Motivation

Student-Tutor Interaction
○ More effective than typical classrooms and mastery learning
○ Perceived interaction is known to be important
○ Provides direct access to students’ knowledge production process

CAN WE SIMULATE THIS??
What is needed?

- Content
- A theory of learning
- A pedagogical basis for teaching
- A model of tutoring
- Assessment

Content

- Newton’s Laws: 1-D and 2-D motion
- Justification:
  - Most conceptually accessible concept area
  - Target audience is HS students
  - Many materials already developed
Pedagogical Basis

The Learning Cycle

1. Exploration

2. Explanation

3. Application

Karplus (1977)

Incorporation

<table>
<thead>
<tr>
<th>Exploration</th>
<th>Lesson</th>
<th>Tutors</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Observe videos &amp; applets. Make</td>
<td>Students ask questions &amp;</td>
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<tr>
<td></td>
<td>measurements.</td>
<td>receive answers.</td>
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<tr>
<td>Explanation</td>
<td></td>
<td>*** Tutors ***</td>
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<td>*** Written ***</td>
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<td>*** IDVL ***</td>
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<tr>
<td>Application</td>
<td>Use videos &amp; applets. Make</td>
<td>Students ask questions &amp;</td>
</tr>
<tr>
<td></td>
<td>predictions &amp; measurements.</td>
<td>receive answers.</td>
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</tbody>
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Content Knowledge

- Informedia Digital Media Library

The Tutoring Interaction

![Diagram showing Tutor and Student with sections labeled Script, Content, Prior Knowledge, and Script]
Synthetic Interaction

- Requires pre-recorded answers
- Allows multiple perspectives and diverse backgrounds

The Tutoring Interaction

- Questions
- Answers
- Clarifications
- Rephrased Answers
- Comments
The Script

○ Questions
  ● Live student-tutor interaction
  ● SI personas’ teaching experience

○ Results
  ● ~80 Physics content questions
  ● ~15 Technical question
  ● ~100 Lesson assistance question

Varying the Interaction

- The SI Speaks alone
- The SI & a static image
  \[ F = ma \]
- The SI & other video/applets
Future Goals

○ Short Term
  ● Recruit HS participants (Fall 2008)
  ● Continue creation of video content (Ongoing)
  ● Study lessons in HS and university context (Winter 2009)

○ Long Term
  ● Combine lessons and synthetic interviews (Ongoing)
  ● Test the combined interfaces (2009-2010)

Thanks

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