on a daily basis in interpersonal situations in order to make decisions, making these skills crucial to today's learners (Dwyer et al., 2014). "The rate at which knowledge has been growing is exponential, and the most valued asset of any society in the coming decades is a knowledgeable, thinking citizenry--human capital is the wisest investment" (Halpern, 1998, pg. 450). One of education's crucial ends must be critical thinking. Development of critical thinking is another positive effect of metacognitive reflection in the classroom.

"The term critical thinking refers to the use of those cognitive skills or strategies that increase the probability of a desirable outcome" (Halpern, 1998, pg. 450). Critical thinking involves inference, recognition, deduction, interpretation, and evaluation or synonyms of those processes (Magno, 2010). It is more purposeful and reasoned than

other lower order thought. Critical thinkers assess the consequences of their cognition with the goal of improving it. These skills are more complex and need to be applied through analysis and evaluation versus rote repetition (Halpern, 1998). Because of the reflective nature of critical thinking, metacognition plays a large role in its process. Students must monitor their cognition while critically thinking, assessing progress, accuracy, and weighing decisions about time and effort (Magno, 2010). Metacognition enables critical thinking.

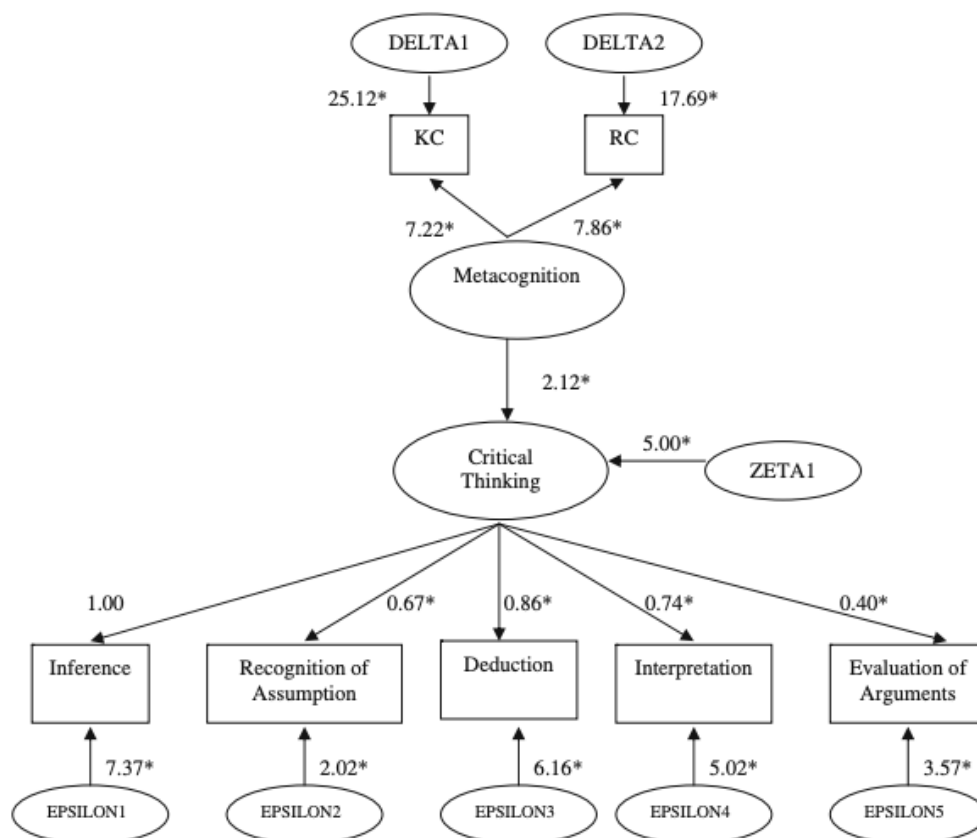
A study of 240 undergraduate university students in the Philippines set out to test the theory that metacognition aids in the development of critical thinking. Participants were asked to take two assessments, one to measure metacognition and one to measure critical thinking. The results of the study revealed that the correlation between metacognition and critical thinking is statistically significant and positive, as shown in Figure 1 (Magno, 2010). This study provides concrete evidence for the theory that metacognition leads to improved critical thinking. It shows that the executive processes used in metacognition allowed for deeper critical thinking because critical thinking requires a form of meta-level operation.

Metacognition starts early in life. When children first gain an awareness of their mind and others' thoughts, they are thinking at the meta-level. Like many other innate skills, though, metacognition often does not reach the potential it is capable of reaching (Kuhn & Dean, 2004). Because critical thinking requires some form of reflection on one's own thinking, metacognition and metacognitive reflection must be put to use to acquire greater critical thinking skills as well. The practice and purposeful development of

metacognition will inherently lead to the practice and development of critical thinking, a crucial skill in the 21st century.

Figure 1

Effect of metacognition on critical thinking



Note. The above figure provides a visual representation of the study on undergraduates in the Philippines. It reveals how different metacognitive components, knowledge of cognition (KC) and regulation of knowledge (RC) significantly correlate with an increase in critical thinking skills. Reprinted from “The role of metacognitive skills in developing critical thinking” (147), by C. Magno, 2010. Springer Science + Business Media, LLC. 2010.

Transfer of Knowledge

In addition to furthering the understanding and retention of content and the development of learners' critical thinking, metacognitive reflection allows for the transfer of content knowledge into a new situation when the original context is lost. The goal of guiding students to become better thinkers is for them to transfer those skills to real-world situations (Halpern, 1998). Lifelong learning is essential for maintaining a high standard of professional practice, and lifelong learning requires the transformation of frames of reference, the transfer of knowledge. Reflection is the driving force of that transformation (Koole et al., 2011). Through the development of metacognitive processes, students achieve the transfer of knowledge to new contexts, permitting them to use knowledge throughout their entire lives, not just in the classroom or school setting (Dean & Kuhn, 2003). These new contexts can involve career tasks, relationships, and any other life situation that requires problem-solving or decision-making. The use of metacognitive reflection in the classroom will set students up to be successful life-long learners.

A study by Lehman and Nisbett (1990) on participants who had completed a four-year undergraduate degree sought to test out whether reasoning skills taught in university courses transferred into realistic situations after graduation. Subjects were first tested on whether their reasoning skills improved in the classroom setting. After determining that reasoning and critical thinking skills improved significantly when they were explicitly taught in classes, the study continued months after the courses were completed. Each participant received a phone call, unknowingly from the researchers, who acted as if they were surveying people for a different purpose. They asked questions that required similar reasoning skills to those they had improved on throughout their

education, though they were now being asked to use them in their homes. This part of the research supported the theory that the students had gone on to use the thinking skills taught in their classes, in a new context, their homes, with new ideas, even after their courses had ended (Halpern, 1998). Critical thinking can be learned through instruction, and it will transfer to new realms when called for.

If any skill is deemed transferable, it must be able to be recalled when necessary and elaborated on because elaboration on a specific concept provides the opportunity for a meaningful connection with other relevant concepts. In order to ensure recall and elaboration, meaningful practice is required. Therefore, if the goal is for transfer of content knowledge and critical thinking skills, like elaboration, from inside classrooms to real-world contexts, the practice needs to be done (Halpern, 1998). The connection between metacognitive reflection and critical thinking has already been made clear. Practice of elaboration and recall through metacognitive reflection can lead to transferable skills. Real-world cognition has a context, and if teachers are fostering a good learning environment, it will include practice of that cognition (Halpern, 1998).

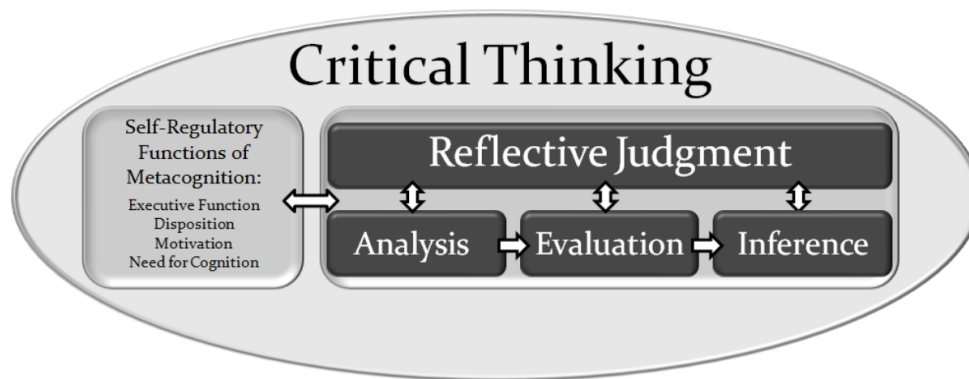
Accountability & Motivation

A final positive benefit of metacognitive reflection includes self-regulatory functions involving accountability and motivation. These functions can in turn lead to more success in all areas of understanding by managing the application of critical thinking. According to Flavell, as cited in Dwyer et al. (2014), metacognition is an understanding of one's personal cognition, including observation, adjustment, and management of all processes related, self-awareness. Individuals who have heightened metacognition and critical thinking skills are able to recognize and become self-aware of

personal higher-order thinking. They also have the capability to seek better judgement if higher-order thinking is insufficient, made possible through reflective judgement, as shown in Figure 2 (Dwyer et al., 2014). Reflective judgement is an individuals' understanding of how cognition and its limits can affect how they back their reasoning, even in contexts where assumptions may not match evidence presented (King & Kitchener, 2004). Reflective judgement allows critical thinkers to hold themselves accountable for positive behavior and more reasonable thought and decision-making. By acknowledging any doubt in decision-making and problem-solving, critical thinkers can hold themselves accountable for better thinking.

Figure 2

The interdependencies among the self-regulatory functions of metacognition, critical-thinking skills and reflective judgment



Note. The above figure shows the interconnectedness of metacognition, critical thinking, and reflective judgement, three necessary abilities to foster more personal accountability for good thinking. Reprinted from “An integrated critical thinking framework for the 21st century”, by Dwyer et al., 2014.

The self-awareness found through metacognition not only allows for greater accountability, it also provides learners with the tools and awareness to set appropriate goals and gain motivation through suitable goal-setting, as it provides students with conscious control of their learning. Though it does not ensure proper goal-setting, high levels of self-awareness maximizes the potential (Ridley et al., 1992). If students are consciously assessing their own cognition, they can determine their cognitive needs and potential. According to Locke (1996), self-established goals have been found to be more effective in increasing commitment to their completion than those set by others. Self-set goals allow students to internalize the process and set them up for building intrinsic motivation. Deci and Ryan, as cited in Li et al. (2020) point to the Self-Determination Theory to explain how students are motivated to learn and succeed, stating that humans are motivated by their perceptions of competence, social connection, and autonomy. Because metacognitive reflection provides autonomous learning, it has a strong connection to intrinsic motivation. If individuals are not at the center of their own learning and thinking, learned helplessness may be the result. If students are not able to think critically about their own thoughts and their state of cognition they may feel a sense of hopelessness and lose all motivation to succeed and learn (Ganz & Ganz, 1990)

Metacognitive reflection has invaluable benefits for learners of all age groups. Through reflection that involves critical analysis of one's individual thoughts, learners can increase comprehension and retention, develop greater critical thinking skills, ensure the capability of transferring knowledge and skills to new real-life situations, and provide greater possibilities for increased accountability and motivation needed to learn and succeed.

Classroom Systems For Reflection

Metacognition and reflection on one's own thought processes is a skill like any other that must be learned. Providing feedback and expecting that students will automatically see their mistakes, be able to analyze their incorrect thinking, and fix their thinking is unrealistic. Instruction in processes like metacognitive reflection that require students to be active constructors of their knowledge, rather than passive consumers, is extremely crucial (Curwen et al., 2010). Because metacognitive reflection is a personal cognitive process, it is inaccessible to those who are not the person performing the reflection. An outsider attempting to assess reflection poses a threat to valid assessment, without the ability to verify concrete introspective cognition (Koole et al., 2011). Therefore, educators must implement instructional strategies beyond extrinsic motivators, like grades or assessment, to ensure that reflection is happening and that it contains the critical analysis and necessary metacognitive features that guarantee all of the benefits of reflection.

Berthold et al., as cited in Askill-Williams et al. (2012), states that learning protocol and instructional interventions to provoke students to engage in metacognitive reflection must include four elements, selection of goals, elaboration of ideas, structuring concepts, and monitoring understanding. While the end objective is metacognitive reflection and assessing one's own cognition, there are several different instructional strategies that teachers can use to ensure students are best prepared for metacognitive reflection at the beginning, middle and end of instructional periods. Some of these instructional strategies include explicit or direct strategy instruction, modeling, verbal exposure and prompts, teacher feedback, written responses, and group reflection.

Explicit Strategy Instruction

Students do not become independent, critical thinkers and learners simply through the natural development process. Teachers whose students find the most success rely on some direct or explicit instruction that involves the presentation of new material or concepts. Though direct instruction must be accompanied with other structures that allow for application, studies have shown that mastery is enhanced by explicit teaching (Rupley et al., 2009). Students need the explicit instruction and presentation of metacognitive reflection skills too. In order for them to find awareness of their understanding, analyze it, and develop further or altered learning, students need to be presented with direct instruction on how to do so.

Explicit instruction best reaches the instruction categories of identifying goals, according to Askill-Williams et al. (2012). How explicit instruction of metacognitive reflection looks can vary from classroom to classroom, though. K-W-L charts and graphic organizers that show the thinking process can support students by explicitly revealing what their cognition should eventually resemble as they become more self-sufficient in metacognitive thinking (Curwen et al., 2010). Teacher scripts that provide learning objectives and explanations of how metacognition is required for certain learning activities is also crucial. These are clear clues for students as to the expectations for their thinking and learning. They can also be scaffolded. If a teacher begins a unit by stating “Today’s lesson is about...”. By the end of the unit, he or she may leave the answers up to the students, along with finding a connection with how metacognitive reflection is involved (Askill-Williams et al., 2012).

Modeling

Modeling is another form of explicitly teaching metacognitive reflection skills that is best used to aid students in organizing their knowledge and other cognitive features (Askill-Williams et al., 2012). Modeling is the demonstration of how to use learning (Rupley et al., 2009). Howe (2019) states that students often perceive themselves as deep-thinkers and active reflectors, but their reflections are actually consistently superficial and consist of only lower-order cognition. Zimmerman as referenced by Howe (2019) explains that when proficiently skilled teachers perform a task, such as self-correction, and students are able to observe the rewards of performing it well, students become more motivated to learn and complete the same skill in a similar situation.

Two common strategies to model cognitive strategies like metacognitive reflection are think-alouds and talk-alouds (Rupley et al., 2009). Think-alouds are when a teacher verbalizes their thinking in front of students (Howe, 2019). In the case of teaching metacognitive reflection, it might involve the discussion of the necessary steps and descriptions of the reasoning behind each step. Think-alouds allow students to dive into the teacher's cognition and more easily understand strategies they can use themselves (Rupley et al., 2009). Talk-alouds also involve teacher demonstration, but talk-alouds are less focused on sharing personal cognition and are more likely to involve the demonstration of activities that will also aid in expanding thought. For instance, they may demonstrate how students can organize concepts into different schemas. Because metacognitive reflection requires a learner to make meaningful connections between ideas and organize learning to ensure it is retained, talk-aloud activities in which teachers

verbalize the process of highlighting notes, drawing concept maps, or drawing diagrams would provide a model for students on how to make those connections (Askell-Williams et al., 2012).

Verbal Exposure & Prompts

“Metacognitive experiences are especially likely to occur in situations that stimulate a lot of careful, highly conscious thinking: in a job or school task that expressly demands that kind of thinking... (Flavell, 1979, pg. 908). This is true in the real-world situations that students will find themselves throughout life, but it can also be applied to the classroom. Teachers must provide an environment that stimulates highly conscious thinking if they wish metacognitive experiences to be more likely. This higher-level, metacognitive thinking can be fostered through an increase in verbal exposure and verbal prompts that relate to metacognition.

Pogrow (2004) explains that thinking is a cultural way of representing things. If students are not exposed to conversations that include metacognitive language, it may feel like they are in a foreign culture, which will in turn create cultural dissonance and frustration. The repetitive use of reflective questions and metacognitive language would provide more exposure. It would produce familiarity and confidence that may enable students, especially those who have not been exposed to reflective thinking culture before, to begin taking part in the discussion and thinking. Students who do not respond to reflective questions or do not reach the heightened level of metacognitive reflection is not due to a lack of ability. The issue is the lack of student access to the types of cultural interactions and conversations that engage them in reflective and abstract thought (Pogrow, 2004).

Quigley et al. (2018) advocates that discussion and quality of talk in the classroom is positively correlated with the improvement of metacognitive skills. Thoughtful dialogue, debate, narration of thought, and asking questions, are all types of talk that help expose students to metacognitive thinking. Verbal exposure can be in the form of more teacher-based prompts. For example, teachers could ask students, “What do you already know about...?” to cue students to activate prior knowledge and cognition on the topic (Askell-Williams et al., 2012). Talk can also be more student-centered. For instance, the teacher can facilitate Socratic talk, where students control the questioning and thoughtful dialogue (Quigley et al., 2018). Even the use of terms such as “critical thinking”, “analysis”, “assess”, “evaluate”, etc. can aid in students' exposure to metacognitive experiences. Well-structured questions and language will provide students with experiences and thoughts that they can use in their own practice after teacher scaffolding (Halpern, 1998).

Teacher Feedback

Metacognition is fallible because there are so many biological and social factors that influence learning, thought, and performance (Schofield, 2012). Metacognitive reflection can also mislead students to invalid judgements based on personal bias (Howe, 2019). In order for students to think critically about their understanding of content and their mastery of skills in order to improve, they need to be provided guidance on whether or not they are doing things correctly and objectively. Because the monitoring of understanding is one of the key components of metacognitive reflection, students who are going through the process of learning must receive scaffolding to build their thinking and skills before they can partake in reflective judgement (Askell-Williams et al., 2012).

Effective teacher feedback is another system that can help facilitate students' metacognitive reflection.

Unfortunately, a way of reliably measuring another person's introspection has not yet been developed because the only way to represent one's own introspection is to present it indirectly, whether it's through writing, or a chart, or another visual tool (Koole et al., 2011). Though feedback cannot perfectly track or comment on the successes of another's metacognition, it remains an important part of the scaffolding process. While providing feedback on reflection teachers must provide feedback that considers all contextual factors (Koole et al., 2011). It must also ensure that trust and student perception that they are free from judgement about their thoughts must be maintained. Feedback in the form of another learning activity focused on teaching metacognitive reflection, like modeling, has been found to work the best for improving student's reflection practice (Howe, 2019). Focus on the improvement of how to think about growth and goals will also aid in students' ability to use feedback on content goals too (Zimbardi et al., 2017).

Written-Responses

Because metacognition is so hard to assess and provide feedback for, it is important that students are provided with opportunities to monitor their own progress in their thinking. Monitoring understanding of content is an aspect crucial to metacognitive reflection. Teachers can facilitate this through written responses, like guided reflective journaling or more brief questionnaires.

Berthold et al. (2007) found that students taking part in open-ended writing activities often did it superficially, with a lack of critical analysis of their own thought.

Metacognitive prompts accompanied by the guidance in cognitive learning strategies were found to aid students in reaching better quality metacognitive reflection (Berthold et al., 2007). If teachers have limited time for an extended writing activity or if their student population is unlikely to partake in an extended writing activity without including an extrinsic motivator, like a grade, brief questionnaires can be used to elicit metacognition (Askell-Williams et al., 2012). Two studies on ninth-grade science students and eleventh-grade psychology students revealed that brief questionnaires that used prompts like “Is there anything about this topic you don’t understand, or are not clear about? (You could ask a question)” elicited some positive outcomes for student progress in their metacognitive understanding checks of lesson content (Askell-Williams et al., 2012, pg 432). It is important to note that they were not as successful as other strategies when students were not as exposed to or did not receive as much attention in the classroom (Askell-Williams et al., 2012).

Group Reflection

Our goals for classroom reflection are vast. Deeper critical thinking, stronger motivation, an increase in comprehension, social change, etc. Making time for reflection in groups aids in all of these goals. Most tasks in society today require collaboration. The United States government framework is based on collaboration between different branches. The U.S. is based on the idea of democracy, essentially a collaborative system. Society today relies on working quickly to solve problems and come up with fast solutions. Because collaboration allows for the sharing of knowledge and tools and other information, it has become a basic requirement in the workfield today (Teamwork helps careers). Reflection in groups in the classroom first helps mimic the needs of society and

prepares students for their future that will more than likely involve working with others. They will need to learn how to collaborate.

Group and collaborative reflection activities also allow students to utilize the social aspect of learning. "... a certain amount of learning takes place beyond the confines of the individual mind" (Salomon & Perkins, 1998, pg. 1). Not only do students need to practice collaboration, they can also gain more learning from collaboration. Group work allows for learning that cannot take place in an individual setting, as demonstrated by the following examples (Allen, 2012):

- Students will have their assumptions challenged by diverse perspectives.
- Students will refine with understanding through discussion and explanation.
- Students will develop stronger communication skills.
- Students will provide and receive feedback.
- Students will delegate roles and responsibilities.
- Students will tackle more complex issues than they could individually by pooling knowledge and skills.
- Students will receive social support and encouragement to boost motivation.
- Students will be held accountable and will hold others accountable.
- Students will develop new strategies to resolve differences.
- Students will establish a new identity with a collaborative group.
- Students will develop their own voice in relation to others.

The way in which a teacher develops his or her classroom systems, including instructional activities, routines, and expectations, can either help or hinder students' abilities and willingness to take part in effective reflection. Classroom systems that

support metacognitive reflection and critical analysis of students' own cognition include explicit or direct strategy instruction, modeling, verbal exposure and prompts, teacher feedback, written responses, and group reflection.

Conclusion

This literature review discussed the metacognitive nature of effective reflection in the classroom. The vast benefits of metacognitive reflection were presented to reveal the importance of its use in the field of education. Finally, suggestions were made for systems that can be implemented in classrooms to ensure metacognitive reflection, including numerous instructional strategies to teach students metacognition and allow for its practice. All of the literature presented in this chapter provides evidence for the research question: *How can educators use reflection tools with students to increase student understanding of their own level of course mastery?*

In the next chapter, I will propose a professional development experience that provides teachers with the reasoning behind using metacognitive reflection in the classroom, guidance on tools and strategies to implement, and practice and reflection scenarios to help prepare teachers for using and teaching metacognitive reflection with their students.

CHAPTER THREE

Project Description

Educators are already somewhat aware that metacognitive reflection is crucial in today's classrooms in order for students to develop the skills they need to succeed throughout life in and after academia. Teachers know this, but it is still not being implemented in classrooms in effective ways (Boulware-Gooden et al., 2007). Teachers are not being taught how to implement the structures, tools, and scaffolds that students need to build metacognitive reflection skills in order to understand and take on their own learning. This capstone project provides a professional development framework to support teachers in acquiring metacognitive reflection knowledge and skills to aid their students in doing the same by answering the question: *How can educators use reflection tools with students to increase student understanding of their own level of course mastery?*

This chapter begins with a description of the intended setting and audience of the professional development. It then describes the general framework and the research behind the training methods used for adult education. Finally, it ends with a general timeline of the implementation of the framework.

Setting & Audience

This professional development is designed to take place at a public charter school in South Minneapolis to an instructional staff of slightly over fifty people. The school has just over 500 students enrolled, the majority being Latine students. Over 10% of the student population is either African American or identifies as Black. Over 77% of the students qualify for free and reduced lunch, and over 20% are identified as homeless or

highly mobile. The majority of students are also identified as Multilingual Learners (MN Report Card, 2019). The school network markets itself as a college preparatory school, with a large focus on college acceptances. There have been three graduating classes since the school was established, and almost 100% of seniors who graduated have been accepted into a higher-education institution. This claim is referenced in much of the material shown to the public.

The intended audience of this project is the teachers, instructional coaches, and other instructional staff that work directly with students at the school mentioned above. The intended goal is for instruction to be more geared toward expanding the students' understanding and skills to truly prepare them for a higher-level of thinking and a higher education setting. Because the setting of the training is at a school intently focused on getting students into college, this training is imperative. The current professional development at this school is focused on closing literacy gaps and scoring higher on standardized tests to increase chances of college acceptances. If this school is sending them into higher education, it needs to also be preparing them to succeed once they reach that goal, and there is little data on if that is occurring or not. What is known is that metacognition and explicit teaching of critical thinking is not an area in which the teachers at this school are directly trained.

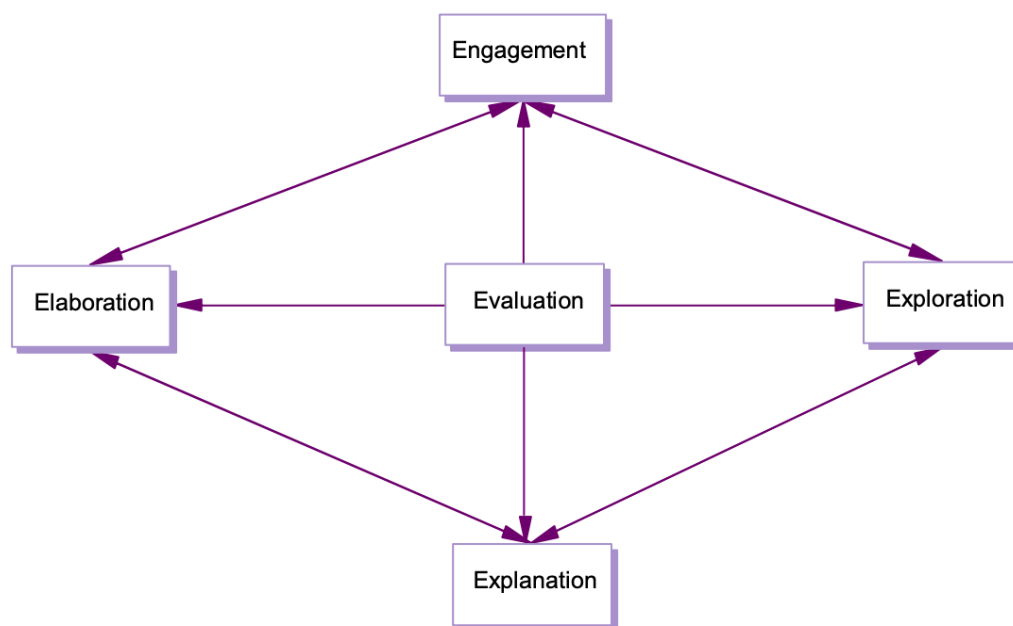
Professional Development Description

The design of this professional development framework is based on the same strategies being suggested to teachers to implement with their students. It involves educating instructional staff on how to explicitly teach their students metacognitive strategies through use of the same metacognitive reflection that is crucial for students'

learning and understanding as well. It follows the inquiry-based 5E Instructional Model that comprises five stages of learning, engage, explore, explain, elaborate, and evaluate and is constructivist in nature, as shown in Figure 3 (Duran and Duran, 2004). Bybee (1997) asserts that the 5E Instructional Model allows learners to internalize and interpret concepts through self-reflection and think more deeply than other learning models. This framework models reflection and teaching strategies that will aid their students in developing metacognitive reflection skills.

Figure 3

The 5E Instructional Model



Note. The above figure shows the five learning stages encompassed in the 5E Instructional Model as non-linear learning experiences in an educational lesson. Reprinted from “The 5E Instructional Model: A Learning Cycle Approach for Inquiry-Based Science Teaching”, by Duran and Duran, 2004.

Knowles et al. (1984) state that adult education must take place in a setting based on collaboration, openness, and humanness. They state that andragogy requires major involvement of the learners in their own diagnosis of needs, learning plan, and evaluation. Within this professional development framework, there is a lot of room for teachers to construct their own lessons and ideas using the provided materials and suggestions. It is learner-centered, but it is not just an allocation of tools.

Darling-Hammond (2017) declares that teachers with access to curriculum tools are more successful in supporting their students when they are provided professional learning and scaffolding in conjunction with model curriculum and that professional learning experiences should not be underestimated. Teachers cannot simply be handed material and expect to gain better results. All learners need guidance in their learning of new subjects.

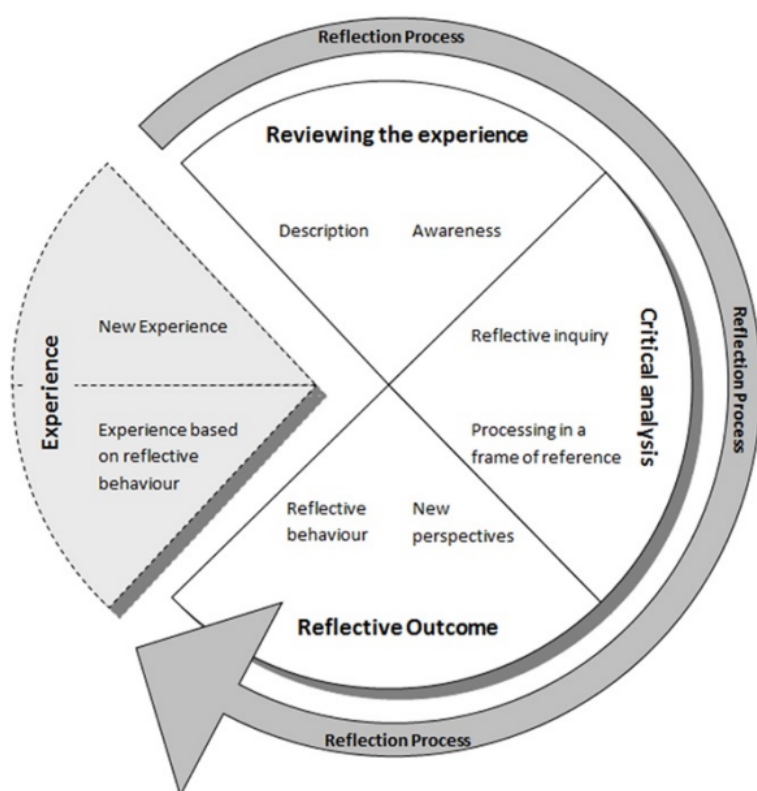
Because educational professional development is most effective with a modeled curriculum, the framework uses the 5E Instructional Model in an introductory training session to begin the process of teaching the instruction of metacognitive reflection. This introductory session includes all five components of the 5E Instructional Model, but focuses on the engage, explore, and explain stages of learning. Instructional staff are asked to access their prior knowledge on metacognition and reflection through reflection on their own classroom experiences with both failed and successful lessons. They are required to explore others' successes and failures, looking at several examples of what is recommended metacognitive reflection and what lessons are lacking. They are also asked to explore their own learning and use of metacognitive reflection. Direct instruction comes through the explanation of the rationale and purpose of teaching metacognitive

reflection. It also includes modeling reflective tools. For instance, think-alouds or talk-alouds are used to model how to reflect on lesson planning for teaching metacognition. The modeling of flow charts and organizers of reflection are included as well as a way for the learners to organize the new information, a critical step in the metacognitive process (Askell-Williams et al., 2012).

Instructional staff eventually reach the learning stage of elaboration and the evaluation stages through planning and executing lessons in the context of their own classrooms throughout the professional development sessions. They are expected to continue this throughout the year as well, with instructional coaches and with other peer collaborators. This training framework includes evaluation and reflection tasks that guide instructional staff through their own evaluation and evaluation with their instructional coaches and teams. Because metacognition is so hard to assess, the evaluation process mostly involves self-assessment based on the metacognitive reflection strategies used in lessons. Figure 4, on the next page, reveals the stages of the reflection process that will be involved in the evaluation learning stage to ensure that instructional staff is practicing the metacognitive reflective process they will be guiding their students through (Koole et al., 2011).

Figure 4

Model of common elements describing the reflection process



Note. The above figure is a visual representation of what is expected in the reflection process. Reprinted from “Factors confounding the assessment of reflection: a critical review”, Koole et al., 2011.

Timeline

The beginning stages of the professional development framework should be implemented during the weeks prior to the school year that are set aside annually for professional development and teacher preparation. This includes the direct instruction session focused on the engagement, exploration, and explanation partitions of the 5E instructional model, with some elaboration built into the session. Bates et al. (2018) maintains that a short, one-day training session is ineffective when it comes to

professional development and that sustained and focused training that lasts months or years is most effective because learners are then able to meet, discuss, implement ideas, share results, and reflect upon experiences. Therefore, the majority of the elaboration and evaluation portions of the framework take place with the instructional coaches throughout the school year and in team collaboration groups to keep a sustained focus on metacognitive reflection in the classroom for a longer duration.

Summary

In order to guide students into better utilizing metacognitive reflection to gain a deeper understanding, teachers must do the same and discover what tools they can use in their classrooms to guide their students to do so. They must be guided through the question: *How can educators use reflection tools with students to increase student understanding of their own level of course mastery?* Through engagement, exploration, explanation, elaboration, and evaluation, teachers are provided the opportunity to develop more metacognitive reflection in their lessons to aid their students to a better understanding. This chapter discussed the setting and audience of this professional development plan, the design and the rationale behind the framework, and the general project timeline.

In the following chapter, I reflect on the process of creating this capstone project, including what I have learned throughout the process and the future implications of this professional development framework on metacognitive reflection and the research that went into its creation.

CHAPTER FOUR

Critical Reflection

When I began the capstone project process, I wanted to create something that would help both my colleagues and students simultaneously. As I scoured my own teaching challenges and the conversations I was having with my colleagues, it became clear that teacher burnout and student frustration both stem from one place. Most students have the drive to grow and learn. Their teachers are working hard to make that happen as well through engaging and relatable learning activities and extensive feedback. The real problem is that there is a step in the process that is missing. This was hard to admit as it was also affecting my own classroom, not just the teachers I was watching struggle. Students are not being provided effective opportunities for true growth between the learning experiences and feedback and the summative assessments. They do not know how to fix their mistakes or expand on the feedback provided to them. They do not know how to reconstruct or interrogate their learning when they make errors. This led me to ask the question that my capstone project is based on: *How can educators use reflection tools with students to increase student understanding of their own level of course mastery?*

In this chapter, I will discuss my major learnings throughout the capstone process and revisit the literature review, sharing key resources that aided in my research. The next section will focus on the implications and limitations of my professional development framework. I will then discuss ideas for future research. Lastly, I will describe how my results are beneficial and will be communicated.

Major Learnings & Literature Review Reflection

Prior to beginning my research, I knew metacognition was an important developmental skill. I also knew reflection and self-assessment was important in the learning process. What I learned through the research that guided my capstone project was that these two things need to be combined to be effective and that they can and should be explicitly taught to students. If students are consciously assessing their own cognition, they can determine their cognitive needs and potential. An effective reflection process has new output of its own, new discoveries and perspectives, and possibly informed behaviors based on that output (Koole et al, 2011). Also, metacognitive skills are not inherent. Expecting that students will automatically see their mistakes, be able to analyze their incorrect thinking, and fix their thinking is unrealistic. I learned that metacognitive reflection has endless benefits, which is why it is so crucial. It aids in retention, comprehension, critical thinking, knowledge transfer, motivation, and accountability.

Besides finding the necessary connection between metacognition and reflection, the research most crucial to my project was focused on actual systems proven to be useful in guiding students toward metacognition. Rupley et al. (2009) discussed many ways to explicitly teach these skills, such as talk-alouds, think-alouds, explicit instruction, and other modeling. Pogrow (2004) provided evidence that mere exposure to metacognitive language starts the process. Berthold et al. (2007) helped me see that how I have been using written reflection exercises has been a superficial experience for my students, explaining how to make written exercises more effective. Allen (2012) offered group reflection systems as a crucial part of the learning process along with individual

reflection tools. I also learned that feedback done correctly can aid in the process. Learning just cannot end with feedback (Koole et al., 2011). The reflection systems I found throughout my research guided the entirety of the project and allowed me to create reflection experiences based on all of these systems.

Implications & Benefits

The professional development framework that resulted from my research and capstone process has implications that are extremely wide-reaching. This framework has the potential to support secondary teachers of all disciplines in providing their students with the reflection experiences to better master all skills and content understandings. The framework provides versatile tools that could work in a plethora of classrooms of various teaching styles, environments, and topics. Humanities teachers could easily use these tools, as could mathematics teachers, art teachers, etc. If students were exposed to these systems throughout their entire daily course schedule, their metacognitive reflection experience would only be greater and therefore lead to increased understanding and refined skills. These systems could also lighten the burdens of teachers by placing the learning responsibility back on the learners. Lastly, instructional time in classrooms would be restructured to ensure greater depth in learning, not superficial content coverage.

The professional development framework sets teachers up for success beyond simply allocating tools to be used in the classroom. Each session is designed to model learning experiences that would take place in a classroom environment that utilizes metacognitive reflection systems. Teachers use each system that their students could potentially use. Educators can experience the tools from a teacher perspective and also

their students'. While the sessions take into account the differences between adult and adolescent cognition, they provide examples for educators on how to implement all systems presented.

Limitations

There are a few limitations to the professional development framework I designed. The time required to present the information effectively is large. Schools who have limited professional development time embedded into their yearly schedules may not have the ability to present three sessions that are each one and a half hours long. Also, while I tried to design experiences catering to a variety of disciplines, the variety is limited. Skills-based courses, like composition and the arts, are underrepresented in the examples provided throughout each session. Each tool provided and explained is still applicable to all disciplines, but is not revealed as explicitly for all. One final limitation I find as I reflect on the framework I designed is the lack of counterproductive reflection or non-examples of metacognitive reflection. The presentations reference superficial reflection, but it may be difficult for teachers to apply that to their own classes without non-examples. Though there are limitations to the professional development framework, the implications are great and could greatly benefit both teachers and students in their paths to success.

Future Research

Much of the research I was able to find on metacognitive reflection was based on adult or higher education learners. There is a lack of research done on metacognition in secondary schools in the United States. I would recommend that in the future there is more research done on high schools in the United States. Specifically, comparing a

classroom that uses metacognitive reflection experiences and one that does not would be extremely useful in revealing both the benefits and possibility. More tangible evidence in the secondary classroom would be helpful.

Another recommendation for further research I have is for more research on the use of metacognitive reflection and how to teach it specifically to students with learning differences and those receiving special education services. Because developmental levels can differ, it would be helpful to know how to create accommodations for those students while implementing metacognitive reflection strategies.

Lastly, I think it is crucial that I expand my research to how it can aid Multilingual Learners (MLL) specifically. While I believe the systems would be the same for all learners, it would be helpful to see metacognitive strategies applied to language classrooms and how they may even take an asset-based approach while making linguistic connections.

Project Use & Communication

My research guided the creation of a professional development framework built around the systems currently used at my school. The communication and content throughout the framework is designed to effortlessly fit into any classroom within the school, working in conjunction with Joe Feldman's Grading For Equity system and system requirements, such as "do first" activities and exit tickets. I will communicate the goals and structure of my project with the deans of instruction and principal at my school in order to discuss how it could be implemented during our days built into the school year for professional development. The framework could easily be implemented at the beginning or in the middle of a school year. It could also easily be used in other contexts

as well. The tools provided to teachers are versatile and can be used with any grading system and among different lesson structures.

Summary

This chapter reflected on the creation of a professional development framework as well as each step taken to answer the question: *How can educators use reflection tools with students to increase student understanding of their own level of course mastery?* Through the synthesis of a multitude of research on metacognitive reflection, it was made apparent through this project that metacognitive reflection is imperative. Though this project has limitations and could be expanded upon in the future, it taught me a new way to view learning and to frame it for my students.

This capstone project reveals the critical nature of metacognitive reflection in the learning process and how significant embedding it into the classroom can be. It provides the missing step between learning activities, formative practice, and feedback and final summative assessments. My hope is that this project could impact school communities to shift policies away from placing more arbitrary demands on teachers, maintaining frustration at students, and hindering the authentic motivation to learn. My hope is that by using systems to teach and allow for metacognitive reflection, students will have the capability to take ownership of their learning and develop their understanding and skills at a greater level.

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