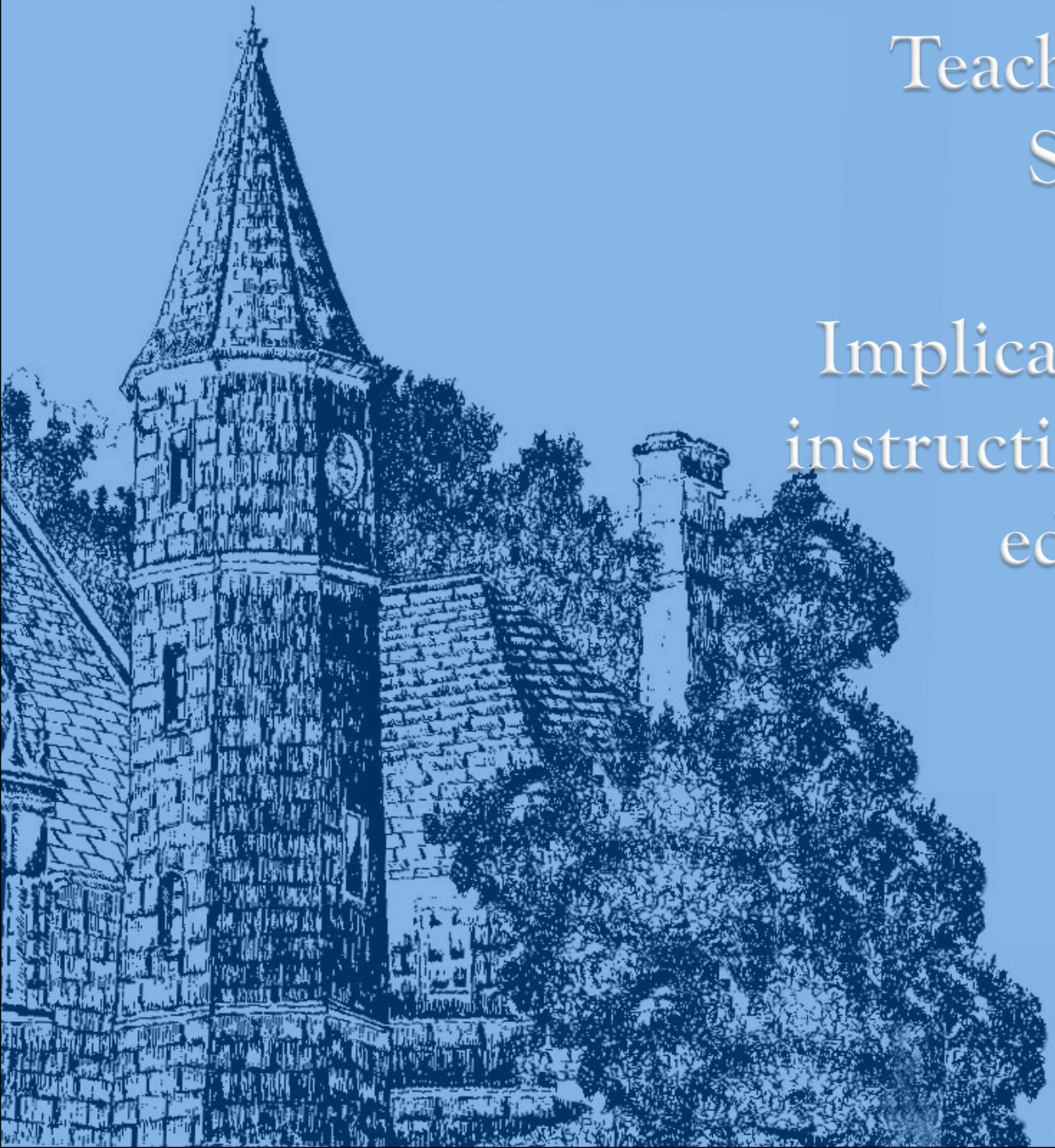


Teaching (Earth) Science:

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?

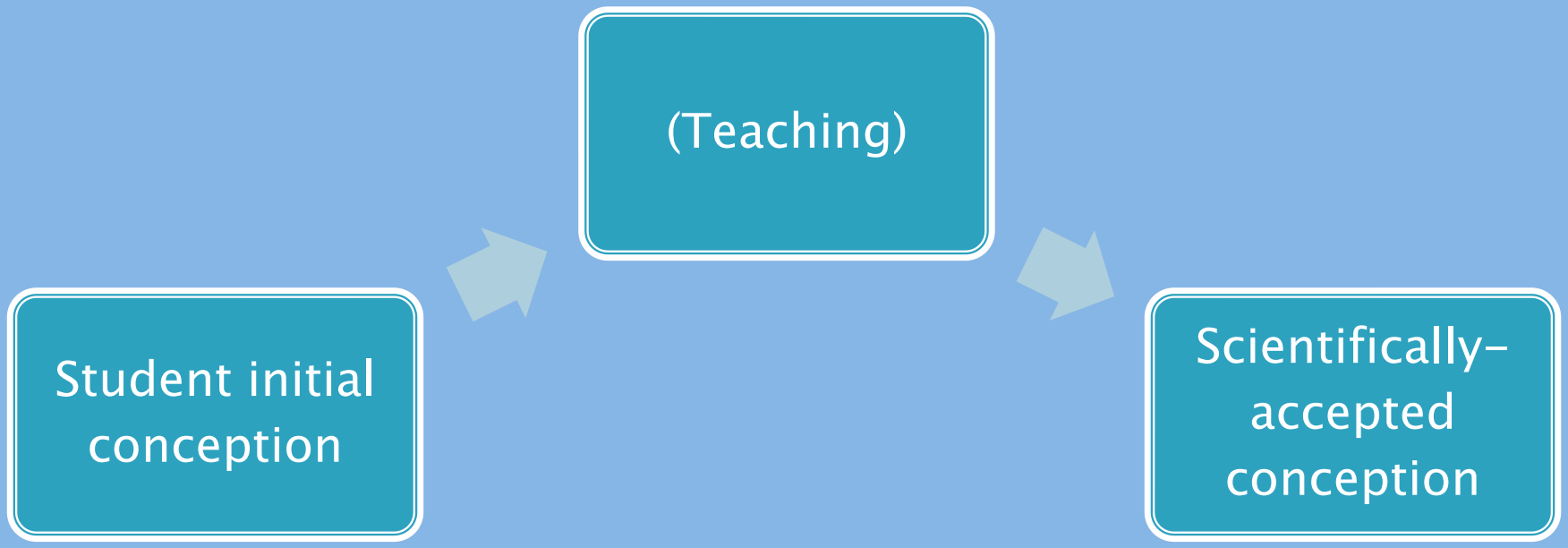
Issues to focus on …

- 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 <u>constrain</u> 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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