Stories of Innovation:
How Engage’s Innovation Simulations and Games Award is changing the University of Wisconsin-Madison
“In 2004, Nintendo invested more than $140 million in research and development. The U.S. Federal Government spent less than half as much on research in education.”

Karl Fisch, “Did You Know”
Simulations and Games Award

The goal of Engage has always been to help faculty use new and emerging technologies to address difficult teaching challenges within a sound pedagogical framework. From 2006 – 2011, the chief area of interest for Engage has been the use of simulations and games in the classroom. While the scope of Engage work is modest in comparison to expenditures such as Nintendo’s, the impact on campus is – and continues to be – profound. The goal of this short booklet is to introduce a few of the awardees and briefly describe how their work with the Engage Innovation Simulations and Games Award is changing campus, changing disciplines, and ultimately changing the world.

Simulations & Games Awardees 2007 – 2009:

C'est la (Seconde) Vie!: Using Second Life to Teach French Literature
Tom Armbrcht - Department of French and Italian, College of Letters and Science

Cool It: An Interactive Learning Game for Cryogenics
John Pfotenhauer, Greg Nellis - Department of Mechanical Engineering, College of Engineering

Critique_It™
Michael Connors - Department of Art, School of Education

GASP Redux - Interactive Tutorials in Probability
David Griffeath, James G. Morris - School of Business

Got Ice Cream? Good Manufacturing Practices (GMP) Learning Tool
Rich Hartel, Steve Ingham - Department of Food Science, College of Agriculture and Life Sciences

J-D Consult: A virtual farm consultation
Ken Nordlund, Mike Collins - School of Veterinary Medicine

Madison Transportation Simulator
Jessica Guo - Department of Civil and Environmental Engineering, College of Engineering

Malaria: Beating the Bugs
Linda Baumann, Laurie Hartjes - School of Nursing

Melody Mixer
Jamie Henke, Alan Ng - Department of Liberal Studies and the Arts, Division of Continuing Studies

One-on-One with Student-Writers: A Simulator for New Instructors
Brad Hughes, Melissa Tedrowe - Department of English, College of Letters and Science

Teaching the Speech Chain
Tom Purnell, Joe Salmons, Eric Rainey - College of Letters and Science

Voice Games
Nadine Connor - Department of Communicative Disorders, College of Letters and Science

Virtual French House
Andrew Irving, Daniel Audaz - Department of French and Italian, College of Letters and Science

Simulation & Game Awardees 2009 – 2011:

Case Scenario Critical Reader Builder
Brad Hughes, Melissa Tedrowe - Department of English, College of Letters and Science

Commodity Risk Management Project
Liz Henry, Randy Fortenbery - Department of Agriculture and Applied Economics, College of Agriculture and Life Sciences

Cool It: An Interactive Learning Game for Cryogenics
John Pfotenhauer, Greg Nellis - Department of Mechanical Engineering

Harmony Mixer
Jamie Henke, Alan Ng - Department of Liberal Studies and the Arts, Division of Continuing Studies

Madison Transportation Simulator
Jessica Guo - Department of Civil and Environmental Engineering, College of Engineering

N Game
Teri Balser - Department of Soil Science, College of Agriculture and Life Sciences

Point, Counterpoint
Jamie Henke, Alan Ng - Department of Liberal Studies and the Arts, Division of Continuing Studies

Wisconsin Speech Chain Online (WiSCO), Pt 2: Mapping Speech Patterns
Tom Purnell, Eric Rainey, Mark Livengood, Joe Salmons - College of Letters and Science

Wolf Hunting Policy: Gaming with a Purpose
Adrian Treves - Gaylord Nelson Institute for Environmental Studies
Classwork into Practice – Cool It

A game originally developed to give Engineering students practice with real world problems has led to an NSF award and a new model of assessment.

“Learning doesn’t happen when you are sitting in the classroom where the person is lecturing to you. It happens when you are using [knowledge] in real-life applications”

Dr. John Pfotenhauer - Professor Mechanical Engineering, College of Engineering

Dr. Pfotenhauer’s initial application for an Engage Innovation Simulations and Games Award was not accepted. “I had written a proposal that may not have been that stellar,” admits Pfotenhauer. “But, I remember having really good discussions with [Engage staff] that wound up directly informing the current game to make my idea workable.”

The team of Engage staff formed around this educational need helped Dr. Pfotenhauer to develop Cool It, a simulation that can be used by anyone, at any level, to start teaching themselves about the issues around cryogenics.

Cool It is an alternative to calculation-based homework sets in Dr. Pfotenhauer’s cryogenics class. But this game is no mere calculator. Real-life engineering challenges and graphically amplified results...
transform this game into a learning tool that motivates exploration and provides rapid meaningful feedback to real-life engineering design challenges. As with many engineering projects, solutions are obtained by adjusting a variety of interrelated parameters within a set of physical constraints to satisfy a threshold condition.

Cool It teaches principles of cryogenic design by assigning the student/player to the role of a cryogenic consultant. He or she chooses from a selection of real-life cryogenic challenges in the fields of space, medicine, communications, electric power, or defense, and, while minimizing cost, develops a design that satisfies a set of defined constraints.

Dr. Pfotenhauer has found that Cool It can make the learning fun, increase time students spend on learning tasks, and serve as a nice springboard for discussion. Additionally, the Cool It design team was awarded second place in the 2011 Interactive category of the Association for Educational Communications and Technology Multimedia Production Awards AECT/MPD. This award acknowledges innovations that define best practices for multimedia in education and communication.

Dr. Pfotenhauer already received an NSF grant to use Cool It to explore issues of gender in engineering and to refine new modes of assessment around game-based learning. Dr. Pfotenhauer has additional ambitions for Cool It. “When I go to conferences, I run into people who say, ‘Hey, you are the new cryogenics person.’ But they do not know where to go, or how to educate themselves. Cool It could be that [educational piece] someday.”

“I am really thankful that the university funds a program like Engage”

Dr. John Pfotenhauer - Professor Mechanical Engineering, College of Engineering
A Game for Novices and Experts - Melody Mixer

A game developed to address students’ varied levels of experience with music and differences between online and face-to-face instruction resulted in a tool that benefits everyone.

“One of the key reasons why we developed this game was to bridge the gap for students who needed more ear training on music concepts.”

Dr. Jamie Henke - Faculty Associate
Division of Continuing Studies

Dr. Jamie Henke and Dr. Alan Ng were looking for a way to provide students with more opportunity to experience musical concepts. Dr. Henke teaches an introductory music theory class that includes students with a range of musical ability, from no formal music experience to more than 10 years of formal music experience. Students who are musicians use their instruments to experiment with music theory concepts, but non-musician students have limited opportunities to experiment. In addition to this experience gap, Dr. Henke teaches two sections of her introductory music theory class as traditional face-to-face and one class that is totally
online. She wanted a tool that would be useful to all of her students, regardless of experience or learning environment.

Through an **Engage Innovation Simulations and Games Award**, a game called **Melody Mixer** was developed to meet the educational goals of the instructors. The goal of Melody Mixer is to save four composers who have been transported back in time. Some of their melodies were mixed up in the process. It’s the gamer’s job to put them back in order. Dr. Henke has found that the game “gives [students] a chance to associate the concepts we cover in class with how they sound in real music.”

There have also been some unexpected gains attributable to the Melody Mixer. Dr. Henke explains: “We assumed that students would learn theory concepts in class and use the game to practice ear training for those concepts. But we found that the game started to impart theory concepts to students as well.” Dr. Henke also found that students spent more time on ear-training tasks because they did not get as fatigued. This extra time allowed students without a music background to develop their listening skills much faster than was previously possible.

Dr. Henke continues to explore new ways to teach and use new teaching tools, and she believes that technology is an essential component of quality education. “We have a responsibility to educate children so they can be successful citizens in this country, [and] technology has to be part of that.”

To download Melody Mixer and other music games, go to: [http://courses.dcs.wisc.edu/music/](http://courses.dcs.wisc.edu/music/)
Changing A Discipline - WiSCO

A linguistic project that began with a goal of illustrating regional changes in pronunciation for students, and wound up developing a tool that is revolutionizing the discipline.

“WiSCO has fundamentally changed how we are teaching a whole set of classes on campus, and it’s going to change how we understand American English far beyond campus.”

Dr. Joe Salmons - Professor
German, College of Letters and Science

“real” research in linguistics. The group proposed a software program that would allow undergraduate students to see data from their recorded speech in context with other speakers. The Wisconsin Speech Chain On-Line (WiSCO) is an interactive speech sound visualization program. Using their own speech and that of friends and family from across Wisconsin and beyond, UW students can not only understand the phonetics of speech, but also compare and contrast data from different regions.

When Dr. Joe Salmons, from German, and Dr. Tom Purnell and Dr. Eric Raimy, from English applied for an Engage Innovation Simulations and Games Award, they almost missed the application deadline. “Wow, what a mistake that would have been,” said Joe Salmons.

Salmons, Purnell, and Raimy were looking for a way to give undergraduate students a chance to do
The professors needed ways to introduce newcomers to linguistics and to the basic acoustic analysis of speech sounds quickly and cleanly. Engage worked with them to create WiSCO, which allows them to cover in a few weeks more than could previously be covered in a semester.

WiSCO allows for the import, management, and visualization of speech data. Even though it was originally developed to help novice students in beginning phonetics courses quickly master acoustic analysis of vowels, WiSCO is now used as a research tool and in courses on dialects, variation and change, and historical linguistics.

Before WiSCO, only graduate students could conduct the kinds of language analysis that students in introductory classes are now participating in. The simulation makes the research more accessible because it plots the sound data immediately. Previously, students and instructors had to spend a great deal of time learning how to use different spreadsheet tools to plot human language sound data. Now, students across a whole set of departments, and at different expertise levels, can sift through real-world data on regional and social variations in speech patterns. Even those with no research experience are quickly able to begin their own scientific inquiry and advance the current understanding of language.

“This tool really is revolutionizing and really democratizing [linguistic inquiry]” said Salmons. “WiSCO is the tool that allows us to ask the higher level questions about language. That is the payoff.” Raimy added, “Our real goal is world domination – at least in linguistics.” Engage is honored to have helped start this revolutionary effort here at UW-Madison, and will be working with WiSCO to add capabilities for interactive mapping and vocabulary data.
A Tool For Everyone – CSCR

A recognition of what makes simulation games useful to educators gave rise to the development of a tool that many educators can (and have) used to increase student interactivity with course content.

“Scenario-based learning allows instructors to put course content into compelling story-like contexts where students assume an active role in applying what they learn. Often used in a blended learning environment, these learning activities build connections between complex real-world situations and classroom experiences.”

Blaire Bundy and Les Howles, Consultants and CSCR Builder co-creators, Academic Technology, Division of Information Technology

Designing a game can facilitate a keen understanding of how powerful stories and context can be in engaging students in course content. It was this understanding that led Brad Hughes from the University of Wisconsin Writing Center and Jan Miernowski from French and Italian to apply for an Engage Innovation Simulations and Games Award to develop what has come to be called the Case Scenario Critical Reader Builder (CSCR) tool.

CSCR Builder is a downloadable authoring tool (for PCs and Macs) that educators can use to present instructional content on the web in the form of interactive cases, scenarios, simulations, or criti-
Our [CSCR] project was time-consuming. Nevertheless, we feel very confident that our time and efforts were well spent as not only have we received positive feedback when this work has been presented at national meetings, but our students and medical trainees have been very enthusiastic about the teaching they received by playing the simulation.”

Sumona Saha, MD - Assistant Professor, Gastroenterology, School of Medicine and Public Health

CSCR is currently being used by several instructors in the Engage Adaptation Situated Learning: Case, Story, Place Award. To learn more about the award go to: http://engage.doit.wisc.edu/sl
This site provides examples of case scenarios developed by UW-Madison faculty and gives information for how to download the tool.