Mass Producing Example-tracing Tutors

- **Goal**
  - Use problems from the National Assessment of Educational Progress (NAEP) released items
  - Create a user interface to permit middle school students to practice NAEP Math problems
- **What I did?**
  - Used one problem (Given two similar triangles, find one side)
  - Created two versions of the problem: with and without decimals in the related arithmetic

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1. Created Student Interface in Flash

a) Created **Student Interface** in Flash with the diagram of the triangles:
   - In the first iteration, I used numerical values for the lengths of the given sides
   - In the second iteration I used input areas for the lengths of the given sides to permit mass production

b) Added CTAT components (Shell, Input Areas, Button)

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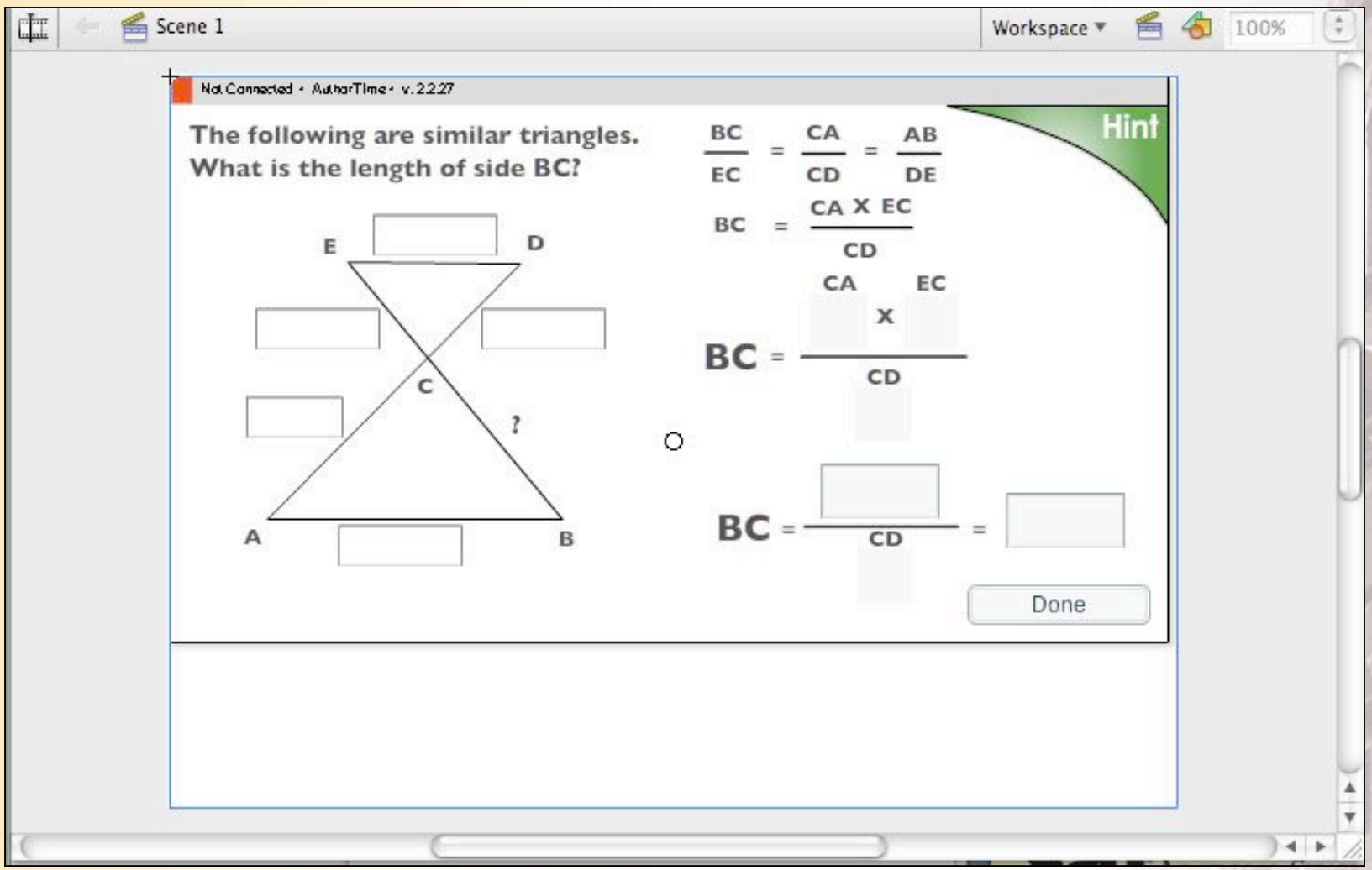
Developed Student Interface in Flash



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2. Authored Example-tracing Tutor

Used completed Flash student interface with CTAT's Behavior Recorder to author **Example-tracing Tutor**:

a) Set Start-State

b) Demonstrated correct and incorrect paths

c) Annotated solution steps with appropriate bug messages and hints

- In the first iteration I used numerical values in the hint and bug messages
- In the second iteration I used variables to dynamically generate appropriate "numerical values" in the hint and bug messages

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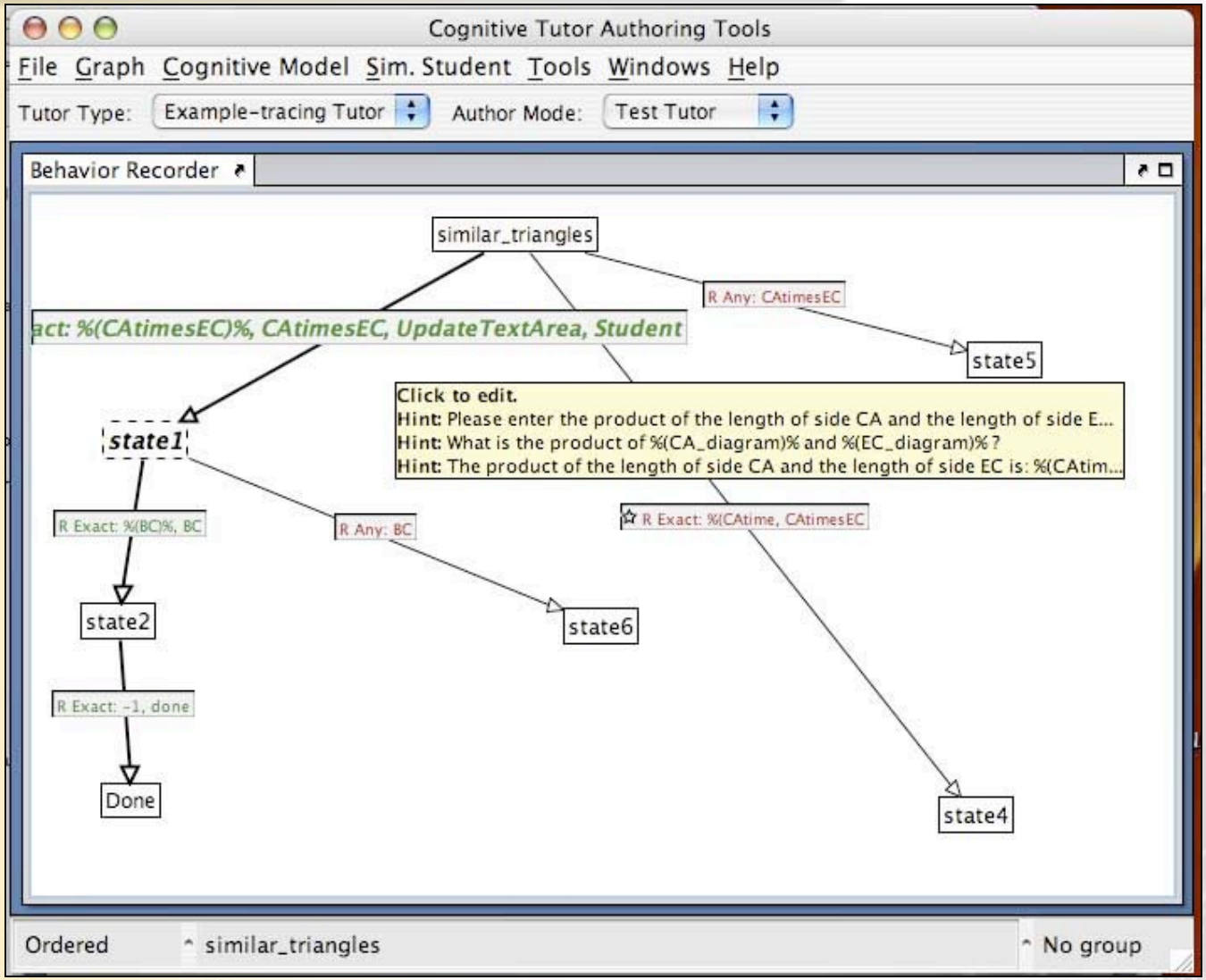
Entered Variables in CTAT Behavior Graph



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3. Created and Merged Problems Table

a) Created a "**Problems Table**" in the CTAT behavior recorder

b) Entered information relevant to problems in the problems table using Microsoft Excel and saved it as a text file

c) Merged the problems table (text file version) with the behavior template to create the mass-produced behavior graphs for multiple problems

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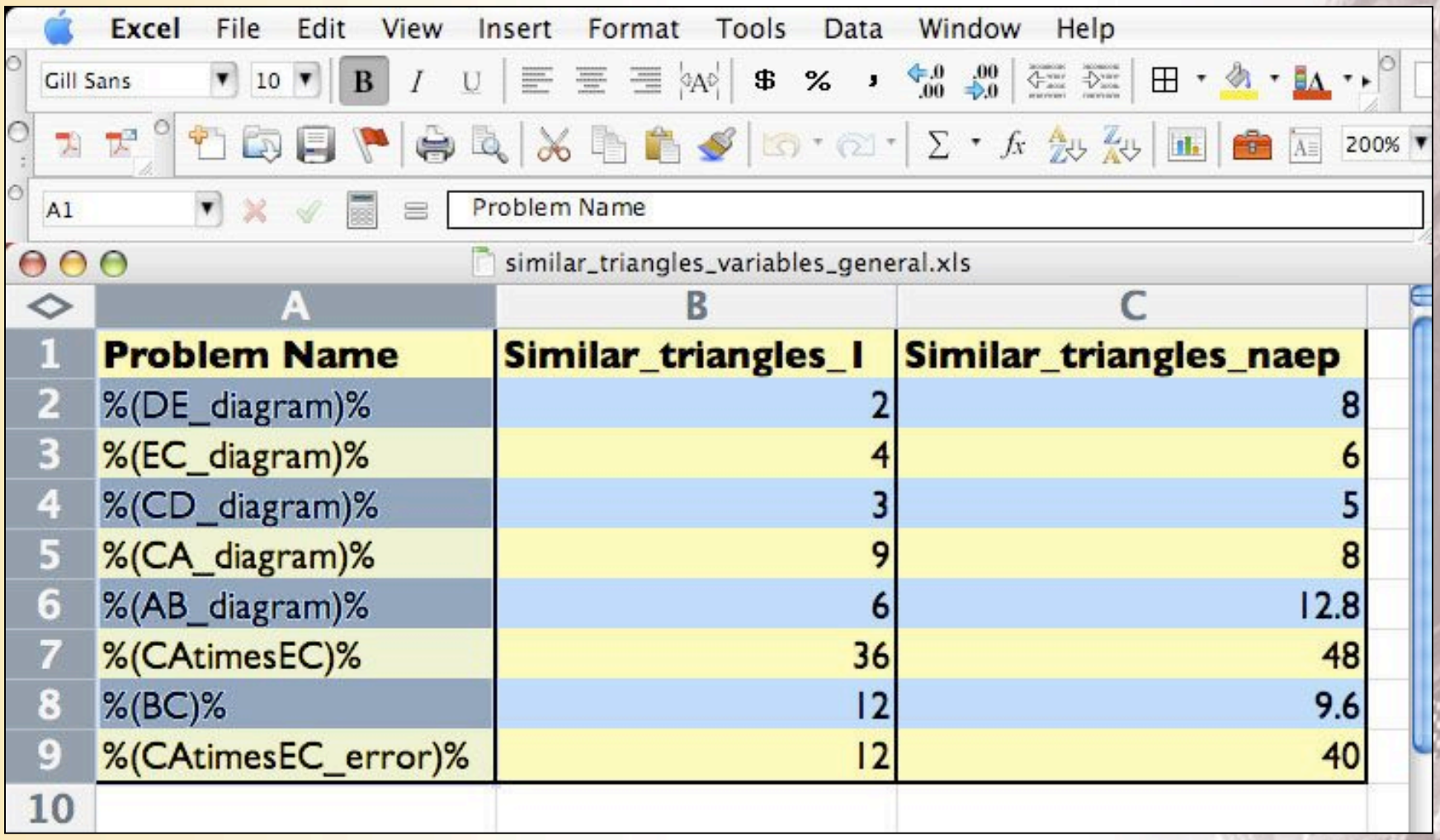
Entered Problems in Problems Table



	A	B	C
1	**Problem Name**	**Similar_triangles_I**	**Similar_triangles_naep**
2	%(DE_diagram)%	2	8
3	%(EC_diagram)%	4	6
4	%(CD_diagram)%	3	5
5	%(CA_diagram)%	9	8
6	%(AB_diagram)%	6	12.8
7	%(CAtimesEC)%	36	48
8	%(BC)%	12	9.6
9	%(CAtimesEC_error)%	12	40
10			

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4. Published "HTML" Interface from Flash

a) Published **HTML Student Interface** from Flash

b) Edited HTML file to permit sequencing of multiple similar problems

c) Implemented HTML student interface (that are embedded with the .swf / Flash movie files)

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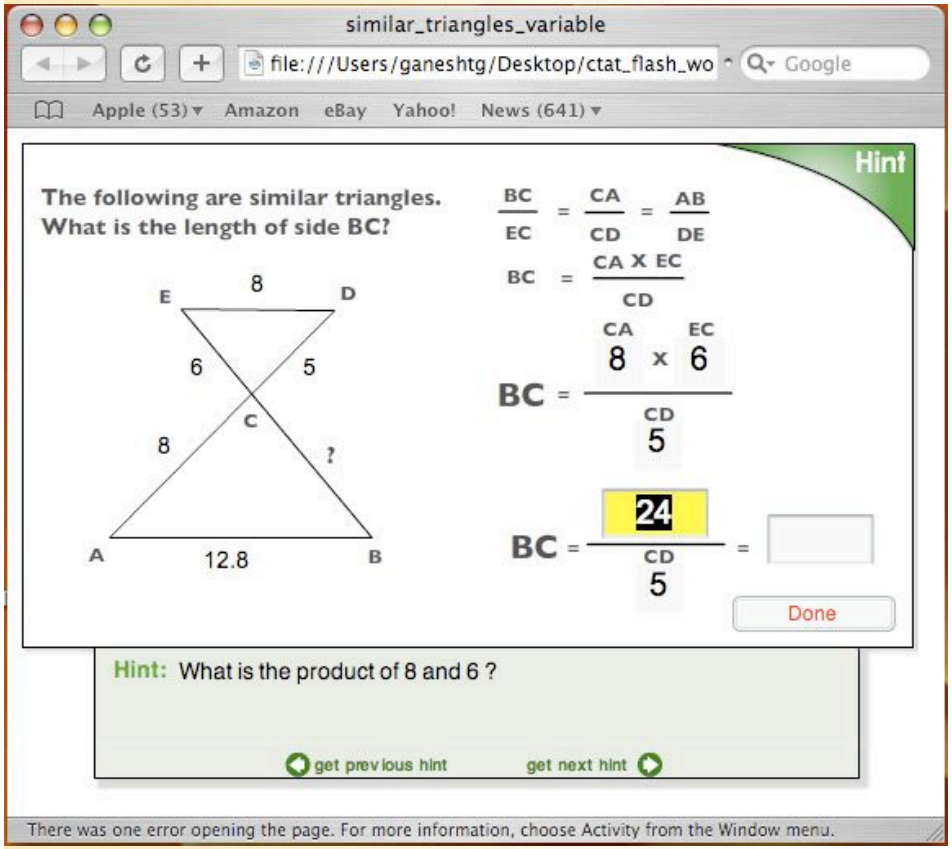
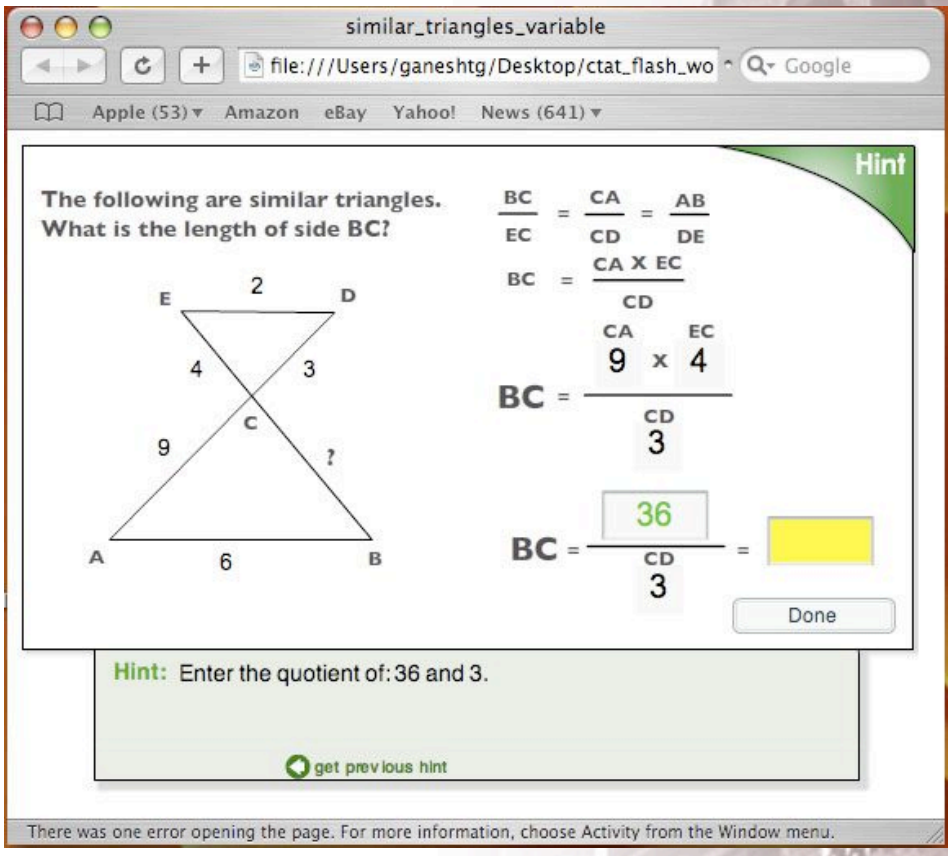
Published HTML Student Interface





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Next Steps. . .

I would like to use a selection of problems from the NAEP Math released items where data about students' correct & incorrect responses and percent students who answered the problem in various ways are available. This gives us some background on the predicted responses.

Using these data, I would like **to develop a Cognitive Tutor** to compare students' thinking about the selected problems with the cognitive models I develop from the NAEP data.

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