On Models of and for Teaching: Toward Theory-Based Computing Education

J. Philip East
University of Northern Iowa
east@cs.uni.edu

Introduction

- Paper espouses explication of "theory" for computing education
- Why explication?
  - Enhances understanding
  - Allows/forces examination of beliefs/knowledge
  - Necessary for shared understanding
- Why Theory?
  - Used to guide/explain practice & predict student learning (is a statement of understanding)
  - Will eventually lead to "paradigm" which will allow for accelerated progress in the discipline

A Possible Theoretical Framework

- A complete theory needs to address all of:
  - Learning (but not just learning)
  - Content
  - Teaching/Pedagogy
- Should be useful to/for
  - Researchers, curriculum designers, teachers
  - Individual user
  - The discipline (science?) of computing education

Much of the rest (of the paper) is an example of the framework being fleshed out with my personal knowledge/beliefs

Important (to me) Aspects of How People Learn

- Diversity and similarity of individuals
- Importance of experience
- Neuronal basis of learning
- Conceptual understanding of learning

Content

- A general model or approach
  e.g., knowledge vs skills vs ?
- Useful/desired mental model & other meta-cognitive aspects of content
  e.g., programming as processes & naming; computing as "design"

Teaching/Pedagogy

- Theory?
  (model?, good/best practice?)
- Many activities
  - Planning instructional activities (of teacher & students)
  - Delivering instruction
  - Assessing performance/learning
  - Assessing instruction
- Affected/guided by theories/models of learning & content

"My" Theory

- Expresses "my" understanding (probably not yours)
- Is not complete and subject to reconsideration & revision
- Helps me
  - Decide what research to conduct
  - Consider alternative instructional environments and curricular organizations/approaches
  - Think about my practice

For Example

- Is it worthwhile to conduct research on learning styles?
- Should we teach all the overhead of user-input in CS1 (or just have students use it as magic)?

I have a means other than seat-of-pants to consider these questions

So What?

- Writing this paper (better explicating my theory) has helped me better understand what I know/believe about teaching & learning!
- Will it provide impetus for discussion in computing education about theory of learning and teaching?

Questions/Comments?

east@cs.uni.edu