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A Framework for Reflective Practice

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Abstract

Teaching involves making constant choices and orchestrating interventions that impact purposeful teaching and learning. Finding time to collect information and develop solutions for a teaching challenge can be problematic. Teachers may feel pressure to shift instructional practices without incorporating purposeful reflection. We developed a reflection framework and tested it in a middle grades classroom over a two-week period, and employed practitioner research to investigate the potential of allowing for deep reflection within the middle school structure. We investigated how the framework impacted the teacher's ability to reflect and adjust based on student learning in the classroom. We conclude that sophisticated reflection in a social context is crucial to making conscious instructional modifications.

A Framework for Reflective Practice

The first period bell rings and thirty middle school students fill the room to take their seats. Today, the topic is initial ideas about solving two-step algebraic equations. The teacher is excited to use Hands-On Equations manipulatives (Borenson, 1986) to introduce the concept of solving equations for the variable value such as $2x + 3 = 7$. This approach to solving algebraic equations allows students to physically build and manipulate items on a picture of a balance scale (Figure 1).

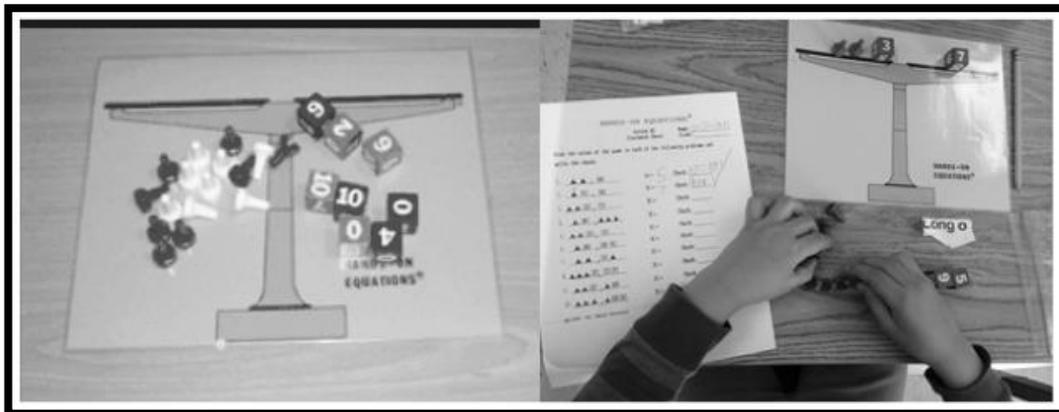


Figure 1. Hands-On Equations manipulatives and an example of the types of

algebra problems that students solved. On the right, the equation $2x + 3 = 7$ has been set up on the scale. Students learn to move pieces with legal moves from one side of the balance scale to the other to solve for the value of one pawn, or x .

Students learn to simplify the equation by combining variable terms, isolating the variable term, moving constants to opposite sides, and applying conceptual reasoning about the value of x .

The teacher has over 20 years of experience in elementary school, but is new to middle school. Thus, being a new teacher to the grade level and having never used the Hands-On Equations manipulatives (Borenson, 1986), the teacher is surprised at the students' reaction to the lesson. Overall, students seemed confused with the connection between the manipulatives and conceptual reasoning about the variable values. Students wondered "When am I going to ever use this?" and often built towers with the blocks rather than engaging in the thought process required to find the value of x . While the teacher carefully constructed the lesson, the results did not meet the envisioned goals for the activity and student learning.

What just happened? What caused the misconceptualization by both the teacher and the students? The bell rings and thirty different students enter the classroom, and the teacher prepares to repeat the lesson. The teacher makes several shifts with the next class regarding using manipulatives, setting up equations, and changing the pace of the lesson. Although, the next two math periods proceed with the class obtaining a better understanding of using the manipulatives to show the mathematics, the teacher is still not satisfied with either the way in which the manipulatives are being employed nor the student learning which occurred that day.

Modes of Educator Thinking

Young adolescents' learning is influenced by how teachers design and implement lessons and assess student learning to make instructional decisions. The Association for Middle Level Education (formerly National Middle School Association [NMSA]) advocates that students and teachers must be engaged in active learning, continually reflecting on lessons and formatively assessing student thinking (NMSA, 2010). Danielson (2009) highlights four modes of educator thinking (Figure 2). The four modes of educator thinking align with practitioner-led inquiry in that the modes offer a reflective and systematic approach to research.

Formulaic:	Thinking is based on prepackaged knowledge from an external source such as general policies and rules that are part of the school culture or standardized instructional decisions regarding curriculum.
Situational:	Decisions are made on information gathered during a specific time in a specific context (e.g. responding to off-task behavior in the classroom setting).
Deliberate:	The educator purposely seeks more information than the immediate context provides. This type of thinking helps teachers understand why or why not a method of instruction is successful.
Dialectical:	A step further than deliberate thinking to gain understanding of a situation and generate solutions.

Figure 2. Danielson's (2009) four modes of educator thinking

The teacher followed the process of using the Hands-On Equations system (Borenson, 1986) to introduce algebra because the grade level had decided on this approach (formulaic thinking). The teacher's efforts to try different groupings and expectations during the lesson are examples of situational decisions that were used in reaction to the context of each lesson. Additionally, in middle school, each class period presents differently as a group, essentially changing the situation for each lesson. Formulaic and situational thinking are a momentary reaction to the current and changing classroom contexts. The overall issues with the manipulatives, lesson design, student response, and rigor of the unit are a more complex problem than the teacher realized. In this case, the teacher needed to intentionally seek more information beyond what was being addressed with situational corrections (deliberate thinking). This required thought focused on *why* or *why not* the hands-on manipulatives were working in the classroom. Moving to dialectical thinking for an educator takes this one step further. For example, understanding the many variables contributing to the class reaction to the instruction and tasks, and generating solutions for shifts to occur in both student understanding and teaching pedagogy for students.

According to the *Principles and Standards for School Mathematics* (NCTM, 2000), supporting student learning involves focusing on mathematical thinking and reasoning. This focus begins with writing effective lessons that engage students and support their understanding of the content. Middle grades students must be "engaged in active, purposeful learning" (NMSA, 2010, p. 14)

and quality teaching should respond to students' developmental needs, paying particular attention to the big mathematical themes, presented as interconnected topics (Ma, 2010). Effective teaching involves supporting student learning by carefully sequencing tasks and addressing misconceptions while engaging in activities that appeal to young adolescents. The teacher must consider multiple kinds of information and make decisions that target students' mathematical developmental needs and optimize student learning of significant mathematical ideas. This is particularly important for teaching young adolescents, as they are developing complex thinking skills at a range of levels.

But, how do teachers keep track of what is happening in the classroom from day to day and how do they manage to be responsive to the class as a whole to know how to adjust the next lesson? This article tells the story of a teacher looking for answers and a mathematics educator willing to assist in the process. Gelfuso (2016) found that when reflection is content specific, one needs to have well-developed professional understanding of the subject matter to assist the teacher in analyzing and synthesizing teacher moves. Through practitioner research, "a process of discovering and framing questions, collecting data, and analyzing data to answer the questions" (Campbell, 2013, p. 4), the teacher and the mathematics educator agreed to use a framework for reflective practice to promote dialectical thinking. It was beneficial for the teacher to reflect on her own teaching, as opposed to other methods of reflection where an observer comments on the teacher. Practitioner research allowed for responsive teaching by uncovering truths about student learning in a deliberate reflective approach; rather than reacting to momentary situations. A shift in teacher action resulted based on data collected from classroom episodes.

Reflective Practice in Action

The collaboration presented in this article showcases a team consisting of the new middle grades teacher seeking to change her teaching practice and a mathematics educator supporting her in this process. The team used practitioner research with the intention of "providing insights into teaching in an effort to make change" (Dana & Yendol-Hoppey, 2014, p. 9). Through reflective practice, lessons were modified with the goal of adapting the pedagogy and tasks to support middle grades students' learning of algebraic expressions and equations. The team chose to use the Google Doc platform for communication because it allowed both the teacher and math educator access to one document, which was instantly updated as reflections and responses were shared. The Framework for Reflective Practice (FRP), a tool for teachers to keep track of the student learning that takes place and to note tasks that support shifts in student thinking, was used

to map where the students had been in their learning and make decisions about what to include or exclude in the next lesson. The FRP also documented the authentic learning that took place over time and the specific tasks that supported shifts in student thinking. Essentially, the FRP assisted the teacher in accessing deeper modes of educator thinking leading to both deliberate and dialectical decision making to bring about positive change in her classroom. Practitioner research in this case allowed the teacher to bring “those hunches, the teaching lore we carry quietly with us, to the surface of [her] teaching” (Hubbard & Power, 1999, p. 19).

Framework for Reflective Practice

With the purpose of analyzing and transforming teaching, a daily reflective framework was created. The teacher collaborated with the mathematics education researcher to create daily reflection questions. The questions were created to provide: 1) opportunity for daily self-reflection to gather situational information during three math courses taught by the teacher; 2) an opportunity to interpret daily practice in a deliberate and focused way, and; 3) generate solutions to create shifts in teacher actions based on reflection framework. The daily reflection questions were as follows:

1. What was the mathematical meaning you wanted to happen through this lesson?
2. What misconceptions occurred for the students during the activity with the Hands-On Equations?
3. What situation or activity led to this misconception?
4. What student comments or reflections were shared?
5. What will you change during the lesson and why?
6. What are you going to do for the next lesson? Why?

The teacher reflected daily for two weeks of instruction using the FRP. A two-week reflection was used in this case because it matched the unit length and seemed a reasonable amount of time to participate with fidelity in the reflection. Figure 3 is an example of a piece of the FRP.

Date/Activity	Date: 11/14 Use legal moves to remove x's from both sides of equation in order to simplify the equation for guess and check.
What is the mathematical meaning you wanted to occur during this lesson?	Students practice moves and then see that guess and check is easier. Connecting to values of x in the equations

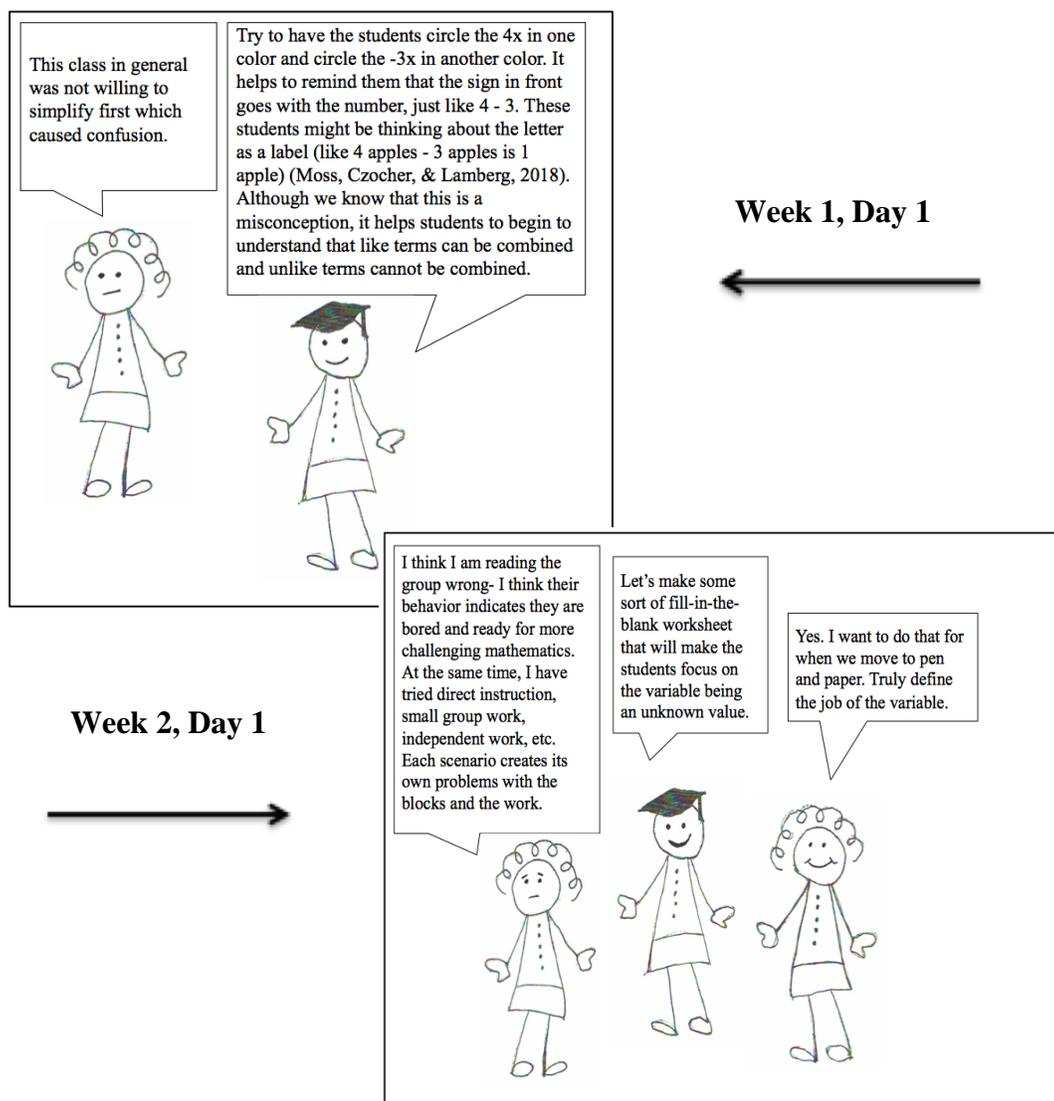
	and building a basic understanding of what is happening.
What misconceptions occurred for the students during the activity with the Hands-on Algebra?	Errors in the guess and check mode Not understanding that x must be the same number in the equation Not checking the x value in the original equation Motivation
What situation or activity led to this misconception?	It is mostly a trick of time. Students refuse to build the equations and believe they can SEE the answer. Students feel confused by what the blocks are teaching them- they are convoluted. Some students are developmental adders, which makes finding x a laborious chore.
What student comments or reflections were shared?	Why am I learning this? When will I ever use this? It may be helpful for building stuff. My older brother and sister do hard math with variables.
What will you change and why? What are you going to do for the next lesson? Why?	Students work at very different rates, I will have an activity planned for those who finish early. The hard part about the blocks is it makes it seem kid-like to use manipulatives; however, it presents opportunities for really difficult algebra concepts to emerge. In the next lesson, I will get them working on more difficult problems quicker, instead of talking them through how to do these more difficult problems. I will also try to institute student mentors, which I think will be somewhat successful.

Figure 3. First day of reflections with the Framework for Reflective Practice.

The teacher committed 25 to 30 minutes each day during lunch or prep period to use the FRP. The mathematics educator committed about 30 minutes to an hour each day to read the reflections and respond with comments for the teacher based on the day's lesson. The teacher reported that this time for reflection provided a moment to debrief and make sense of the mathematics, student reactions, and purposeful teaching in each day's lesson. As seen over time in the FRP, the first concern was the behavioral reaction from the students to

using the Hands-On Equations manipulatives (Borenson, 1986). With the help of questions and comments from the mathematics educator, the teacher could push towards dialectical decision making (Danielson, 2009). The mathematics educator encouraged the teacher to focus on understanding her teaching practices and helped her think about how to modify instruction for student learning.

Through unpacking her teaching using the FRP, an important shift occurred in the teacher's practice and her perception of efficacy in the classroom. Figure 4 shows parts of a discussion that occurred over two weeks of reflection between the teacher and mathematics educator.



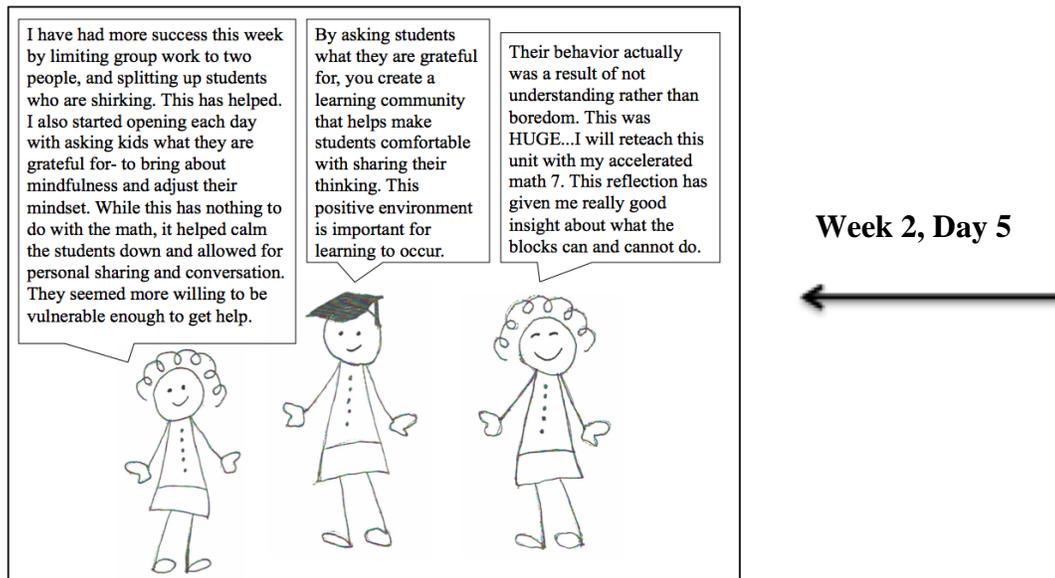


Figure 4. A depiction of the teacher and mathematics educator having a virtual discussion via Google Docs about teaching.

After each daily teacher reflection, the mathematics educator made comments to help the teacher focus on how the students were conceptualizing the mathematics content. The teacher used the framework and comments from the mathematics educator to adapt instruction in purposeful ways to target young adolescents' learning needs as opposed to simply teaching the lessons without attending to students' conceptions and misconceptions. Throughout the two weeks of reflections, the mathematics educator continually attempted to bring the teacher's attention to the learning objectives in the mathematics lesson and how students were making sense of those big ideas.

The mathematics educator proposed that the students might be experiencing a common misconception and provided instructional support to assist in deeper student conceptualization. The teacher was reacting to student behavior by speeding up the lessons, expecting more output from students, and assuming they were not challenged. Over time, using the data from the FRP (Figure 4), the teacher realized the behavior was a symptom of general student confusion about the use of the manipulatives and the type of thinking required for the tasks. Additionally, while the Hands-on Equations allowed for a physical interaction with the algebraic equations, the teacher realized that the students still did not have a deep understanding of the nature of such equation. Danielson (2009) contends that the greater a teacher's ability to suspend judgment and the broader the repertoire of pedagogical strategies, the more flexible dialectical

thinking will be. The FRP provided an opportunity for self-study and generated solutions to transform teacher struggle into pedagogical insight.

Purposeful Teaching and Learning

Research (Constantino & De Lorenzo, 2001; Danielson & McGreal, 2000; Glickman, 2002; Lambert, 2003) confirms the benefit of reflective practice to provide professional growth. It was beneficial for the teacher to use the FRP and have another practitioner read the reflections and provide suggestions on how to modify instruction to help the teaching and learning process. The questions in the FRP align with Larrivee’s (2000) framework for teacher self-reflection that contains stages for transforming current practice through examination, struggle, and perceptual shifts (Figure 5).

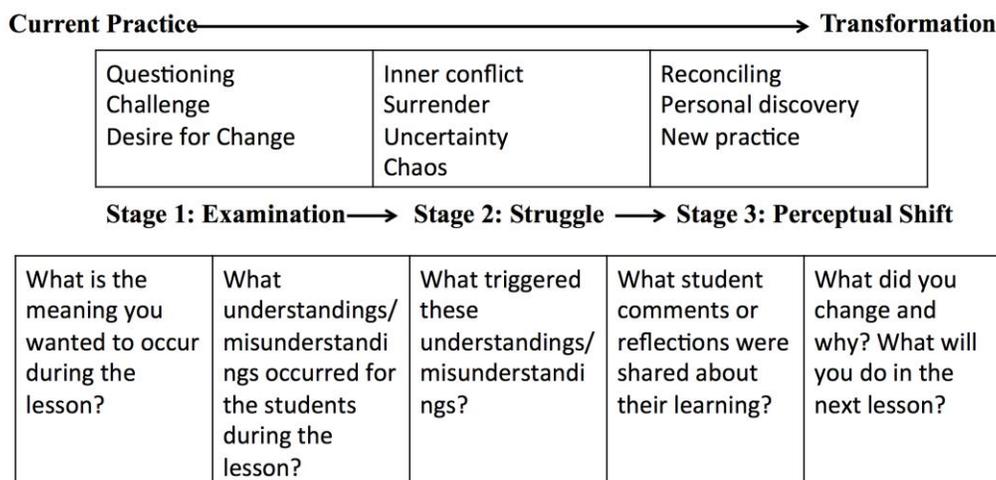


Figure 5. A framework that shows the nature of stages of transformation of current practice (Larrivee, 2000) and questions that teachers can use or modify for reflective practice.

According to Larrivee (2000), stages of self-reflection involve observing patterns of behavior and then examining the behavior in light of what we truly believe. In the struggling stage, teachers can often feel alone and isolated due to the pressures of the teaching profession. The teacher was greatly challenged with the marked difference between elementary and middle school aged students. Due to the new middle school situation, the teacher desired to change her practice so she developed questions that might provide a methodological way for her to reflect about her teaching and the students’ learning. It should be noted that the questions in the FRP were developed to match the teacher’s perceived needs and

struggles during this time. The process of self-reflection and teacher action transformation was the overarching goal of this reflective practice. Reflective practice can also be thought of as “sense making” —the process by which teachers notice and select certain messages from their environment, interpret them, and then decide whether to act on those interpretations to change (Coburn, 2001; 2004).

Discussion

The FRP, and the convenience of real-time feedback using Google Docs, can provide teachers with a tool that creates a community of reflective practice to encourage purposeful learning and teaching. As with any reflective practice, a challenge is finding the time and energy to actively reflect and be a contributing member in a community of practice. One of the benefits of this framework is that it can be adjusted to provide the educator with the insight that they seek. Additionally, it is an efficient and effective process to help eliminate the isolation a teacher may feel beginning their career, or moving to a new school and grade level. The FRP provides opportunities for educators to collaborate in ways that include:

- Communities of Practice, Professional Learning Communities
- Pre-service teachers with college supervisors
- Mentorships nationwide
- Reflection on multiple academic subjects and educational processes

Nagle and Taylor (2017) investigated extending a reflective practice with students using Google Docs and found that this format allowed teachers to become more constructivist and integrated; which transformed teaching. Virtual communities can open dialogue that help teachers in all capacities feel supported and think about ways to shift their instruction quickly and efficiently to support student learning. As Larrivee (2000) explained, reflective practitioners “challenge assumptions and question existing practices, thereby continuously accessing new lenses to view their practice and alter their perspectives” (p. 296). Through Danielson’s (2009) four modes of educator thinking, teachers can reflect on and make routine decisions about their teaching to address both simple and complex situations that occur in authentic classroom settings. Further, by engaging in practitioner research, which involves relinquishing control and predictions (Dana, 2016), teachers can challenge and examine inner conflicts regarding their current practice and work together to create new learning experiences that focus on conceptual understanding based on meaningful reflections on teaching.

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