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Summit on Educational Games

Findings and Recommendations

Organized by: Federation of American Scientists

Sponsored by:
Entertainment Software Association
National Science Foundation

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Summit on Educational Games

- October 25, 2005
- Sponsors:
  - Federation of American Scientists
  - Entertainment Software Association
  - National Science Foundation

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Summit on Educational Games

100 Experts Participated

- Video game industry executives/developers
- Educational software publishers
- Experts on technology and pedagogy
- Researchers
- Teacher representatives
- U.S. military
- R&D funders
- Government policymakers

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Summit on Educational Games

Areas of Inquiry

- Games features for use in learning
- Skills that games could teach
- Research needed to use games effectively for learning
- Business climate for educational games
- Instructional practices and educational games

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Why Focus on Educational Games?

- U.S. workforce must raise skills to compete in global labor markets
- U.S. workforce must raise skills to support an innovation-based economy
- U.S. workforce must be ready for new jobs created by technological advancements
- Digital media the medium of attention for youth
- Schools must become high-performance organizations

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What the Policy Leaders Say…

- We must support workers' and families' ability to succeed, not merely survive, in a world in which skills needs are rapidly changing and the competition for jobs is global.
  - *Innovate America, Council on Competitiveness*
- A substantial portion of our workforce finds itself in direct competition for jobs with lower wage workers around the globe…
  - *Rising Above the Competitive Storm, National Academy of Sciences*
- …the Workforce/Education issues are critical to our Nation's long-term economic security and innovation leadership.
  - *Sustaining the Nation's Innovation Ecosystems, PCAST*
- The bedrock of America's competitiveness is a well-educated and skilled workforce. …we can do more to provide American students and workers with the skills and training needed to compete with the best and brightest around the world.
  - *President George W. Bush, American Competitiveness Initiative*

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Game Features Attractive for Learning

- Clear learning goals
- Broad experiences and practice opportunities
  - Fly through the interior of a cell, operate equipment
  - Try over and over again to mastery
- Monitor progress, provide continual feedback
- Move player to higher challenges as mastery is gained
- Encourage inquiry and questions

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Game Features Attractive for Learning

- Contextual bridging
  - Closes gap between what is learned and its use
- Time on task
- Motivation/strong goal orientation
- Scaffolding
  - Provide cues, hints to keep learner progressing
- Personalization
- An infinitely patient medium

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Learning Amenable to Educational Games

- Higher order skills
- Practical skills
- Practice for high performance situations
- Rarely used skills
- Developing expertise
- Team building

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Major R&D Challenges

- Explore features of games important for learning
- How best to design games to deliver positive learning outcomes
- Tools to create learning games quickly at low cost
- Basic and applied research, technology and prototype development needed

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R&D Agenda

- Role of games in learning
- Design of pedagogy for game-based learning
- Best features of games to apply to learning
- Features of challenges for motivation/learning
- Stories/scenarios for motivation/learning
- Educational density
- Effect of immersion and engagement on learning
- Gaming and goal orientation

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R&D Agenda

- Degree of authenticity
- Designing simulated actors
- Designing for gender/socio-cultural differences
- Educational scaffolding
- Assessment/learner modeling data
- Assessing attainment of higher order skills
- Understanding change in education and training institutions

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R&D, Design
Findings and Recommendations

- A public investment in educational games research is needed
  - Department of Education and NSF should support R&D on educational games for K-12, post-secondary and adult learners
  - Department of Labor should support R&D on workforce training-related games
  - Use a variety of R&D models

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R&D, Design
Findings and Recommendations

- Game industry technology and craft knowledge should be transferred to the learning arena
  - Involve game industry/game designers in learning research and game development
  - Federal R&D investment should catalyze collaborative efforts
  - Multidisciplinary teams should form to develop learning games

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Business Climate: Investment

- Learning games deemed too risky and too expensive to develop
- No funding available for educational games or ventures

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Business Climate: Markets

- Education markets are highly fragmented
- Most schools unwilling to give up textbooks/print for technology
- Because of NCLB, schools reluctant to adopt unproven innovations
- Negative attitudes toward games

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Business Climate
Findings and Recommendations

- Explore new business/product models
  - Classroom materials for off-the-shelf games
  - Modified commercial games for learning
  - Education as secondary market for game industry technology
  - Shorter, less costly downloadable games
  - Open source models/mod-makers

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Business Climate
Findings and Recommendations

- Explore new markets
  - Aggregate markets among states (ESL, math remediation)
  - Develop games to address difficult educational problems
  - Virtual schools/online learning
  - Informal after school market
  - Home use
  - Training

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Schools and Instructional Practices

- Unlike other industries, education has not transformed via new technology, modern management and new models of organization
- Education has not been part of the IT revolution
- Most adoption of technology has focused on integrating it into existing systems

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Schools and Instructional Practices

- Educational games are fundamentally different than “tell and test” methods frequently used
- Teachers not trained to use educational games
- With focus on NCLB, little room for classroom experimentation

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Schools and Instructional Practices

- Educational games' potential for teaching higher-order skills under appreciated
  - These skills not revealed by tests of facts/SOL exams
  - Lack assessments for higher-order skills
  - In absence of measures, teachers can't measure outcomes for accountability

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Schools and Instructional Practices

- IT often not integral to the classroom experience/learning
  - Access to computers (number available and time to use them) often too small for mainstream role
  - Massive installed base of video game consoles underutilized for learning

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Schools and Instructional Practices

- Few reports of clear/unequivocal outcomes for educational games
- Lack of exemplar products to show benefits
- Schools cannot or will not use unproven educational innovations
- More evaluation data needed

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Schools and Instruction Practices
Findings and Recommendations

- Educational institutions need to transform their organizational systems and instructional practices
  - Undertake transformation process
  - Identify lessons already learned about learning games from U.S. military, 1st responders
  - Promote educational innovations to taxpayers, parents, employers

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Schools and Instructional Practices
Findings and Recommendations

- Instructional paradigm needs to change to take advantage of educational games
  - Schools should redesign instructional practices and learning environments
  - Schools of Education (with learning games experts) should develop new/revamp old pedagogy
  - Train teachers to support game-based learning/new teacher training materials

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Schools and Instructional Practices
Findings and Recommendations

- Use educational games to teach skills in demand by employers
  - Departments of Education and Labor should work with employers for consensus on important higher-order skills
  - Translate higher-order skills to curriculum standards and student assessments
  - Develop improved measures of higher order skills

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Schools and Instruction Practices

Findings and Recommendations

- IT should be integral part of classroom experience/learning
  - Need adequate number of up-to-date computers
  - Use computing resources as mainstream teaching tool
  - Give students greater access to computers while in school
  - Take advantage of video game consoles for learning

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Schools and Instructional Practices

Findings and Recommendations

- Outcome data from evaluations of educational games are needed
  - Use some educational technology R&D investment to fund evaluations
  - Educational technology researchers/game developers should focus on affecting test scores
  - Universities should participate to ensure high quality evaluations
  - Evaluations should consider how instruction practices, teacher prep, school environment, etc. affected outcomes

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