

Thoughts from DOCE – Learning Is the Name of the Game

Last September the White House and Department of Education (DOE) held Ed Games Week, a special summit on the emergence of video games in education. Events included the Ed Games Expo, which showcased 25 newly developed learning games, many of which were funded with DOE's Small Business Innovation Research (SBIR) grants. While no USDA agency participated in the Ed Games Expo, NIFA's own SBIR program has funded successful educational games. Challenge Grant programs within NIFA's Division of Community and Education (DOCE) have also funded high-quality games that have received national attention. We'd like to tell you about some of these projects in this issue.

It's easy to see why NIFA, DOE, the National Science Foundation, National Institutes of Health, and the Department of Defense have all been active in supporting educational games to promote science, technology, engineering, and mathematics (STEM) learning. Worldwide market estimates for educational games vary from \$2 billion to \$10 billion, depending on whether the definition includes simulations and virtual worlds. China is predicted to be the dominant market in 2016, with the United States replacing South Korea as the second largest consumer. The rising demand, and 20 years of research, suggests that educational games facilitate learning. We encourage this creative use of NIFA funding. The question is: What other innovations are possible using educational games as a means to promote agricultural literacy and prepare students for the food and agricultural workforce? Let the DOCE Director Suresh Sureshwaran know your suggestions at ssureshwaran@nifa.usda.gov.

Primary Grades: Promoting Math Literacy and Cultural Learning

Two video games developed through a grant from NIFA's [Small Business Innovation Research](#) program have helped students living on North Dakota Indian reservations achieve significant improvements in their math capabilities. **Spirit Lake**, a game of multiplication, division and geometry, and **Fish Lake**, a game about fractions, are commercially available for individual, classroom, and site license purchase. Both are part of the [7 Generation Games](#) family that targets 4th through 6th grade students, but they also help students who are struggling with math in later grades to catch up. More games will soon be available.

"We chose fractions as the focus for Fish Lake in response to a 2010 report from the Institute of Education Sciences, that suggested a lack of skills in fractions is affecting students' ability to learn algebra," said AnnMaria De Mars, CEO of the Dakota Learning Project, which produced 7 Generation Games.

Four North Dakota schools—Four Winds School and Warwick Public School, from the Spirit Lake Reservation, and Turtle Mountain Elementary School and Ojibwa Indian School, from the Turtle Mountain Reservation—helped test the games' effectiveness. Initial tests with the Spirit Lake schools found students who used the games showed three times more improvement in state-mandated math skills than students who did not. The second test data, currently being analyzed, suggest that students who use the game show a 30 percent skill improvement over their pre-test abilities.

"In Phase Two, the school board leadership told us the parents didn't want any control group students," said De Mars said. "Not after they learned how much it helped students in the first test."

In addition, reservation communities support the project. Tribal elders allowed their voices and stories to be used in the games. The elders also reviewed both games for cultural relevancy and helped to integrate instruction in Dakota/Ojibwa culture. A school district in west central Montana took a license for the entire school district to promote cultural literacy among all their students while teaching social studies and mathematics.

Secondary/Post-Secondary: Computer Simulations Promote Diversity

Two games funded by NIFA are promoting greater diversity in the agricultural sciences.

Oklahoma State University (OSU) used two grants from the [Secondary Education Challenge Grant program to](#) develop a computer game where students ran a virtual farm. Gamers learned about budgeting and marketing tools and used those tools to make decisions about risk management, marketing, and investments. Since 2013, dozens of workshops have been held utilizing the game. In 2013, high school agriculture teachers reported sharing this interactive learning tool with 1,793 students, including 559 minority students.

"We've utilized the game with students from age 7 and up and with adult learners, such as Women in Ag conference attendees and high school ag teachers," said Project Director Eric DeVuyst, professor of ag economics at OSU. "The game provides a great venue for teaching complex economics and management concepts." Contact [DeVuyst](#) welcomes inquiries about the game and can be reached via email or at 405-744-6166.

South Dakota State University received a Higher Education Challenge Grant to partner with New Mexico State University (NMSU) to produce web-based learning tools that give high school and undergraduate students a "dress rehearsal" in conducting food science labs. The simulations increase diversity among food science undergraduates by teaching research techniques to students in high schools with limited lab facilities. [Myfoodsciencelab.org](#) drew 900,000 hits in 18 months and the virtual labs are now part of [BrainPop](#), national educational website for students in grades K-12, used in more than 20 percent of U.S. schools. They are also available on [NMSU's website](#) and have been adopted by several vocational schools and universities.

"We are going to publish a paper on the effects of these virtual lab games," said Project Director Joan Hegerfeld-Baker. "We found they improved students' labs skills and conceptual knowledge, but work best as a complement to a teacher's actual instructional delivery. We've had help from a 3M food safety scientist; high school science, ag, and consumer science teachers; computer graphic programmers; and faculty through the creation and review process, but without (NIFA's) Higher Education Challenge Grant none of this would have been possible."

Doctorate/DVM: Training Professionals to Address a Food Chain Crisis

Kansas State University, through a Higher Education Challenge grant, developed a computer simulation module so that doctor of veterinary medicine students can quickly identify and act on serious animal disease outbreaks that could threaten world trade, U.S. farms, or human health. It also teaches protocols for working with USDA's Animal and Plant Health Inspection Service and other state and federal agencies.

"We created new content (animations, virtual microscopy slides) for use in the online "Emerging and Exotic Diseases of Animals" course that is managed by the Center for Food Security and Public Health at Iowa State University," said Dr. Derek Mosier of Kansas State University's Diagnostic Medicine and Pathobiology Department. "All or parts of this course are used by every North American veterinary school for learning about these diseases, their management, and for accreditation purposes."

Mosier said even more advanced features are in development. Comments from students regarding the new content included: "Great learning tool, particularly for visual learners;" "easy to understand, attention grabber, creative;" "provides a great summary of the entire exercise," and "solidified information in disease scenarios and enhanced learning and retention."



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