Using Earth Data in a Large General Education Oceanography Class

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http://oceanography.geol.ucsb.edu/

Learning Plate Tectonics

Overall goals:

Learners will understand
• The process of science
• How to critically evaluate science claims
• Appreciation of interplay betwee science and society.
• Improve content knowledge

Challenges:
• Data access amd display
• Creating true inquiry activities (the text gives the answers)
• Assessment of learning

Approach:
• Model student activities after those of practicing scientists

Scientific investigations include:
• Posing a solvable problem
• Gathering relevant data
• Presenting and discussing preliminary results
• Writing a scientific paper

Strategy:
• Learn the theory
• Find data to support some aspect of the theory or its predictions
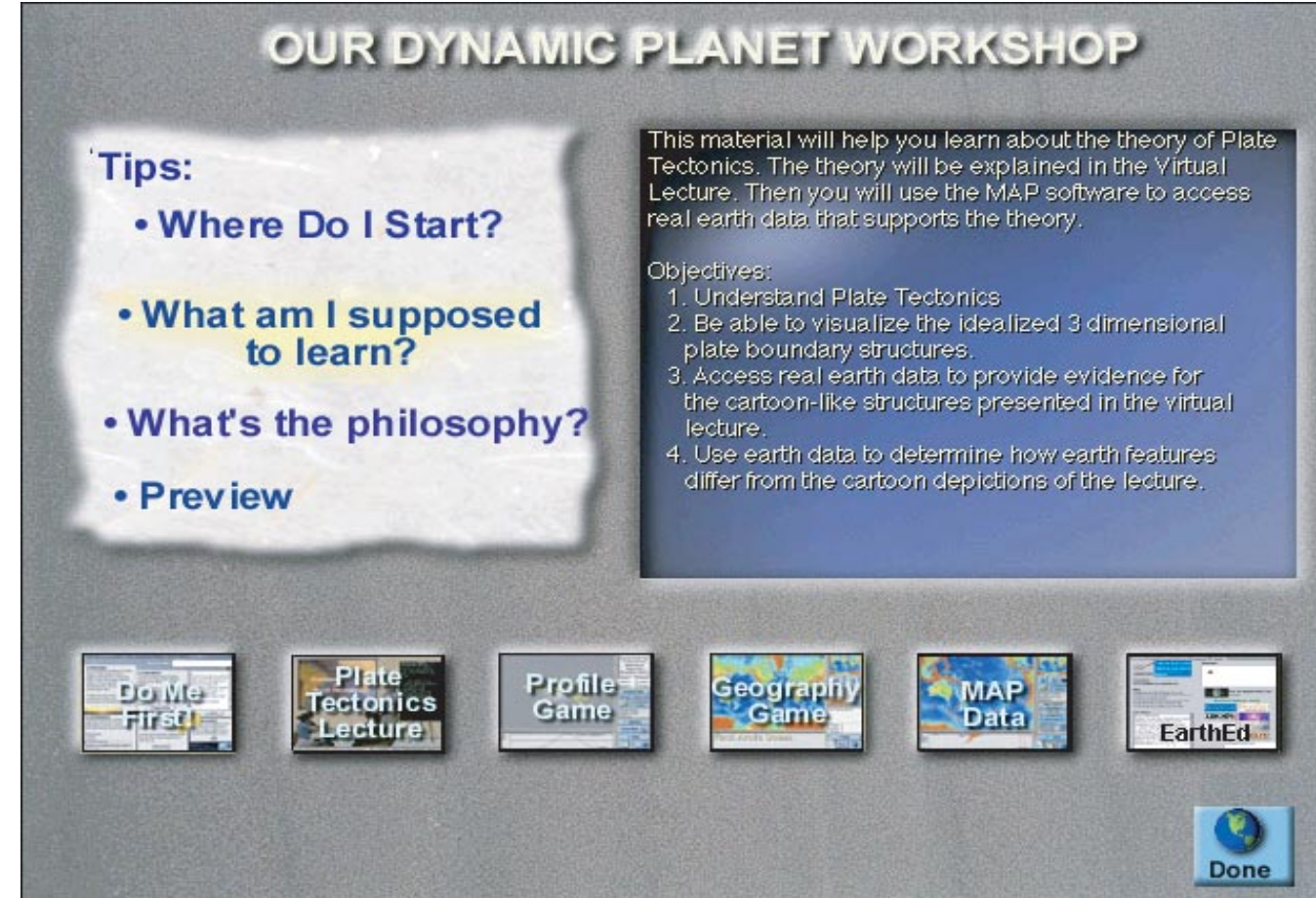• Make a scientific argument based on the data.

Activities are supported by:
• Class presentations (during lab)
• Small group discussions
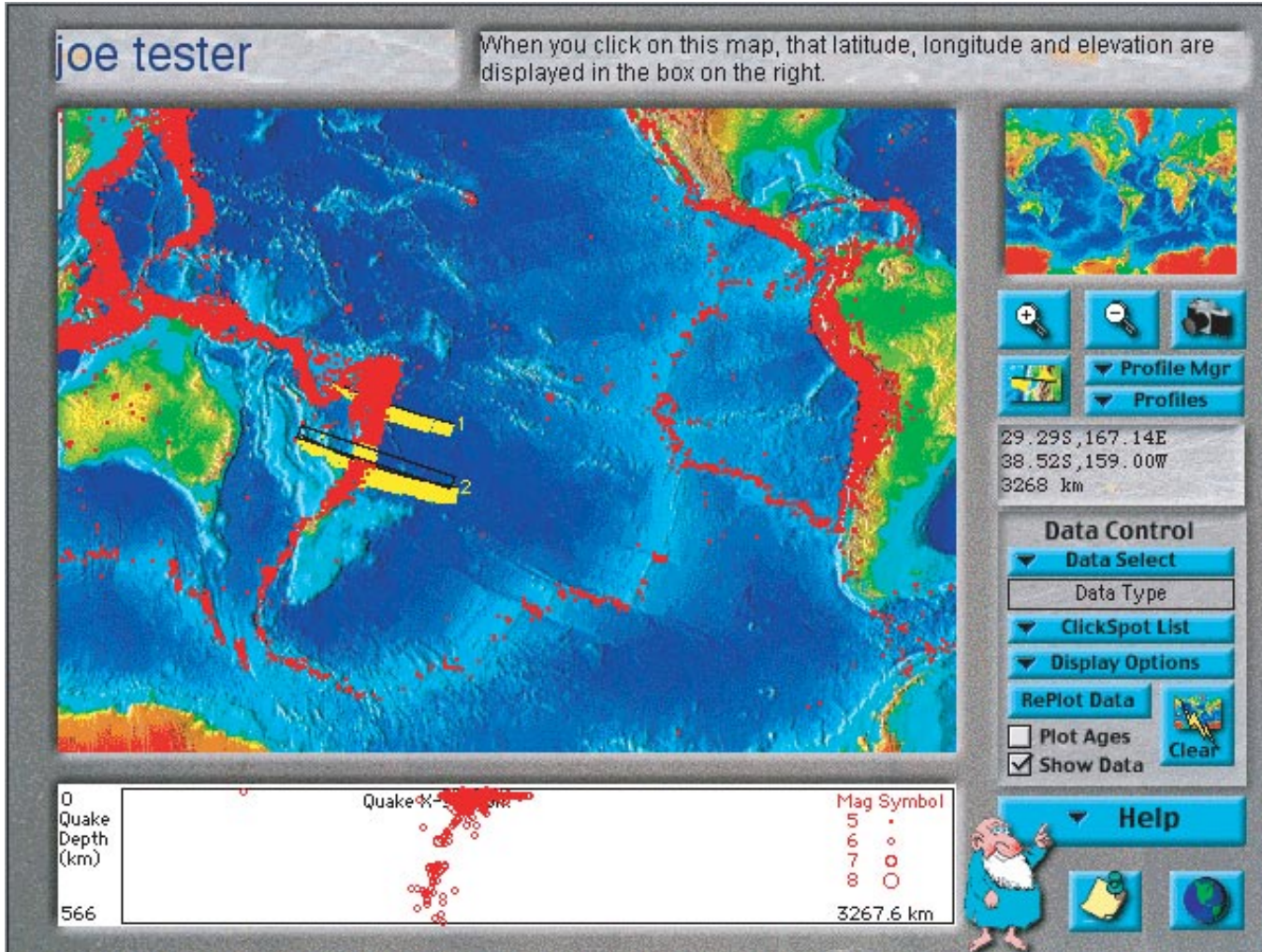• Final paper (1200-1800 words)

Evaluation:
Evaluation is supported by studies of student writing by colleagues and students in the Graduate School of Education, and by student feedback. For example, see; Takao, A, W. Prothero, and G. Kelly, "Applying argumentation analysis to assess the quality of university oceanography students' scientific writing", Jour. Geoscience Education, V 50,p40-48, Jan. 2002.

The "Our Dynamic Planet" CDROM
Tools for investigating plate tectonics

Index to tools

Access and display earth data:

Acquiring background information
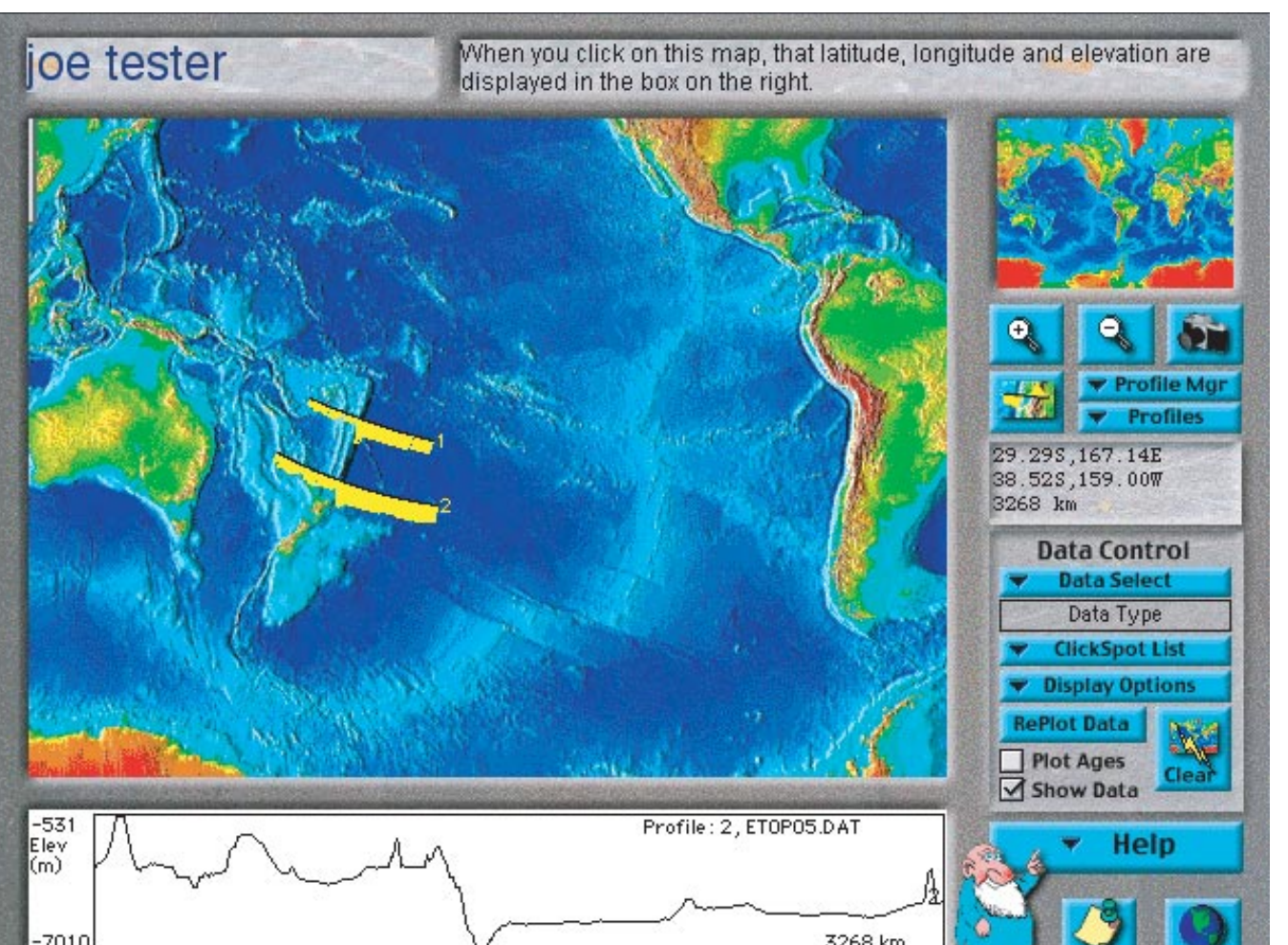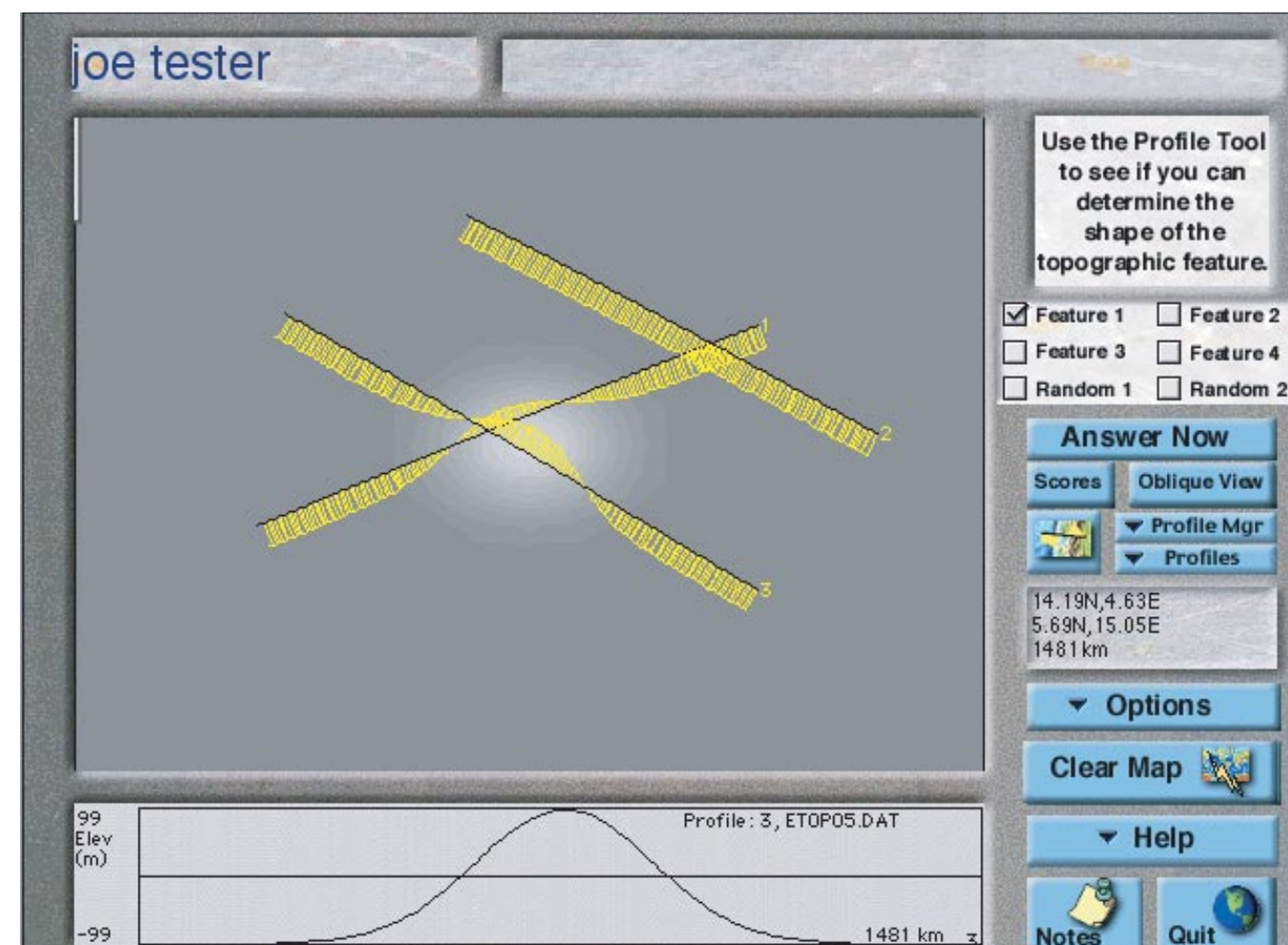The virtual plate tectonics lecture

Data types:
• elevations (ETOPO5)
• quakes (pde)
• volcanoes (Smithsonian)
• seafloor ages
• island ages
• seafloor heat flow
• clickspots (linked images and movies)

Other tools:
• graphics editor
• geography game

Developing visualization skills
The Profile Game

Scaffolding to improve success:

A. Weekly online assignments:
1. Homework (auto-grade)
2. Multiple choice quizzes (auto-grade)
3. Thought problems (TA grad)

B. Group work and presentations:
1. Mini-studies in lab section
2. Homwork help sessions

Earth Summit
Making Oceanography Relevant
W. Prothero and Holly Dodson

The Earth Summit Framework is a working outline that we are using to implement relevant, data driven, critical thinking activities in a large introductory oceanography course.
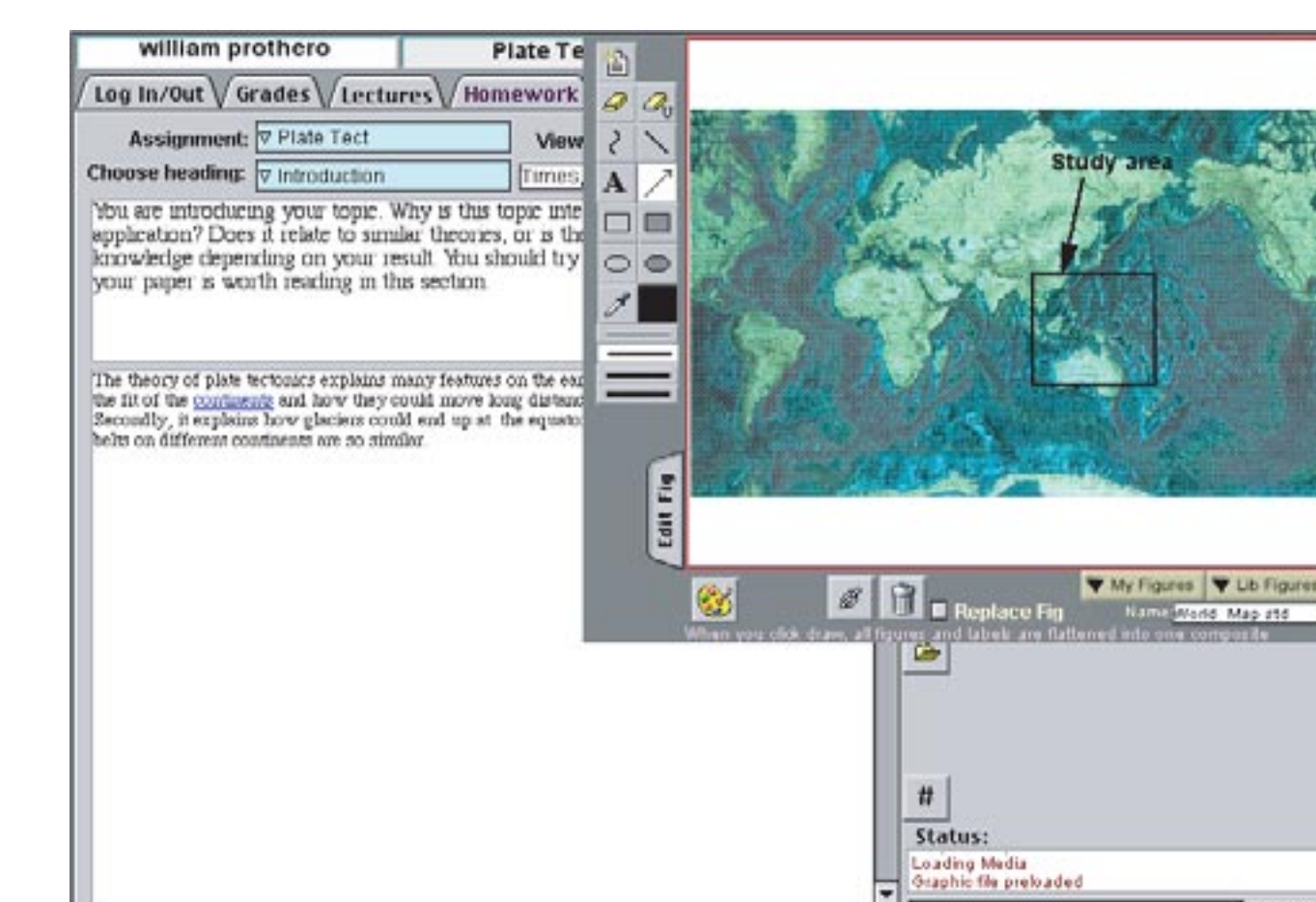
Goals:
• make oceanography relevant
• help learners become critical consumers of science claims.

Content Themes:
• Ocean basins and plate tectonics
    Our Dynamic Planet CDROM
• Atmosphere/oceans/climate
    Mini-studies, access data on the web
• World Fisheries
    Fishbanks game, web data

Methods:
• Each student joins a group that relates all topics covered in the course, to their country.
• Mini=studies provide tutorials that help students learn how to apply web data to their own country.
• Students must also learn enough about their country to present the science from the appropriate perspective.
• see the oceanography web site (url above) for more information.

Extensive online support software tools have been created to support scaffolding, writing activities, and peer-peer collaboration.

The "Writer" (above) is a tool that supports guided writing exercises. Students write, edit and link graphic images to their writings, and hand in the work online. The TA or Professor enters online comments and grading rubric scores, and returns in online. This is not only efficient, but maintains a record of all actions by both student and TA.