


Future Elementary Teachers' Epistemic Beliefs and Views About the Nature of Science

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Research Questions

What are future elementary teachers'...

- epistemic beliefs regarding the physical sciences?
 - How do these epistemic beliefs change after they complete a physical science course? Focus of this talk
- views about the nature of science?
 - How do these views change after they complete a physical science course?

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Research Participants & Context

- Elementary Education Majors
 - N = 108
 - 95% women
- Conceptual Physics Course
 - Almost no students have high school physics
- Pedagogy: Learning Cycle¹
 - Exploration: 1st half of week in Activities Center
 - Concept Introduction: Lecture with Peer Instruction
 - Application: 2nd half of week in Activities Center

¹ Karplus & Renner (1974)

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Data Sources

Pre-Post comparisons of scores on...

- Epistemic Beliefs in the Physical Sciences (EBAPS) Survey²
 - A 30-question multiple choice questionnaire Focus of this talk
- Views about Nature of Science (VNOS) Survey³
 - A seven-question open-ended questionnaire

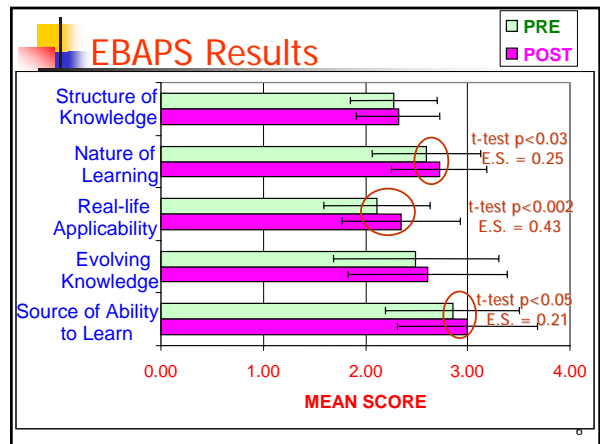
² Elby & Hammer (2002) ³ Lederman & Abd-El-Khalick (2002) ⁴

Interpreting EBAPS

Four Dimensions

- Structure of Knowledge
 - Coherent vs. Pieces
- Nature of Learning
 - Propagated from authority vs. Self constructed
- Real-Life Applicability
 - Applicable vs. Non-applicable to the real world
- Source of Ability to Learn
 - Innate vs. Acquired

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Conclusions

Future elementary teachers' epistemic beliefs in the physical sciences are...

- Non-expert like (EBAPS score below 3) both before and after completion of a physical science course.
- Change in some dimensions after taking the physical science course.
 - Statistically significant ($p < 0.05$) change in "Nature of Learning," "Real-Life Applicability" and "Source of Ability to Learn" dimensions
 - Only the "Real-Life Applicability" dimension shows a significant change (Effect Size = 0.43)

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Limitations of Study

Inherent limitations in the instruments

- EBAPS:²
 - Teasing Epistemology vs. Expectations
 - Teasing Beliefs vs. Goals
 - Inferring students' sophistication
 - Inviting stock responses from students
- VNOS:³
 - Validity of open-ended responses need follow-up interviews

² Elby & Hammer (2002)

³ Lederman & Abd-El-Khalick (2002) ⁸

Future Work

- Confirm the validity of VNOS open-ended responses
 - Do students' responses to interview questions agree with their open-ended responses to VNOS questions?
- Examine correlations between EBAPS scores and course performance
 - Do students with more sophisticated epistemic beliefs perform better in the course?
- Investigate connections between epistemic beliefs and views about the nature of science
 - Do students with more sophisticated epistemic beliefs also have more sophisticated views about the nature of science?

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THANK YOU

For information please contact
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