

MOSQUITO 3-D ID

20 interactive mosquito models

Part of a collaborative effort with
ECU Library Media Services ECU
College of HHP, College of Arts and
Sciences students

3-D ID models

- ◆ Computer aided learning with technology has mixed reviews as a teaching tool.
- ◆ Glittenburg, C. and Binder, s. Using 3-D computer simulations to enhance ophthalmic training. Ophthalmic Physiol Opt. 2006 Jan; 26(1): 40-9. **Comprehension Tests *80% vs. 63%**
- ◆ Mayer, R. E.; Hegarty, M. ;Mayer, s., and Campbell,j. When static media promote active learning: annotated illustrations versus narrated animations in multimedia instruction. J Exp Psychol Appl. 2005 Dec; 11(4):256-65. **Paper group significantly better than computer group on transfer AND retention tests**
- ◆ Thatcher, J. D. Computer animation and improved student comprehension of basic science concepts. J Am Osteopath Assoc 2006 Jan; 106(1):9-14. **CAI effective Lesson comprehension significantly higher for subjects who used the computer animation than subjects who used textbook**



Dish of Ae. albopictus z-stack microphotograph



Other teaching issues

- ◆ Research indicates that both objective and integrative learning are necessary to understand a visualization and an animated sequence of action as a whole concept.
- ◆ Consequently, animated sequences of complex processes, such as DNA replication are difficult for some students: i.e. extra processing detracts from learning.

Teaching issues

- ◆ Extreme Fidelity in “still” and interactive visualizations can also detract from learning.
- ◆ A balance must be sought in animation, fidelity, and interactivity to maximize learning of different types.
- ◆ Grant work with Computer technology “Virtual reality” classroom

Viability of Technology in Science Teaching: Research History in PubMed database:

- ◆ 2003-2006:
- ◆ Science articles: 3-D reconstructions in Medical applications
- ◆ Animation tools like “Movie maker” which creates intermediate structures for animation sequences using algorithms and interpolations.

Other References in Current Research PubMed database.

- ◆ McLean, D.; Brown, S., and Bellamy, K. Digital images and animation in PowerPoint. *J Audiov Media Med.* **2003** Dec; 26(4): 174-7.
- ◆ Stith, B. J. Use of animation in teaching cell biology. *Cell Biol Educ.* **2004** Fall; 3(3): 181-8.
- ◆ Aldur, M. M. Creating computer aided 3D model of spleen and kidney based on Visible Human Project. *Saudi Med J.* **2005** Jan; 26(1): 51-6.
- ◆ Maiti, R.; VanDomselaar, G. H., and Wishart, D. S. MovieMaker: a web server for rapid rendering of protein motions and interactions. *Nucleic Acids Res.* **2005** Jul 1; 33(Web Server issue): W358-62.
- ◆ Ward, J. and Liu, C. H. VRVision: a new tool for the display of 3-D images in behavioral research. *Behav Res Methods.* **2005** Aug; 37(3): 464-9.
- ◆ Thatcher, J. D. Computer animation and improved student comprehension of basic science concepts. *J Am Osteopath Assoc.* **2006** Jan; 106(1): 9-4.

Usefulness of 3-D taxonomic models?

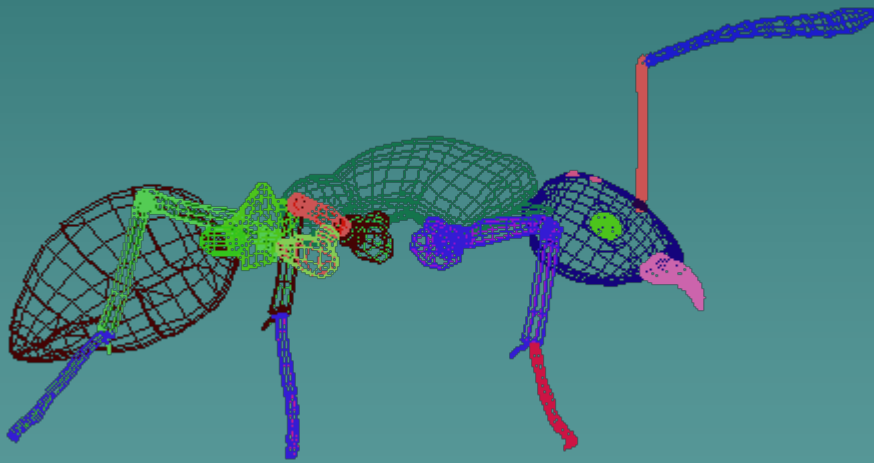
- ◆ Current research indicates animation improved learning in “dry” science basics.
- ◆ Teaching taxonomy can be tedious with just paper “keys”.
- ◆ Surveillance or monitoring, and identification of insects and other health threats requires training in taxonomy: the “front end” is thin. “ Anything that helps”.
- ◆ High performance Technology = interactive, easy to use, functional in multimedia applications
- ◆ Many students are visually oriented and many have been using interactive gaming software for years.

3-D mosquito models process

1. Started with collection of mosquitoes, rearing larvae
2. Next, photos with Leica stereo microscope and camera with z-stack software
3. Several photos from this process sent to art student
4. Wire diagram built with 3-D studio Max on Mac

Our Process: 3-D Models

Wireframes constructed with 3-D studio Max



Mosquito models had as many as 50 geometric objects per species, with many newly created surface textures, such as reflective transparent wings

3-D Mosquito Model process

6. Art student was majoring in computer graphics and animation. He created new textures and techniques with 3-D software.
7. Models were edited many times to make them taxonomically correct. Some corrections still need to be done. I invite you to add a sticky note to posters for revisions.
8. We converted files to flash format for a first attempt at exporting the interactive files. Too many details lost.

3-D mosquito model process :

Rendering and animating software

- ◆ 8. An 8-10 hour rendering process (taking hundreds of electronic photos of the 3-D Studio Max PC program's model) was required to maintain detail.
- ◆ 9. The rendered and animated file is then interactive and movable, and can be transferred to other video formats.
- ◆ 10. Some of the screen was cut off in the transfer from Mac to PC.....still not perfect!

A process project

- ◆ Future of technology constantly changing: New animation software being produced (Movie Maker, VRVision)
- ◆ Several technology research centers at ECU interested in working on projects. Teaching students is part of the project.
- ◆ University job is also to be on the cutting edge helping to create the future.
- ◆ Process may be much easier in the future: scan and build automatically

What does the future hold?

- ◆ ECU "Teaching with technology 2005"
"THINK IN" many ideas: (2006
technology "think in" is TODAY 10:00-
2:00 in the Student Union building
upstairs
- ◆ Pod casts **Health Statistics**
- ◆ Vod casts **Victorian Literature**
- ◆ Interactive audio and video
- ◆ "Global classroom" **Intro to EH**
- ◆ Globe trecking interactive
- ◆ Videoconferencing **Social Studies**

Other technology innovations in our College related to DE

- ◆ Multipurpose Integrated-Media Modules: MIMM
- ◆ With flash interface, “you can combine audio, text, video, interactive assessments, activities and animations in a single cross-platform application. This has been useful for online courses.”

Mosquito 3-D Identification In the future:

- ◆ New key with interactivity and voice components
- ◆ Using models: format to make available commercially. ECU Technology transfer office involved.
- ◆ Posters for educational fairs, made to order (for sale) T-shirts? Tecnology transfer office

- ◆ 20 species:
- ◆ *Ae. vexans*, *Ae. albopictus*,
- ◆ *Och. canadensis*, *Och. sticticus*, *Och. triseriatus*, *Och. taeniorhynchus*, *Och. atlanticus* *Och. sollicitans*
- ◆ *An. Crucians*, *An. Punctipennis*, *An. Quadrimaculatus*, *An. bradleyi*
- ◆ *Cs. Melanura*
- ◆ *Cu. pipiens* (complex) *Cu. restuans*, *Cu. salinarius*,
- ◆ *Ps. columbiae*, *Ps. ferox*. *Ps. ciliata*
- ◆ *Ur. Sapphirina*