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**Claim, Evidence, and Reasoning: Evaluation of the Use of  
Scientific Inquiry to Support Argumentative Writing in the Middle  
School Science Classroom**

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# CLAIM, EVIDENCE, AND REASONING

Evaluation of the Use of  
Scientific Inquiry to  
Support Argument in the  
Middle School Science  
Classroom

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# Argumentative Writing in Science

- **Next Generation Science Standards**
  - Inquiry and literacy
  - “Engage in argument through evidence” (NRC, 2012)
- **Students struggle with science writing tasks.**
  - General lack of support for writing in science curriculum (Kiuhara, Graham and Hawken, 2009)
  - Need for more specialized teaching methods (Norris & Phillips, 2003)

# Purpose

## **Evaluate a methodology for inquiry-based writing exercises in the middle school science curriculum**

- Common successes and deficiencies
- Inform further argumentative writing instruction in science curriculum

# Literature Review

1. NGSS and CCSS have altered the roles of inquiry and collaboration in the classroom.
2. Inquiry + communication → meaning-making
3. Students can combine scientific inquiry and evidence to create and defend arguments in written form.
4. Argument-Driven Inquiry can be used as a model to implement these teaching practices. (Sampson, et al., 2013)
5. Limitations include self-efficacy, a bias against science literacy, and budgetary and professional development issues.

# Modified Sequence of Instruction

- Before engaging in argumentation, students are given support with writing a scientific claim.
- Class-wide argumentation session
  - Monitor discussion
- Reflective discussion occurs throughout instruction

# Data

1. Reading Assessment – Identify, Critique, and Compare Evidence (adapted from Knight, et al., 2013)
  - Administered pre-and post-instruction
2. Writing Assessments (**claim, evidence, and reasoning**)
  - **Summative:** Pre- and post-instruction (adapted from Knight, et al., 2013)
  - **Formative:** Paragraphs written throughout instructional sequence
3. Student survey via Google Forms
  - Writing strengths/weaknesses
  - Experience with claim, evidence, and reasoning; peer review

# Data Analysis Themes

1. Inquiry-based argumentative writing instruction increases students' ability to identify, critique, and compare the quality of evidence in written arguments.
2. Participation in inquiry-based argumentative writing exercises helps to strengthen students' scientific claims.
3. Students' writing scores increase when scaffolded to meet expectations.
4. Students need continuous feedback in order to improve as writers.



# Suggestions for Future Instruction

- Data that is personally meaningful to students
- Argumentation sessions that allow for student/teacher feedback on evidence and reasoning, as well as claims
- Lab analyses scaffolded to areas of student need
- Clear expectations for meaningful peer feedback



# QUESTIONS

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# References

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Norris, S.P. & Phillips, L.M. (2003). How literacy in its fundamental sense is central to scientific literacy. *Science Education, 87*(2), 224-240. doi:10.1002/sce.10066

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