Teaching with Online Games

- The session will begin at 1:00 pm Eastern (New York time)

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  - Tools → Preferences → Connection Speed*
- Configure microphone and speakers **
  - Tools → Audio → Audio Setup Wizard…
- To share your profile with others, enter information:
  - Tools → Preferences → Edit Profile…*
- To view the profile of another participant:
  - Hover pointer over their name in the Participants window

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* Mac Users please use: Elluminate Live! → Preferences ** Speakers required; Mic only needed if you want to speak
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- **Emoticons and Stepped Away**
- **Send Message**
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Teaching with Online Games

Dr. David Gibson

December 11th, 2008 at 1:00 pm EST
About Dr. David Gibson

Dr. Gibson is a Research Assistant Professor in the College of Engineering and Mathematical Sciences, University of Vermont and Executive Director of The Global.

His book *Games and Simulations in Online Learning* outlines the potential for games and simulation-based learning.

He is creator of simSchool [www.simschool.org](http://www.simschool.org), a classroom flight simulator for training teachers, currently funded by the US Department of Education FIPSE program.

His business, CURVESHIFT, is an educational technology company [www.curveshift.com](http://www.curveshift.com) that assists in the acquisition, implementation and continuing design of games and simulations, e-portfolio systems, data-driven decision making tools, and emerging technologies.

Most recent publication: *Digital Simulations for Improving Education: Learning Through Artificial Teaching Environments* of which David was the editor of. [http://igi-global.com/reference/details.asp?id=9691](http://igi-global.com/reference/details.asp?id=9691)

**Contact Info:** david.gibson@globalchallengeaward.org or (802) 253-9588
Looking Under the Hood

*Digital Simulations to Improve Education*

David Gibson
• Situating in Education
• Social Analyses
• Teacher Development
• Augmented Reality
• Embedding Assessment
Coming Soon!

Digital Simulations for Improving Education

- Defining the context
- Design considerations
- Case studies focusing on teaching
- Case studies focused on learning
- Engaging graduate students in development
- Complex systems concepts in simulations
Agenda

• Why Do We Need a Bridge?
• **Modeling** Teaching and Learning
• Interactive **Visualizations**
• **Unified** Qualitative-Quantitative Models
• **Unobtrusive** Assessment
• Web 2.0 in **Informal & Global** Education
<table>
<thead>
<tr>
<th>Games &amp; Sims</th>
<th>Sitting in Algebra 2</th>
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</thead>
<tbody>
<tr>
<td>- Fast, immediate</td>
<td>- Wait your turn</td>
</tr>
<tr>
<td>- Parallel</td>
<td>- Linear</td>
</tr>
<tr>
<td>- Graphics</td>
<td>- Text heavy</td>
</tr>
<tr>
<td>- Random</td>
<td>- Ordered</td>
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<tr>
<td>- Connected (Epistemic)</td>
<td>- Abstract (Symbolic)</td>
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<td>- Active</td>
<td>- Passive</td>
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<tr>
<td>- Play</td>
<td>- Work</td>
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<tr>
<td>- Payoff, Reward Now</td>
<td>- Patience, Reward Later</td>
</tr>
<tr>
<td>- Fantasy</td>
<td>- Reality</td>
</tr>
<tr>
<td>- Technology Helps</td>
<td>- Technology Distracts</td>
</tr>
</tbody>
</table>

Adapted from Prensky (2001) Digital Game-Based Learning
A Bridge to Somewhere

• Students spend an enormous amount of time outside of schools playing games (Pew)
• Gen-Y teachers’ habits were formed in this milieu and should be tapped (CITE)
• The bridge can be a 2-way street if we “look under the hood” of games & sims (Gibson)
Learning Theory Framework

- Learner
- Assessment
- Knowledge
- Community

Activity Theory Framework

Agenda

✓ Why Do We Need a Bridge?
• Modeling Teaching and Learning
• Interactive Visualizations
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• Unobtrusive Assessment
• Web 2.0 in Informal & Global Education
Example 1: simSchool

simSchool... a Classroom Simulator for Educators

PLAY TO LEARN!

- Build Your Confidence in Teaching.
- Understand Students' Behavior & Learning Styles.
- Practice Your Classroom Management Techniques.

Teach your simStudents & watch them respond!

REGISTER for simSchool NOW!
simSchool Creates “Know-How”

…the tacit decision making processes a teacher uses when assigning classroom tasks, questioning students, making suggestions, or noticing signs of understanding.
What context teachers see

What teachers do

Independent Variables

Observable Variables

Dependent Variables

Hidden Variables

student outcomes

How students react

simSchool’s “Engine”
Representational Domains

V A K O C E A N n...

Sally
Josh
Dynamic Profiles

- A database of text on each personality element allows 5 statement fragments per element
- This produces $5^9$ or 1.9 million written profiles
What Teachers Do

- **Select Tasks**
  Emotional, Physical & Cognitive current states of students interact with task requirements
  A Zone of Proximal Development determines time-to-success on task and effects student attitudes

- **Talk to simStudents**
  Questions, observations, or assertions about academic or, behavioral issues
3-Aspect Personality

- Openness to learning
- Conscientiousness toward tasks
- Extraversion to introversion
- Agreeableness
- Neuroticism - emotional stability

- Visual
- Auditory
- Kinesthetic

- Expected academic performance
3 Parts + Environment

(Environment)

C

Gc

O

C

A

E

N

Gf

Gs

Gt

Gps

Gsm

V

E
Interpersonal Circumplex

(Hidden Variables)

Teachers and students interact with one another by negotiating power and affiliation.
Task Profiles
Dynamics

V  A  K  O  C  E  A  N  n...

Sally Task
Dynamic Landscapes

Student → Task
simStudent Learning
(e.g. 5 min gains on 3 tasks by “Ali”)

Do an oral quiz

Recite a lengthy poem

Do whole-class oral response

Gain (0.11)  Gain 0.07  Gain 0.17
Feedback

Post-game wrap-up

Download [class overview spreadsheet](#)

- Amazo, Jay

Performance in Time

Tasks

Feedback

Performanc
e in Time

Tasks
Preliminary Findings

• Stronger self-efficacy - a feeling of confidence that one can adapt teaching to the needs of all students

• Heuristic knowledge connected to the specific focus of a simulation (e.g. significant rank orderings of within-group similarities and between-group differences)
Agenda

✓ Why Do We Need a Bridge?
✓ Modeling Teaching and Learning
  • Interactive Visualizations
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  • Unobtrusive Assessment
  • Web 2.0 in Informal & Global Education
Example 2: LeadScape

July 2008: LeadScape Summer Institute Seattle, Washington

January 15, 2007: LeadScape begins, applications sent out to urban districts to choose participants.
April, 2007: LeadScape participating districts selected.
July 2008: LeadScape Summer Institute Seattle, WA.
January 2009: High selection of 400 additional LeadScape principals.
January 2009: LeadScape Winter Institute Scottsdale, AZ.
April 2009: Complete selection of 400 additional LeadScape principals.
April 2009: LeadScape Summer Institute, Location TBA.
Data in Motion
Agenda

✓ Why Do We Need a Bridge?
✓ Modeling Teaching and Learning
✓ Interactive Visualizations
  • Unified Qualitative-Quantitative Models
  • Unobtrusive Assessment
  • Web 2.0 in Informal & Global Education
Unified Qual-Quant Models

STELLA & GIS
Agenda

✓ Why Do We Need a Bridge?
✓ Modeling Teaching and Learning
✓ Interactive Visualizations
✓ Unified Qualitative-Quantitative Models
  • Unobtrusive Assessment
  • Web 2.0 in Informal & Global Education
Mislevy Model Details

- Student Model
- Evidence Model
- Task Model
- Presentation Model
- Assembly Model
- Delivery Model
- Interpretation Method
- Observation Situations

Assembly & Delivery Methods

Student Model → Assembly Model → Task Model → Presentation Model
Assessing (Evidence & Validation)

- Complex performances can be supported and documented in network-based assessments via multimedia, multileveled, and multiply connected bases of knowledge.

- With many instances of the learner interacting with applications in different times, places and contexts, network-based assessments can build a long-term record of documentation, showing how learners change over time.
Complex Analyses

The lac operon

From an isolated colony, you are expected to identify the exact mutation using the resources available to you in the menu items. Viewing menu items will take time off the clock. You have 72 hours to complete the task.
STUDENT 86763 Discussion Grade 6.5

Well, I thought the Western Blots were the most helpful because it dealt directly with the Z,Y genes on the lac operon. If something didn't match, it was probably in one of those genes. In conjunction with that, the next thing that was really helpful was the indicator plates. With that information, you could tell if something was affecting the Z or Y genes. The only other option I thought was helpful other than those two I mentioned was the Southern Blot test. Using that, I was able to see if the restriction sites were the same and it was helpful in eliminating choles of mutants.

I didn't do too well on this exercise because of my last 3 attempts, I only get 1 correct. That's pretty low and I was wondering if I might be able to do it a couple more times to get points?
Assessing (Evidence & Validation)

• *Analysis of expert-novice differences* can be facilitated across groups, across space and time, drawing from an evolving common knowledge store.

• The interactive potential of network-based assessment opens up new possibilities for *fostering and determining metacognitive skills* of the learner.
Expert-Novice Metacognition
Assessing (Evidence & Validation)

• Emerging capabilities in metadata generation offer the potential for *identifying the problem-solving strategies* of learners.

• Network-based assessments can include *statistical analysis and displays* of information to assist learners and teachers in making inferences about performance.
Assessing (Evidence & Validation)

• Unobtrusive observation techniques combined with libraries of evidence and tasks can make possible *timely feedback to learners and teachers* and matching of current needs with best “next step” materials, tasks and challenges, including tasks that involve transfer of learning to new contexts.
Automated Essay Scoring

Based on your predicted score, I suggest you:

- Check out Students: Demographics on the school site.
- Check out Students: Performance on the school site.
- Check out Technology Infrastructure: Classroom Based Facilities on the school site.
- Check out Technology Infrastructure: School Wide Facilities on the school site.
- Check out Curriculum and Assessment: Classroom Pedagogy and Assessment on the school site.
- Check out Curriculum and Assessment: Instructional Sequence on the school site.
- Check out Curriculum and Assessment: Standards on the school site.

<table>
<thead>
<tr>
<th>RUBRIC</th>
<th>Score: 0</th>
<th>Score: 1</th>
<th>Score: 2</th>
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<tr>
<td>Does not identify aspects of case information, including appropriate technology uses, to help differentiate instruction</td>
<td>Identifies aspects of case information, including appropriate technology uses, without explanation or examples of how these help differentiate instruction</td>
<td>Identifies aspects of case information, including appropriate technology uses, with explanation or examples of how these help differentiate instruction</td>
<td></td>
</tr>
</tbody>
</table>

Identify case information that must be considered in a decision about using technology to meet your learners' diverse needs.

**Your answer:**

It is important to consider many pieces of information when deciding how to use technology in the classroom. I need to understand what the needs of my students are by considering demographics, past performance, curricular objectives and instructional framework. I need to consider which technologies are available that might help to add value to the teaching and learning of my learners.
Agenda

- Why Do We Need a Bridge?
- Modeling Teaching and Learning
- Interactive Visualizations
- Unified Qualitative-Quantitative Models
- Unobtrusive Assessment

- Web 2.0 in Informal & Global Education
Example 3: Global Challenge

Giving Students the Tools & Confidence to Solve Global Problems Together

Make Global Friends
GoGreen
Win Stuff

Teams of US high school students collaborate with international counterparts to address global climate change and compete for prizes and scholarship awards!
Goals

• Assist pre-college students in self-directed learning of science, technology, engineering and mathematics

• Use game- and simulation-based guidance to understand the complex nature of global systems

• Use the tools of computational science, simulation, and telecommunications
Global Challenge Combines:

Social Networking
Games & Simulation
Exploratory Learning
Fun & Challenge

SAVE THE WORLD on Your Way to College!!

Do you think kids can make a difference in the world?
Do you like IM and surfing the net?
Do you like the chance to earn prizes?

This online program for kids aged 14-17 years is for you!

DID YOU KNOW? The Arctic has lost about a third of its ice... the Arctic is going to be a very different place within our lifetimes.

You and your friend are partnered online with two high school kids from another country. You'll work together (virtually) to come up with a solution to any aspect of the global climate crisis. UVM engineering students are there every step of the way to help your team. You can win great prizes, like ITUNES gift cards and Scholarship Awards. So check us out at...

www.globalchallengeaward.org
The Game Begins As Soon As You Register

in collaboration with The University of Vermont
Global Challenge: What Is It?

High school student teams of four work for nine months to develop a global business solution that addresses global warming & the future of energy.
Global Partnerships

4-person teams of Chinese (& 50 other countries) & US teens meet and work online to solve global warming

Photovoltaic Panels: Thin-film, Multi-junction CIGS with Quantum Dots
Engineeering 2020

- Strong analytic skills
- Practical ingenuity
- Creativity
- Communication
- Business and management
- Leadership
- High ethical standards
- Professionalism
- Dynamism, agility, resilience, and flexibility
- Lifelong learners
STEM Explorations

• **Climate Change** - An Introduction
• **Engineering, the Environment and Sustainability**
• Global Climate **Chemistry** and **Physics**
• Global Climate **Variability**
• Global Climate **Impacts**
• **Engineering Approaches** to Global Climate Change
• Global Climate **Economics**
Computational Science Tools
Individual & Team Learning

Goal/Standard Matrix

Date: 07/26/2006 01:14 PM
Program: Global Challenge Award

Global Challenge Award

<table>
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<td>Brainstorm for A Product</td>
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Work Evaluation

Work: Business Plan Revision
Rubric: 6.0 Financial & Political Feasibility (4-Point Rubric)
Evaluator: PLP Administrator
Date: 08/20/2006 11:06 AM

Additional Feedback

File upload: Upload a file
Global Challenge Elements

- Global collaboration
- Student directed
- Ill-structured real world problem
- STEM learning through sims/games
- Mentor support
- IT Learning & web resources
- Web research for business plan product understanding and development
- Team/individual learning opportunities
A Few Facts

- **3000 students** from 58 countries have signed up *since August 1*.
- **60% girls**
- **All SES levels**
- Students work for **200 hours** on their own time.

### US Ethnicity in Global Challenge 2008

- African American: 19%
- Asian: 15%
- Hispanic: 15%
- Non-US: 44%
- Other (non-White): 6%
- White: 1%

### US SES in Global Challenge 2008

- $<40,000$: 61%
- $41,000-70,000$: 26%
- $71,000-100,000$: 15%
- $>100,000$: 8%
The World is INDEED Flat
World Game Missions

Explore - Experiment - Observe, record, analyze - Build models - Compare perspectives - Lead & participate in research
That’s a Look Under the Hood

David Gibson
david.gibson@globalchallengeaward.org
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*Digital Simulations for Improving Education: Learning Through Artificial Teaching Environments* - Releasing Next Week!

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*Games and Simulations in Online Learning: Research and Development Frameworks* – Available Now!

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www.igi-global.com
Handbook of Research on Effective Electronic Gaming in Education (3 Volumes)
Edited By: Richard E. Ferdig, University of Florida, USA

Presents a framework for understanding games for educational purposes while providing a broader sense of current related research.

http://www.igi-global.com/reference/details.asp?id=7960

International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)
Editor-in-Chief: Richard E. Ferdig, University of Florida, USA

Devoted to the theoretical and empirical understanding of electronic games and computer-mediated simulations.

http://www.igi-global.com/journals/details.asp?id=8005
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