

Teaching (Earth) Science:

Implications for K-12 instruction and teacher education



State of Affairs for science teachers

- ▶ Nationwide as well as New Jersey:
 - Teacher turnover rates quite high due to:
 - Retirement (of many baby-boomers)
 - Non-retirement Attrition; 2 categories
 - “older” teachers (> age 30) leave school for another school
 - “younger” teachers (< age 30) leave school for another field
 - Heavy focus on recruitment:
 - Colleges of Education
 - Scholarships / reduced tuition
 - Districts
 - Alternative-route certification programs

With all of the focus on recruitment...

- ▶ What happened to teacher retention?
 - Not worried about retirements
 - Not worried about the changes in placements
 - Worried about the young leavers
- ▶ What are some strategies for increasing retention?
 - Formal coursework (often graduate-level or post-bac)
 - Professional Development opportunities
 - Workshops
 - Teacher inservice days
 - Conferences (such as this one)
- ▶ What about blending the two issues...
 - How can we combine both teacher recruitment with retention?

Issues to focus on ...

▶ Pedagogical Issues

- It's not about “how good of a communicator” a teacher is
- How do teachers focus on student learning as well as “content” coverage?
- Role of cognitive psychology
- Sequence and order of instructional events within any given lesson
 - As long as you cover activities in lesson plan, does it matter the order in which you cover them?
- Begin with phenomenon

Students' Conceptual Understanding

▶ Misconceptions:

- Inaccurate beliefs
- Organize and constrain learning – very similar to Thomas Kuhn's scientific paradigms
- Highly resistant to change as concepts are tightly connected to other concepts

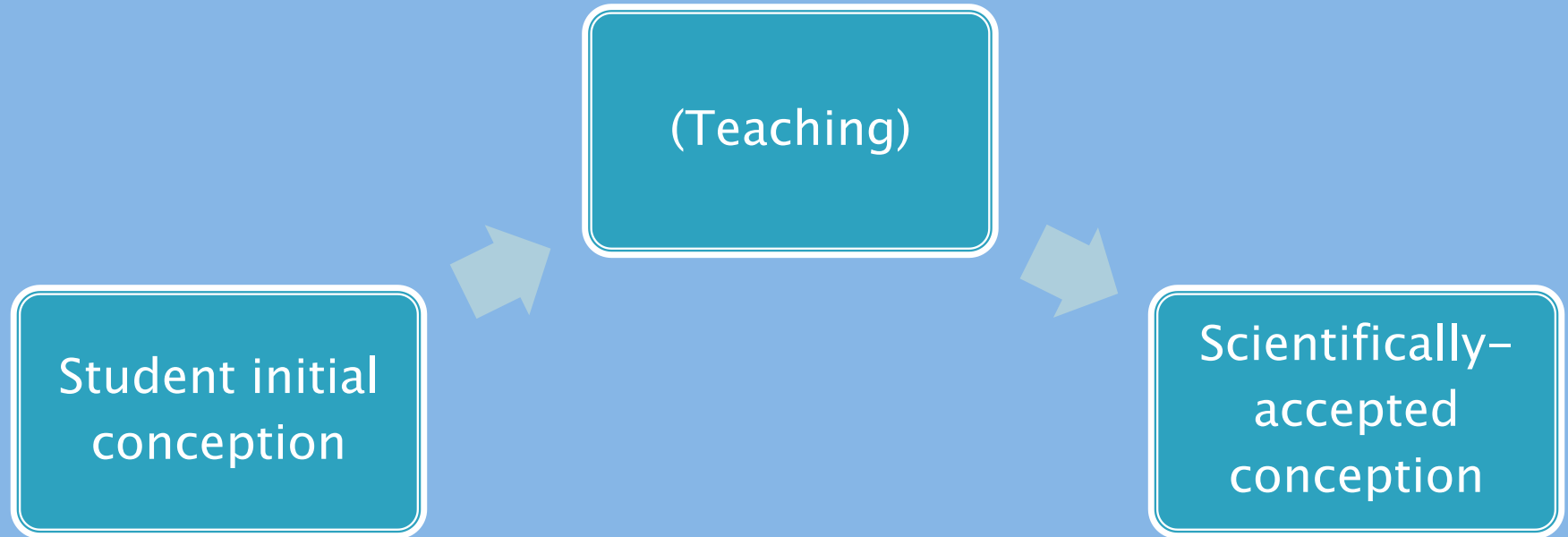
▶ Dilemma of changing misconceptions

- In order to promote positive conceptual change, one must design strategies that focus on changing more than one concept simultaneously

▶ Conceptual Change Theory:

- Learner must be dis-satisfied with initial conception... abandon it via cognitive conflict ... and integrate a scientifically accepted conception (Strike & Posner, 1982/1992)

A (The?) Major Goal in Science Education



Problems with the generalization

- ▶ Do teachers often take misconceptions into account?
 - Since “no” how should take students’ misconceptions into account?
 - How can instruction be modified to pose a situation of cognitive conflict for the students
- ▶ Is this a new issue?
 - Since we can’t feasibly interview every student for their pre-conceptions for every concept we teach, what to do?
 - Literature base
 - Pre-instruction surveys
 - Formative assessment via discussion, etc.

What we can do as a field

- ▶ Awareness of literature on misconceptions and conceptual change
- ▶ Talk to others in the field
- ▶ Absorb everything from Professional Development opportunities
- ▶ Attend professional conferences (such as this one!)
- ▶ Don't be afraid to try something new!

Announcements and plugs

- ▶ Fall 2009:
 - Conference at Kean University on Teaching Evolution
- ▶ Spring 2010:
 - National Science Teachers Association (NSTA) National Conference in Philadelphia

Thank You!

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