Background

Possible Advantages
- Provides individualized guidance and feedback while they practice solving problems outside class at their convenience
- Aim: Effectiveness through good design and pedagogy, vs. complex programming or artificial intelligence
- Customizable by individual instructors

Theory

- Cognitive Apprenticeship
- Reciprocal teaching
- Learning from well-studied examples
- Context-rich (CR) problems

Design

Experimental plans

Interaction mode 1 – Implementation
C decides, S implements, C assesses

Interaction mode 2 – Coaching
S decides, C implements, S assesses

Interaction mode 3 – Independent practice
Scaffolding gradually withdrawn

Current status

- Test effectiveness of currently finished computer tutors on introductory physics students (Fall 2010)
- Examine net gain of student performance on quizzes, final exam vs. control group
- using scoring rubric developed for problem solving (see below)

Sample students - scoring with rubric

Goal for setup

- Limited number of tutors finished, more by fall semester.
- Baseline set of student exams collected
  - same introductory class (spring 2010)
  - two raters (established inter-rater reliability) score baseline for future comparison
- Goal: 40 tutors (8 for each of 5 topics), larger-scale study (~spring 2011)

References

b. Palincsar & Brown, 1984
c. Zhu & Simon, 1987
d. Heller & Hollabaugh, 1992
e. Docktor, 2009; Docktor & Heller, 2009