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A Proposal for Accelerating the Implementation and Development of Video Games in Education

by Greg Jones and Kevin Kalinowski

During the International Society for Technology in Education's ([ISTE](#)) 2005 National Educational Computing Conference ([NECC](#)), a group of educators began the process of forming a new ISTE Special Interest Group (SIG) on [games and simulations](#). At the group's first meeting, over 100 participants shared their thoughts on games and simulations in education. The group then met online over the next several months and created a mission that encompassed the development and educational use of digital games and simulations with an emphasis on credible research supporting their value in the classroom. As part of their initial planning, the SIG founders discussed problems facing key stakeholders—parents, school administrators, and legislators—on implementing video games in the classroom. Consequently, some members of the proposed SIG recommended the creation of an open, online community of educators and game developers who would collaboratively explore the instructional benefits of video games. This article explores the current issues surrounding the limited use of video games in the classroom and outlines the anticipated online solution.

Video Gaming Technology in Education: Obstacles and Challenges

For years, researchers have discussed the educational potential of video game technology as well as of game play itself (Gee 2003; Prensky 2001), and we are beginning to see published research on the use of video games such as [Europa Universalis II](#) and [Civilization III](#) to support instruction in the classroom (Egenfeldt-Nielsen 2005; Squire 2005). However, while efforts are being made to increase interest in commercial video games enhanced to support education (e.g., the [Massachusetts Institute of Technology Comparative Media Studies Program](#)), video game supporters nevertheless still find limited acceptance of such technology in the classroom. Without a process of aligning games with standardized testing objectives and state educational standards, proponents of the instructional use of video games will be hard pressed to have games accepted in their classrooms. Further, in light of the No Child Left Behind Act ([NCLB](#)) of 2001, stakeholders may have doubts about the educational use of video games without credible "scientifically based research" to document its effectiveness (U.S. Department of Education 2002, B-2). In addition, they may perceive video games as containing content inappropriate for an educational setting (Aguilera and Memdiz 2003; Lombardi and McCahill 2004).

What are the impediments to addressing these very real concerns? By and large, game developers have little interest in working with educators to infuse educational elements into game play or to develop after-market educational materials that can be tied into video games. There are a few exceptions to this situation, notably [Firaxis](#), the developer of [Civilization III](#), which has created a space on its Web site called [Teacher Features](#) to support the discussion of video games in education. In addition, independent game developers such as [GarageGames](#) and others commonly referred to as "serious game developers" (e.g., the [Serious Games Initiative](#) and [Team Play Learning Dynamics](#)) are beginning to reach out to educators since the possibility of profiting from the development of video games for the education market increases as each year passes. However, until more game developers actively target the educational market, educators must fill the void by developing their own curricular materials for classroom use. This situation places a substantial burden on educators; creating new materials for each video game that might be used in their curriculum is a time-consuming and redundant process that may not utilize the best pedagogical methods. Decreasing the time and resources required to develop new curricular materials and increasing alignment with state educational standards should increase the acceptance of video games in the classroom.

An Online Community of Open Source Development for Video Game Technology in Education

As a step forward, we envision a project that would tie together the development of open source materials and a self-organized open community to explore and support the use of video game technology in educational settings. While open source in its strictest sense refers to software published under a [free software license](#), we use the term loosely to refer to the more general concept of materials or objects that are shareable and that draw on other similar objects or materials in an open and communal process. The creations of self-organized communities of shared objects are well represented by [Merlot](#), [Wikipedia](#), and [Slashdot](#). The outcome of our project would be to create a similar online collaborative environment where those interested in video games in the classroom could work together to create a library of learning objects and share advice on their integration in the classroom.

Using learning objects to support instructional design and materials is a fairly recent trend in education (Wiley 2002; Institute of Electrical and Electronics Engineers 2002). While there seem to be as many specific definitions of learning objects as there are groups interested in them, Polsani (2003) suggests that in the educational community, the principles of reusability, interoperability, and accessibility are generally understood to be the basic functional requirements of learning objects. In the project we envision, learning objects would include such items as open source [mods](#) of video games not otherwise restricted by copyright, modding tools or procedures, custom-designed applications designed to support the educational use of games, or curricular materials designed to support the implementation of such games in learning contexts (syllabuses, assignments, group projects, discussion questions, etc.).

To attain reusability and interoperability, Polsani (2003) emphasizes that the development and eventual use of learning objects should be mutually exclusive processes. The separation between creation and deployment ensures that learning objects do not favor any instructional methodology and can be reused in a variety of contexts. While this general rule may not apply to learning objects such as course-related assignments and activities involving video games, it would apply to learning objects such as modding tools, modding procedures, or customized programming codes that allow developers to create new functions or simulations within a video game. For example, a biology educator might create a set of useful procedures for modifying a video game and apply these procedures in order to meet state science education standards. Later, a chemistry educator interested in the same video game could access these procedures but use them to modify the game to meet science education standards in a different discipline. Still another educator might adopt the same procedures to modify the game to meet state mathematics education standards. In this case the learning object itself (modding procedures) would not be altered, but how it would be used in a variety of learning environments would change over time as long as the object remained accessible in an open community space.

The project we envision would provide such an open community space by including a repository of such learning objects for reuse by project participants. Learning objects must be stored and categorized in an accessible repository if they are to be useful, and several existing learning object repositories have been documented by Neven and Duval (2002). Although the exact format for our gaming repository is unimportant at this early stage of development, it is important to note that learning object repositories can only become successful if they are used. However, if they are to be used successfully, a critical mass of learning objects must already exist (Neven and Duval 2002). This "chicken and egg" problem with learning object repositories prevents them from becoming more widespread (Spalter 2002). Nevertheless, we hope that through active scholarly interest and vigorous promotion at conferences, the online environment of video game learning objects we propose will grow and thrive, both for game developers and educators.

As the repository expands and the community hones the learning objects, game developers using these online resources will be able to adapt newly developed video games to new educational settings quickly. The potential for reusing learning objects from one video game to the next is possible because the majority of video games can be placed into fairly well defined categories or subcategories. Consequently, curriculum elements created for one video game can be modified and moved to support another video game of similar nature. For example, the various [tycoon games](#) are similar but do have some specific elements unique to each. In our proposed project, a community could build various curriculum-specific learning objects for one

tycoon game (e.g., a gaming activity for a high school economics course) and then port them to another tycoon game by changing details as necessary to fit the design of the new video game. This reusability and interoperability through an accessible environment takes advantage of the similarity of video games within genres and makes developing the subsequent learning objects easier.

Finally, educators using such an online repository could comment on which video games are useful or appropriate in the classroom. Clearly, not every video game can be used in the classroom since appropriateness is influenced at minimum by the age of students, the subject matter being taught, and the learning outcomes being measured. But under the right circumstances, many video games can be implemented in a variety of educational situations. As an example, we are acquainted with a middle-school educator in Texas whose stakeholders find the video game [Neverwinter Nights](#) inappropriate for use in the classroom because of its fantasy storyline. However, through its scenario-building toolset, the video game becomes an instrument for students to design their own digital stories (cf. Gouglas et al. [2006](#)), which in turn is readily accepted by stakeholders in support of literacy. As educators share successful experiences with video games in the classroom, there will be more examples to help thwart the negative perceptions currently facing video games in the classroom (Aguilera and Memdiz 2003; Lombardi and McCahill [2004](#)).

Overcoming the Reluctance of Stakeholders by Fostering Research

As promising as this scenario may sound, merely creating a self-organized community of video game learning objects will not sufficiently foster their widespread use in education. Various stakeholders such as parents, administrators, and legislators must be convinced of the immediate and lasting benefits that such technology can offer to students.

For years, games of various types have been used in education, and since the time computers first made their entrance into the classroom, computer-based games have had their place as well. However, the existing emphasis towards nationalized testing of established objectives puts the future of educational gaming in jeopardy. Many schools are hesitant to invest resources in any new or unproven technology and may have doubts about the educational use of video games without authoritative research to support their pedagogical value. Consequently, stakeholders are redirecting their limited resources toward high-stakes testing in order to meet required expectations, avoid withdrawal of state and federal funds, and work against the loss of jobs and administrative control. These apprehensions by stakeholders, which are completely understandable given the current circumstances, can be minimized with credible research.

The approach proposed in this article has the potential to foster credible research on the use of video games in the classroom. For instance, in a single online environment, teachers can share classroom success stories, educators and game developers can publish and hone reusable learning objects in a common repository, and scholars can provide theoretical direction for applied research studies. Coupling those intellectual resources with the financial resources potentially available to educational researchers through grants and initiatives opens the possibility for ground-breaking results. With this synergy among developers, researchers, and educators in the online environment, we expect forthcoming research to show how the proper use of video games in the classroom has the potential to increase such educational goals as the retention of facts, the identification of abstract categories, and the analysis of complex situations. Furthermore, we hope that stakeholders will recognize the research, eventually endorse video games in schools, and use them in the best pedagogical sense.

Moving Involvement from After-Release to Before-Release

Today, educators who employ video game technology in their teaching almost exclusively prepare their materials after the release of a particular game, and we feel that this will continue to be the case for the coming years. Therefore, the immediate goal of our project is to focus on existing video games and their use in the classroom in order to create a learning object repository and a self-organized community of educators, designers, and researchers. As new games are released, new learning objects can be added to the

repository, reused or modified by educators, and assessed by project participants. However, once the environment and repository have achieved sufficient momentum, the next stage is getting educators involved in before-release game developer activities.

Software developers often encourage their gaming population to become prerelease testers in order to work out bugs and ensure proper game play (e.g., ArenaNet 2006). In this environment, educators and their students have the opportunity to take the initiative and become testers and play the latest video games before their release. In turn, becoming active in video game testing allows for the prerelease development of curricular materials for tested games. Materials developed could then be integrated into the project as soon as the nondisclosure agreements used for testing expire. As noted earlier, as independent and serious game developers enter the educational space, they will actively seek educator involvement in prerelease development. This involvement might take the form of the developers using or referencing materials in the proposed project repository to enhance the design of an existing game or asking educators involved in the project to assist with the alignment or creation of new materials. Through the online environment we propose, game developers will have the ability both to collaborate with an established community of educators interested in incorporating computer games in their classrooms and also to utilize an existing repository of computer gaming learning objects for their own game development. The last stage of this project would encourage software developers to include educators directly in the design and development of future games. In this new role, educators would hopefully be able to shape games to meet educational needs and interests better while still allowing game developers to address their primary profitability channels.

As a first step towards this larger goal, our proposed project would allow smaller game developers interested in designing games with educational tie-ins the opportunity to examine how educators utilize larger mainstream games in their work. We believe that it is possible for educators to participate with interested smaller game designers in the developmental process, especially if doing so gets potentially large numbers of students using their game designs. Smaller video game developers then will be able to show off their game designing talents and receive publicity for their creative developmental procedures and unorthodox partnerships. Working directly with educators, smaller video game publishers and developers have the opportunity to see how educational infusion can work and still be potentially profitable. Ultimately we hope that once larger video game publishers observe the market potential forged by smaller game developers they will show interest in the educational gaming marketplace.

Conclusion

By creating an online environment to maintain a repository of learning objects for using video games in education, we hope to yield several outcomes:

- an accessible and reusable repository of learning objects that can grow as the technology changes,
- a community of educators interested in the development of curricular materials for use with video games in the classroom,
- materials aligned to various educational standards, and
- communication between video game developers, researchers, and educators.

However, as promising as this proposed project appears, there are nevertheless several major challenges facing its implementation. First, the project is still in its infancy, and so many of the project details, such as the shape of the online environment and the sources of funding, are still unknown. Second, just because the online environment and learning object repository are built does not mean people will use them. It will take strong advocates, both in print and at conferences, to support and promote the need for such a project. Third, gathering interested educators may be difficult since they tend to work in isolation and do not necessarily have the resources to attend academic conferences around the world. In this case, grassroots efforts by researchers, such as communication with educators in online gaming discussion forums, will be needed. Fourth, just like with educators, grabbing the attention of gaming developers will be a challenge. Starting with

smaller, more approachable game developers by way of online gaming forums and conferences will most likely need to be done in order to convince larger game developers of the potential value of the project.

This proposed project has recently been discussed at the Association for the Advancement of Computing in Education ([AACE](#)) games and simulations group meeting in Orlando in March, 2006. Comprised of educators, researchers, and game designers, the group showed interest in the concepts we have presented here and further discussion will be held on the group's online forum. Additional goals and subsequent action plans are slated to be discussed in more detail over the coming months and during the [NECC's](#) 2006 conference. We hope that these initial groups of interested parties will serve as a catalyst to entice other participants to become part of the project, and that as more researchers, educators, and developers hear the "buzz" surrounding the project, critical mass will form, the details of the project will take shape, and tangible products will come to light.

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