Technology Now
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Game-Based Learning in Medical Education

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Medical schools around the country are increasingly utilizing and creating educational games for learners. These games, also known as "serious games," are educational tools that employ game-thinking and mechanics where the principal intent is not amusement or pleasure, and are designed for the express goal of improving medical education. Serious games offer the ability to extend learning outside of the classroom and can be attractive options for everything from teaching flashcards to modeling and experiencing the complexity of the real world within a simulated environment. Serious games vary greatly in complexity and technology requirements.

Games for education feature:

- Goals – clearly defined learner outcomes that players can work to achieve
- Rules – limitations on how players can achieve the goals of the game
- Feedback systems – a method for players to track progress; identify how close they are to achieving a goal

Spectrum of serious game components

- Social teambuilding
- Knowledge quizzing
- Virtual patient interaction
- Task/skill building
- Virtual experience/decision making
- Self-assessment tools
- Simulation scenarios
- Process modeling
- Risk management
- "Safe place to fail"

Serious games build adaptive expertise through

- Teamwork and empathy
- Hand-eye coordination and proprioception
- Medical decision-making and problem solving
- Improved self-confidence and emotion management

Development considerations

- Identify learning objectives first
- Avoid "focusing on the technology"
- Establish a plan to measure effectiveness
- Identify stakeholders for development:
  - Content experts
  - Game designers
  - Target audience
  - Teaching faculty
- Select game platform/technology requirements based on learning objectives
- Target audience feedback during development
- Integrate with medical literature/other resources
- Pair with specific curriculum content to augment learning experience
- Leverage the mobility of games for location agnostic learning
- Plan for ongoing content management and maintenance

Development cautions

- Overemphasis on technology, not pedagogy
- Weigh learning value against game complexity
- Potential high development cost
- Potential lengthy development time
- Inclusion of too many learning objectives
- Balance difficulty and playability

Types of game platforms

- Paper (cards or board)-based
- Mobile device applications
- Web-based

Feedback/reward systems:

Intrinsic rewards

- Self-efficacy: increased knowledge, acquisition of a new skill
- Personal challenge: problem-solving
- Socialization: collaboration with colleagues, social interaction

Extrinsic rewards

- Achievements: points, badges, levels
- Reputation: status within the community of users

Would students use serious games

In a 2010 survey of two medical schools, students responded they would use serious games under the following conditions:

- 97% if game is fun
- 77% if helped to accomplish an important goal
- 90% if helped to develop skills in patient interactions

Additional Resources: Efficacy studies with medical students, residents, continuing medical education; Post-secondary institutions' uses of serious games; Video games as medical education tools; ECAR research bulletin on game-based learning; Games for clinical care delivery; Game-based learning ROI and effectiveness

Examples: Septris, Pulse!!, ElderQuest, 3DiTeams, Upper Respiratory Virtual Lab, A Zygote Story, Build-A-Brain, DecisionSim, Prognosis, Heart Sound Challenge

Note: The examples in this Technology Now brief do not indicate an endorsement by the AAMC or the authors.