1700 CD
DOI: 10.1017/S1431927606066037

Microsc Microanal 12(Supp 2), 2006

Nanoworld webquests with peer-review

P. Fraundorf*, Keith Stine**
Physics & Astronomy*, Chemistry & Biochemistry**, and Center for Molecular Electronics, University of Missouri-StL (63121), St. Louis MO USA

We discuss two developments in our program [1] to develop web-content for individual teachers in web-connected classrooms, as a developing force in modernization of both pedagogy and content. The first involves development of web-based specimen explorers capable of supporting scripted, open-ended, and classroom-structured nanoworld exploration. The second involves use of "journal management software" to streamline anonymous classroom peer review of individual student observation reports, thus giving students experience with both sides of the peer review process in topic areas relevant to their course. The web-explorers discussed here involve a *Mathematica*-based applet [2] capable of only simple geometric rendering. It is freely available, and its floating point geometry allows one to put together specimens with structure ranging over "powers-of-ten" size scales [3]. Platforms that incorporate nanoworld contrast mechanisms and physics remain scarce.

Fig. 1 shows the web-interface developed (and refined after the fact) to capture the interest of a walk-through audience for open-access computers in the Cyberville section of the *St. Louis Science Center*. The applet is controllable either via javascript buttons or via mouse actions on the screen. Although this one operates in "microscopy mode", in which one rotates the specimen with respect to a fixed background, the applet can also support "explorer mode" in which the observers viewpoint shrinks and rotates instead [3]. Fig. 2 shows a more elaborate web-interface developed for an intro-chemistry class application. In this case, scripted tutorials have been added to walk students through the process of measuring sizes (assuming only that the starting disc is 3 mm in diameter) and angles. In each case, the specimens are treated as true unknowns, accessible only via equipment with limited capabilities (even if the eucentricity of the rotation stage is impressive by anyone's standards). Hence an observer's ability to assess uncertainty in their measurements is a key part of the evaluation rubric [4]. These interfaces are designed for non-microscopist users, although they might also be designed to mimic that of specific microscopes. Also a large library of specimens can be created and made available as needed e.g. for application on timed exams.

Once you have students reporting about their own observations of nature (virtual or otherwise), an excellent opportunity to participate in the refinement of their own communication skills is at hand. In that context, we found Open Journal Systems to be an excellent (and free) platform for managing anonymous peer review for classes with many students, and have set up a journal to that end [5].

Acknowledgement: Thanks to Chris Roman and Frank Kusiak at the *St. Louis Science Center* for providing access to their Cyberville facility on behalf of *MissOuri NanoAlliance* participants.

References:

[1] P. Fraundorf and N. Pongkrapan, *Microsc. Microanal* **10**(Supp 2), 2004, 1564-1565.
[2] Martin Kraus, http://www.vis.uni-stuttgart.de/~kraus/LiveGraphics3D/index.html
[3] cf. *Powers of Ten Explorer* at http://www.umsl.edu/~fraundor/nanowrld/ssystem.html
[4] cf. *Rubrics for Scientific Interaction* at http://newton.umsl.edu/~philf/rubrics.html
[5] cf. the *Fleas on Fleas on Fleas* Journal at http://os.umsl.edu/ojs/index.php/lipsum

Fig. 1: WebQuest Trainer developed for "walk-in's" at the St. Louis Science Center's Cyberville, accessible at http://www.umsl.edu/~fraundor/nanowrld/newlive/everyday.html.

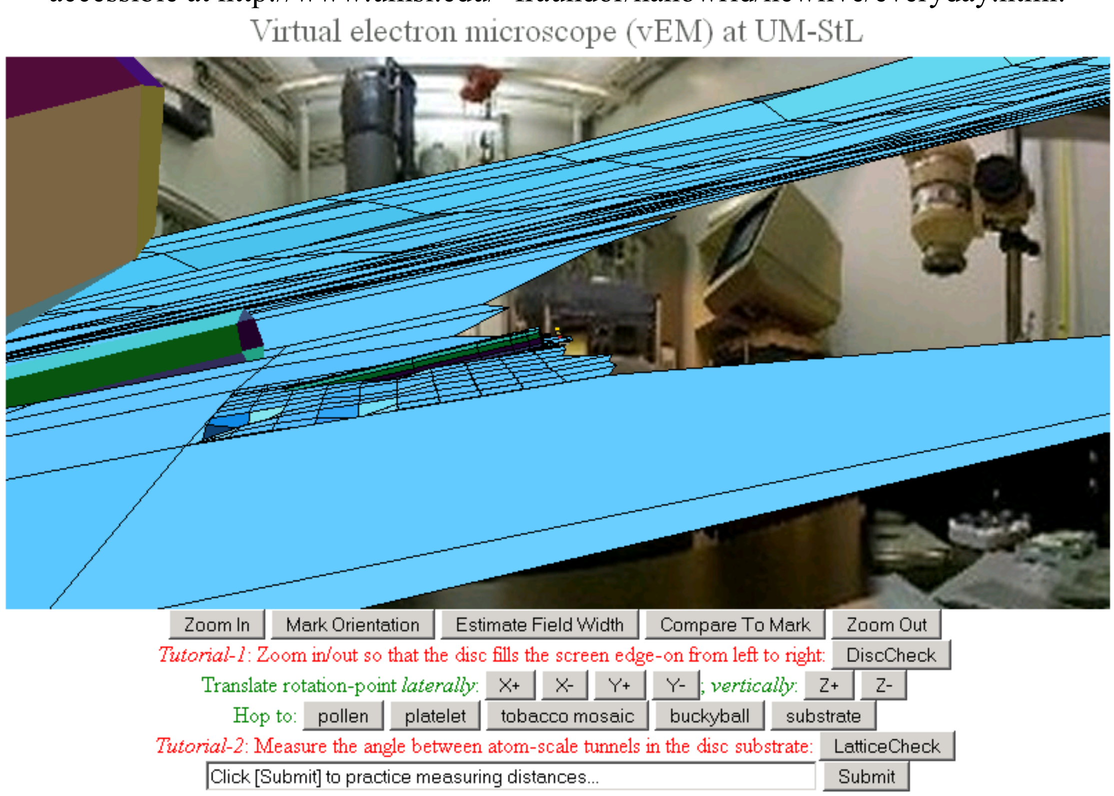

Fig. 2: More elaborate web-explorer including size and angle measuring tutorials, developed for intro chemistry classes at http://www.umsl.edu/~fraundor/nanowrld/live3Dmodels/chemapp.htm.

https://doi.org/10.1017/S1431927606066037 Published online by Cambridge University Press