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

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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?

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