Real-World Contexts: Challenges in Curriculum Development



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Why Real-World Contexts?

Real-world contexts ...

- motivate² students to learn physics.
- promote inductive reasoning principles developed from observations.
- provide situations for design-based³ problem solving.

² E.g. Pintrich & Schunk (1996)

³ E.g. Lobato (2003)



Which Real-World Contexts?

Contexts chosen based on following criteria...

- Have all students experienced it in some way?
- Is it amenable to hands-on exploration?
- Are underlying principles in clear view?
- Are principles transferable to other contexts?



In spite of these criteria...

Most students have ...

- Seldom given prior thought to how real-world devices work, although they have used them.
- Do not have well formed ideas about the working of these devices.
- Make up their thoughts on the spot, when asked how the devices work.

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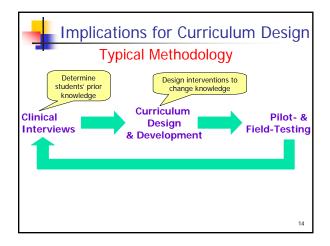
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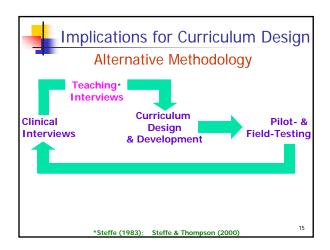
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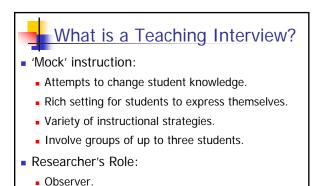


- Stability of knowledge is questionable.
- Framework: p-prim⁴/resource⁵ rather than coherent mental model.
- Difficult to probe student knowledge without affecting it.
- Focus on dynamics of knowledge transfer & construction rather than state of knowledge.

⁴ diSessa (1999) ⁵ Hammer (2001)







Engelhardt et al (2004)

Benefits of Teaching Interviews

Provide insights about ...

- Dynamics of knowledge construction & transfer.
- Effectiveness of materials & strategies.
- Student interactions with...
 - instructional materials,
 - peers, and
 - instructor.

Teaching Interviews are a bridge between research and curriculum development.



Summary

Instructor.

- Real-world devices ...
 - provide useful contexts for learning.
 - raise important issues in PER.
 - pose challenges to teaching & instructional development.
- Teaching Interviews can help address these challenges.

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