Older Kids Teaching Younger Kids: Education and Outreach in the Classroom

The body bag is one of the items University of Washington bioengineering graduate students bring to middle school classroom visits. Inside are artificial body parts, implants used by surgeons to replace the failing real parts of people’s bodies: a knee, a hip, fingers, teeth, and heart surgery, or received a hip implant. “The hands just go up,” says Michael Wiley, 14-year-old Cole Terry looked proudly around at his peers. “I didn’t think science could be this fun.”

The program is taught by the Department of Bioengineering and UWEB faculty: Tekie Mehary, Dan Graham, Kip Hauch, Buddy Ratner, and Winston Ciridon with tremendous support offered by UWEB’s Director of Outreach and Education, Fanaye Turner and K-12 Education and Outreach Coordinator, Janet Blanford. Also in attendance for this commemorative occasion was the Vice-President of Minority Affairs, Dr. Nancy “Rusty” Barceló who spoke with students about the cultural diversity in this program to promote diversity here at the University of Washington. Buddy Ratner, the director of UWEB, agrees. He says that “more diversity in participation in science and technology increases the range of ideas, broadens the potential to solve real problems and also addresses the future economic health and social stability of the United States.” Ratner hopes to get a more diverse class of graduates and undergraduates in science and engineering at the University of Washington. “We want to cultivate the young ones by exposing them to the rich intellectual environment of science in a most positive manner.”

Science Fiction: Guy Simplant is the Bioengineer Challenge

What do the Bionic Woman, the Six Million Dollar Man, and the Transformer have in common? They are science fiction heroes with synthetic or engineered body parts. Meet Guy Simplant. A modern-day hero with bad luck. In a daring escape from enemy territory, the secret agent’s parachute does not work properly and he ends up severely injured. Thanks to bioengineering, Guy can be repaired using synthetic parts, but only if the virtual bioengineer, the player of the game, can make it successfully through training.

Fanaye Turner, Director of Education and Outreach, and Karen Cheng, a professor in the Department of Visual Communications, led the collaboration to produce the interactive CD and website. Karen describes the collaboration as “a way of showing what design [can] do for a different field.” Take the National Science Foundation (NSF) mandate that National Research Centers like UWEB must communicate state of the art bioengineering research to K-12 students and there’s a fundamental problem. How to bridge the mind of a scientist with the mind of a small child? Kjell Nelson, one of the first graduate student Outreach Coordinators for the UWEB Student Leadership Council (SLC), realized students needed something more engaging than props to learn about biomaterials. Something “to introduce the idea, stimulate interest in science, to broaden [students’] awareness of what scientists do, and the value of [their] research.” Kjell’s “kernel of an idea,” Guy Simplant: “The Hand,” now reaches schools all over the state of Washington, and the second program, “Guy Simplant: The Heart,” is being prepared for a national and international audience.

Wing Fong and Karen Gutowsky-Zimmerman were graduate students in the Department of Visual Communication when Karen Cheng proposed the idea to them in 1999. In fact, Guy Simplant design became Wing’s master’s thesis, a “simulated experience in a multi-media realm to educate people.” In a computer age, Cheng says that “the joy of animation is pretty pervasive. If you show anyone, even a young person, a button, the impulse to press, to do something is pretty strong.” She explains that it’s because you’re making the choices and you’re an actor. Gutowsky’s recalls designing the game so that students can work independently to construct Guy’s hand out of synthetic materials, with minimal or no supervision.

“Guy is a ‘hero with problems.’ You can put yourself into the game,” says Fanaye. "It’s a way to reinforce the concepts and wrap up the last day. It’s a comprehensive education program. ‘Youth Take Heart’ program is one example. Coordinated with the Hope Heart Institute, the program is centered around the current project, “Guy Simplant, The Heart.” In this new game, Guy’s stressful lifestyle puts him at risk for a heart attack. Worried, Guy goes to see his doctor, and she tells him to change his eating habits and start an exercise routine. Players of the game are asked to choose a healthy diet and regular exercise schedule for Guy. Depending on wisdom of the player’s choices, Guy is back in the spy world or he is in the hospital earmarked for invasive surgery. Combined with a unit on tissue engineering, she says Guy is a fun way to reinforce the concepts and wrap up the last day.

Is there a future for Guy Simplant? “He’s got a whole anatomy we can work on,” Fanaye laughs. But in all seriousness she explains Guy’s potential to become a

Check out Guy Simplant at:
http://depts.washington.edu/simplant
Director’s Cut
A Case for Education/Outreach

I’m pleased to contribute a greeting to this launch issue of UWEB EON. Education and outreach are subjects worthy of serious contemplation and focused action.

Three quotes have been on my mind lately:

“If a nation expects to be ignorant and free, in a state of civilization, it expects what never was and never will be.”
—Thomas Jefferson

“... whenever the people are well-informed, they can be trusted with their own government; that, whenever things get so far wrong as to attract their notice, they may be relied on to set them right.”
—Thomas Jefferson

“More and more, the future of society is a race between education and catastrophe”
—H.G. Wells

One of Thomas Jefferson’s conditions for the success of a democracy was that the populace must be educated in order that they should have the tools to make wise decisions. Are we educating our students (and the public at large) up to Mr. Jefferson’s standard? Here are some results from the National Geographic-Roper 2002 Global Geographic Literacy Survey, which polled the age group 18 to 24 in the United States and several other countries shortly after 9/11/2001:

- 11 percent of the young Americans couldn’t locate the United States on a world map.
- 87 percent of the Americans surveyed could not locate Iraq or Iran on the map.
- 86 percent could not find Israel.
- 83 percent couldn’t locate Afghanistan.
- 58 percent of young Americans could not locate Japan.
- 65 percent could not locate France.
- 69 percent couldn’t locate the United Kingdom.

Is the problem just geography? Hardly. A 1998 NSF report states that only 13 percent of Americans can define “molecule.” An astounding 48 percent of Americans do not know that the earth goes around the sun once each year. While greater than 64 percent of the public uses the Internet, only 16 percent knows what it is. Over 70 percent of adult Americans do not know what DNA is.

The case for an educated populace is easy to make — start with Thomas Jefferson’s observations on the elements needed for a successful democracy and then work out the educational requirements for a competitive economy. Since our economy and society are immersed in technology, decisions requiring an understanding of technology frequently must be made. Thus, circa 2003, technological literacy is a critical component of the education for a citizen within our democracy. Think of today’s pressing science/technology issues: global climate change, stem cells, world water resources, AIDS, malaria, cloning, genetic modification of crops, fossil fuel reserves, species diversity, animal research, cancer, biowarfare, and many other issues. It’s simply impossible to vote on these issues or to vote for elected officials to act on these problems, without at least a basic understanding of the science and technology underlying them.

The UWEB investment in education and outreach is a patriotic action. Our country and our world will be better places to live with a populace that can appreciate the significance of DNA, the relationship between auto emissions and global climate change, the dietary contributors to heart disease or the risk/benefit ratios of nuclear power. The UWEB investment is ramping up with more programs reaching larger populations — we feel the pressure to make a difference...

“More and more, the future of society is a race between education and catastrophe.”

Benefits of the REU program:

“I was able to explore my interests in science/engineering and medicine...It has pushed me beyond my limits.”

Announcing the
UWEB 3rd Summer Symposium 2004
University of Washington
Engineered Biomaterials (UWEB)
University of Washington
Seattle, Washington, USA

For more information, contact info@uweb engr.washington.edu

UWEB is published by the University of Washington Engineered Biomaterials, a National Science Foundation Engineering Research Center.

Elizabeth Sharpes, MA
Editor
Shari Ireton, MA
Layout & Design

For more information, contact info@uwebengr.washington.edu

Event Calendar

Summer Research Experience for Undergraduates (REU) Welcome Dinner
Science Teacher’s Institute (STI) “Stick This in Your Ear: Cochlear Implants”
Science Teacher’s Institute (STI) “Build Me Up, Scotty: Tissue Engineering”
Lab Experience for High School Students (2-Week Research Experience for High School Students)
Summer Research Experience for Undergraduates (REU) BBQ
Summer Research Experience for Undergraduates (REU) Poster Session
NESCABIO Workshop (www.nb. engr.washington.edu)
UWEB Summer Symposium on “Biocompatibility/Bioactivity” (See ad in this issue for details)
7th International Symposium on “Polymers for Advanced Technologies,” Ft. Lauderdale, Florida