LIVE: Xbox Kinect©s Virtual Realities to Learning Games

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Abstract: The emergence of augmented reality technology in the form of interactive games has produced a valuable tool for education. The "Live" communal nature of these games, blending virtual content with global access and communication, has resulted in a new research arena previously called, "edutainment" but more recently called "learning games". Windows Live combined with Xbox 360 with Kinect technology provides an agile, real-time environment with case-based reasoning, where learners can enjoy games, simulations and face to face chat, stream HD movies and television, music, sports and even Twitter and Facebook, with others around the world, or alone, in the privacy of the home. This research explores this emerging technology and how it serves to collaborate, innovate, and produce positive learning outcomes.

Introduction

To best explore the benefits Xbox LIVE and Kinect technology have on education, it is necessary to first describe the features of the gaming technology. Xbox LIVE allows 300 million Windows Live Messenger users worldwide a new way to stay connected with other members, friends and family via video chat from Xbox to Xbox, PC or MAC using a webcam and television using the Kinect features.

Xbox 360 Kinect is a controller free camera system using infrared technology. Kinect operates through Smart technology features such as the wave of the hand, facial expressions, speech commands and the movement of the body. The software tracks 48 points of the body for as many as two players in real time. It offers full body mobility, the camera tilts up and down, and it follows the user around the room while chatting. Should another person enter the room, the camera automatically reframes to include everyone.

The social opportunities opened by Xbox LIVE and Kinect technology have been given a lot of fanfare. However, the future uses of technologies like these also have serious government, health, education and other "public good" application for the not-so-distant

future (Niehaus, 2010). The following exploration will further discuss the capabilities and learning applications of Xbox LIVE and Kinect along with the current research in edutainment or, as it is more modernly called, learning games.

Research Methods Applied to Learning Games

The past few decades began the exploration of how teaching and learning can occur through the use of computer games. *What Video Games Have to Teach Us about Learning and Literacy* (Gee, 2003). The primary challenge in researching this topic is that gaming has differing platforms: laptops, mobile phones, devices connected to TVs (Xbox, PlayStation, Wii) or to PCs (Dance Dance Revolution), as well as toys notionally connected to the Web (WebKinz), mobile phones, and portable devices (PlayStation Portable, Nintendo DS). And like languages, games are globally distributed (Alexander, 2008).

Practical experience using and thinking digitally in teaching and learning environments has rewritten the way we store information (CDs, USB drives); assign and research web pages, and; develop and send learners to podcasts. Developing ways to design pedagogies and learning outcomes for the 21st century involves a delicate blending of traditional forms of learning, such as assigning textbook readings and assignments, as well as learning games. According to Alexander (2003), some games are recognizably intellectual and academic. Other games teach teamwork, information seeking, self-assessment, communication, numeracy, and spatial literacy.

Research on virtual reality and learning games includes constructivist pedagogy that suggest positive learning results from richly interactive, education software components (learning objects) and curriculum units. Constructivist learning goals are engaging, interactive, self-paced and student-centered (Squire, 2007).

A growing number of learning institutions and global media corporations are using game theory, gamers' sociology, and political game strategies in learning environments. Games have emerged as academic inquiry in professional conferences, peer-reviewed articles and books, as well as among faculty and programs (Alexander, 2008).

In 1987 Chickering and Gamson's "Seven Principles for Good Practice in Undergraduate Education" was first published. These principles were supported by the American Association of Higher education, the Education Commission of States, and The Johnson Foundation. Almost 25 years have passed since that time. Education is still struggling to meet the principles. Xbox LIVE moves education another step in achieving these principles in education.

The Seven Principles for good practice in undergraduate education are (Chickering and Gamson, 1987):

1. Encourages contact between students and faculty,
2. Develops reciprocity and cooperation among students,
3. Encourages active learning,

4. Gives prompt feedback,
5. Emphasizes time on task,
6. Communicates high expectations, and
7. Respects diverse talents and ways of learning.

The following study results support the above principles as applied to learning games such as Xbox Kinect.

Results

The Education Arcade (Klopfen and Osteweil, 2009), a research exploration at the Massachusetts Institute of Technology (MIT), addresses the concerns of those who see "edutainment" as a dead market by making a case for learning games grounded in principles of good fun and good learning. The research suggests that games can both build 21st century skills and channel those skills in traditional academic environments. Games promote learning in schools without the requirement to blend into outmoded forms of schooling. In integrated learning systems (ILS) (Oppenheimer, 2003), games "engage players in learning that is specifically applicable to schooling," while allowing a means by which teachers can leverage such games without disrupting the worlds of either play or school.

The research analyzed the strengths, weaknesses, opportunities, and challenges of both classrooms and games. The resulting suggestion was to design agile environments where tradition and learning games meet at the most productive intersection. MITs Education Arcade continues to examine existing best practices and speculative designs to move learning games forward in education.

The Smithsonian Institution has implemented Microsoft's Surface computer as a hands-on learning aid. The exhibit, "The Wonders of Light," allows visitors to interact with photos, rub sticks on the surface to create virtual fires, and shine a real flashlight onto the Surface screen to light up an underwater scene (Lowersohn, 2010). The key to success lies in forging a relationship that allows students to be students--creative, idealistic, and passionate--while still meeting educational goals for quality and performance. There's no set formula for what will work: The skills that each side, teacher and student, brings to the table will vary from institution to institution (Schaffhauser, 2011).

LIVE and Kinect Technology Discussed

Learning online has been a large part of higher education for the past fifteen years. According to Campus Technology's IT Forecast (McCrea, 2010), experts cite increased mobile and wireless access and cloud computing among the top trends in education for 2011. More students will opt for online learning opportunities as virtual learning becomes more student-centered and self-directed. Technology such as Xbox LIVE can provide an excellent framework for tracking and guiding the learning process. Achievements are earned through game play. It is learn at your own pace. Xbox LIVE is truly active learning.

The technological marvel of natural user interfaces (NUI) like Xbox LIVE and Kinect are only secondary to the developer's emphasis on its usage in human-to-human communication. The motion tracking abilities of Xbox Kinect have valuable applications for physical therapy and home rehabilitation exercises. Doctors and patients connect through Xbox Live with rehab courses prescribed, graded, and assessed (Niehaus, 2010). The speech recognition filters out background noises from the user's voice using an engineered audio cone around the user's body even if they are moving. Kinect also has facial recognition through biometrics offering information security of copyrighted materials, curriculum and training, business and government.

The largest research area where NUI is being explored currently is the military. The COMET project is focused on rehabilitation, telemedicine, training and education, neurocognitive and psychological treatment (Niehaus, 2010).

The study of medicine along with natural sciences has lagged behind other topics in the move to online education. Xbox LIVE with Kinect could change this. Students can attend a laboratory through Xbox LIVE where they can have real time virtual (or real) laboratory experiments supervised by the professor of the course. This would open online learning to these laboratory sciences. It can also serve to greatly enhance health science education.

Two very interesting learning opportunities involving Xbox LIVE with Kinect technology are Video Kinect and Avatar Kinect. Video Kinect can host synchronous or asynchronous conferences or classes that can be viewed by users with WindowsLive Messenger or Messenger for Mac or supporting mobile and ubiquitous real- time video mobile devices such WinPhone7 or iOS. This technology can support the development of robust course learning outcomes where high-engagement interaction and information-rich communication are integrated into the curriculum. Windows Live Messenger makes it possible for activities to be integrated with other Microsoft products such as MSN, Zune, MS Office suite, Facebook, Twitter, and other social networking.

Avatar Kinect is similar to Video Kinect with the addition of choosing an avatar and the environment in which learning occurs. The users become the avatars and have full interaction with motion sensors which can detect the slightest detail. Your avatar can unlock deeper levels of learning as knowledge improves in a subject area.

Activities, friends, and status can be saved on Xbox LIVE and accessed from a Windows Phone7. Up to eight people can chat at one time. This means that groups of students can build communities of learning. Students are highly motivated by the socialization that occurs through both video and voice. Players can share ideas and critique one another's research. Access to the learning activities can be available anywhere and anytime via LIVE and is available in 35 countries as of November 10, 2010.

Using Windows Live SkyDrive, members are allowed to upload 25 GB of files free to MS Cloud with the option to buy more using Microsoft Azure (blue). The cloud storage

includes privacy control allowing the specified end users/learners to access the information from their computers. Access is not directly through Xbox which protects intellectual property from unauthorized users who may use the Xbox.

Conclusion

The traditional educational system has been under fire for a number of years. The sage on the stage (lecturer) must be replaced by the guide on the side in education from K-12 through higher education. The new focus is on teaching students how to learn. As John Tagg and others have noted, learning cannot be done to you. Learning must be active and the learner must be engaged in the activity. Xbox LIVE takes this to a new level.

Xbox LIVE supports all of the principles for good practice. The chat feature and Video Kinect can encourage contact between students and faculty. Students can build communities of learning through the online chat, gaming, and video features. The Kinect brings active learning into an entirely new realm as students can use this tool without the need to manipulate equipment. Feedback from the system is instantaneous so students can learn from their mistakes immediately. Students are required to stay engaged and active during the sessions. Students can progress through different levels as they unlock deeper learner and greater opportunities. With chat, voice, video, body language and controls a wide variety of learning styles are presented.

In short, Xbox Kinect along with Xbox LIVE have not only changed the way we play games, but they have also opened doors to more self-paced, self-directed, and rewarding ways to learn. Xbox LIVE and other NUI technologies are changing the way we view gaming education and learning in the 21st century and into the future.

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