

Do Future Teachers' Views & Epistemic Beliefs About Science Change After a Single 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)²
 - A 30-question multiple-choice questionnaire
- Views about Nature of Science (VNOS)³
 - A seven-question open-ended questionnaire

² Elby & Hammer (2002)

³ Lederman & Abd-El-Khalick (2002)

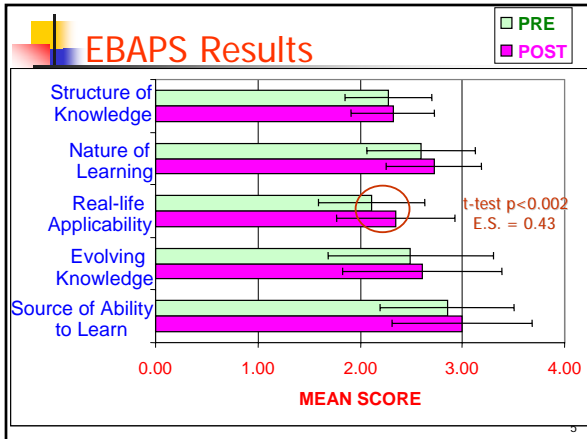
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EBAPS Dimensions

- 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
- Evolving Knowledge
 - Knowledge changes with time
- Source of Ability to Learn
 - Innate vs. Acquired

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EBAPS Results

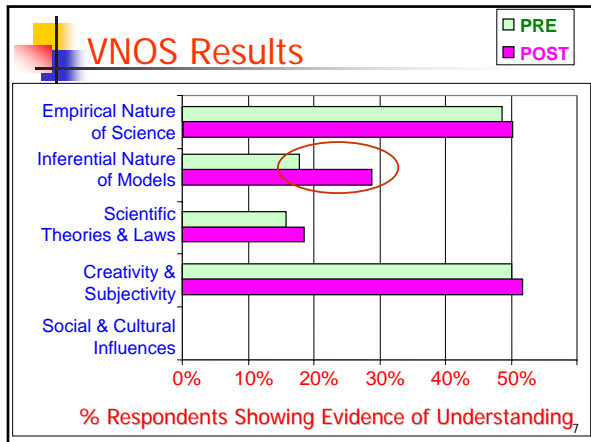


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VNOS Dimensions

- Empirical Nature of Scientific Knowledge
 - Observations are used in making scientific claims.
- Inference & Theoretical Entities in Science
 - Scientific models are inferential in nature.
- Nature of Scientific Theories & Laws
 - Theories provide a framework for examining evidence.
 - Laws may change.
- Creativity & Subjectivity in Science
 - Creativity permeates science, no single scientific process.
 - Science is a mixture of objective & subjective components.
- Social & Cultural Influences
 - Science is a culture in itself and is influenced by society.

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Conclusions

Future elementary teachers'...

- Epistemic beliefs (as measured by EBAPS) **do not change** significantly after this course.
 - Only change in "Real-Life Applicability" dimension
- Views of Nature of Science (as measured by VNOS) **do not change** significantly after this course.
 - Only change in "Inferential Nature of Models" dimension

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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 interpreting open-ended responses
 - Inter-rater reliability (low ~70%)

² Elby & Hammer (2002) ³ Lederman & Abd-El-Khalick (2002) ⁹

Implications

A single reformed science course, even one that uses research-based pedagogy, may not significantly alter students' views or epistemic beliefs about science.

These issues may need to be explicitly addressed over the long term in a students' educational experience.

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THANK YOU

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