

How Does the Implementation of *Math in Focus*
Affect the Way Teachers Make Decisions about Teaching Methods?

An Action Research Qualitative Study

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Abstract

This study addressed the question, how the implementation of *Math in Focus* affects the way teachers make decisions about their teaching methods. For this qualitative study, I conducted interviews with four New Hampshire middle school math teachers who had recently begun using a new mathematics program in their classrooms. *Math in Focus* is a Singapore curriculum that is based on the Common Core State Standards, which have been recently adopted by New Hampshire schools. Using open coding and themes, I found three overarching conclusions from my data analysis. The factors affecting teacher's methods the most were: the type of classroom design, the depth of gaps to be filled in students' background knowledge, and the teacher's years of classroom experience. I was able to conclude that a new program will change teaching methods, but there are other factors influencing their teaching practices, such as standards changes and types of learners.

Introduction

In the following study, I explored how the implementation of a new curriculum would affect the teaching methods of a classroom teacher. For this study I focused on one particular program, *Math in Focus*, which is a mathematics curriculum from Singapore that supports the Common Core State Standards. Before my study began, I researched the Common Core State Standards, the background of Singapore and *Math in Focus*, along with textbook design and other studies of implementing new programs. For my study, I interviewed four middle school math teachers who were currently using *Math in Focus* in their classroom. Using this interview data, I was able to make conclusions on how the program was affecting teaching methods in the classroom.

Literature Review

With the new common core state standards being put into place, there have been major curriculum changes in some schools to adjust to the new requirements. One of the adjustments that schools have made is to adopt *Math in Focus: Singapore Math* by Marshall Cavendish. This math curriculum is adopted from Singapore, one of the most promising and successful nations in mathematics (Leinward and Ginsburg, 2007). Leinward and Ginsburg (2007) gave five main reasons why Singapore as a nation has been so successful. The first is that the framework to develop the curriculum is well organized. Educational institutions follow the same standards, the same curriculum and all put the same importance on certain areas. For instance, Singapore places problem solving at the center of their framework and connects everything from there. On the other hand, in the United States, the classroom teacher decides which areas require more emphasis. There are requirements, but the school system can choose how they are implemented.

The next reason they give is alignment between the different grades. The curriculum is designed to be contiguous throughout all grades, and all schools follow the same curriculum. The third reason is focus. Singapore puts a lot of focus on one concept at a time and allows time for mastery. This is compared to the United States, which does more scattering to hit more topics. Singapore math also looks at multiple models for problem solving, especially the use of bar modeling. The last reason is the rich content in problems the textbooks in Singapore offer (Leinward and Ginsburg, 2007). However, Leinward and Ginsburg say in the article “it would be unfortunate to react to the United States problems in mathematics achievement by assuming that the widespread adoption of Singapore Math is the cure-all. [...] the real value is in the Singapore Math program.” His point being that by just adopting the textbook used in Singapore, the United States will not immediately, or ever, bring their students up to a Singapore level of mathematics.

This leads into the article “Beyond Singapore’s Mathematics Textbooks” by Iverson and Myers which demonstrates in great detail the amount of training and selection that goes into the teachers of Singapore classrooms, and how their success is not just the developed curriculum. There is also a curriculum developed for the universities of education, and what educators are required to learn and demonstrate to obtain a license to teach. This article also discusses the United States looking towards Singapore for support in education curriculum, since Singapore is so successful, and the United States is continually trying to increase their rankings. The article begins by pointing out that, though the textbooks are available in the United States, it is not just the textbooks that make the math education in Singapore so successful; it is the highly trained and supportive teachers (Iverson, 2009).

Math in Focus specifically, is a textbook Singapore produced with their curriculum that has been adopted by local communities in the United States. The description below is provided

by the publisher, but quoted from “A Study of the Instructional Effectiveness of *Math in Focus: Singapore Math*” (Conner, 2011),

Math in Focus: Singapore Math by Marshall Cavendish brings to U.S. classrooms Singapore’s top-ranking approach to teaching mathematics in grades K–8. This problem solving-based approach thoughtfully builds on a concrete-to-pictorial-to-abstract progression for greater depth of instruction and mastery of math concepts. Visualization strategies including model drawing allow students to master more complex problems. The program also uses powerful number bond models to enhance the instruction for mental math, number sense, and computation. The program is aligned with the Common Core State Standards and offers comprehensive print and online resources for teachers and students (pg.4).

Math in Focus is a relatively new program in United States. It is commercialized widely for its connection with the Common Core State Standards, which is why many schools have chosen to adopt it (Conner, 2011). There have been studies done on schools piloting the program. Most studies have only looked at a year of the program, or a specific unit that used the textbook. Conner (2011) did a study of a 6th grade class in New Jersey that taught a single chapter of the *Math in Focus* program during their school year. Most of the teachers were unfamiliar with the program prior to this trial period. The study followed these 6th grade classrooms for about 6-7 week while the teachers taught the chapter. Students were pre-tested before beginning and then post-tested after the chapter was completed, using the textbooks pre-made tests. Students’ scores rose significantly and effectiveness was shown. The program was also studied to see if it helped any particular demographic, which it did not show favoritism toward any particular one. Conner (2011) did another study in 2nd-4th grade classrooms, also in New Jersey, on the effectiveness of *Math in Focus*. These classrooms piloted *Math in Focus* for a full year. The conclusion here was that the program was associated with significant improvements in the student’s mathematics achievement during that year. These results were tested using a nationally used mathematics test.

In Hegseth (2012), a large study was done over a year with selected 4th, 5th and 6th grade classes in a Nevada school. Teachers were given *Math in Focus* as a pilot program and were observed during this time along with training every few months. Teachers were given monthly surveys and the principal given one every few months. The teachers were not allowed to implement other materials into the program and were to use only the parts of the program with *Math in Focus*. They saw improvements in the area of math problem solving, but found that students were less confident in math procedures. *Math in Focus* is known and intended to increase student's ability to think more deeply about problems, while still teaching procedural methods (Hegseth, 2012).

Math in Focus is designed to help with all kinds of learners, including those on the Response to Intervention path (those who are in need of extra help in the classroom) following the three tiers. *Math in Focus*'s program includes a recall prior knowledge section at the beginning of each chapter. Following, students are given a chapter pre-test, to determine if they are ready to begin this chapter. For each problem they get wrong, there is a corresponding "reteach" book that tells the teacher what types of problems or concepts need to be established and practiced more. Along with this, *Math in Focus* includes a transition guide, which helps students who are far behind to catch up with the material. In the chapters, there are different "reteach" options to help reinforce the material that may be more difficult for some students. Each chapter has all these options in the program, as well as basic and guided practices in the textbook itself. This way, *Math in Focus* is also helping those students who have gaps in their background knowledge ("Tier I, & Tier II").

The adoption of a new textbook causes many changes for the teacher and the curriculum at a school. Most teachers are assigned a new textbook, in order for the school district to keep up

with the changes in national standards. For example, a study by Remillard (2000) looked at two 4th grade teachers who were assigned a new textbook. During this time, the National Council of Teachers of Mathematics (NCTM) had just published the Curriculum and Evaluation Standards, and different districts were adopting this in order to improve the student's success in math and keep up with the changes. The textbook adopted was commercialized to reflect these new standards. This is similar to how *Math in Focus* is commercialized to reflect the Common Core State Standards. The teachers found that some of the hardest challenges were applying the new ways the textbook wanted them to present the material. For example, one teacher was not used to working with unit cubes and rods, and found that this new way of working with manipulatives actually helped her students think in a different way, and presented better connections to other lessons. The teachers both commented on liking new pieces, but also skipping other suggestions due to feeling more comfortable using techniques they were already familiar with.

The problem with the adoption of new textbooks is that the teachers also have to learn the new curriculum, and the new ways a textbook presents the material to the students. This means that students who are in the classroom of a trial run of a new book may get a poorer experience than those students whose teacher is experienced and has practiced with that textbook. Also, the publishers of these textbooks are often not grade school teachers themselves, but rather mathematicians going off of studies on how material should be presented and how concepts should be differentiated (Ball & Cohen, 1996). Not all textbooks consider the different issues that teachers have to deal with on a daily basis, especially the type of class they have in front of them. All students are different and are coming from different backgrounds and schooling. Not only do teachers have to follow the textbooks and curriculum, but also differentiate it for the particular learners in their class. Teachers are encouraged to be creative and plan fun activities

for their classes while also making sure all the required standards are successfully taught. It is difficult to do this with a rigorous curriculum that is set in place for you (Ball & Cohen, 1996).

Teachers also have to be careful about the attachments to textbooks. Though many are very well written and organized, all textbooks have a certain tone and persuasion that they use towards the way they are teaching a lesson. Wagner (2012) discusses that the tone of the textbook and the way the material and concepts are presented can persuade the reader to go in a certain direction. For example, if wording is misleading, a reader may get sidetracked or confused about the concept the book was attempting to present. The author explores different sections of your basic textbook, including different examples, practice problems, and the wording that the problems use such as saying “I” or “you”. The way the textbook presents the material can determine whether the reader will focus more on the strange wording or the direct instruction. These ideas look into whether instruction textbooks should be open or closed (Wagner, 2012). *Math in Focus*, in particular, asks for closed textbooks during instruction, but that the teacher walks through the examples on the board for students to take notes. The students can then go back through the examples and descriptions in the textbooks when they are doing the exercises.

Textbooks can also be very different in the way they approach mathematical concepts too. In a study done on three different textbook’s approach to fractions at the 5th and 6th grade level, co-authors Yang, Reys and Wu (2010) found that textbooks from three different countries had different approaches. The countries textbooks were from United States, Singapore and Taiwan. Looking just at the sections on fractions, the results found that the United States showed more authentic mathematics, connecting to ratios and percents early on while enforcing the material by providing real life examples. Singapore and Taiwan were more similar in that they

were more procedural rather than conceptual knowledge. This seems different than earlier studies on Singapore, but may be the way they first approach a new concept, or perhaps it was the particular textbook used in the study. The conclusion also show that each textbook had different levels, allowing for presenting the material in varying speeds in the same grade (Yang, 2010). Textbook series can have different ways of approaching material, and this can vary how teachers teach the material, or why a school would choose a particular program.

With the coming adoption of the Common Core State Standards in most states, many schools are looking at textbook reform in order to align the curriculum better. The Common Core is the first set of standards that the national government has released. Many states have already adopted or plan to adopt the new standards. In an article by Dacey and Polly (2012) the authors take a look into what makes up the Common Core, and how it is connected between grade levels. There will be more time spent on certain topics, and also a connection to previous grades. With many states adopting these standards, it will be better for students going between schools to not have as many gaps (Dacey & Polly, 2012). Schools also have to make sure the curriculum they implement will align to the state standards. Newton and Kasten (2013) did a research study with three different schools, in three different states, to see how their curriculums lined up with the new Common Core State Standards. The two models they used were Surveys of Enacted Curriculum and Webb Alignment Tool. The results varied between the two different models and what exactly it was looking at. It also mentioned that these were not evaluations, but should be used as check marks to help in applying the standards and verifying along the way if they were staying connected (Newton, 2013). It can be difficult applying new standards so quickly, and it will take trial and error and practice before they can be fully realized.

Before the Common Core, the closest mechanism the nation had for connecting standards was the NCTM's Principles and Standards of Mathematics, which was released in 2000. Though these were not national standards, they were a guideline for states to align their curriculum amongst themselves. These standards were the first to start requiring students to think at a deeper level. In Sherin, Mendez and Louis (2004), the co-authors were looking at a classroom and *Fostering a Community of Learners*. This focuses on how to create a classroom that helps work with all learners coming from different backgrounds. In mathematics, this can be very difficult depending on the way students learn and their previous knowledge. The classroom observed was connecting to the Standards of Mathematics, and was having difficulties bringing students to this new method of thinking. Rather than being just rules and procedures, students were now being asked to explore and find reasoning (Sherin, 2004). Today's students seem to have trouble getting to this new level of thinking. In Pape, Bell and Yetkin (2003), observations of a 7th grade math classroom showed that students did not have the willingness to learn at this deep level. The study was on student's problem-solving behaviors and strategies. Math problems are getting more difficult, and the teacher was giving hands on projects and learning activities that allowed students to interact with one another. The teacher was now requiring students to engage in more discussion and discourse in the classroom, and as a result the students were able to discuss their reasoning behind problem solving better (Pape, 2003).

The Common Core has been a relevant follow up from the NCTMS Standards of Mathematical Practices. This means many more teachers are becoming involved in this change of pace for math classrooms. Workshops, like the one described in Billings, Coffey, Golden and Wells (2013) help teachers work on their problem solving and reasoning skills, while also encouraging discourse during the workshop. The article includes different ways the workshop

helps with implementing discussion in the classroom, especially in the case of word problem.

Word problems are often very difficult for students. However, word problems are rich in mathematical thinking because it forces students to apply the concepts they know into real life situation, which in turn creates higher order thinking (Billings, 2013).

In a second grade classroom implementing the NCTM Standards of Mathematics and the new Common Core State Standards, Wenrick, Behrend and Mohs (2013) observed how the teacher had the students working with one another and exploring their own problems. Students were developing answers as a group, coming up with good reasoning, and if incorrect, would ask questions and come up with a different understanding. They displayed the problem solving work that these new standards are pushing students to work towards. The teacher commented it is difficult for young students to listen to one another's reasoning, but providing this type of discussion at this young age will help them practice and work into deeper thinking as they grow (Wenrick, 2013).

With the background knowledge on *Math in Focus*, I was interested in performing a study to see how schools were implementing *Math in Focus* into their classrooms. The Common Core State Standards were only recently adopted in New Hampshire, so the schools using the programs are still very new to the standards and the program. Having a new curriculum can create a lot of changes in a school, but can also have heavy influence on a teachers practice. I was interested in finding how different teachers have changed their own methods because of a change in curriculum.

Methodology

For my study I chose to explore the question "how does the implementation of *Math in Focus* affect the way teachers make decisions about their teaching methods." This study was

looking at the effect a new curriculum has on teachers and their teaching methods. Being a future math educator, I was interested in the effects the new program is having at the middle school level. Because my study was to “understand and interpret phenomena as they occur in natural settings (Hendricks, 2009, p. 2)” I chose to do a qualitative study. The participants were chosen by their experience with a curriculum change, and my data and analysis results from talking with my participants about specific subjects.

In my study, I conducted interviews with four different middle school math teachers who were using the *Math in Focus* program. After receiving consent from the principals and the teacher, I arranged a meeting at their after school hours to conduct thirty minute interviews. No students were used in this study, nor were any observations of the teachers in practice conducted.

The following is a brief background of each participant. Their names and schools are kept confidential.

Teacher A: Teacher A has five years of educational experience. This teacher is a 6th grade math teacher and they are in their first year with *Math in Focus*. At the time the school piloted the program, this teacher was teaching science instead of math. Previously, this teacher taught Title 1, and was a long-term substitute, all in different districts, still teaching math.

Teacher B: Teacher B has five and half years of educational experience. She taught math all five years, but in different school districts, and is currently teaching 7th and 8th grade. This teacher is in her second year using *Math in Focus*, previously piloting the program, but first year truly implementing the program in its entirety.

Teacher C: Teacher C has 37 years of educational experience. 23 years in one district teaching 7th and 8th grade, and 14 years in her current district teaching 8th grade. This is her first year using *Math in Focus* in her classroom.

Teacher D: Teacher D is in her ninth year teaching math and has been teaching in the same district all nine years, in the 7th grade. This teacher piloted *Math in Focus* last year and is now in her second year using the program.

These teachers were located in schools central to myself in New Hampshire, and were all in middle schools that were using *Math in Focus*. During the interviews, I recorded the conversations while simultaneously using a transcribing program to convert the interview to text. Following the interview, I used the audio recording to review the transcriptions to ensure accuracy. This assisted later when analyzing the data. All teachers were aware of the study and agreed to the conditions.

All teachers were asked similar questions during their interviews. I came in with a list of specific questions that I made sure I asked or touched upon during the interview. They were not all asked in a specific way or order. The following is a list of questions asked during the interview, along with a brief reason behind the usefulness of each question as it pertained to the study:

- On first implementing *Math in Focus*, did you have any immediate concerns?
 - I used this question to find out what the teacher was thinking before the school year began, or early on in the program. This helped me see if there were any concerns that were just early on, and then disappeared, or kept constant the whole

time. It also allowed me to see if there was anything alarming in the teachers' eyes about the program.

- How did you introduce *Math in Focus* to your students?
 - This question was used to see if the teacher changed anything in the way they begin their school year, now that they have a new math program.
- How did you present *Math in Focus* to the parents? Did they have any questions?
 - This question was important because I was curious if the teachers did anything different for the parents because a new program was being implemented into their students' curriculums. It also let me see if parents were highly involved during the implementation process, or had any drastic concerns.
- On the first day of implementing *Math in Focus*, what did you do?
 - This question connects back to introducing to students, but also let me see how they were implementing it at the beginning, if it was different than other years or in a special way to get students prepared or excited.
- Since then, have you changed how you present the material from *Math in Focus* to the students?
 - With this question, I was looking to see if the teachers had changed their presentation of Math in Focus since the beginning, since it takes trial and error to get to know anything new.
- What about compared to other years in your experience?
 - This was one of my bigger questions, since it ties into my overlying question the most. Now I was looking to see how the teachers themselves had changed the way

they present materials, and how their teaching methods may have changed with this new program.

- What parts of the program do you utilize?
 - More of a factual question, this let me see how involved with the program this teacher was, and how much of their class used the program.
- Are you implementing other materials that aren't in *Math in Focus*? If yes, what materials are they and what was your reasoning for using them?
 - These questions tie back to what parts of the program they were using, and in this case what did they feel they had to add on or use with the program. This is important to see what they were using, and why they felt they needed materials that were not in the program there school was implementing.

When analyzing my data, I went through and read each interview thoroughly, looking for connections between them, and any particular things that connected or contrasted. I used an open coding system in order to code the data. This meaning, while I read the interviews, I would give each section a specific code that categorized what kind of interview data it was for my study and how it would affect and help my analysis. These codes helped me connect my data and find where they matched or contrasted on specific subjects. Following is the codes I used, along with what kind of data it was and how it helped this study:

Code	Short Phrase	Description
C	Concern	Data that aids to the types of concerns the teacher had about the program in aspects of the student's success and teaching methods.
PC	Parent Connection	Data that aids to how do the teachers connect the new program back to the parents, and any parental involvement seen.

SC	Standards Change	Data that supports the programs material affected by the changes in the curriculum (the CCSSM).
PI	Program Implementation	Data that supports how the teacher is implementing the program in their classroom, especially including the parts of the program being used.
FG	Filling Gaps	Data that supports teachers recognizing students with gaps in their backgrounds knowledge with the use of this program or with the standards change.
OP	Outside Program	Data that shows teachers pulled materials and resources from outside the <i>Math in Focus</i> program in their classrooms or teaching methods.
AI	Administration Instruction	Data that aids in what the teachers were required to do in their classrooms, showing reasoning to their methods.
CM	Change in Methods	Data that teachers claim is a difference in their previous teaching methods that they see clearly.
TM	Teaching Methods	Data that teachers claim is their teaching methods and styles, or any connection back to how a teacher teaches in their classroom. Also including teacher's opinions on how <i>Math in Focus</i> would like their teaching methods to be.
S	Scaffolding	Scaffolding is a learning style that constantly builds on the concepts and material that came before it, in a slow but concrete building block way. This data supports teacher's opinions on scaffolding in the program.
BM	Bar Modeling	Bar modeling is a mathematical strategy that draws out physical bars in representation of algebra problems. Being able to physically see the bars allows students to break them up into multiple units (works as the variable). This data supports bar modeling in the teachers methods with <i>Math in Focus</i> .
P	Positives	This data supports any positives the teacher has mentioned about receiving <i>Math in Focus</i> , and positives to their teaching methods.

By using these codes with my data, I was able to establish how my data was taking shape, and what kind of analysis I was able to make. During my analysis of this data after coding, three

major themes occurred. The first theme is traditional views versus newer classroom views. Looking through my data, teachers often viewed “traditional methods” as direct instruction, where the teacher is located in the front of the room and lecture while students take notes and do practice problems. This in comparison to more recent classrooms trying to draw away from the traditional, by implementing things such as collaborative activities, the flipped classroom, and more student exploratory methods. A flipped classroom, in this study, will be viewed as a classroom where students learn the new material on their own (in particular, watching lecture videos during after school hours), and work on more in depth problems during class with the teacher as more of a leader. More exploratory methods will be looked at as students being left to explore mathematics rules themselves, and looking for reasoning’s behind them. The second theme found is filling the gaps. This was something that emerged in all my data, and filling the gaps often connected to what pieces of the program were utilized, and how the teacher had to change their classroom dynamic. Because this was something that occurred so much, I choose to make this code an overlying theme as well since there were many connections and overlaps with this. The final theme that emerged is years of experience with teaching. This theme is looking at how many years the particular teacher has been in practice, and how that affected their concerns, their teaching methods, and their changes in methods with a new program. Following in my analysis, I will explore each of these themes using my interview data to support my reasoning’s and conclusion.

Analysis

Theme 1: Types of Classrooms

The first theme I would like to explore is looking at the type of classroom that is set up based off the curriculum. Is a classroom atmosphere and function based off of a program? Looking at the data collected, I saw four different teachers who had very different opinions on this theme. Teacher A was using *Math in Focus* for a flipped classroom. Connecting with the technology age we are in, Teacher A began videotaping her lesson lectures, and posting the videos on her website for her students. She would use the lessons directly from the *Math in Focus* textbook, the way the program wanted it to be taught, and give direct instruction through the video. “What I really make sure I don’t do is going back to traditional, because that goes against everything we are trying to do” she said when discussing the videos. For homework, students are to watch these videos, take notes, and do the guided practice problems along with it, since this would all be in their textbook at home as well. In class the next day, Teacher A would attend to any misconceptions right away, and once the class was on the same page, would dive into the deeper more challenging problems. This was most often the word problems that the students would work on in groups. “When I do my videos for certain sections in the textbook that are current, I go by the textbook. For some reason it is much better than going through reading the textbook with the kids. They will watch a video and follow exactly what the book says. It’s like asking them to read the book, but they’ll take notes on it and try the guided practice problems and it just goes wonderfully.” By doing this flipped classroom, the teacher spent significantly less time in the front of the room instructing, and more time leading the students the next day with these higher order thinking problems. Since this is the first year doing this, she says it is still not running perfectly, but so far has gone very well and has seen happy students. “I think we are seeing happy kids and kids who are, you know, having these little epiphanies when they see these problems on the board. You can see those light bulbs over their heads.”

Teacher B tries to make her classroom fun and creative, trying to get away from the traditional idea that math is copious note taking, practice problems and too challenging to succeed in. However, with *Math in Focus*, she feels that this is being taken away from her, “*Math in Focus* is very traditional and there are very few hands-on manipulatives.” Since Teacher B was required to teach the book to fidelity, she is not to use other materials outside the *Math in Focus* program in order to see the program be successful. An example of this would be previous activities or small projects she has used successfully in the past; if it wasn’t part of the *Math in Focus* curriculum, she was asked not to use it. As an educator, she still makes decisions that helps the students most, but says that she is not able to do as much creative aspects as before, “I find myself often trying to find something that will fit into the curriculum so we are not just doing here is an example, do 50 problems.” Previously, she taught the curriculum with materials she already had, making sure to follow the standards, which at the time in New Hampshire were Grade- Level Expectations (GLE’s). This was done without a direct textbook to follow. Now there is more practice problems and direct instruction; “It is very different because I look at the text, and my districts says to teach the text to fidelity, and that to me is very unfortunate because one of my goals of becoming a math teacher is to add the fun to math. And now, it means taking [fun] out of the curriculum. And it is sad for the kids and me because it is being creative with, what the kids would say is boring material, is the key to keep them engaged and focused and hopefully long term success.”

Teacher C says that she is trying to pull away from the traditional methods of being in the front of the room giving lectures. Now, she is trying to do more group work with students and having students work more collaboratively on problems and coming up with reasons and solutions on their own. However, when discussing this, she also mentions that this is not because

of *Math in Focus*; it is because of the changes in education today, and the direction is going away from direct instruction. When discussing if she has changed her methods because of the new curriculum, Teacher C responded “maybe more children working together instead of me in front of the room. But the curriculum didn’t change that that is how things are now. We want the kids to be working a little bit better together. So I would say no [to changing teaching methods].” So her classroom hasn’t necessarily changed in anyway, aside from having students work more together than direct lecture.

Teacher D says similar things as Teacher C, but also touches on *Math in Focus* saying it can be a dry program, meaning very little activities and creative aspects. She is also trying to add her own flare to the program, “I’m trying to liven it up a little because I find if you just present exactly the way [the material is] in the textbook, it gets really dry.” But she adds that she must get to know the program first before she can truly adjust to both the textbook and her own flare to mathematics. She does however mention she tries to liven up classes, but still teaching the books material and giving direct instruction. “This is kind of dry, the curriculum is dry, but once I get more comfortable with it I can take a little bit of my own spin on it.” When speaking about Teacher C’s methods and how she used to have students explore rules and reasoning’s to different concepts, she responses that “you do that a little bit with *Math in Focus*, like with hands-on activities and the number line is presented in more ways, but it’s not as much exploratory. I think it is more of direct instruction than it has been in the past. Like looking at why it works, but you’re not just having them discover on their own.”

One thing that Teacher A and Teacher D both mentioned was an aspect to the program in the way it presents new material. It is called bar modeling. This is a strategy that *Math in Focus* teaches their students as a visual representation of word problems. To represent variables in an

equation, or how many “bars” you have, you can compare who has more bars, how much the bars would total to, what the difference between the bars would be if they were to be made equal, etc. Both Teacher A and Teacher D took courses on bar modeling in their own time, in order to use it in their classrooms more this school year. When talking to Teacher A about what she incorporated in her videos she says,

“So one of the things that I love in *Math in Focus* that I love is the bar modeling. I took a bar modeling class over the summer and I'm a believer. Because you see the problem in front of your face, you can see the proportions right there. You don't have to draw a picture of the boat, you're drawing unit bars, it's just wonderful and the kids seem to enjoy it the more they learn about it. But they really didn't have much for bar modeling prior to this year, even the kids who were in the pilot program last year.”

With Teacher D, when discussing what other materials she was implementing, “the only other materials that I've used this year is our problems from the bar modeling book that came with the *Math in Focus* program, as well as I took an online course for bar modeling and I've been implementing some of those bar modeling word problems that they gave us to show we can use for modeling so I can get the kids comfortable with it.” So both teachers here are implementing a part of the program they have not used before, in order to try this new strategy with the students. This is something new that changes the way these teachers are presenting materials.

Looking at what the teachers have mentioned, the program seems to be able to take the direction the teacher wants to take it. However, this could be from having more experience working with different curriculums. The teachers have mentioned that before they can do much with the program, there has been a lot of reteaching and back tracking, as well as research and practice in their own time. This leads into the next theme I explored, which was filling gaps.

Theme 2: Filling Gaps

Looking through my interviews, every teacher had the same comment to make; students had gaps in their background knowledge, and gaps needed to be filled. This was with 6th, 7th and 8th grade teachers that I talked too. When speaking to Teacher D about immediate concerns before the first day of the program, she said “the background knowledge of the students wasn’t going to be where I needed it to be in order to implement the program right away, so there was going to be a lot of gaps that we needed to fill.” When discussing with Teacher A what happened right in the beginning of implementation, “then what we found, well what I found, was there were some gaps to fill, so we focused on that.” Similarly at the beginning with Teacher B, “on day one we started off with the recall prior knowledge in the book, and it was immediately apparent that we needed to fill material and gaps in order to make sure students were successful in the program.” And when talking to Teacher C about what parts of the program she was using in 8th grade, “we are finding the need to go back to the 6th and 7th grade to get extra practice sheets to work on, to work them up to that skill on that grade level.”

It was interesting to me that every teacher found gaps, so I looked further into this. The first thing the data displayed was that the gaps could be related to changes in standards, not just the program. With the new Common Core, the requirements for students at different age levels have increased in difficulty. Material that used to be in 8th grade is now being seen at a 7th grade level. Teacher D commented when discussing this standards change, “the students had to take a risk and go a little bit deeper and stuff that I am teaching in 7th grade now is stuff they weren’t seeing until 8th grade.” Students are being challenged more. Teacher B commented when discussing early-on concerns, “our students seemed very ill prepared for the rigor and depth of the algebra and pre-algebra that was being introduced at such a young age in the curriculum.

Things that I hadn't seen in a book until high school was appearing in 7th grade materials, which was very concerning.”

However, since these standards changed with the students already in these upper grades, they have not received the new curriculum earlier in their education careers, something that the new curriculum expects they have. This connects with implementing *Math in Focus* in all grades at once, so that students in the upper grades are without the program since Kindergarten. The program spans from Kindergarten through 8th grade, and expects the students to make ties back to those previous grades and knowledge often. However, if students were not being taught those standards all along, they did not see any of the material, which none of these middle school students have. As said by Teacher A, “the immediate concerns I had were my students are in 6th grade and they are expected to know the material *Math in Focus* has introduced back in K-5th grade, and they didn't. But I was reassured about, you know, whenever you roll out a new program if you're going to put it in all grades at the same time you are going to have those big gaps.” So therefore, there are many gaps in the student's background knowledge.

With this many gaps, teachers have to choose how they are going to support students background with teaching, or reteaching, concepts they may not be strong with. This could mean going back to previous grades materials, which *Math in Focus* has opportunities to do. Unfortunately, this takes time away from what needs to be accomplished during that school year, and teachers have to make the decision whether to back track, or keep moving ahead. When discussing these gaps with Teacher A, “so what conflicts with that is the pace which were going, which still comes up once in awhile, I feel like I am going fast enough but then I just told myself if I go too fast, what's the point of doing it all because they're not going to get any of it. So for me it's understanding and mastery over pace.” And even still, there are times where the program

is still to advance for the students, as said by Teacher B in her experience, “most often we are using the transition guide in order to go back within the program. This is the reteach, the transition guide. The problem we see as a middle school is that it does not go back far enough, and the material we need more of is lacking.” So there are still cases where going out of the program is necessary for student’s success. Knowing what to do in these times takes many years of practice to understand students minds and knowing best practices, which leads into my final theme; years of experience.

Theme 3: Years of Experience

Looking at the different backgrounds of the teachers in my study, and comparing to their concerns for the program, I noticed that the teachers with more years of practice had less concerns than those who were newer to the profession. Teacher C, who had 37 years experience, had little concerns with the program. She says she was “nervous about the unknown [starting a new curriculum], but for the most part because of the years of teaching I have, it really doesn’t matter the curriculum. You are going to pull the same old tricks for the student understanding anyways.” With her many years in the education field, Teacher C has researched and developed ways for teaching different mathematical concepts. One example was algebra. The requirements for 8th grade pre-algebra/algebra are now richer and go deeper than before, “we have taught students, 8th grade students, how to do algebraic equations in the past but not to this extent that this curriculum is using so how I would teach that, that is something additional that is something I wouldn’t have done in the past with this age group is teach them that concept. Like teach them the distributive property or substitution, so that is new to them and new to me to teach to them.” And though Teacher C says she has never taught this to 8th grade before, because she has taught

that particular material in her experience, it was just adjusting for that level, “but being an algebra teacher that is not new for me to teach it.”

The other teachers in my research had about five to nine years teaching experience with middle school math. Comparing this to 37 years is a big difference in experience. These teachers had more changes in their teaching styles upon implementation of the new program. Teacher A, though, seems to have changed on her own choice. She chose to use this new curriculum and try implementing her videos and the flipped classroom style. This was also to help move away from direct instruction. “I have been in places that where you do it, is by lecturing in the front of the room and that drives me crazy” she says when discussing new teaching methods. The new standards required her to do something different, especially with the amount of gaps to be filled, and the flipped classroom was something she had wanted to try using.

“I think [*Math in Focus*] works really well for the flipped classroom from what I can see, and I have always wanted to try and flip the classroom and I know we are not all the way there yet but with this, even at the 6th grade level, it seems to be working where they can be independently go through the videos take those notes try those basic questions they do very well on. The program seems well suited for that. And I am really happy about that.”

So even though Teacher A came in with less experience, she began trying new techniques in her classroom to find what works. Teacher B also has less experience, but seems to feel very restricted in what she is and isn't allowed to do with the program. This can be difficult because though she may have other ideas and ways to teach these students, she is trying her best to use the *Math in Focus* program, knowing that it does have a good success rate in other places. “My teaching methods have changed dramatically than before” she says when discussing any obvious changes, “previously I used the GLE's as my curriculum and used whatever material I had for teaching the curriculum. We used a lot of singing and games and hands on activities and movement and outside and hands on measuring. With *Math in Focus* there is not a lot of

opportunity for that. Not a lot of activities.” Unfortunately, having to spend so much time reteaching concepts can affect what you can really do in a classroom. “Now with the amount of training we have [for *Math in Focus*] we are trying to use the book more and use the curriculum more,” she says when discussing using the program more in her second year, “the problem is the kids have only had the program for two years and don’t have the background knowledge in order to be successful.” So Teacher B has seen many changes in her methods that seem to be directly related to *Math in Focus*.

Teacher D had a similar background to Teacher B. Both came from classrooms that they once had an open curriculum for them to fill with their own methods and materials. But now with a program before them, they have to adjust the way they present materials and how they approach it. When discussing if she felt changes in her teaching methods, Teacher D says,

“Yes there is more, well I don’t want to say more worksheets, but I have had to use more paper than I have in the past, but it is always from the program. And a lot more direct instruction, like I am giving notes or directly talking to the kids about methods about three times a week, more than before it was once or twice because they were exploring something.”

Both have said that they are trying to follow the book in the way it teaches, in order to see if the students can be successful this way. Though, Teacher D puts more emphasis on the standards changing, and not necessarily the program, “I don’t think I have thought of it before, but it does make sense the curriculum would change how I teach. I think it is more of the Common Core, but it really depends on the teacher, because like, I still try to incorporate my own flare to things.” Going back to Teacher C responses, this is how she says you do everything with teaching, trial and error. If they don’t understand, or something doesn’t quite work right, you go and try something else.

Conclusion

After analyzing my data, my conclusion for this study begins with students seem to have large gaps in their background knowledge, which is what is causing the most issues with the implementation of the *Math in Focus*. Had this been a program with standards students have been taught since Kindergarten, the reactions and concerns for this program may have been different. Teachers may have felt this was just new techniques, and gave the new strategies a chance, with a more positive outlook. The students also may have made better connections and related the strategies being taught in upper grades with ones done in the younger grades. However, because this came with new standards, and the standards were applied to all grades at once, these students have been put on this jump, and teachers have to find ways to fill these gaps while still teaching the materials that need to be accomplished during that school year. This can be very difficult for teachers, and this is without considering what kind of learners you have in your classroom.

Another conclusion I made of this study was that the more experience and practice the teacher has, the less concerns they seem to have. I understand this as, with much experience, they may have dealt or seen this kind of curriculum and standards change before. Having that for experience, they could use that knowledge and apply it to students now. This is not saying that the teachers with less years experience are not successful, especially in this study, for all the teachers found ways to implement the program well. It is concluding that with more practice, you will have more material and methods you can apply to your classroom depending on the requirements of it.

Finally, my conclusion is that implementing *Math in Focus* did indeed change the teaching methods of these teachers. However, it was not for the better or the worse. This can be seen as a learning experience for everyone involved, and teachers are learning new ways to

incorporate the program into their classes. Being only the first and second year of implementation, there is still time to find ways to add the teachers own style and methods, while still following the program. The biggest conclusion made was that the most effect came from the change in standards, and the gaps that students have. Once students who have seen the program for many years come up to the middle school grade levels, teachers may have different opinions and methods they are using by then. It will be interesting in the future to see the outcomes of students and teachers, once this program has been used in its entirety through all grade levels.

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