The Models
TPCK (Mishra & Koehler)

Pedagogy

Content

Technology

TPCK (Mishra & Koehler)

Substitution
Tech acts as a direct tool substitute, with no functional change

Augmentation
Tech acts as a direct tool substitute, with functional improvement

Modification
Tech allows for significant task redesign

Redefinition
Tech allows for the creation of new tasks, previously inconceivable

Enhancement

Substitution
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Transformation

SAMR (PuenteDura)
TPCK and Educational Games

Diagram illustrating the relationship between Pedagogy, Content, and Technology, with subcategories PK, PCK, CK, TPK, TPCK, TCK, TK.
Pedagogy Content Technology PK CK TK PCK TPK TCK TPCK

Latest News

EduCopia Announces the Digital Generation Project
The MacArthur-supported project aims to help educators and parents understand how digital media are changing today’s youth.
Read the press release.
Visit the project's Web site.

MacArthur Island Opens in Virtual World of Second Life
The island is a new laboratory for MacArthur's two-year exploration of virtual worlds, led by the University of Southern California and the nonprofit Virtual Kids.
Read the press release.
About MacArthur's grantmaking in virtual worlds.

Global Competition Selects 16 Innovation Finalists

The MacArthur Foundation launched its five-year, $50 million digital media and learning initiative in 2008 to study how digital technologies are changing the way young people learn, play, socialize, and participate in civic life. Answers are critical to developing educational and other social institutions that can meet the needs of this and future generations. The initiative is both examining what is already known about the field and seeding innovation for continued growth.

On this website you can find:

- Information about ongoing projects and emerging research.
- A link to the Spotlight blog, where visitors can interact with initiatives and discuss their work.

Alice

An Educational Software that teaches students computer programming in a 3D environment

Alice 3 wins O'Reilly's Choice Award at JavaOne 2009

Alice is a teaching tool designed as a revolutionary approach to teaching and learning introductory programming concepts. The Alice team has developed instructional materials to support students and teachers in using this new approach. Resources include textbooks, lessons, sample syllabi, talk tanks, and more. Other authors have generously joined our efforts, creating additional textbooks.
Electromagnetism Supercharged! Learning Physics with Digital Simulation Games

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Abstract: Learning scientists are increasingly turning to computer and video games as tools for learning. Simulation might not only motivate learners, but provide accessible ways for students to develop intuitive understandings of abstract physics phenomena. This study examines what learning occurs when an electromagnetic simulation game is used in a school for underserved students. Students in the experimental group were significantly better than students in the control group (guided discovery-based science) on a final exam. Students also were able to explain and fulfill requirements of the physics representations. Implications for PK-12 educational digital media are discussed.

Keywords: computer games, simulation, electromagnetism, physics education

Introduction

Many science educators advocate conceptual or qualitative physics, the notion that physics is best taught not by mathematical formulae, but rather through experiments, labs, demonstrations, and visualizations which help students understand physical phenomena conceptually (diSessa, 2000; Forbus, 1997; Hewitt, 2002). Consistent with the Physics First curriculum movement, this perspective maintains that a deep, fundamental understanding of physics provides a solid basis for future science learning. How to engage younger students in complex physics thinking is a challenge, but computer simulations provide one intriguing way to engage students in the study of abstract, complex physical phenomena (diSessa, 2000; Dede et al., 1999). Digital technologies can immerse the learner in worlds that not only represent scientific phenomena, but behave according to the rules of physics. Simulated worlds can be programmed to behave by Newtonian or Maxwellian rules (Dede et al., 1999). By representing the simulation through digital gaming conventions, educators can potentially increase engagement while also fostering deeper learning, as learners engage in critical and recursive game play, whereby they generate hypotheses about the game system, develop plans and strategies, observe their results and adjust their hypotheses about the game system (Cueva & Lepper, 1996; Gee, 2003; Squire, 2003). Experiences in game worlds become experiences that students...
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Immune Attack

Industry Giant 2
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Lure of the Labyrinth

Resources Cited
• The Models:
  • The TPCK Model:
    • TPCK - Technological Pedagogical Content Knowledge
    • AACTE (Eds.) The Handbook of Technological Pedagogical Content Knowledge for Educators. Routledge. (2008)
  • The SAMR Model:
  • Integrating TPCK and SAMR:
    • Puenteuera, R.R. As We May Teach: Educational Technology, From Theory Into Practice. (2009) On iTunes U at:

• TPCK and Educational Games:
  • CK: The Ludologist
    http://www.jesperjuul.net/ludologist/
  • PCK: Learning Games Network
    http://www.learninggamesnetwork.org/
  • PK: MacArthur Digital Media & Learning Initiative
    http://digitallearning.macfound.org/
  • TPK: Alice
    http://www.alice.org/
  • TK: GameDev.net
    http://www.gamedev.net/
  • TCK: Gamasutra
    http://gamasutra.com/
• SAMR and Educational Games:
  • **Substitution:** DimensionM
    http://www.dimensionm.com/
  • **Augmentation:** Immune Attack
    http://fas.org/immuneattack/
    http://www.youtube.com/watch?v=KtpvjZGaufw
  • **Modification:** Industry Giant 2
    http://ig2.jowood.com/
    http://www.youtube.com/watch?v=ZkmaxkOt-dw
  • **Redefinition:** Lure of the Labyrinth
    http://labyrinth.thinkport.org/www/

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