Video Games & School Learning

Video games could be used for a variety of learning styles in schools. Students have different styles of learning, including those that are more visual or require actually completing an action themself to fully understand how to correctly do it. By using video games, you allow students to fail and learn without using materials or potentially messing up a one-time try. Students who are also more visual learners have the opportunity to see visual representations of the subjects they are attempting to learn. This type of assistance can already be seen in the form of small childrens toys and shows, in which physical representations of numbers and letters are used to help small children learn to read, sound out, and complete simple math equations. Some schools are already starting to employ this method of learning at a first and second grade level, with noticeable improvements in attention and desire to learn (Annetta et al., 2009).

Video Games & Military Strategizing

In military strategizing, one small mistake can cost thousands of lives, dollars, and a whole slew of other things. Military leaders have to be at the top of their game to ensure their decision making is sound and at the level it needs to be should they be called upon to make tough decisions. Video games, specifically a first person shooter or real time strategy, could offer a way for military officials to practice their decision making in war type settings, without the real risks associated with failure. Running through simulations, against highly advanced AI systems would allow for generals to continually retry when they fail, until they can come up with solutions that would work. Officials could get creative and use outside of the box thinking while participating, attempting new solutions without having to risk any real resources. The repetition provided through these games and simulations would also increase the comfort level of these military leaders, so that when a real time situation happens, they are able to remain calm and use a clear head to process and react to the situation at hand.

Video Games & Astrophysics Simulations

Space can be unforgiving to those who are unprepared. The laws of nature can prove challenging to overcome when you have no experience in dealing with them. This is why using video games to prepare the next generation of aerospace engineers would prove beneficial. Under the guise of games, engineers could be presented with scenarios in which there is a time crunch, lives on the line, and they are the only thing able to save them. Engineers would have to problem solve within the game to ensure the survival of the team, and fix the issues at hand, using their prior knowledge to come up with creative solutions that would work in the circumstances. While rare, miscalculations or unintended accidents happen within aerospace travel. Having engineers trained to think on their feet and react to any number of scenarios or

situations would allow for greater ease of mind while in dire situations where the potential for loss is real. Using these games would also let engineers see where they may be lacking in knowledge, so they can brush up on that material, or could be used to create efficient problem solving teams by matching up different engineers with each other and pitting themselves against each other in competition.

Synthesis

While not overly apparent, there is some overlap between the disciplines that could benefit from the use of video games and simulations. Between school learning and military strategizing, the military academies present themselves as excellent benefactors of this technology. For four years students are taught how to lead and employ excellent strategy. Video games or simulations could be used in classrooms to give hands on learning to students without fear of loss. They could freely learn from mistakes and perfect the techniques they are being taught in classrooms before employing them on the battlefield where the risk is high and actions have real consequences.

Adding onto this, astrophysics or any other aerospace students are a perfect meshing ground for school learning and astrophysics simulations. If universities are given grants to create and implement state of the art computers which can run simulations, instead of just doing equations on paper for four years, they can take to the keyboard and actually see real time how their work would pan out in a legitimate scenario. Some universities are already using open-world video games to teach physics (Mohanty & Cantu, 2011). Through the use of in-game physics engines, students are able to work out how physics may apply to real life. This application could easily translate into the field of astrophysics with the implementation of an advanced astrophysics engine that is updated with new information in real time.

Lastly, combining military strategy and astrophysics in the current time is difficult, but may not be out of the question in the near future. With the potential of some sort of ‘space military’ being formed, it calls into question how viable this branch would be. Through use of simulations, scenarios could be run that would allow for testing of space stations where hundreds of personnel could live. On top of this, with the potential for single-person spacecraft in the future, fleets that would enact formations similar to aircraft on Earth, would require plenty of calculations and testing to make sure they are good for use in space.

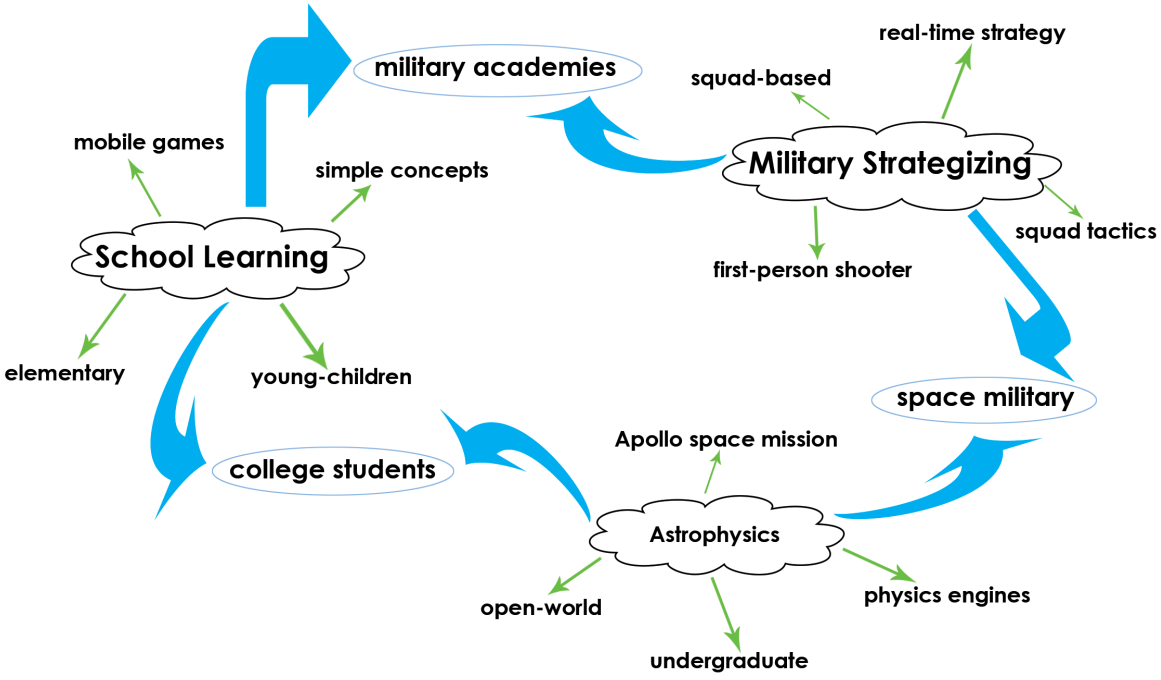
Redesigning for the Future

As good products do, video games continually evolve to meet the needs of their consumers. While not the first thought for the video game developing market, the three disciplines mentioned above should all be seriously considered by developers as potential target users for future games. Video games made for school learning should be very user-friendly, especially

when made for younger audiences. Giving intuitive design to the games will allow for a better learning environment for the user. Also, creating designs that connect to real world scenarios can help bridge a common gap in schools surrounding material and real life application, even from a young age. For military use, creating highly realistic first person games, that are squad based could serve as a good tool for implementing strategy on a small scale. Using real-time strategy games may serve as a good tool for large scale strategy, where users would have command over a large number of units as opposed to just themselves. And finally, for astrophysics, to really make best use of the game, updating the physics engines so they included astrophysics would allow for a wider range of use in open world games. Having a game that is fully realistic in terms of natural laws would open the door for creativity and discovery over any number of scenarios.

Video games have always been looked upon as just that, games. They are primarily seen for the entertainment value they can provide to users. However, they are so much more than mere games and time-wasters. Research has shown that certain types of video games, in the right situations, can prove to boost cognitive functions, increase critical thinking, improve problem solving, and lead to better focus and engagement. New markets for this type of product could include mobile apps that are game focused, which schools could implement in their curriculum at any level of education. On top of this, real-time strategy developers could create military focused game levels - such as recent battles fought - to give upcoming military leaders and strategists a glimpse into how to lead on the battlefield. Open world games have long had their place in helping psychology research, but giving them realistic physics engines could help the next generation of astrophysicists push our space programs to the next level - or even galaxy. With correct implementation, video game developers could open up a whole new realm of possibilities and markets if they cater to a new type of user. Instead of focusing only on the entertainment industry, they could move into new fields and expand their reach. This would benefit the developers, as well as the new users who have a novel outlet to use for research, education, and problem-solving.

Mind Map Visual



Matrix

Video Games	School Learning	Military Strategizing	Astrophysics Simulations
School Learning	X	while at any of the military academies, students could take advantage of games and simulations to undergo situational training for their future in the military	engineering students could take advantage of state of the art simulations where they are presented with random materials and have to construct potentially life saving solutions
Military Strategizing	X	X	with the potential of space travel or a 'space military' branch, having a combination of military and astrophysicists working together on simulated situations to come up with solutions to potential problems, such as military aircraft travel, space stations that support military personnel, etc.
Astrophysics Simulations	X	X	X

Citations

Annetta, Leonard A, et al. “Investigating the Impact of Video Games on High School Students' Engagement and Learning about Genetics.” *NeuroImage*, Academic Press, 23 Feb. 2009, www.sciencedirect.com/science/article/pii/S0360131509000049.

Djorgovski, S.G., et al. *The MICA Experiment: Astrophysics in Virtual Worlds*. American Physical Society, 29 Jan. 2013, arxiv.org/abs/1301.6808.

Gee, James Paul. “Learning by Design: Good Video Games as Learning Machines.” *Journal of Research in Crime and Delinquency*, SAGE Journals, 1 Mar. 2005, journals.sagepub.com/doi/abs/10.2304/elea.2005.2.1.5.

Mohanty, Soumya D, and Sergio Cantu. “Teaching Introductory Undergraduate Physics Using Commercial Video Games.” *IOPScience*, IOP Publishing LTD, 2011, iopscience.iop.org/article/10.1088/0031-9120/46/5/009/meta.

Nakasone, Arturo, et al. “AstroSim: Collaborative Visualization of an Astrophysics Simulation in Second Life.” *An Introduction to Biometric Recognition - IEEE Journals & Magazine*, Wiley-IEEE Press, 21 Aug. 2009, ieeexplore.ieee.org/abstract/document/5210067.

Rosas, Ricardo, et al. “Beyond Nintendo: Design and Assessment of Educational Video Games for First and Second Grade Students.” *NeuroImage*, Academic Press, 4 Dec. 2002, www.sciencedirect.com/science/article/pii/S0360131502000994.

Williamson Shaffer, David, et al. “Video Games and the Future of Learning.” *Journal of Research in Crime and Delinquency*, SAGE Journals, 1 Oct. 2005, journals.sagepub.com/doi/abs/10.1177/003172170508700205.

Wright, Talmadge, et al. *Creative Player Actions in FPS Online Video Games Playing Counter-Strike*. Research Gate, Dec. 2002, www.researchgate.net/profile/Talmadge_Wright/publication/220200729_Creative_Player_Actions_in_FPS_Online_Video_Games_-_Playing_Counter-Strike/links/0deec53566263ae497000000/Creative-Player-Actions-in-FPS-Online-Video-Games-Playing-Counter-Strike.pdf.