INTERNET COACHES FOR PROBLEM SOLVING
IN INTRODUCTORY PHYSICS: USAGE & USABILITY STUDIES
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Background

Goals
- Test the usage and usability of computer programs designed to provide students with individualized coaching while solving problems to direct future development of these coaches
- Coaching programs are designed within the framework of cognitive apprenticeship and provide scaffolding in conjunction with the processes of modeling, coaching, and fading
- Coaching programs emphasize the process of decision-making in solving problems.

Design Process Cycle

Implementation
- Coaching programs are designed within the framework of cognitive apprenticeship and provide scaffolding in conjunction with the processes of modeling, coaching, and fading.

Assessment
- Coaching programs emphasize the process of decision-making in solving problems.

Study
- Computer coaches for 35 problems were incorporated into 2 sections of a calculus-based introductory mechanics course (148/103 students) in Spring 2013.
- Students were required to complete their homework using WebAssign (coaches were available to help with some problems).
- Data collected included: Students keystrokes when using the coaches, Standard pre/post assessments (FCI/Math/CLASS) and mid and end of semester surveys about the coaches.

Computer Coaches (version 1.0)

Usage and Usability

What are the characteristics of students who use the coaches?
- L group (Light/Non user): 0-20% (of the coached problems)
- M group (medium user): 40-60% (of the coached problems)
- H group (high user): 80-100% (of the coached problems)

Do students perceive the coaches as useful?
- Students were asked to rate several statements about computer coaches on a 5 point Likert scale.

How do students use the coaches?
- A higher FCI pre-test score is correlated with lower usage compared to that of the class as a whole (30%)
- Females are underrepresented in the L group (15%), compared to that of the class as a whole (30%)
- A higher FCI pre-test score is correlated with lower usage
- Students in the L group expect to spend less time studying and are less confident of their success
- Students in the H group expect to spend more time studying and earn a high grade
- Students in the M group show a dramatic decrease in their coach usage
- Some mechanism is necessary to wean the H user group from the coaches
- Way to approach homework: Students in the H group seem to depend on the coaches for their homework
- M group shows a dramatic decrease in their coach usage

Lectures
- 8.3 ± 0.3
- 7.5 ± 0.9
- 7.2 ± 0.7

Doing the homework
- 6.8 ± 0.5
- 7.2 ± 0.6
- 8.1 ± 0.4

Computer coaches
- 4.9 ± 0.5
- 7.2 ± 0.5
- 7.0 ± 0.5

How do students use the coaches?
- Students were asked to rank the class components from the most useful (10) to least useful (1).

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Do students perceive the coaches as useful?
- Some mechanism is necessary to wean the H user group from the detailed help provided by the coaches
- Have adjustable grain sizes to better serve the M group
- For development of the coach version 2.0, please see PST2C10
- For more information, please visit our website: http://groups.physics.umn.edu/physed