



Learning to Teach Secondary Mathematics

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My Research Interests

- How people learn
- How people learn mathematics
- How people learn to teach
- How people learn to teach mathematics

Problem

- Many schools in Southern rural U.S. are perpetually low-performing
- Many schools in Southern rural U.S. with teacher-centered classroom environments, repetitive drill of procedures for student practice, and curricular focus on test preparation.

Extending research

- Understanding how beginning secondary mathematics teachers learn to teach in their internships in traditional, rural Southern schools
- Qualitative investigation through the lens of constructivist and social cognitive theories of whether beginning teachers learn in their internships in the same way that students learn academic content

Three Case Studies

- Undergraduate mathematics teacher intern
- Classroom mentor teacher (CMT)
- Alternate route mathematics teacher intern

Research Design

- Interviews and casual conversations with the participants
- Observation of the participants in their teaching/learning settings
- Collection of related documents and archival data (lesson plans, teaching resources, reflections, etc.)

Theoretical Framework

Constructivist Theory

- Constructing meaning (making sense) by connecting new information to prior knowledge and experiences
- Zone of Proximal Development—the range of what one can add to their knowledge and skill with the support of someone else more knowledgeable

Theoretical Framework

Social Cognitive Theory

Observation of others

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graph TD; A[Observation of others] --> B[Self-efficacy]; B --> C[Self-regulation];
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Self-efficacy

Self-regulation

Theoretical Framework

- **Vygotsky** theorized that all learning was linked to one's history and culture.
- **Bandura** linked culture with observational learning. Modeling varies across cultures, and that influences how self-efficacy is developed which influences how self-regulation develops.

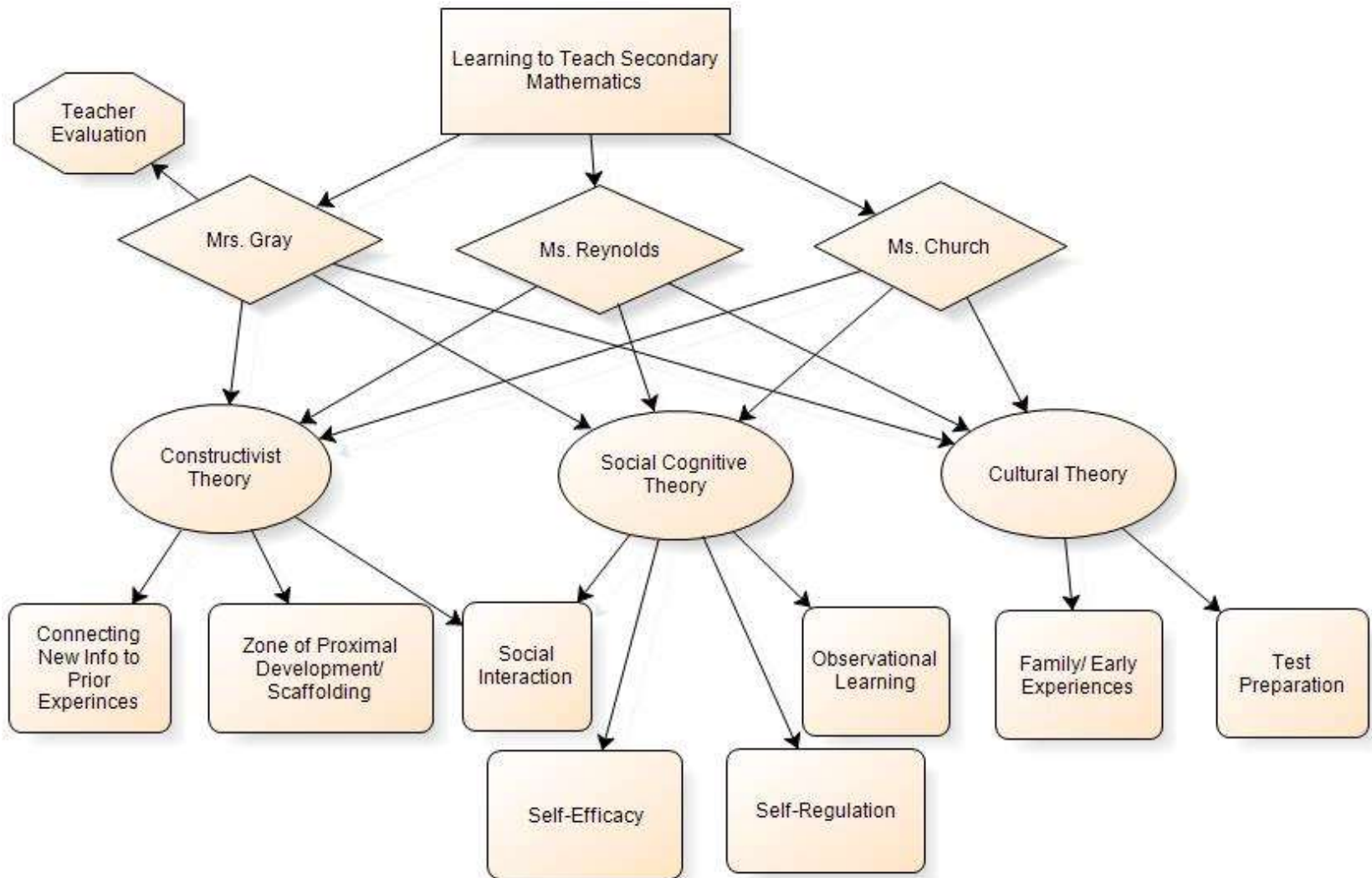
Data Analysis

- ◉ Coded all data using Nvivo 10
- ◉ Parent nodes of three theories of theoretical framework
- ◉ Child nodes of concepts of the theories
- ◉ Nodes of my three participants
- ◉ Word frequency query
- ◉ Model of project
- ◉ Charts of coding

Learn Text Query - Results Preview

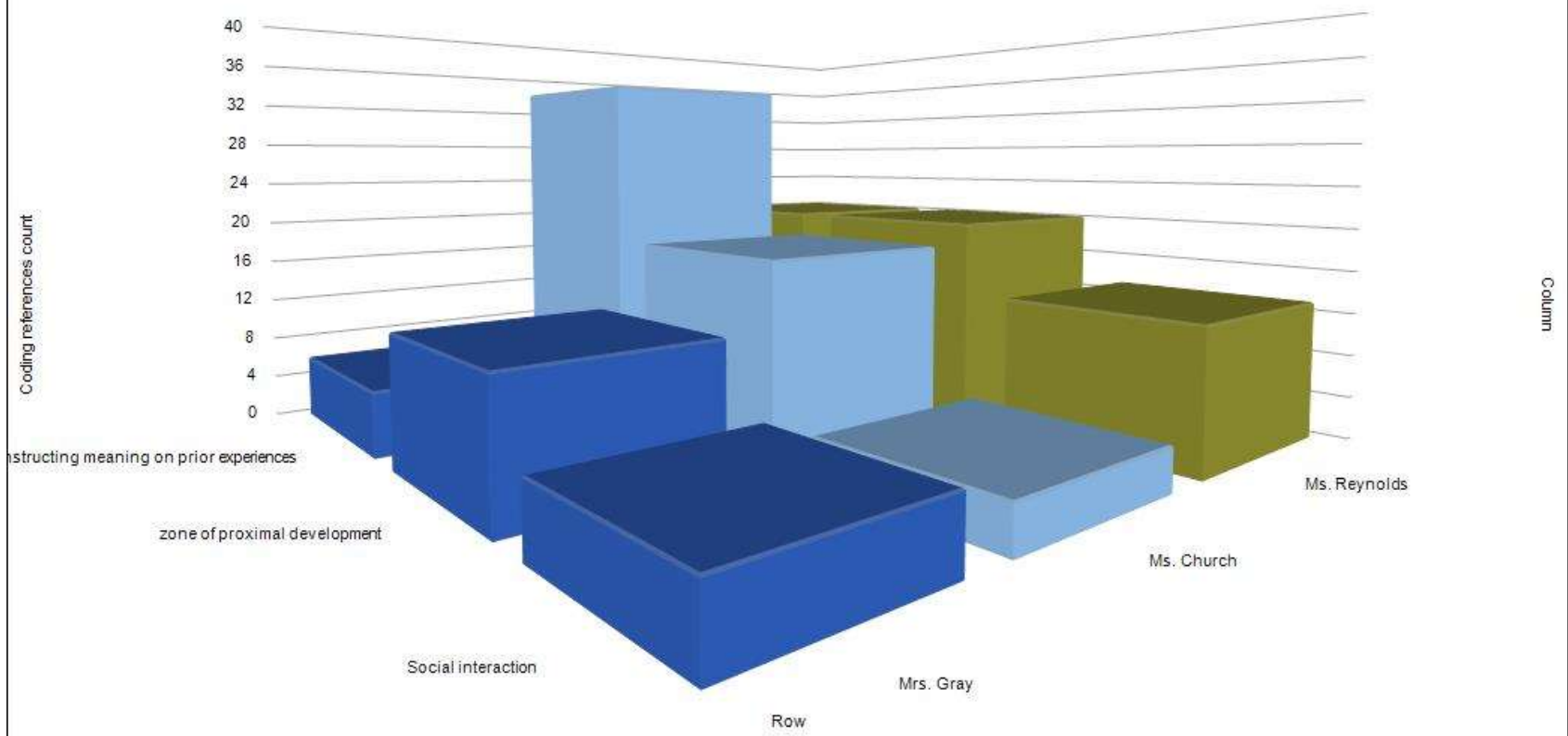


Learn Text Query

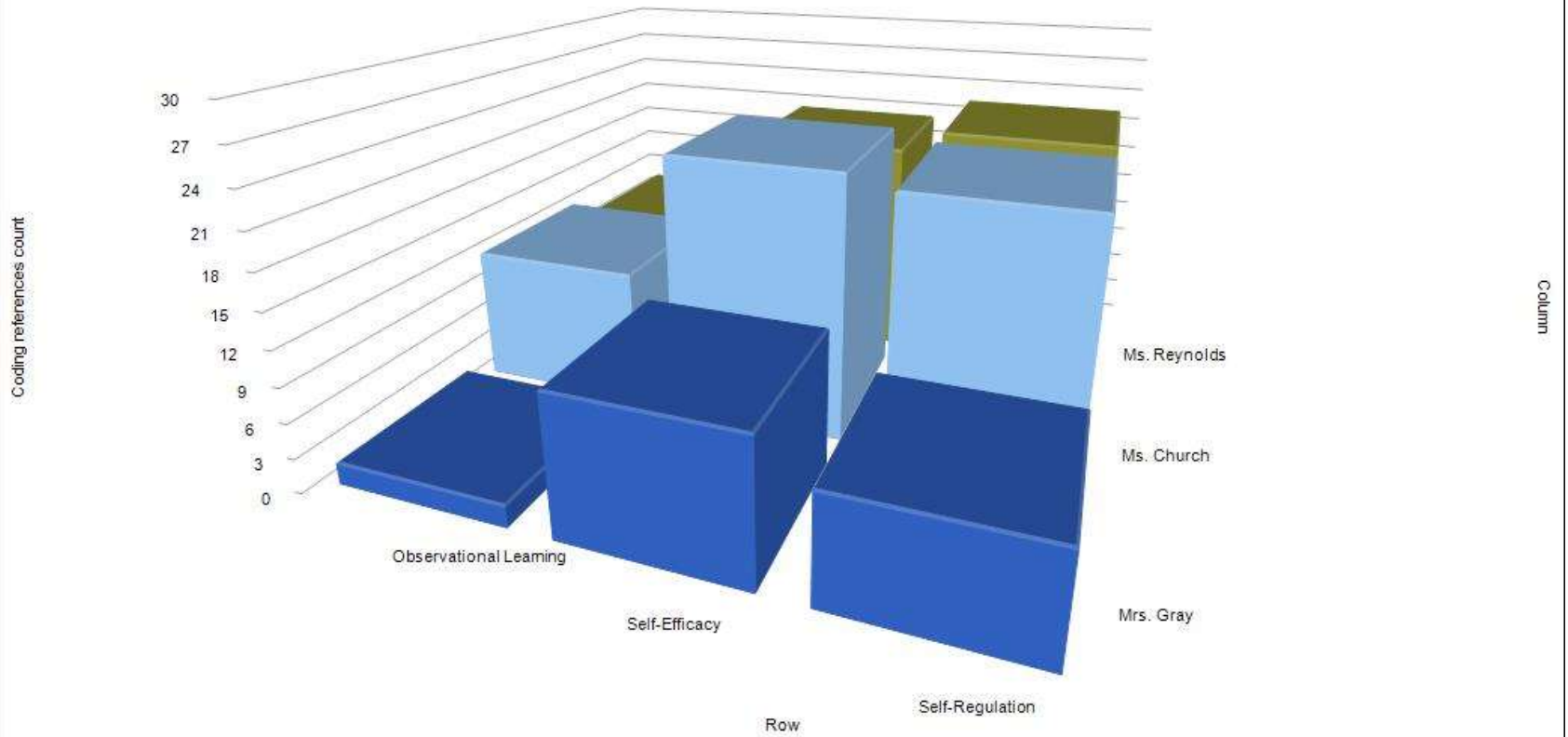




Constructivism by Cases - Results Preview



Social Cognitive Theory by Cases - Results Preview



Findings

Culture

- Born and lived their entire lives in a rural area within 250 miles of their university.
- Profoundly influenced by particular mathematics teachers in their grade-school years.
- Interns had mothers who impressed upon them the importance of education, but neither intern had parents or other family members who were able to support them in learning mathematics content like the mentor teacher did.

Prior Experiences

“I teach the way I was taught.”

- Undergraduate Intern
- Mentor Teacher
- Alternate Route Intern

Zone of Proximal Development

- Undergraduate Intern experienced great success teaching Advanced Algebra with the support of Mentor Teacher, but had great difficulty teaching Transition to Algebra by herself.
- Alternate Route Intern had difficulties teaching without mentor support.

Observation of Others

- Overlaps with Prior Experiences
- Teach the way they were taught

Image Credit: Rockwell, N. (1956). School Teacher (Happy Birthday Miss Jones, Teacher's Surprise). *Saturday Evening Post*. <http://store.nrm.org/browse.cfm/4,3007.html>

Self-efficacy

- Both felt unprepared at beginning of internship
- Both felt confident and capable quickly

Self-regulation

All three described self-regulation in early life and continue self-regulation in learning while teaching.

Conclusions

- Teachers *teach the way they were taught*, especially when their school continues the same culture of teaching and learning in which the teachers grew up.
- Pre-service teachers have been taught to teach with constructivist and social cognitive practices, but they don't internalize them to the extent that they continue to use them independently in their own teaching to foster effective learning.

Implications for practice

- Focus both undergraduate and alternate route teacher preparation on making connections between theories of learning and traditional school cultures.
- Continue support of beginning teachers in their rural settings.
- Establish stronger university-school connections for supporting best instructional practices in rural settings.