

How do Administrative Leaders Support STEM Teaching and Learning in their Schools?

Data gleaned from interviews with middle school principals.



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Focus Question

As a practicing teacher, you are scheduled to be formally observed by your principal administrator tomorrow. You have decided to teach a 'STEM infused' lesson that you are sure will dazzle and effectively demonstrate your instructional expertise. You have taken the past week to meticulously prepare a lesson plan and all course materials. So you are ready!

- After the observation and under the best case instructional scenario, what do you expect your principal administrator to document from your STEM infused lesson tomorrow?
- Do you have any specific concerns as to why your principal administrator may not positively report, or even misinterpret from your STEM infused instruction? What are some of those concerns?

Introduction and Context

- Assertion → Principals are the Instructional Leaders
- Principals come to leadership from various backgrounds and areas of content expertise
- STEM Education (interdisciplinary nature) is seen as critical for student success
- Increased need for STEM teachers and enhancement of curricular and instructional practices
- Principals are an integral piece in influencing success of STEM Education!
- **How can principals be better prepared for this role?**

The Study

- An interdisciplinary team of teacher educators engaged in a small, Pilot research inquiry with limited funding
- Investigates perceptions of four middle school principals in STEM Education
- Focuses on experiences as teachers and administrators, preferred teaching styles, observation instruments, vision of STEM instruction, *as well as observation and feedback*
- Builds on notion of principal as instructional leader and potential impact of principal on success of STEM instruction

Research Purpose

- Focuses on **Three Research Questions** based on:
 - Understand Principal's Teaching Experience and Views on Teaching
 - Understand Principal's perspectives on STEM Education and Observation Expectations
 - Understand Feedback offered by principals following observation of STEM instruction

*Specific focus on middle school math instruction

Framework - Professional Vision

- Dr. Ginger Rhodes

Research Significance

- Better understanding of principal interaction with STEM teachers and impact on teaching/learning in these classrooms
- What is their professional vision? How does the vision of the administrator impact teaching and learning?
- How can universities better train administrators for this role?
- What resources and/or training is needed for our current administrators in the field?

Methodology

- Charles L. Cahill Grant for Faculty Scholarship at UNCW
- Case Study Approach with in-depth focus on four middle school principals
- All principals chosen from the same partnership district; district considered leader in STEM Education in the region
- Purposive Sampling
- Use of two video clips of authentic classroom instruction from Accomplished Teaching, Learning and School (ATLAS) series
- Semi-structured interview, conducted by same researcher, recorded and transcribed for accuracy, coded and assigned meaning by researchers

Research → Interview Questions

Understand Principal Background and Experiences

What is the teaching and leadership experience of the principal?

What is the preferred teaching style of the principal?



Understand Principal Perceptions of STEM Instruction

What is the principal's perception of STEM education?

What is the principal's perception of this specific STEM lesson?



Understand Principal Feedback to Teachers

What sort of feedback does the principal typically give?

What sort of feedback would the principal give to this specific STEM teacher?



Results-

Principal Background and Experience

- One School Counselor, One Middle School Math Teacher, One High School Science Teacher, and One Middle School Teacher (All Core-Subjects)
- Three taught for at least 12 years
- All considered their teaching styles to be student-centered
- One discussed whole-group instruction as meaningful, three tended to focus on phrases such as “PBL” and “hands-on” learning



Results- Effective STEM Instruction

- Similar responses from all principals included:
 - Principal A: “Higher-order thinking skills and problem solving”, “High-level engagement”
 - Principal B: “Important to see what the students are doing”
 - Principal C: “Kids highly engaged in their units”, “actively learning” “shouldn’t just be sitting and getting”
 - Principal D: “Creative and far-reaching in their thinking”, sought relevance and real world application

ATLAS Video #1

- Watch the video. What do you notice about the instruction?
- Video Link: <https://atlas.nbpts.org/cases/1740/>
 - Clip #1740- clip between 1:00-5:30
- Take a couple minutes and talk with your partner(s).

Results-

Perspective and Feedback Classroom 1

- Varied responses to first clip featuring seventh grade students converting between algebraic forms to solve multi-step problems
 - Principal A: “Compliance, but not engagement”, most “kids sitting looking bored”
 - Principal B: “Good problem” while some dialogue “off track”, overall would offer “favorable feedback”
 - Principal C: Noted limited whole-class engagement, teacher doing a lot of talking, offered several reflective questions
 - Principal D: Liked dialogue, encouraged by student voice in classroom

ATLAS Video #2

- Watch the video. What do you notice about the instruction?
- Video Link: <https://atlas.nbpts.org/cases/819/>
 - Clip #819- clip between 0:30-5:00
- Take a couple minutes and talk with your partner(s).

Results-

Perspective and Feedback Classroom 2

- Varied responses to second clip featuring sixth grade students modeling multiplication and fractions using manipulatives
 - Principal A: Noticed greater teacher presence, student engagement, and independent learning
 - Principal B: “A little more elementary”, focused on need to enhance rigor
 - Principal C: Too much Independence? Students “actively involved”, positive feedback overall
 - Principal D: Praised level of dialogue and participation, great “level of collaboration”

Discussion of Results

- Different “noticing” apparent even with principals in same district, observation protocols, and related trainings
 - Principals teaching experiences varied along with their responses
 - Ex- Former Math teacher saw Clip 2 very differently than other 3 principals - focus on math tasks (content) vs. role of the teacher (strategies)
 - Divergence in feedback could lead to mixed messaging
 - Each principal had unique positionality, but same observational task



Limitations

Limited sample size → Would be beneficial to add to study by interviewing middle school principals from different districts across the state

Limited interview time → Would be useful to have longer segments of the video clips (were only 4-5 minutes) as well as more reflection and interview time (limited to respect time of working principals)

Conclusions and Implications

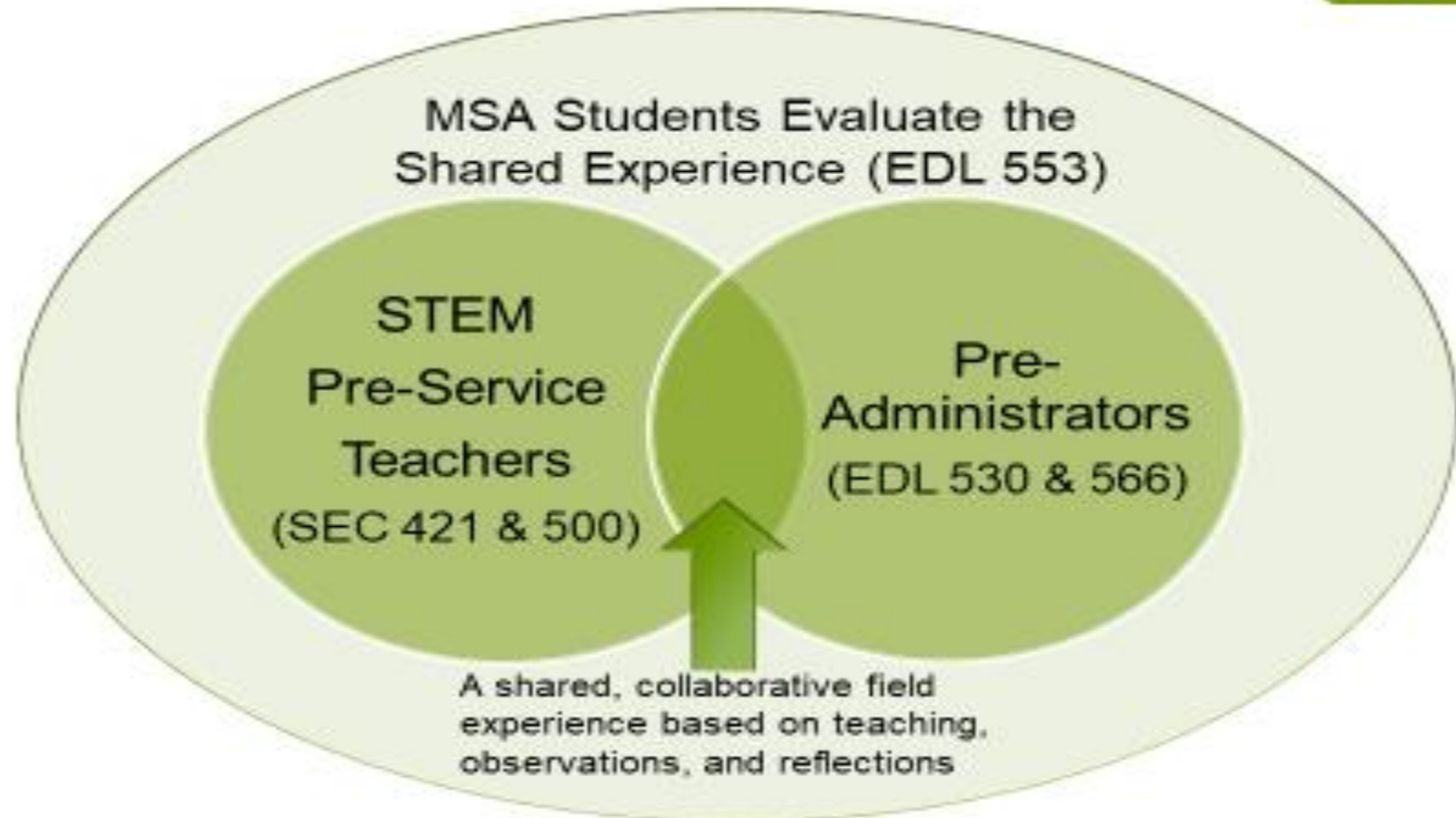
Pilot study provided insight into important role of Principals in four key areas:

- Perceptions of Effective STEM Instruction, Feedback to Teachers, Professional Development, Preparation of Principals
- Principals past teaching experience does impact their “Noticing” and Feedback
- Divergence in identifying what good STEM instruction is
- Feedback varies even when employing the same observation protocol and training
- Work to be done to effectively provide all teachers with feedback to meet goals of STEM Literacy

Future Research

iTALL preparation model

A multilayered applied learning experience



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