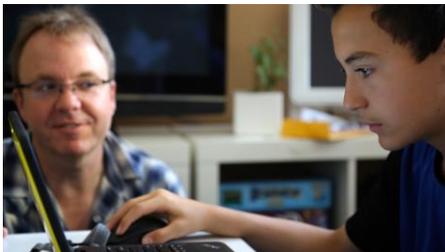# GAMES:
IMPROVING EDUCATION

Educators recognize the impact of entertainment software and utilize games as a teaching device in a growing number of classrooms and business settings. More than just play, entertainment software helps impart knowledge, teach life skills, and reinforce positive habits in students of all ages.

COGNITIVE RESEARCH

In addition to being a great way to keep students engaged, researchers found that video games have potential as next-generation learning tools. Games use new technologies to incorporate principles crucial to human cognitive learning. According to **a recent study conducted by researchers at the University of Michigan**, puzzle video games that exercise children's working memories can enhance their abstract reasoning and problem-solving skills, which can have a direct impact on future educational and occupational success. Another **study conducted by scientists at the University of Texas at Austin** found that playing video games can increase a player's cognitive flexibility, which impacts a person's ability to switch between tasks and use multiple concepts and ideas to resolve issues. Additionally, **SRI International and the Bill & Melinda Gates Foundation found** that game-based classroom tools can boost cognitive learning among average-performing students by 12 percent.

The federal government has encouraged similar research. For example, the Department of Education provided initial funding for the nonprofit National Center for Research in Advanced Information and Digital Technologies. The center offers grants to academic institutions, nonprofit organizations, or corporations who propose to research and develop new educational technologies, including simulations, computer and video games, virtual worlds, and avatars that serve as tutors.

64 Million

The number of children between 2 and 17 years old who are currently gamers, according to The NPD Group.

IN THE CLASSROOM

Teachers are taking steps today to incorporate video games into learning. From national organizations to individual classrooms, the education community is actively pursuing new methods for developing young minds.

ESA partners with Electronic Arts, Institute of Play, the MacArthur Foundation, and the Bill & Melinda Gates Foundation to support the **Games, Learning and Assessment Lab** (GlassLab), an unprecedented effort to explore games' potential to serve as learning and assessment tools. In addition to developing its own educational games, GlassLab is examining popular game titles to identify elements that increase student comprehension and enhance classroom performance. In March 2013, the lab launched SimCityEDU, an online community and resource hub for educators to create and share learning tools and assessments that use SimCity to encourage students to think critically about the challenges facing modern cities. GlassLab has since released SimCityEDU: Pollution Challenge!, which focuses on environmental issues, and Mars Generation One: Argubot Academy, which tests students' mastery of the elements of argumentation, including claims, evidence, and reasoning.

8.07

The Increase in students' math test score numbers after playing *DimensionM* over an 18-week period, compared to an increase of 3.74 points for the control group, according to a study conducted by the University of Central Florida.

The Smithsonian Institution released *Hidden Expedition: Smithsonian Hope Diamond* to engage youth in history, science, and culture. Designed for elementary and middle school students, the game takes players on a worldwide adventure to find the Hope Diamond, one of the world's largest blue diamonds and among the most popular exhibits at the National Museum of Natural History in Washington, DC. Students search through accurate representations of Smithsonian buildings, discover lost and hidden symbols, and learn about the Hope Diamond's 400-year history.

Middle school and ninth-grade teachers use the online, game-based learning platform iCivics to help teach civics lessons. Former U.S. Supreme Court Justice Sandra Day O'Connor collaborated with Georgetown University Law School and Arizona State University to develop the platform. First launched in 2009, iCivics now features 21 games about constitutional law and the branches of U.S. government, each of which also comes with suggested lesson plans tailored to meet state-specific learning standards. Recently, iCivics released *Argument Wars*, which allows players to test their persuasive abilities by arguing a real Supreme Court case, including monumental cases such as *Brown v. Board of Education* and *Miranda v. Arizona*.

New York City school teacher Joel Levin created *MinecraftEdu*, an educational version of the extremely popular sand-box game *Minecraft*, to deliver highly-immersive and challenging learning experiences in the classroom. The game is customizable and enables teachers across academic subjects to develop diverse, topic-relevant worlds for their students. It also helps students build new skills such as video production, programming, and design.

Video games also engage students in current events, offering players a chance to respond to the world's toughest challenges

while helping them understand complex historical concepts. *Democracy 3*, a strategy game about running an indebted country, immerses players in the global financial crisis and the debate over Eurozone government debt. Banking scandals, credit downgrades, street protests, and other in-game situations ripped from the headlines offer players a chance to learn more about Europe's political and financial environment.

Other developers use games to educate kids about past human rights struggles. Educational game publisher EverFi's *306 – African-American History* engages students in the long history of the civil rights movement, from the Underground Railroad to *Brown v. Board of Education* and the freedom rides. In addition, the National Civil Rights Museum offers a number of games and tools to teach young people about civil rights history. One game, *Before the Boycott: Riding the Bus*, follows a school newspaper reporter assigned to ride the Montgomery, Alabama bus system in 1955, exposing players to instances of racial discrimination along the way.

The White House has encouraged these trends through the *Educate to Innovate* campaign. The campaign seeks to improve science, technology, engineering, and math (STEM) education for children by enlisting various private companies and nonprofit groups, including ESA, to encourage students, particularly those in middle and high school, to pursue these subject areas. Since 2011, ESA has worked in cooperation with several organizations to harness students' passion for computer and video games by offering the National STEM Video Game Challenge, a game design competition.

> **70**
> The percentage of teachers that said video games increased students' motivation and engagement levels, according to a national survey of 500 teachers who use digital games in the classroom.

In some instances, games provide a framework for a school's overall curriculum. Quest to Learn, a public school with New York City and Chicago campuses, uses a teaching model that draws direct inspiration from video games to create challenging learning experiences. Games also play a direct role in many classrooms, with teachers requiring students to design their own video games or play them as part of their coursework.

An increasing number of teachers and school administrators also recognize the educational value of video game design courses, which provide their students with instruction in traditional academic subjects as well as career preparation. Now, state education officials are beginning to standardize and approve game design curriculum for statewide use. The Texas State Board of Education approved standards for a high school Game Programming and Design course, and the North Carolina State Board of Education approved introductory and advanced Game Art and Design courses for high school students. Both sets of standards went into effect during the 2012-13 school year.

PROFESSIONAL SKILLS AND PUBLIC EDUCATION

Computer and video games' impact inside the classroom has inspired educational and training efforts outside the classroom. Businesses use games to train employees and games are becoming a key fixture in public education campaigns.

Fortune 500 companies are using games to test applicants and train their employees. One entertainment software company, Games2Train, has developed employee training games for American Express, Bank of America, IBM, JP Morgan Chase, Nokia, and Pfizer.

The U.S. Department of Homeland Security's Science and Technology Directorate (DHS S&T) partnered with the U.S. Army to develop the Enhanced Dynamic Geo-Social Environment (EDGE). The EDGE system enables first responders to practice disaster mitigation without endangering civilians or themselves by training in a virtual environment.

In addition, surgeons and doctors use video games to improve hand-eye coordination and precise movements. Researchers from Sapienza University of Rome found that surgeons who operate using tiny cameras and instruments improved their performance after playing video games on the Nintendo Wii. In addition, surgeons at Florida Hospital Celebration Health who played video games for more than three hours per week made 37 percent fewer errors, were 27 percent faster, and scored 26 percent better overall than surgeons who never played video games.

Video games and their technologies also serve as tools to educate the public. Developers incorporate political issues into games to engage the public in the key policy debates taking place on Capitol Hill and around the country. In March 2013, developer Muzzy Lane Software, in cooperation with McGraw

Hill Education, released *Government In Action*. The game allows players to serve as a Member of Congress, challenging players to build up political capital, awareness, approval, and influence to pass legislation and ultimately get reelected.

Additionally, the federal government partnered with the American College of Emergency Physicians to release *Disaster Hero*, a free online game that teaches families the skills needed to prepare for, survive, and recover from a natural disaster by testing the player's emergency preparedness.

DEGREE PROGRAMS

The educational benefits of video games are extending into higher education. Ludology, the study of video games from a humanistic perspective, now qualifies students to pursue careers in computer and video game design and programming. Moreover, nearly 400 U.S. colleges and universities offer computer and video game-related programs or degrees. These programs continue to expand and evolve. The University of Texas at Austin, for example, recently partnered with legendary game designer Warren Spector to create the Denius-Sams Gaming Academy, the first video game program in the United States led and taught by video game industry executives. The program focuses on developing students' creative and business leadership skills, and is an important part of a continued effort by universities, private companies, and local government to expand Austin's booming tech and game development industries.

It is clear students, educators, and lawmakers understand video games can provide a lucrative career path for young graduates with starting salaries significantly higher than other industries. In fact, the video game industry's average compensation per employee is $90,000.