Increasing Knowledge, Reducing Risk, Inspiring Change and Engaging the Next Generation

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How do we communicate “flood risk”?
Posters and pamphlets are not enough...
Teachers Promote Flood Risk Critical Thinking Through Serious Gaming While Meeting Science Standards

By Hunter Merritt, USACE Sacramento District

The U.S. Army Corps of Engineers (USACE) Sacramento District has been working with the educational community to reduce flood risk in a novel way by bringing science teachers into the conversation on water management and developing games that help them teach complex subjects and promote critical thinking among their students. Essentially, the approach is to help teachers “play” with flood risk as the topic. The concept is not new, and it is used widely in adult learning, but the name might be counterintuitive: Serious Gaming.

The initial goal of the project was to increase awareness among children and young adults, enabling them to prepare for and take action in case of a flood emergency.

The district’s efforts at promoting flood risk through connections in the field of education started in 2014 by way of a Silver Jackets Interagency Non-Structural Flood Risk Management project called the California Educator Project. The initial goal of the project was to increase awareness among children and young adults, enabling them to prepare for and take action in case of a flood emergency. For the younger children, this resulted in a coloring book that has been widely distributed and even translated into Spanish. However, for the older students, a more nuanced approach was necessary.

What kind of thinking does it take to manage a dam? U.S. Army Corps of Engineers Planner Patricia Fontanet speaks to Advanced Placement (AP) Physics students from Folsom High School in Folsom, California, on the genesis of the Flood Fighter: Nevada game and on her work as a planner in the Corps. The free, educational video game provides a unique and engaging platform for teachers and presenters to introduce complex subjects and systems-based solutions for water resource challenges.

The team quickly focused on teachers’ needs and asked what USACE could do to help these teachers educate the next generation of scientific thinkers. Phil Romig, a science curriculum specialist in Sacramento County, offered that computer modeling was likely to be a
Most Districts Face Teacher Training Gaps

In addition to persistent teacher shortages, an overwhelming majority of districts face training gaps, as most of their teachers are not well prepared to teach to the new standards (Figure 10). Thirty-nine percent of responding districts cited insufficient teacher training as a big challenge and 37 percent reported that it is somewhat of a challenge; among large districts, these percentages are slightly higher. This has important implications for NGSS implementation in classrooms: without sufficient training, teachers may not be prepared to align instruction with the new standards.

FIGURE 10
Most districts report insufficient training as a challenge

![Bar chart showing insufficient training as a challenge for large and all districts.]

NOTES: Sample includes weighted responses from 204 school districts. We perform an ordered logit regression that includes district enrollment, geographic location, high-need students share, student performance, and district type. We report subgroup results only if group indicator is significant. For “insufficient teacher training,” we also include a variable indicating whether respondents think that their districts have enough teachers (see Technical Appendix B).

FPMS: 2015 California Educator Project
CA Educator: Flood Management Model

- Free software (Vensim)
- Increasing Level of Complexity
- Prompts Critical Thinking
- Scaffolding to other topics
Purpose of Models

“The model has to be *useful* for helping predict or explain a system. If the model is only descriptive and doesn’t help to answer a question about how, or why, then it isn’t a *scientific* model.”

- Cindy Passmore, UC Davis

Source:

San Francisco Bay Model, Sausalito, CA
Why & How Do We Use Models?

Computer Models:
- Hydraulic Models (e.g. TuFlow)
- Reservoir Simulation (e.g. ResSim)
- Economic Models (FDA)
“A declaration issued at the World Economic Forum in Davos, Switzerland in 2000 read: Climate change is the greatest global challenge facing humankind in the 21st century. There is no doubt that the study of climate change and its impacts is of enormous importance for our future. Global climate models are the best means we have of anticipating likely changes” (Lynch, 2007, p. 3438).
The best way to learn...is to try teaching!
Systems are Complex!
Who remembers this?

YOU HAVE DIED OF DYSENTERY
Gamification of Flood Risk?
WE are the Gamers!

Download here: www.nevadafloods.org

Watch the tutorial video https://youtu.be/GgoYBNhNHzY
"Hole-In-The-Wall" Project

"...Ten years later, a girl in rural Maharashtra is studying aeronautical engineering following her encounter with the computer in the wall. A village boy who became a genetic engineer in one of India's premier laboratories found the subject by reading the New Scientist at his hole in the wall."

- Sugata Mitra
Thank you!

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