Georgia Tech Center for Education Integrating Science, Mathematics & Computing

"We Get to See What Works" Teacher Commitment to Curriculum within a Research Practice Partnership

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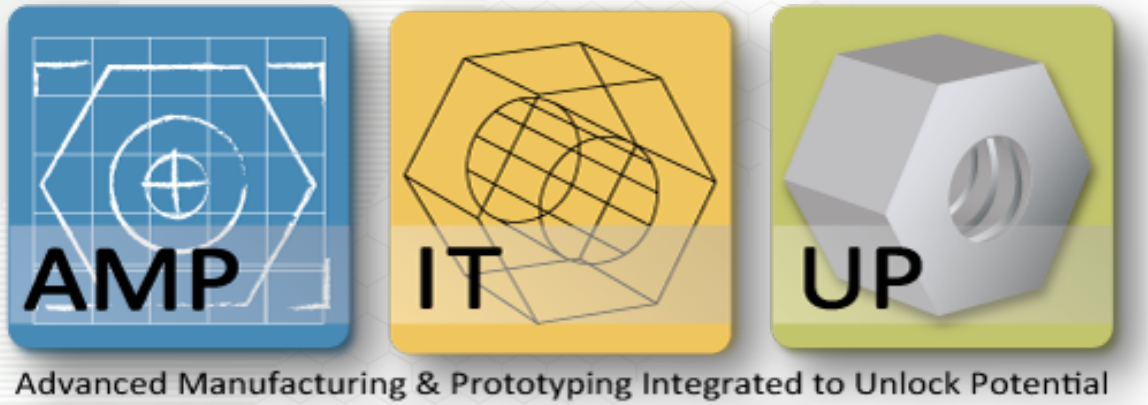
Advanced Manufacturing and Prototyping Integrated to Unlock Potential

NSF Math and Science Partnership



NSF Award # 1238089.

AMP-IT-UP GOALS (SELECTION)

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Goal 1: Create a model partnership between GT, the partner school system, and area industries to improve K-12 STEM education though collaborative activities that draw on the talents of all partners and that leverage existing education and workforce initiatives.

Goal 2: Design and implement in all middle and high schools of the School System:

- **Component A**: STEM Innovation and Design (STEM-ID) connections courses for grades 6-8 and a semester-long 9th grade engineering course
- **Component B:** 1-week Modules for core science and math courses (Grades 6-8)
- **Component C:** Professional development and an on-going support system
- **Component D:** Extracurricular enrichment programs at all middle and high schools

AMP-IT-UP SCIENCE MODULES

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	Module	Integrative Themes			
		Experimental Design	Data Visualization	Data Driven Decision Making	Disciplinary Content
Earth Science (6th Grade)	Lava	X			Plate Tectonics
	Earthquake		X		Plate Tectonics
	Winter Weather			X	Weather
Life Science (7th Grade)	Oil Spill	X			Marine Ecology
	Deep Sea		X		Marine Ecology
	Coral Reef			X	Predator/Prey, Ecology
Physical Science (8th Grade)	Marine Snow	X			Density, Ecology
	Helmet		X		Energy
	Skate Park			X	Energy

MODULE INTEGRATIVE THEMES

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Experimental Design	• Planning and Carrying Out Investigations (NGSS Practice 3) • Make Sense of Problems (SMP #1); Use Appropriate Tools Strategically (SMP #5)
Data Visualization	• Analyzing and Interpreting Data (NGSS Practice 4) • Make Sense of Problems (SMP #1); Model with Mathematics (SMP #4)
Data Driven Decision Making	• Constructing Explanations and Designing Solutions (NGSS Practice 6) • Engaging in Argument from Evidence (NGSS Practice 7) • Make Sense of Problems (SMP #1); Construct Viable Arguments (SMP #3)

AMP-IT-UP SCIENCE MODULE EXAMPLE

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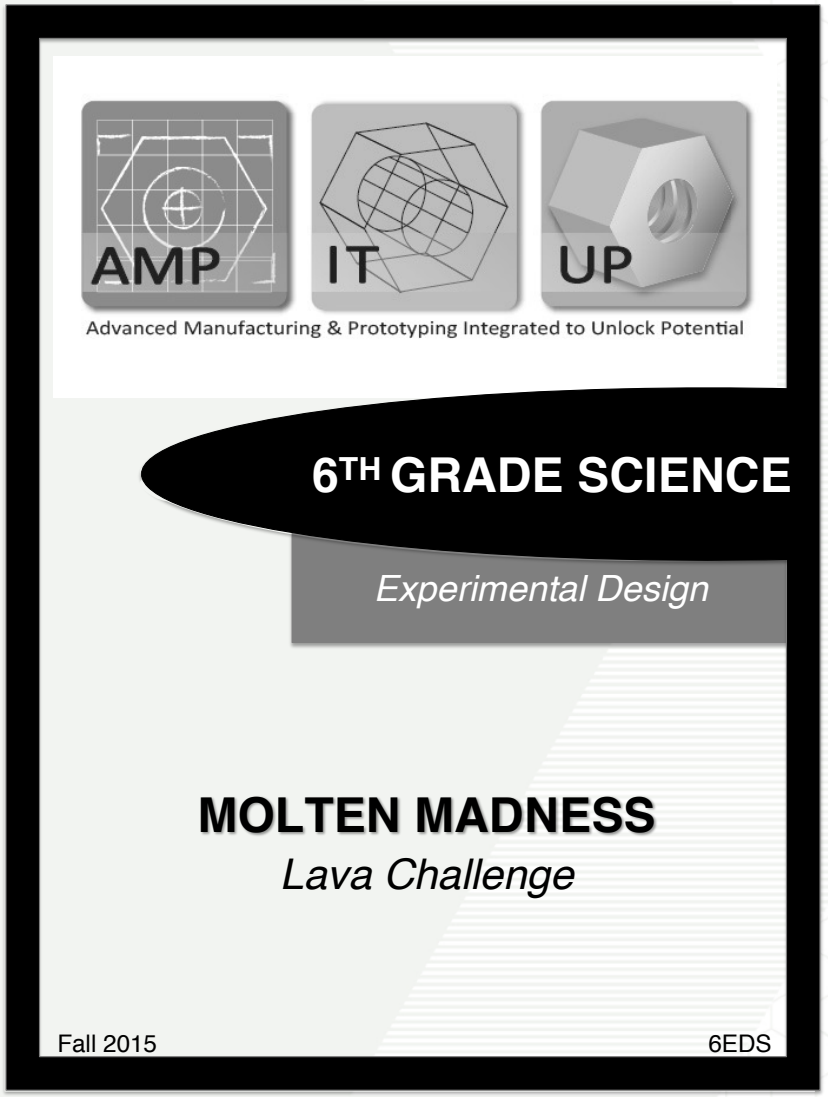

- ~ 1 week module in 6th grade science
- Challenge: Develop procedure using a model to accurately measure lava flow.
- Students conduct 2 investigations to refine procedure
- Focus on variation in data and importance of consistent procedures

RESEARCH QUESTION

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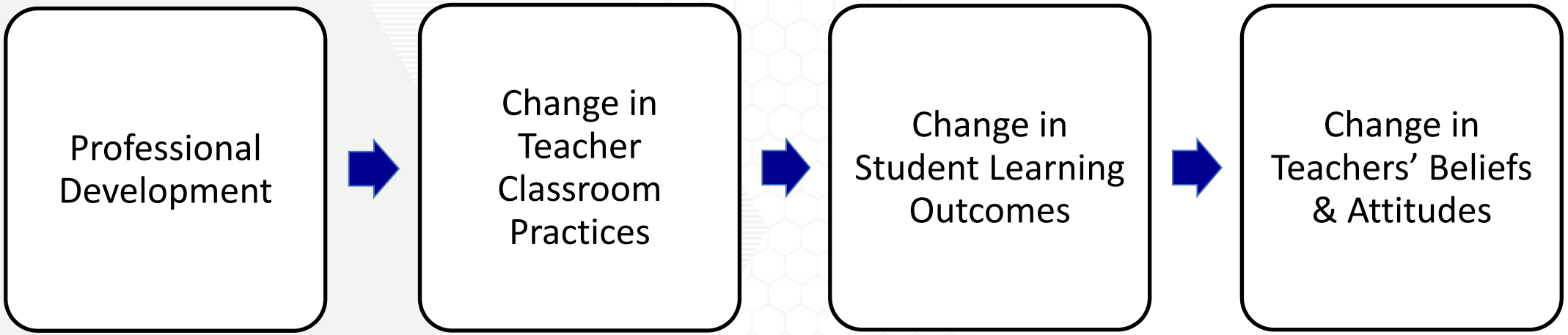
What factors influence teachers' commitment to implementing and sustaining curricula developed within a research practice partnership?

THEORETICAL FRAMEWORK



Guskey's Model of Teacher Practice Change (adapted from Guskey, 2002).

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DESIGN & PROCEDURES

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DATA SOURCES

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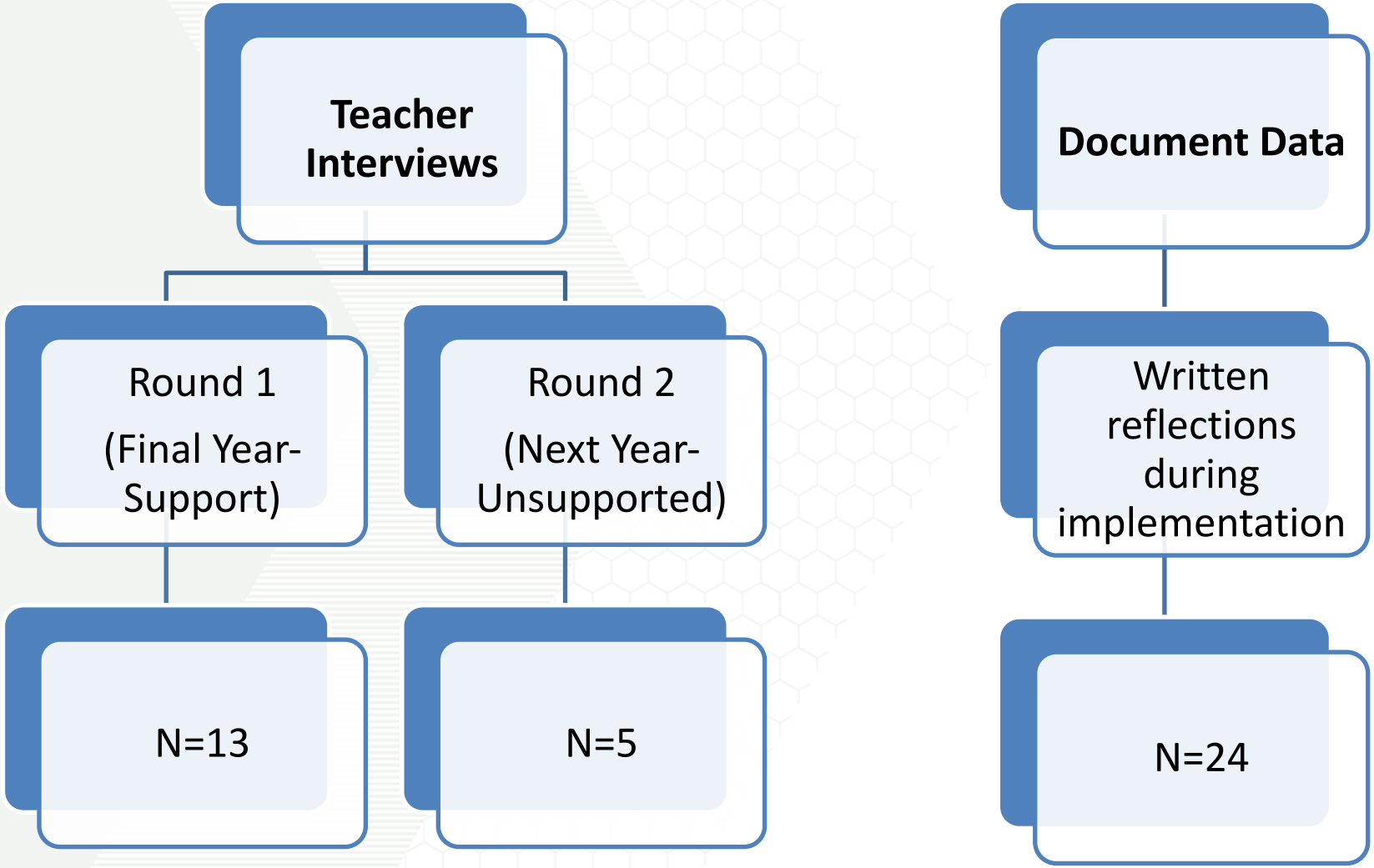

INTERVIEW ANALYSIS

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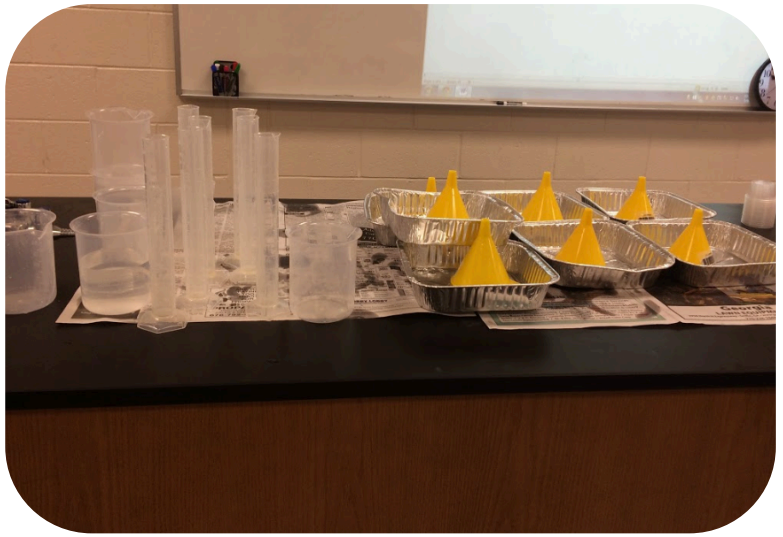
Describe their approach to science teaching

Reflect on their experience implementing the modules



Describe any changes in their science teaching practices

WRITTEN REFLECTIONS

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- Teachers responded to a a set of open-ended questions about module implementations
- Main venue for teachers to share experiences and resources which each other that they developed for the modules
- Reviewed to inform analysis of teacher interviews and for identifying factors influencing teacher perspectives on module implementation

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ANALYSIS & FINDINGS

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DECIDING TO IMPLEMENT AND SUSTAIN CURRICULUM

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- Observations of student learning
- Compatibility between the modules and other school/district initiatives
- Professional development experiences

OBSERVATIONS OF STUDENT LEARNING/ENGAGEMENT

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- "So to me, the *AMP modules give the students a chance to show what they know*. Cause sometimes when they fail a test, you be like, "oh they don't know this. They gotta be retaught." No, it may just mean that they didn't have a way to display it, where they can show you what they know."

- "*The success is seeing their understanding* when they do come to it and they're like, "Oh, well I enjoyed the coloring because I could visualize the data." Or at the end of the Oil Spill, when we do the graph and I put it on the board, and allowing the students to be the leaders, and you see that I think that really just brings it out as, "Oh I got this from it." I can honestly say, some of the lower performing students, they do really well on labs."

- "Like I said, my first year when I taught sixth grade science and implemented those modules, *after they went so well, I think unintentionally I said, 'I want to see more of this in my classroom*.' So, the next year I started implementing it even more."

DECIDING TO IMPLEMENT AND SUSTAIN CURRICULUM

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COMPATIBILITY WITH SCHOOL INITIATIVES

- "In fact we met with [District Science Coordinator] yesterday and *the plans are to continue to implement them [modules] each year*. We discussed that and our plan is to make sure we do all three each year."

- "Because it was new I didn't quite get how it was gonna help students. I see it now. But in the beginning I really didn't see it. And I think *when we're talking about differentiated instruction and this school wanting kids to have inquiry based learning*, that it has helped that way."

COMPATIBILITY WITH SCHOOL INITIATIVES

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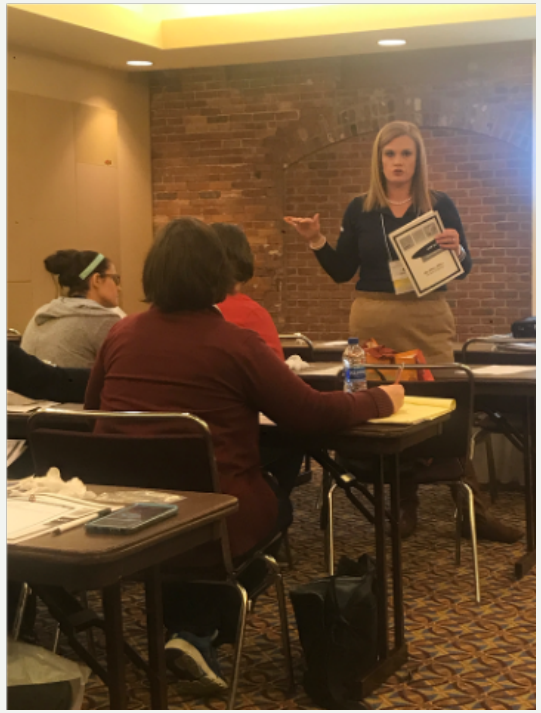

Performance Assessment

Engaging Scenario

Your job for a cell phone manufacturing plant in Georgia is closing. You have been hired to help the company decide where to build its new cell manufacturing plant: Northern California or Hawaii. You have to investigate the rock types in these areas that the company will have to move to, due to the rate of weathering and erosion related to each of these states, since the plant sites they have looked at were on hills. The company is also very concerned about volcanic and earthquake activity in these areas as well. You will construct an explanation that is supported by evidence gathered by using data maps, histograms, readings, modeling lava flow rate, weather and erosion, and soil investigations. (AMP IT up modules will cover modeling of lava flow rate and earthquake data with the histograms.)

Situation: Your job for a cell phone manufacturing plant is closing. You have to decide if the company will relocate to Hawaii or Northern California.

Challenge: To choose a location for the plants construction supported by evidence you have collected through your research (Plate movement and their causes and how along with erosion/deposition and weathering are constantly altering the surface of the Earth.)

Role: You are an employee for a cell phone manufacturing plant

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DECIDING TO IMPLEMENT AND SUSTAIN CURRICULUM

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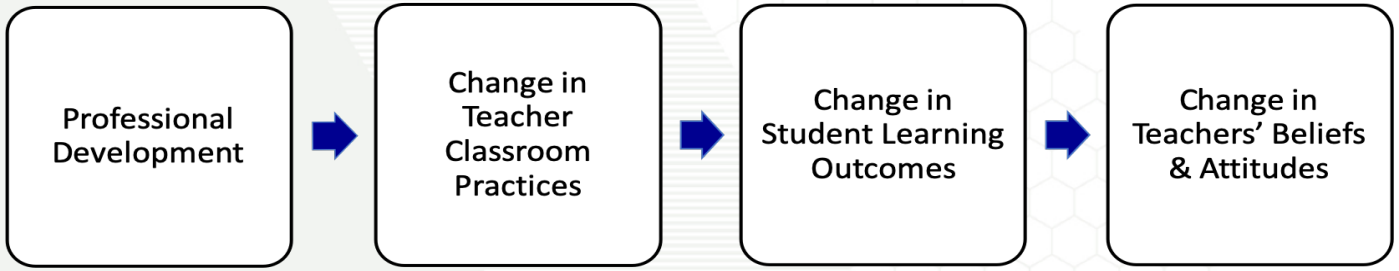
PROFESSIONAL DEVELOPMENT EXPERIENCES

- "I felt pretty comfortable with it all, and *I would say that was due to the training in the summer where we were able to actually go through all of the modules* and we were able to ask questions, and we were able to receive feedback from teachers who have done it two or three times already. I think that made me much more comfortable to implement it on my own."

- "I would say I'm pretty confident, of course, that's due to me looking back at the materials prior to actually implementing them in the classroom. *I think the training that occurred at the beginning of the school semester, that was helpful of being able to actually go through each module* and see how it was designed to be implemented, that was helpful for me. So that I could just directly model that within the classroom."

DISCUSSION/IMPLICATIONS



Guskey's Model of Teacher Practice Change (adapted from Guskey, 2002).

- Study provides insights into the factors influencing the implementation and sustainability of innovations at the classroom level
  - Provides support for the view that teachers' commitment to new practices is informed primarily by their observations about how their students engage with and learn through curriculum
  - Highlights the importance of compatibility between curricular innovations and existing school or district initiatives
  - Illustrates the important role that teachers' experiences in professional development- especially opportunities to engage directly with curriculum as learners
- Teachers were involved in the Research Practice Partnership for several years and had a high level of commitment to the project.

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THANK YOU!

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