BEST PRACTICES FOR USING GAMES & SIMULATIONS IN THE CLASSROOM

Guidelines for K–12 Educators

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The Software & Information Industry Association is the principal trade association for the software and digital content industry. SIIA provides global services in government relations, business development, corporate education and intellectual property protection to the leading companies that are setting the pace for the digital age.

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Best Practices For Using Games & Simulations In The Classroom: Guidelines for K–12 Educators

SIIA Software & Information Industry Association

A Publication of the SIIA Education Division

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Acknowledgements

We greatly appreciate the contribution of SIIA education members, educators and others in the education community who gave of their time and expertise to guide this report.

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We gathered critical information for this report by using EDRoom [www.edroom. net]. EDRoom's online discussion space enabled thoughtful interactions and as a result, the SIIA's EduGames Working Group gained a new depth of understanding about the practical aspects of using games and simulations as learning tools.

Education–market research experts Ellen Bialo and Jay Sivin–Kachala of EDRoom worked closely with the SIIA Working Group to create a detailed discussion guide built around the outline for the report. They developed the panelist profile to help SIIA secure a geographically diverse panel of district and school level administrators and teachers.

Our focus participants were teachers, technology coordinators and instructional leaders who actively used games and simulations in the classroom for at least one year. They represented district sizes that ranged from individual private academies to the largest public school district in the country and one college professor. We are extremely grateful for the expertise and time that they gave to this project.

We interviewed executives from companies and organizations who develop educational games and simulations. We are grateful to the following companies for making their executives available for this project: Dana Laursen (PLATO Learning), Michelle Roper (Federation of American Scientists (FAS), David Martz (Muzzy Lane, Inc), Ntiedo Etuk (Tabula Digita), Barry Joseph (Global Kids), Jim Bower (Whyville.net) and Atusi Hirumi (University of Central Florida).

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EXECUTIVE SUMMARY

This report provides a blueprint for successful implementation of EduGames in the average classroom. This term encompasses video games, console games and virtual worlds used in the classroom. Other terms for these games include: Serious Games; Massively Multiplayer Online Learning Games (MMOLG); Massively Multiplayer Online (MMO) Games; Immersive Learning Environments (ILE); Edutainment – older educationally–themed games published for home use (e.g. Reader Rabbit, Math Blaster, etc.).

We start from an assumption that games have positive impacts and our objective is to support the growth of this promising and emerging market. We have distilled the hard–won lessons from the schools and companies that have pioneered this space in order to provide guidelines to new users.

This paper is intended for teachers, administrators, policy makers and developer companies. They will get practical hands–on tips and insights on successfully integrating games into classroom practice.

If you need to be persuaded that games can work, we urge you to read the books and research developed on this topic. SIIA published a 12–page roundup of the research base, case studies, books and media coverage of EduGames. The paper can be accessed for free at www.siia.net/education/foreducators.

The guidelines for implementing EduGames are based on common sense.

The guidelines for implementing EduGames are based on common sense. However, EduGames are different enough that they do require some specific implementation assistance. While EduGames exist for all curricular levels, we have focused on implementation in grades 5–12.

We conducted an online focus group of classroom practitioners, interviewed companies and institutions that have deployed games broadly and did a literature review to develop these guidelines. See the Appendix for detail on the interviewees.

Phase 1 – Selling the Idea

The effective deployment of any instructional resource requires the support of teachers. Educators cannot feel threatened, be uncomfortable, or lose control when they use something new. With EduGames, the potential for all three of these issues is higher, so a well crafted strategy to address them is essential.

Administrators need to understand their unique role and see resources that they can use to explain the project to stakeholders. If an administrator is driving the deployment, he/she needs to be prepared to support a wide range of teacher familiarity and comfort with EduGames. Administrators will need to be equipped with research and references that can be shared with parents and the press.

Information Technology groups will prioritize stability, efficacy, network safety and cost control when they evaluate new products. Advocates for EduGames need to earn the trust of IT early in the process, or the project can be shut down before it even begins.

Students should not feel threatened and they need to understand how it will work. They also have sophisticated filters for good games and won't easily tolerate poor design.

As with any new instructional resource, gaining parental support is an important part of the political process. Widespread misconceptions about games can stall efforts unless you are prepared to address them. Regularly inform parents of the purpose, scope and results of the project. Demonstrate the connection to 21st Century Skills to earn the support of the community. Where possible invite parents into the process.

Phase 2 – Preparation

A holistic approach that addresses technical infrastructure, installation, support resources, professional development and lesson planning covers most of the bases.

Because EduGames are still largely unknown to most educators, implementation services can not be optional. In order to reach sustained – rather than experimental – usage, schools and districts need to dedicate time and money to preparing the environment thoroughly.

Districts vary widely in technology infrastructure, the openness of IT to new solutions and their general policies about games and learning. However, in general, advocates need to acknowledge that games need extra support and cooperation from IT.

Implementing any new instructional approach requires professional development. Even teachers who are gamers do not intuitively know how to use games in the classroom. Tightly link professional development and initial student use – any delay can lead to problems. Plan on a minimum of a ½ day on–site with hands–on time in teams.

Teachers need to understand how the activities connect to the standards, what the goals are for the exercise and which students it can benefit the most. They should also introduce the games at a pace they are comfortable with. Teachers are the lynch pin to success. Get the right teachers on board and they will inspire their students and the other teachers in your building. Ideally you want people who are leaders – politically, technically and pedagogically.

Phase 3 – Implementation

The majority of the comments we received on teaching strategies related to blended learning. Mix game play with discussion, lecture, reading and writing to gain the most benefits. Panelists encouraged others to tap those aspects of games that make them fun – competition, failure and transgressive play.

Lessons and game activities should be organized so they can be "consumed" in a 45–50 minute class period. It can be useful to start small in order to accommodate the natural learning curve teachers and students will need before they become proficient with a new resource.

There are pedagogical and practical reasons for having students play in teams of 2–4 rather than alone. Pedagogically, games force collaborative decision making. Grouping helps reduce barriers to learning by grouping proficient gamers with non–gamers. Practically, working in teams lowers the technology footprint needed and it allows students to cover for each other during absences.

Classroom management for EduGames is very similar to any hands on activity. An actively involved teacher providing content expertise and focus moves things along. Games appear to be particularly good at encouraging peer tutoring. To date, behavioral issues like bullying have not been an issue. Backend integration with the school's management systems relieves a lot of the administrative burden from teachers.

Given the novelty of game–based learning, many educators remain skeptical of the games' ability to facilitate learning or to embed assessments appropriately. It is important to provide external validation of the learning that is taking place. Over time, if games deliver as promised, we expect educators to become more comfortable with in–game assessments.

INTRODUCTION

Objective

This report provides a blueprint for successfully implementing EduGames in the average classroom. A new generation of learning games is coming to market and our objective is to support the growth of this promising and emerging toolset. We have distilled the hard–won lessons from the schools and companies that have pioneered this space in order to provide insight for new users. We believe the key to the long–term growth of EduGames is a wave of successful implementations in regular classrooms.

"Schools already integrate supplemental resources into classrooms and most of the same practices also apply to EduGames."

There are a number of people at the university and corporate level conducting research into games in the classroom. Their focus, however, is on efficacy, not on widespread adoption of materials designed for the classroom. These studies have primarily used consumer games or games designed specifically for the research project.

Our intention in this paper is to let that work speak for itself and to focus on what teachers, administrators and companies can do to deploy educational games. In other words, we start from an assumption that games have positive impacts. This frees us to focus only on best practices for implementing games.

If you need to be persuaded that games can work, we urge you to read the books and research developed on this topic. In January 2008, SIIA published a 12 page roundup of the research base, case studies, books and media coverage of EduGames. A link to this free PDF is in the Appendix.

Schools already integrate supplemental resources into classrooms and most of the same practices also apply to EduGames. However, EduGames are different enough that, while the approach may be similar, additional support beyond that provided with traditional materials may well be needed.

Despite the many benefits of integrating EduGames into the learning ecosystem, the resistance faced by those implementing them is significant. In 2005, Kurt Squire wrote:

> "…as challenging as it is to design a good educational game, it may be more challenging to design a good educational system for educational games to flourish in. Right now [2005], even if you had the ideal game–a more polished Civilization III or perhaps a Full Spectrum Scientist, it is not certain that such a game could even survive in today's educational environment as our contemporary educational systems do not know how to sustain a curricular innovation built on the properties that make games compelling."

We hope this paper contributes to the solution of this problem.

Intended Audiences

Teachers will get practical hands–on tips for how to sell the idea of games, how to prepare their classrooms in advance and how to manage their classroom while using games.

Administrators, policy makers and other instructional leaders can use the information as a planning and coaching guide to ensure that teachers and students have the resources needed to be successful when they implement game–based learning.

Developing companies will gain insights to help them design EduGames and implementation services.

Focus

While games are being adopted across the entire learning spectrum (pre–K to Adult Education), this report is focused on the most common deployment in schools – grades 5–12. Most of the innovative games used in schools target this age group. And, most schools do not deploy computers – much less games – until the 4th or 5th grade. More sophisticated uses typically start in middle school and beyond.

We believe our findings can be generally applied to younger and older learners, but they may require additional support not specifically covered in the scope of this report.

There have been earlier waves of EduGames. In the '70s, we saw pioneering games like Oregon Trail on terminals. In the '80s, we had drill and practice programs like MathBlaster and Reader Rabbit. The '90s saw a wave of 'sims' (simulation games) that included Civilization and the Tycoon series. Almost all of the earlier generation games lacked true multiplayer modes and most of them were only tangentially designed for classroom use. The web and a new generation of development tools have changed both the economics of developing for schools and the level of social interaction among players. These changes have led to a new class of EduGames.

Our research focused on these modern games, rather than commercial off the shelf games (e.g. Civilization). The EduGames included in our study meet most of the following criteria:

- ◆ Intentionally designed for classroom use
- ◆ Experiential, constructivist
- ◆ Multi–player, web enabled or web based
- ◆ For sale or free to schools, not research projects

"The web and a new generation of development tools have changed both the economics of developing for schools and the level of social interaction among players."

We use the following conventions for naming in this paper:

◆ **EduGames** – This term encompasses video games, console games and virtual worlds used in the classroom. No one has developed a term that is broadly accepted yet. Since this term has the benefits of brevity and clarity, we have adopted it. Other terms for these games include: Serious Games; Massively Multiplayer Online Learning Games (MMOLG); Massively Multiplayer Online (MMO) [Game]; Immersive Learning Environments (ILE); Edutainment – older educationally–themed games published for home use (e.g. Reader Rabbit, Math Blaster, etc.).

◆ **Instructional Resources** – This term is used to describe the full range of materials found in today's classrooms, including traditional textbooks, supplementary materials, manipulatives, lab hardware and materials, instructional software and online tools.

Methodology

This report is an aggregation of input from experts. There were three main sources of insights.

Online Focus Group of Practitioners

Our primary source is an online focus group discussion conducted in June, 2008.

Seven educators participated over 14 days using EDRoom, an online private discussion area designed for moderated conversations. Participants were teachers, technology directors and instructional leaders (principals) who have been active users of EduGames for at least one year. Five states and different sized districts were represented.

Eight prepared questions generated a robust exchange among the participants. The average response was 2–3 paragraphs in length. Participants made substantive contributions and responses.

EduGame Developer Interviews

Interviews lasting 60 minutes were conducted with senior executives at six organizations actively developing video games and simulations for the classroom. These included companies, non–profits and universities. Bringing products to market has provided these executives with valuable lessons about the characteristics of successful implementations in a wide variety of settings. We interviewed the following organizations:

◆ PLATO Learning: PSP and computer based content games. Products: Lightspan, Achieve Now, Straight Curve Math.

◆ Tabula Digita: Single user and multiplayer PC video games. Products: Dimension M Series (Algebra)

- Muzzy Lane: Single user and multiplayer PC video games. Products: Making History and publisher projects (Social Studies/History)

- Federation of American Scientists: PC video games/virtual worlds. Products: Immune Attack and Discover Babylon (Biology/Health)

- Numedeon, Inc.: Virtual World. Products: Whyville.net – Math/Science.

- University of Central Florida: Research: Atusi Hirumi, UCF Professor and Author of the Tabula Digita Study

Literature Review

We conducted a high–level literature review and found very few articles that addressed questions of implementation. We have cited those articles where relevant in the report and have provided links to them in the Appendix.

Report Structure

We have grouped the topics covered in the report into three large segments that roughly parallel the sequence a school goes through as it implements games:

- Selling the idea

- Preparation

- Implementation

- Each sub–section follows the same outline.

  - **Introduction**
  - **Key Findings** – If you want to skim the document, these bulleted lists are a handy way to see "just the facts."
  - **Guidelines** – In this section, we take each of the key findings and briefly expand on them and, where appropriate, provide quotes from the panel, interviews and literature.

    A key to the characteristics of the quoted professionals can be found in the Appendix under the header EDRoom.

PHASE 1 – SELLING THE IDEA

EduGames are still a novelty. Convincing all the stakeholders to support implementation takes more effort and focus than do traditional supplemental materials. Teachers need reassurance that the additional effort will result in improved outcomes. Administrators and parents need to understand the pedagogical benefits of playing EduGames and that they are not just for amusement. Information Technology (IT) departments need to protect the network and cannot take on onerous implementations. Even students need support and structure to understand how games can be used to learn rather than "just" play.

TEACHERS

The effective deployment of any instructional resource requires the support of teachers. When the door closes on a classroom, if the teacher is not convinced that the tool is worth their time, it will not get used. Teachers cannot feel threatened, be uncomfortable, or lose control when they use something new. With EduGames, the potential for all three of these issues is high, so a well crafted strategy to address them is essential.

Key Findings

- Give teachers a metaphor that connects EduGames to something familiar (and safe) like labs.
- EduGames must come with guidelines for classroom management. Teachers can not feel like they are going to lose control.
- Teachers want a "suspenders and a belt" approach to assessment. Provide both in–game and paper and pencil assessments.
- Explain the benefits clearly and without "marketing–ese." Engagement, motivation and reach are the core benefits.
- Teachers need to understand their role as content area experts.
- Teachers need peer reference. "It works and it is safe."
- EduGames need proof of efficacy.
- EduGames must be aligned to standards.

Guidelines

Give teachers a metaphor that connects EduGames to something familiar.
One of the easiest ways to lower the threat level of something new is to metaphorically align it with something familiar. In schools, EduGames are most closely related to Lab work – hands on time for students to explore and use what they have learned elsewhere. History or English teachers might not be used to labs in the classes, but they know how they are used in science.

EduGames need to contain guidelines for classroom management.
Most early technology adopters are comfortable providing the structure around new products for themselves. It is part of what interests them about using new and cutting edge materials. However, the vast majority of people

> *"In schools, EduGames are most closely related to Lab work..."*

want a more scaffolded experience – a structure that tells them how best to use and manage a product.

Most teachers will need to understand how classroom management and professional development will be addressed before they will agree to use EduGames. Whether you are an internal advocate in a school or a developing company, do not neglect to address these issues early on, in as much depth as teachers need.

Teachers also need to understand is that there are multiple paths to using games in their classroom and they can choose the one that works best for them and their students. Showing teachers a range of options from experimental use to jumping in completely will help alleviate anxiety among the less technically adept members of the audience.

Provide both in–game and paper and pencil assessments.
Many people are excited about the ability of games to track and provide detailed feedback on student learning (time on task, path to problem solving, communication logs, etc.). But several of our institutional experts discovered that their initial assumption that this approach would be sufficient was wrong. They were forced to go back and create parallel paper and pencil assessments to help teachers bridge the gap between the old and the new. We discuss the reasons for this in the section on Assessment toward the end of the paper.

Explain the benefits clearly – engagement, motivation and reach are the core benefits.
The following are benefits that teachers told us they valued.

- **Engagement:** Games provide an opportunity to gain the attention of students who are not otherwise engaged with the content of a class. The fun of the game pulls them in. Research shows that EduGames have the biggest impact for low performing students – students who do not engage through the textbook, lecture and other classroom activities.

  > DavidMcD – "[Games] motivate students to engage in the learning process. When engaged, then I can teach in the ideal classroom…in which nearly all students are listening and learning from our interaction."

  > PeggyS – "The compelling nature of the 3–d environment creates a participatory culture where students are engaged and invested…teachers report a deeper, more profound level of discourse, shared across all learning styles and ability levels."

- **Motivation:** The ability to harness competition as a motivating force. Students will learn in order to have a shot at winning.

  > TonySF – "In the multiplayer games competition is such a motivating factor, students want to win even if it means they have to learn something."

"The compelling nature of the 3–d environment creates a participatory culture where students are engaged and invested…"

◆ • **Reach:** The ability to provide input through more learning styles. Learning styles are the varied processes through which people best acquire new information. The primary styles are visual (reading), auditory (listening) and kinesthetic (moving objects or the self)

> DavidMcD – "Using games allows me to hit multiple learning styles in the same lesson in a much easier way than the normal classroom environment."

"Using games allows me to hit multiple learning styles in the same lesson in a much easier way than the normal classroom environment."

Teachers need to understand their role as content area experts.
One of the biggest fears teachers have about using EduGames is that there is not a role for them, which may lead to a loss of control in the classroom. Explaining the role of the teacher can alleviate their reluctance to try games.

In point of fact, one of the things that sets school–based EduGames apart is that a content area expert is available before, during and after the game to guide students. Games outside the classroom cannot count on this expertise and are at a disadvantage as a result. A teacher can prepare students with the necessary background knowledge, intervene with advice during play and guide a reflective conversation after play about what students learned and how it can be applied elsewhere. There is nothing artificial about the intelligence a teacher contributes to this process.

Teachers need research and peer references.
A well–researched reference base is essential – it cannot be skimped. Educators assume this references are there for more traditional materials, but newer, riskier products are naturally held to a higher standard.

Having references is an axiom of selling to the school market. The closer these are geographically and demographically to the school you are working with the better. For developing companies, this means paying close attention to your early customers, supporting and tracking their successes and, when they are ready, inviting them to participate as references.

Teachers should participate in online forums where they can get unvarnished feedback from their peers. In the EduGames space, two forums in particular are valuable resources for this kind of research – Rez Ed   http://www.rezed. org/ and the Serious Games Working Group http://seriousgames.ning.com/

EduGames need proof of efficacy.
One rarely hears school boards demanding to know how much textbooks are being used and what results are being attained. Education technology is held to a much higher standard – and particularly so for cutting–edge technology. While this may not seem entirely fair, advocates for EduGames need to be well–versed in the research findings that do exist.

EduGames must be aligned to standards.
Developers and internal advocates will not get permission to talk about new instructional materials unless they can demonstrate how they connect to standards. Developers must build products using the standards as a guide and

provide alignment/correlation documents as part of the sales process to get past this gatekeeper issue.

Games present some challenges in this area because of the naturally multidisciplinary nature of gaming and because many of the skills they develop are not part of the core curriculum (but should be!). It is acceptable to provide separate correlations (for example, Language Arts and Social Studies) if you truly address the standards in both areas.

ADMINISTRATORS AND POLICY MAKERS

Administrators share most of the teachers' concerns, but they also need to understand their unique role and see resources that they can use to explain the project to stakeholders.

Key Findings

- ◆ If an administrator is driving the deployment, he/she needs to be prepared to support a wide range of teacher familiarity and comfort with EduGames.
- ◆ Administrators will need to be equipped with research and references that can be shared with parents and press.

Guidelines

Administrators driving deployment need to be prepared to support a wide range of teacher familiarity and comfort with EduGames.
When an administrator takes on the leadership role, he/she will need to be very flexible about how they allow teachers approach using these tools. Sensitivity to insecurity about new technology, the ability to pair experts with non–experts and patience to let usage unfold at a natural pace will all go a long way toward allowing a smooth deployment.

Administrators need to make a sustained commitment to professional development. Materials this new require starting at a very basic level and building from there. What are games? How can you teach with them?

Administrators need to be equipped with research and references that can be shared with parents and press.
Research findings that may be acceptable in an academic environment are typically not in a format that is readily accessible to non–educators. Given the political exposure an administrator may have when they try something innovative, it is important to have the right ammunition to support the political conversations that go along with change.

Skepticism is healthy. Advocates for change should be able to support their cause with evidence rather than just passion. But when evidence is presented, know the audience. Equip them to be advocates in their own words.

INFORMATION TECHNOLOGY (IT)

A good IT shop will prioritize stability, efficacy, network safety and cost control when they evaluate new products. Advocates for EduGames need to earn the trust of IT early in the process, or they can shut the project down before it even begins. In the case of IT, it is better to get permission than it is to ask for forgiveness.

Key Findings

- It is not just about technical specifications. Efficacy is also part of IT's charter in most school districts.
- Simplify installation and upgrades.
- Learn the existing policies about port access, games on the network, etc. and work within them whenever possible.

Guidelines

Efficacy is part of IT's charter in most school districts.
Most school districts have charged IT with supporting the core mission of learning. Today's school IT looks far beyond just the technical aspects to see what technologies can reach students who are being left behind. Be sure to share your research and references with any IT staff that are part of the process.

Simplify installation and upgrades.
Most school IT departments operate on a thin staff compared to the corporate world. Minimizing the time they need to spend installing software and upgrades on individual machines scattered across a district will help them enormously.

Work within the existing policies about port access, games on the network, etc..
Games should be designed to adhere to industry standards for network access (ports, protocols, etc.). Even when you meet standards, you will still need approval and support from IT to allow your application to access the network. Get it in advance!

> JohnR – politics plays a role too. "Negative attitudes toward use of gaming may prevent some lab administrators from installing necessary software on lab computers. CIPA [Children's Internet Privacy Act] filters are normally set to block online gaming and allowing access to a site often requires diplomatic skills and knowing who controls the settings. Such political obstacles can be more troublesome than obtaining the needed physical resources."

While web–enabled or deployed EduGames can help reduce the installation effort, they frequently come up against network access restrictions and policies about "games" on school networks. No advocate for EduGames should take either of these issues for granted.

"While web–enabled or deployed EduGames can help reduce the installation effort, they frequently come up against network access restrictions and policies about "games" on school networks."

If policy prevents "games" on networks, presenting them as a "simulation," a "lab", or a "virtual learning environment" may be necessary. Otherwise a waiver from an administrative supporter may be required. Resolve this issue before attempting to deploy will save a great deal of trouble later.

STUDENTS

Given the level of video game use among today's students, convincing them to use EduGames is easier than their elders. But like teachers, they should not feel threatened and they need to understand how it will work. They also have sophisticated filters for good games and will not easily tolerate poor design.

Key Findings

- ◆ It must be a great game first.
- ◆ The game mechanic needs to embody the learning objectives.
- ◆ Non–gamers need structure and peer support.

Guidelines

It must be a great game first.
Today's students have a sophisticated understanding of what makes a good game and will not easily tolerate poor design. Too much of what has been passed off as EduGames is "chocolate covered broccoli" – a game that presents the learning components, but is just not fun to play.

The 'game mechanic' needs to embody the learning objectives.
Game designers call the core set of rules that guide a game the "game mechanic." The game activities that lead to success have to be aligned to the learning objectives. Too often, the game part of EduGames is a reward for doing something inherently uninteresting. In a poorly designed game, a player may have to memorize a formula to earn the right to blast some aliens. In a properly designed EduGame, the student should use the formula to blast the aliens.

This does not mean that EduGames need to rival the look and feel of commercial games. In most cases, this is neither feasible nor necessary. It means that the game mechanic has to be engaging and fun. For more on this subject, we recommend reading Raph Koster's book "A Theory of Fun."

Non–gamers need scaffolding and peer support.
Many adults fall into the fallacy that all students are gamers. Despite the Pew Report that shows that 94% of teens play games, teachers need to be sensitive to the fact that many students are casual gamers, at best.

Kurt Squires paper, Changing the Game, notes:

> "When I introduced Civilization III into curricula, I found that students were anything but immediately motivated. They frequently asked, 'What's the purpose of this?' and 'Why are we doing this?.' Even for middle school students, it was not entirely clear how a computer game could teach them about history or geography. In part, this was because most students

"The game activities that lead to success have to be aligned to the learning objectives."

needed 6–7 hours of game play to even understand the most basic game concepts. Roughly one quarter of the students elected to withdraw from the unit, opting to participate in reading groups rather than a game–based unit. They felt that the game was too hard, complicated and uninteresting."

PARENTS AND COMMUNITY

As with any new instructional resource, earning parent support is an important part of the political process. Widespread misconceptions about games can stall your efforts unless you are prepared to address them.

Key Findings

- Regularly inform parents of the purpose, scope and results of the project.
- Demonstrate the connection to 21st Century Skills to earn the support of the community.
- Where possible, invite parents into the process.

Guidelines

Regularly inform parents of the purpose, scope and results of the project.
Do not let parents find out that games are in the school over the dinner table after the fact. Several of our participants stressed how important parental support is to trying something different like games. Many non–gamers only hear the negative stories about video games. Parents need to see that there is real learning going on and that there is a lot more to the technology than what is found at the local game shop.

> Middle School Journal – "As with any new teaching methodology, we suggest that parents be carefully informed regarding the purpose and scope of the video simulation use in the classroom."

Communicate results regularly and openly.

Demonstrate the connection to 21st Century Skills to earn the support of the community.
Explicitly pointing out how EduGames develop teamwork, problem solving, communication and other 21st Century Skills is important. This may be counterintuitive to many people. For laymen, we recommend Stephen Johnson's book, "Everything Bad is Good for You" as a primer on this topic. This can be particularly useful with the business community that values skills like teamwork, problem solving, creativity and self–motivation.

Where possible, invite parents into the game.
Many parents may quietly want to play the game to learn concepts they never properly mastered or that they have forgotten. If your license allows, encourage parents to do it. This is a great way to expand the base of your support.

"... we suggest that parents be carefully informed regarding the purpose and scope of the video simulation use in the classroom."

Public libraries are building collections of games and many are sponsoring family video game nights. A partnership with the local library can provide a non–threatening environment in which to expose parents to the games students are playing in school.

"To get sustained, rather than experimental usage, schools and districts need to dedicate the time and money to thoroughly preparing the environment."

PHASE 2 – PREPARATION

Once the case for EduGames is made, the ground needs to be prepared for a successful deployment. A holistic approach that addresses technical infrastructure, installation, support resources, professional development and lesson planning covers most of the bases. Picking the right teachers and administrators to lead the charge will also improve your odds of success. Because EduGames are still largely unknown to most educators, implementation services are not optional. Several of the companies we talked to stressed this fact. To get sustained, rather than experimental usage, schools and districts need to dedicate the time and money to thoroughly preparing the environment.

INSTALLATION AND SUPPORT

Educators will need to translate the advice that follows for their specific situation. Districts vary widely in technology infrastructure, the openness of IT to new solutions and their general policies about games and learning. We heard everything from full support to stubborn resistance from our panelists.

Key Findings

 * Implementation services are not optional at this stage of the market.
 * Games need extra support and cooperation from IT.
 * It takes about 10 days to get new online products up and running in a school. Budget 2–3 weeks in the schedule.
 * Cater to the school calendar. Resolve infrastructure issues before the school year starts.
 * EduGames should be built for slightly older technologies.
 * Support should be available during class time.
 * Building–wide implementation encourages sustained use.

Guidelines

Implementation services are not optional at this stage of the market.
It just is not obvious enough yet what the best approach to implementation is. To get sustained use quickly, vendors have to require implementation services with purchases and districts/schools have to dedicate the time and money necessary to take full advantage of the purchase.

The extent of needed services is district–specific. Several members of the study group said they had great cooperation and others talked about how this was a major hurdle.

Games need extra support and cooperation from IT.
Many districts' policies actively thwart gaming technologies.

> JohnR – "Negative attitudes toward use of gaming may prevent some lab administrators from installing necessary software on lab computers. CIPA filters are normally set to block online gaming and allowing access to a site often requires diplomatic

skills and knowing who controls the settings. Such political obstacles can be more troublesome than obtaining the needed physical resources."

Our group was surprisingly upbeat about these issues. While technical issues took time to resolve, they were not a major stumbling block. If you ask nicely, it will not generally be an issue. IT staff are often interested in new technology and won't obstruct reasonable installations.

It takes about 10 days to get new online products up and running in a school.
Building in enough time for IT to work through any issues is an important part of having them as a partner. Our panelists felt that if you respect their time, they will provide the support you need. Allow 2–3 weeks to install and test before beginning use.

Resolve infrastructure issues before the school year starts.
Cater to the school calendar. This means products need to be ready by mid–August in most states. Networks and systems often get locked down after that.

Opening ports, bypassing filters and hardware compatibility represent 90% of the issues you will face. EduGame companies should be in an all–hands–on–deck mode during July and early August.

EduGames should be built for slightly older technologies.
Commercial games shoot for the cutting edge of clock speeds and graphics. Companies need to understand that schools have older equipment and that they do not update it as quickly as corporate users do. EduGames have to run on a mélange of systems that are, on average, 3–4 years old. On one hand, this restricts innovation. On the other hand, it forces better game design if developers cannot rely on flashy graphics to paper over the thin spots in a game.

Do not create islands of older products by jumping too far ahead on the tech curve. This complicates tech support and impacts customer satisfaction since schools do not always have access to the latest system software.

Support should be available during class time.
There was broad consensus on this issue. Teachers made a point of stating how important support during class time was to them. This availability frees them up to focus on the content.

In many situations, support can be provided by student mentors rather than IT, but do not rely solely on students. There are some issues that only IT can resolve.

Despite the best preparation, you will have technical issues.

Building–wide implementation encourages sustained use.
It is easier to let EduGames in quietly through one or two teachers. But, if you want to ensure longevity rather than novelty, a school–wide implementation is better. When more teachers are using a tool, they get more peer support and it is easier to move students between classes.

"EduGames have to run on a mélange of systems that are, on average, 3–4 years old. "

PROFESSIONAL DEVELOPMENT

Implementing any new instructional approach requires Professional Development (PD). This is doubly true when it involves a resource with which most teachers are unfamiliar. Even teachers who are gamers do not intuitively know how to use games in the classroom. Hand them a new textbook and they can parse the structure and teacher's guide with a little assistance. Give them a game and they are at sea. Teachers need hands–on game experience in the absence of students and grounding in why games work as learning devices.

Key Findings

"You need to schedule orientation for the teacher as closely as possible to the time the games are introduced to their students."

- Tightly link professional development and initial student use.
- Teachers need a safe place to ask questions and a peer network.
- Plan on a minimum of a ½ day on–site with hands–on time in teams.
- The teacher orientation should cover:
  - Introduction to games as teaching devices
  - Administrative tasks (roster provisioning, etc)
  - Multiple implementation options
  - The roles and responsibilities of teachers and students
  - An introduction to the structure of the game (no need to cover all the details)
  - The game interface (Being able to help students over this initial hurdle is an important part of getting to the content.)
- Provide quarterly follow up – forever.

Guidelines

Tightly link PD and initial student use.
This was one of the strongest pieces of advice we got from all participants in our research. You need to schedule orientation for the teacher as closely as possible to the time the games are introduced to their students.

If there is too much time lag, the excitement drops off quickly, so any delay is the enemy of implementation. Small things can derail implementation with teachers who may be apprehensive to try something new and unfamiliar.

Once the teacher is oriented with the software and the students have been exposed, the students' enthusiasm will keep the teacher going.

In an ideal scenario the teachers would be in one room getting their PD and the kids would be in another one getting oriented to the game. When the teachers are finished with their session, they would then see the kids engaged with the content.

PLATO does training for teachers, parents and students in the same week.

Teachers need a safe place to ask questions and a peer network.
Because games are terra incognita, the PD needs to provide opportunities to ask "dumb" questions safely. Help teachers build a peer network for ad hoc support and feedback.

> JohnR – "Teachers need support resources for any new intervention. Something as simple as a mailing list where they can ask questions, or an online bulletin board can suffice. They need a safe environment where they can ask "dumb" questions without being sneered at by others."

Several teachers stressed the importance of having peer support when you launch the game to the students. The PD can do this locally, but teachers should also look to online communities (SecondLife, ISTE, RezEd, etc.) where thousands of other teachers are sharing their insights and advice with each other.

Many buildings designate a Master Teacher to support others on the use of games.

Many teachers select a couple of students to be Master Gamers. They provide expertise on game play and mechanics to other students, freeing the teacher to focus on the instructional content.

> Middle School Journal – "Ask your school to provide information or training to your colleagues. Every teacher needs collegial support. Having your colleagues understand what you are doing and appreciate your innovations is important. Ask your school to support you by making sure your colleagues understand how video simulations can be powerful teaching tools."

Plan on a minimum of a ½ day on–site with hands–on time in teams.

> NT – "Structure the session so that it is 50/50 hands on and discussion. Teachers do not need to become gamers. The real reason to get them online is to show that there is real content – not so much to train on the game."

Be sure to team teachers together. If you have a sense of whom are gamers and whom are not, make a point of pairing them so that non–gamers are not put on the spot. This mirrors the findings about how to pair students in the classroom.

Video walk–throughs work well.

You can make the PD quite involved and that may be necessary for less structured environments like Second Life.

> PeggyS – "[our] teachers are offered a 7.5 hour in–service course in teaching in Second Life for which they receive credit toward salary increments. The teachers are guided through an orientation process on the main grid of Second Life where they acquire basic skills in navigation, communication, avatar design and content creation, as well as the incubation of a professional learning network. They then transfer this skill

"Having your colleagues understand what you are doing and appreciate your innovations is important."

set to the teacher avatar they use on [our] Islands. Upon completion of the course, teachers will have developed a lesson, unit, or project that supports their curriculum translated to the 3–d virtual environment."

The teacher orientation should cover:

"Upon completion of the course, teachers will have developed a lesson, unit, or project that supports their curriculum translated to the 3–d virtual environment."

- ◆ **Introduction to games as teaching devices:** The burgeoning field of Ludology (Latin for "game studies") can provide a theoretical underpinning that will help teachers insert EduGames into their instructional mix.

  The best off the shelf materials right now are available from Muzzy Lane Software. Their "Using Games in Education" (UGE) class is split into two sections. The opening section provides a general introduction to EduGames without referencing a specific product. The second section deals specifically with implementing their "Making History" Product.

  Additional resources can be found at the end of this paper. Several books (Gee, Prensky, Johnson, etc.) cover this ground well and are great references for orienting teachers.

- ◆ **Administrative tasks (roster provisioning, etc):** This section should cover how students get accounts, how the teacher can track and monitor what is happening and how to extract performance information for use in a standard gradebook.

  > DavidS– "What was most concerning to our teachers initially was how they could manage the problems that would arise (logging onto the computer system itself, knowing how to add new students, etc.). These administrative issues were paramount in the minds of our teachers."

  Do NOT short change this aspect of the implementation. Teachers will enter the class with suspicions that this new tool is going to take time they do not have. Address these issues early to alleviate these concerns.

  If administration is a problem with your game, you may want to consider spending the time to fix it before a broad–based roll out.

- ◆ **Multiple implementation options**: Differentiated instruction is not just for students. Teachers have a wide range of exposure and comfort with games and respecting those differences is important to broad based adoption. Let teachers find their own path at their own pace into the products. Companies and trainers should be prepared with a variety of use cases.

◆ **The roles and responsibilities of teachers and students:**
See more about this in the section on implementation.

> NT – Develop a "Master Gamer" from among the students in a class. This gives the teacher some control over student leadership.

> DavidS – He uses his students as mentors to other students. He focuses on training other teachers while his students train the students. With teachers, he focuses on how to manage the lab and how to use the software to teach

> Middle School Journal – "Anticipate on–demand learning moments. Clearly teachers must be expert in the content area that the video simulation will anchor, but they do not need to be highly expert in the use of the game itself. The game experts will emerge among the students…"

◆ **An introduction to the structure of the game:**

> TonySF – "[In Dimexion] there are twenty four missions and three online games. Details of how to complete each mission is not necessary to the teacher to use the game with the class."

The Federation of American Scientists shows a video of the game in the orientation. For their purposes, this is sufficient for most teachers. It is also in their comfort zone.

Other vendors noted that video walk–throughs were great follow up and refreshers for teachers as they got ready to introduce a "mission." These can be posted on the company site or on You Tube.

◆ **Understanding the game interface:** Being able to help students over this initial hurdle is an important part of getting to the content.

> ChrisM – "During the first session or class, the majority of the time with students is spent with questions of interface. Assigning the tutorial BEFORE class worked to alleviate this, but not totally."

The key for the teacher is familiarity, not mastery. Many teachers use peer tutors for in–depth support on interface issues.

Given the short time teachers have to dedicate to introducing the software, game companies should stick to industry standard interface conventions. This is not an area worthy of innovation in schools.

"Clearly teachers must be expert in the content area that the video simulation will anchor, but they do not need to be highly expert in the use of the game itself."

"I think the lesson planning part of this puzzle is no different than planning to use the library, the Internet, field trips, or any other tool that teachers utilize."

Provide quarterly follow up – forever.
Just like other instructional tools, giving teachers a chance to reflect as they become more proficient with EduGames is an important part of maximizing the impact they have on classroom practice.

Follow up does not need to be on–site. It can be in the form of webinars or materials designed for an in–district trainer.

Mentoring from master teachers is essential on an ongoing basis.

> DavidS – "The method we chose to combat this was that my class would go to the lab with the other classes one on one. While my students were mentoring the other students on game play and strategy, I demonstrated to the teacher all of the administrative tools they needed to know. We usually had 3 to 5 sessions together with the two classes combined before the other teacher felt comfortable in working on their own."

PLATO designates what they call "genesis teachers" who take the lead. They have an instructional assistant who handles administrative details so the teacher can focus on mentoring others in the building (paperwork, reporting, etc.).

> Middle School Journal – "If you have not tried using video games as teaching tools previously, it can be helpful to work in tandem with someone who has. This will help you avoid pitfalls, stay on track and stay on schedule with your curriculum."

LESSON PLANNING

While EduGames may appear exotic, lesson planning follows the same core practices used for all instructional resources. Teachers need to understand how the activities connect to the standards, what the goals are for the exercise and which students it can benefit the most. They should also introduce the games at a pace with which they are comfortable.

Key Findings

- EduGames are similar to other supplemental resources.
- Think broadly about who can benefit. Do not restrict access to one group of students.
- Allow teachers to choose their own path in to the games.
- Provide scaffolding for new students and teachers.
- Have clear goals and stick to them.
- Treat it like a lab – an opportunity for students to apply, probe and test what they have learned. Amplify existing behavior.
- Incorporate 21st Century Skills in your objectives.
- Do not let others set unrealistic expectations of how quickly results will be seen.

Guidelines

Bottom line – EduGames are similar to other supplemental resources.

DavidMcD– "I think the lesson planning part of this puzzle is no different than planning to use the library, the Internet, field trips, or any other tool that teachers utilize."

KateC– "Teachers first review the games to correlate the skills in the game with our state and district benchmarks/standards. Next, they review their district Order of Instruction to see where within the course the skills in the game match. Teachers can then group students accordingly based on instructional decisions."

DavidMcD– "Just like with any lesson plan, the objectives for unit are spelled out very clearly. I have used games as a tool to reach the unit objectives. I try to find ways to utilize software and games to make connections with the students."

Think broadly about who can benefit.

Do not restrict EduGames to high achievers as a reward. Target lower performing students as well because you will see the biggest gains there. Games may unlock interest in a subject for kids who have struggled with more traditional materials.

DavidMcD– "I have found the motivated students do well in class with or without a game. Average students achieve a bit higher, but the beauty of games is that [they] raise the bottom. Low achieving students start doing better when a game is involved."

Almost all of our panelists stressed that teachers should not assume any kind of gaming skill level among students – it will be very mixed. This is a common error due to the perception that all kids use technology and play games.

Muzzy Lane likes to start kids in single player mode where there is no social exposure, so they can get familiar with the game and the content without being embarrassed. This has also worked well for Tabula Digita.

TonySF– "In the single player game, there is no interaction between players in the game. However, you receive points for completing a mission and Badges (medals). I have often seen students compete for high scores and badges, redoing missions several times."

Allow teachers to choose their own path in and you will meet less initial resistance and more long–term success.

This is one area where the flexibility of games can be a drawback. Hopefully in the PD, teachers were exposed to a variety of implementation case studies. Here are three approaches teachers can take:

> *"I have found the motivated students do well in class with or without a game. Average students achieve a bit higher, but the beauty of games is that [they] raise the bottom. Low achieving students start doing better when a game is involved."*

- Introduce the content then use the game for synthesis and practice.
- Play the game, then teach the content referring back to the game.
- Alternate playing with activities that expand on or compliment the game content.

One provider reported that they encouraged teachers to introduce the game on a Friday after the other objectives for the week had been met. Teachers are more comfortable doing it at that time. Once students are exposed, their enthusiasm and achievement will help spread the use throughout the week.

Other teachers want to use it with advanced students only. This is a fine place to start, but, again, as they see the benefits, they should expand the use to other populations.

> DavidS– "… teachers initially wanted to use this software in their advanced classes only, but as the school year progressed, they witnessed the success across the board in all of my students. This led to many more students being involved in using the lab."

Muzzy Lane has found it helps to show teachers a clear path that moves them from managing the game to being an expert in educational gaming.

> Level 1 – Take one game and learn to teach with it using company–provided materials.

> Level 2 – Create your own materials to wrap the game experience and compliment the company materials.

> Level 3 – Become conversant in gaming as a "generalizable" tool with which to teach.

Provide scaffolding for new students and teachers.
Show teachers what students will be able to talk about at a deeper level after experiencing the game. This helps the teacher structure the discussions.

The level of difficulty of the content (not the game) determines the amount of scaffolding you need to do.

> TonySF – "Some of the missions are difficult and I will definitely pre–teach the skill as well as maybe demonstrate the game. Others are pretty self explanatory and the students will be able to complete the problems and the mission with out instruction, then I can go back and show them the math that they did and how it relates to our current lesson."

The Federation of American Scientists has found that vocabulary guides help with technical, scientific or historical simulations.

Companies should provide a starter set of lessons and a place for teachers to share lessons they create – a wiki space, a Yahoo group or some other web–based shared space.

"… teachers initially wanted to use this software in their advanced classes only, but as the school year progressed, they witnessed the success across the board in all of my students."

A standards alignment helps, but is not as important to classroom practice. You need it to show the connection to the standards in the sales process, but very few people will use it after that.

Walkthroughs and online videos can help teachers who do not have the time or inclination to play the game. They can also serve as a great refresher right before a lesson. Tabula Digita provides lesson overviews that serve this purpose.

Have clear goals and stick to them.
Middle School Journal recommends that teachers make sure they have the structure and support to keep students on task. The game is likely to be so engaging for students that they may have trouble waiting to start playing or putting it away at the end of the class. Due to the individualized nature of the game play, students need to know and understand goals and objectives before they begin, which means that the teacher must have all the activities lined up, with the relevant standards and assessments determined, before play begins.

Couple core course content tightly to the simulations and structure it into learning modules. Be very clear about which aspects or phases of the game will meet specific standards and what assessments will show that the standards have been met. Simply playing the game is not sufficient; students must produce specific results in the form of reports, tables, graphs and quizzes appropriate to the assessment method chosen…

Treat it like a lab – an opportunity for students to apply, probe and test what they have learned.
Use external productivity tools to help teams manage their experience (like Excel or Word). EduGames present an opportunity to teach these applications as well. If you go this route, recognize that this approach adds an additional area of necessary background knowledge. Many schools that have implemented one laptop per child programs have discovered that students' technical skills are quite shallow – limited to browsing the web, texting and casual games.

Incorporate 21st Century Skills in your objectives.

> ChrisM – "I think they learn skills well outside of history , i.e. decision–making, collaboration and resource allocation…I actually use the game because it helps me reach the instructional objectives of collaborative learning, using e–resources in research and critical thinking."

> Squire – 2004 "Ironically, the skills required by the game curriculum–problem identification, hypothesis testing, analysis, interpretation and strategic thinking more closely align with the new economy than does the "factory" model of curriculum, which privileges following directions, mastering predefined objectives, performance on highly structured tasks and intellectual obedience (Gee, Hull and Lankshear 1996)."

"…I actually use the game because it helps me reach the instructional objectives of collaborative learning, using e–resources in research and critical thinking."

"Do not layer teaching a new content area on top of introducing a game. It is a bridge too far..."

Do not let others set unrealistic expectations of how quickly you will see results.

With any new instructional tool, you usually do not see a full return in year one. In fact, you may see a dip as teachers and students learn to use the new resource. Plan on a teacher using the game for three years before becoming fully proficient. This is a classic learning curve for instructional resources and is very similar to complex instructional materials packages (textbooks, LMS, etc.).

OPTIMAL LEADER PROFILES

Picking the right team to introduce EduGames to your school or district is important. There is enough skepticism about using games that early stumbles will only reinforce existing negative preconceptions. We asked our panelists to outline the characteristics they felt these leaders needed to have.

Teachers

Teachers are the lynchpin to success. If the right teachers are on board, they will inspire their students and the other teachers in their building. Ideally, you want people who are leaders – politically, technically and pedagogically. Several people stressed that there should be a core team of 2–3 teachers – not lone rangers. They can support and encourage each other through the early stages.

Tailor the approach and profile to the specific needs and politics of each school.

Key Findings

- Content area expertise is more important than familiarity with games.
- Being tech friendly helps – particularly in the early stages.
- EduGames are inherently student–centered and constructivist. Teachers should have the temperament to work in this fashion.
- Familiarity with differentiated instruction is very useful in most deployments.
- Politically, it helps to have teachers who can hold the respect of their peers and administrators.
- Find teachers who proactively seek effective new tools for students.

Guidelines

Content area expertise is more important than familiarity with games.

> Sasha– "Do not layer teaching a new content area on top of introducing a game. It is a bridge too far (particularly for elementary teachers)."

Teacher leaders do not need to be gamers. It does not hurt if they are and they certainly cannot be averse to EduGames. Rely on the students to fill the role of expert gamers.

> TonySF – "I do not believe that a teacher needs to know gaming, but I do believe that any teacher would benefit from doing what the students are expected to do. In my school very

few teachers are gamers… All 7th and 8th grade teachers have had their students use the game in some way. I can not think of any type of teacher who could not use gaming."

JohnR – "Many games have commonalities that students can infer (the need for leveling, mastering an area, defeating the "boss" at the end of an area, etc.). For those types of games, student expertise usually suffices."

But, teachers must have a positive attitude toward games. Do not push EduGames on those with negative attitudes.

DavidS – "If the teacher is negative toward using the software as a resource, then its effectiveness will be limited."

Being tech friendly helps – particularly in the early stages. While teachers do not need to be gamers, having a basic comfort level with technology is a huge plus.

ChrisM – "You cannot teach using technology unless you know technology. I would not suggest that anyone who is a novice with technology try to use gaming in a class."

JohnR – "…those teachers expressing low ratings on comfort levels with technology use on those instruments would probably not be good candidates for this type of intervention… Measurement instruments like LoTi or the Texas STARChart should suffice in helping administrators focus in on which teachers might be amenable to using online game usage as an intervention in the classroom."

ChrisM – "A teacher who is not IT saavy would freak out with the tech issues."

Teachers should have the temperament to work in student–centered, constructivist environments.
The more open the simulation, the more true this becomes. Second Life and other Virtual Worlds are completely constructivist. Control freaks need not apply.

ChrisM – "You have to be the type of instructor who is willing to live with chaos and group work and unstructured learning."

KateC – "Today's students are digital kids and, as such, they would rather use the computer and control their learning environment than be a passive bystander."

Familiarity with differentiated instruction is very useful in most deployments.
Being able to mix and match teams and assignments so that students are challenged at the appropriate level, makes the overall experience for the group and the individuals more powerful.

"You cannot teach using technology unless you know technology. I would not suggest that anyone who is a novice with technology try to use gaming in a class."

Politically it helps to have teachers who can hold the respect of their peers and administrators.
Look at who administrators have trusted with new initiatives – usually it is teachers who invest time in communication and feedback outside of their classroom. This is an important part of earning the trust of parents and the community and your lead teachers should to be involved in these efforts.

Find teachers that proactively seek effective new tools for students
Look for teachers who are close to kids and how they are learning.
Your initial lead teachers will have to work through some rough spots so you need people who have the motivation to do that.

ADMINISTRATORS

Some of our panelists noted that administrative leaders also share some characteristics that help smooth the introduction into a building or district. In addition to the pedagogical biases noted in the teacher section, these administrators also value technology for what it contributes and are sensitive to the needs of individual teachers and how they react to change.

Key Findings

- ◆ Find instructional leaders who can manage differentiated instruction – of teachers.
- ◆ Games are collaborative and cross–disciplinary – Administrators should have strong coaching and team building skills.
- ◆ Administrators should genuinely value education technology and provide support for teachers who try new approaches.

Guidelines

Find instructional leaders who can manage differentiated instruction – of teachers
Recognize that everyone will not be at the same level of expertise. Some teachers will hold back for a variety of reasons including technical ability, comfort with new technology, personality or their opinion of the evangelist. As previously noted, sustained long term use only comes when EduGames are adopted school–wide. Being able to bring all teachers into the process when they are ready is an important skill.

Stay close to the ground through ongoing monitoring. This is technical and interpersonal – both usage stats and personal conversations. Continuously match the program to the interests of the teachers as they evolve.
Administrators should have strong coaching and team building skills.
Games are collaborative and cross–disciplinary. These leaders are able to keep people focused on the big goal while matching them with others who can support/push them at the right speed.

Administrators should genuinely value education technology and provide support for teachers who try new approaches.

For teachers to be comfortable trying something new and slightly scary, administrators must value technology in the classroom and make their support clear to others. Experimentation needs to be rewarded, otherwise, teachers may feel they are taking a career risk by embracing these tools.

"Do not abandon what you are already doing to bring in games – add them to the mix."

PHASE 3 – IMPLEMENTATION

TEACHING STRATEGIES

You have convinced the necessary players to support your EduGame project. You have installed the software and trained the team. It is time to make it come alive. In this section, you will find some practical suggestions to help you through this phase.

The majority of the comments we received on this topic related to blended learning. Mix game play with discussion, lecture, reading and writing to see the most benefits. Specific to game play, panelists encouraged others to tap those aspects of games that make them fun – competition, failure and transgressive play (breaking the rules). They also stressed the need to stay flexible. Teachable moments will arise naturally as students engage with the content in a new and fresh way.

Key Findings

- Incorporate EduGames into a blended learning environment.
- The common experience of a game enhances whole class participation.
- Leverage competitive spirit.
- Make failure fun.
- Plan for transgressive play.
- Stay flexible.

Guidelines

Incorporate EduGames into a blended learning environment.
Do not abandon what you are already doing to bring in games – add them to the mix. Using EduGames in a blended learning environment, allows teachers to connect with more learning styles and keep the content fresh.

> DavidMcD – "I still use direct teaching with the games. So those students who have preference to lectures and discussion get their fill."

> PeggyS – "At times, the teachers will complete a unit face to face and have a culminating event that extends the learning or serves as assessment in the virtual world. Other teachers opt to conduct their class within Second Life incorporating whole class instruction, peer to peer instruction, or discovery learning techniques. Literature projects often require the students to read independently and participate in Socratic seminars or debate in the virtual world."

EduGames can provide reinforcement of concepts taught with other techniques.

> ChrisM – "I use [Making History] in class to provide an interactive and engaged activity that compels students to use the knowledge they learned in readings/lectures."

The common experience of a game enhances whole class participation.
A teacher can never count on every student doing their homework or paying attention during a lecture. One of the compelling aspects of games (and other hands–on activities) is that everyone shares similar experiences at the same time. This makes reflective exercises like discussions and essays more powerful and universal.

Leverage competitive spirit.
Do not underestimate the power of immediate feedback and competition as students work their way through an EduGame. Unlike traditional classroom experience where the student waits for the teacher's feedback, a game provides constant performance feedback. Making it known that game provides this type of feedback harnesses one of the distinguishing characteristics of games –competition.

> DavidS – "The gaming element is clearly the biggest difference between my classroom and [other activities]. Students love the immediate results they see of the competition in the game. That aspect is hard to duplicate in class."

> TonySF – "I have often seen students compete for high scores and badges, redoing missions several times."

> KateC – "Basically the competition encourages kids to work together as a team. This is a win–win."

To make this fair, you also need to group your students so that the experienced gamers cannot dominate. (See more on this in the Grouping section.)

Do not assume girls lack a competitive nature. Don't create game groups that either leave girls out or group them all together.

Make failure fun.
Commercial games invest a lot of energy in making failure fun. Electronic Arts, one of the largest game companies, tries to have 200 ways a character can die in every game. They make the moment entertaining and memorable as part of encouraging players to keep trying.

> Squire book – "Failure was not only a "problem," but also a critical precondition for learning. Failure forced students to confront gaps or flaws in their current understandings through cycles of recursive play."

This is a difficult concept to address in school, since some students have negative beliefs about their ability to learn. But, as Mickey Rooney quipped, "You always pass failure on the way to success." Games allow students to "fail" in a less judgmental environment than traditional paper and pencil tests, partly because failing until you succeed is part of the whole gamer culture. Teachers need to embrace this and use failure as a departure point for reflective discussion.

As noted earlier in this paper, having a teacher available to guide this discussion is one of the compelling things that sets EduGames apart from commercial games.

"Basically the competition encourages kids to work together as a team. This is a win–win."

Kurt Squire, in his 2004 paper, commented at length on failure. Some excerpts are as follows:

> "For other students, failure caused frustration. Whereas the stronger, more confident students saw failure as a learning opportunity, others did not. These students had insufficient interest in the game, lacked a requisite self–efficacy with games, or perhaps were just having a bad day where playing such a difficult game was unattractive. … on some days, one is just not up for the humiliation. Interestingly, failure affronted those students who self–identified as gamers, suggesting that educational games may not be such an easy win with gamers who may reject educational games out–of–hand. Further, games may be a poor fit for learners who come to school with "damaged" beliefs about learning, such as that failure is a value judgment on them as students, as opposed to the beginning of a valuable learning experience."

"... it is important to mix up your students in groups that have complementary skills and perspectives."

For all the reasons expressed by Squire, it is important to mix up your students in groups that have complementary skills and perspectives.

Plan for transgressive play.
Transgressive play is when players exploit the game to accomplish things the game designers did not intend. This includes visiting forbidden locations, using cheats and finding bugs in the code that can be exploited. It is something avid gamers enjoy immensely.

In an EduGame, this may involve playing in a counterfactual way – for example having the Germans win World War II.

> ChrisM – "…students tend to want to play counterfactual history [more] than following how things actually went."

As a teacher, if you are prepared for this to happen (and it will), you will be equipped to seize on a teachable moment. Helping the students compare the results they got with the factual record should deepen their understanding of the forces at work (historical, scientific, mathematical, etc.).

Stay flexible.
EduGames are a great environment to deliver just in time learning. Teachable moments arise naturally out of the player's interaction with the game world. Most, if not all, of the precepts about adult learners apply to players of any age in a game environment.

Teachers should include, as part of their preparation, building a resource list of books, websites, articles, etc. that students can use to expand their knowledge of a topic in which they have developed an interest.

Game companies should provide links and references in the game to outside online resources so that students can go deep when they choose to do so.

SCHEDULING

Where can a teacher find the time to include EduGames in a busy schedule? Start by planning to fit the game play into the existing schedule rather than trying to change the schedule. This means breaking the experience and lessons down so they can be "consumed" in a 45–50 minute class period. Another good suggestion is to start small to accommodate the natural learning curve teachers and students will need before they become proficient with a new resource.

Key Findings

*   Game play should fit the block schedule.
*   Teachers have several ways to get started – from full immersion to a quick trial.
*   There will be a learning curve. Plan on extra preparation time for the initial lessons.

Guidelines

Game play should fit the block schedule.
If games are used in class (as recommended by our panelists), you need a model that works in 45 minutes. Thinking of an EduGame as a virtual lab provides a familiar framework for working through the materials during a class period. At 30–35 minutes of play, EduGames are much closer to casual games than they are to immersive MMOs where play goes on for hours at a time.

The first time you play, you will need to dedicate 15 minutes to familiarize students with the game interface, communication tools, logging in and game rules.

Ongoing, the time could be structured as:

> 15 minutes – Provide offline instruction on the content area. This can be via any of the traditional approaches to introducing content.
>
> 35 minutes – Play the game.
>
> Use the game to see how students apply concepts, test them, probe them and assess their ability to use them.
>
> 10 minutes – Debrief and provide post game analysis or assessment (usually outside the game).

Developers need to streamline the interface for EduGames more than for commercial games. This allows students to focus during the time given. Any time spent mastering a complex interface detracts from the learning objectives.

Have students play a "class" several times to see how different decisions affect the outcome. As one panelist noted, this is the difference in nursing education between 20 nurses seeing one real patient on rounds or having one nurse see 100 different patients virtually. You need to do both, but together they result in a more informed student.

"If games are used in class (as recommended by our panelists), you need a model that works in 45 minutes."

Teachers have several ways to get started – from full immersion to a quick trial.

More experienced teachers tend to use a block of several classes as an immersive experience.

> ChrisM – "I build the gaming simulation into the course schedule, two weeks dedicated to studying relevant content, material, tutorial, game play and discussion in place of two weeks of activities on the Interwar era in world history or Nazi territorial aggression for my WWII course."

This will depend on the game. The deeper the students must delve into the story line, the more an immersive approach makes sense. If a game is more focused on practicing skills, it can be used in a more episodic fashion.

One vendor encourages teachers to use what they call "The Toe in the Water Model: introduce the game as a 15–minute session on a Friday. This is a constrained activity at the end of the week requiring little preparation and no real pressure. Once the students start playing, the teacher can observe their enthusiasm and that real content is being mastered. The teacher steadily becomes more comfortable using it at any time it can help students. It will gradually begin to be used throughout the week.

There will be a learning curve. Plan on extra preparation time for the initial lessons.

For the initial class, plan for extra time – up to four times more – than teachers dedicate to traditional instructional resources. This will come down considerably as the teacher becomes proficient.

> ChrisM – "It took about 4X the amount of work than a traditional chalk and talk or ppt lecture/activity. The prep time was significant."

One way to address this is to take small steps. This does not overload the teacher or the students in the early stages.

> PeggyS –" Aim high, start small. Take a small slice and roll it out, then don't stop until you and your kids get it right. Then scale it."

PLAY LOCATION & TIMING

Across the board, our panelists felt that using EduGames during class time is the optimal approach. This tightly links the activity in the game and teacher–led reflection (discussion, essay, etc.) for deeper comprehension. They also encouraged schools and companies to find ways to make the games available outside of class. While this might seem like a contradiction, it is not. As a teaching tool, it is best used in class. Once engaged, students will want to practice and hone their skills wherever they can.

"Aim high, start small. Take a small slice and roll it out, then don't stop until you and your kids get it right. Then scale it."

Key Findings

- ◆ Optimally use EduGames in–class rather than in a computer lab or as homework.
- ◆ A learning center approach works well where technology is limited.
- ◆ Make EduGames available in as many places as possible.

Guidelines

Optimally use EduGames in–class rather than in a computer lab or as homework.
Anything that separates the activity from reflection will lower the impact of the games on comprehension and retention.

> DavdMcD – "I would love to have the ability to play most games in my classroom. I believe the setting would be much more "normal," and the student's frame of mind would be more in the student mode."

Playing the games in class ensures that everyone has a shared experience. This makes the blended learning aspects much more powerful. Not all students complete their homework and not everyone listens to a lecture. Because of the hands on/active nature of game play, if it is done in class, you can guarantee that everyone has a common ground.

A learning center approach works well with limited access to technology.
This is encouraged by PLATO Learning, but it should work with most games. Have 2–3 groups in–game and others doing research, writing, discussing, etc. You can have three computers and still make this approach work for a whole class. Make EduGames available in as many places as possible.

Classrooms, media centers, after school programs, public libraries and home are all places students should be able to access EduGames.

> TonySF – "The learning is the same anywhere they play the [software name] suite of games. You cannot get around the math. It is embedded into being successful in their play."

> KateC – "Our 7th and 8th graders use this gaming software. However, we have 6th graders playing in the media center early in the morning before school. They have asked teachers or other students to teach them the math so that they can play the game."

Companies should consider providing home access/downloading if a game has been purchased by a school. In addition to providing more student practice, this also allows those parents who want to play – or to check it out – the opportunity to access the software.

One respondent felt that wide access worked well for games where learning is embedded in the game play, but that commercial off the shelf games were another matter. Because they are tangentially aligned to education, commercial games should not be available in this way through schools.

"The learning is the same anywhere they play the [software name] suite of games. You cannot get around the math. It is embedded into being successful in their play."

STUDENT GROUPING

All our respondents (educators and companies) encourage grouping for a variety of reasons. There are pedagogical and practical reasons for having students play in teams of 2–4 rather than alone. Pedagogically, games force collaborative decision making and help develop other 21st Century Skills. Grouping can reduce barriers to learning by teaming proficient gamers with non–gamers. Practically, working in teams lowers the technology footprint needed and it allows students to cover for each other during absences. There was less consensus on how groups should be formed.

Key Findings

* The optimal size per group is 2–3 students.
* Grouping forces students to develop collaboration skills.
* Be flexible in how you form groups, but, in general, mix gamers and non–gamers on teams.
* Assign team roles based on student strengths.
* Use whole class sessions to elucidate core concepts.
* Grouping increases required teacher preparation, so group when the return is worth the effort.

Guidelines

The optimal size per group is 2–4 students.
Several people mentioned that 2–3 is the ideal size, but this will depend on the number of accessible computers.

PLATO Learning found that groups of three were best. It moves the conversation above the game, which just becomes the ground for that discussion. The focus shifts to what is supposed to be learned.

Four is the maximum number of people who can work comfortably around a computer. Students will disengage if there are more than four.

Grouping forces students to develop collaboration skills.

> Middle School Journal – "The standard the students had the most difficulty with was interpersonal skills. When working in teams, they were forced to collaborate in real time before the game could go forward. Often, students working in teams will divide the labor and jigsaw the pieces back together to create a product. Instead, the game forced collaborative decision making. Eric, the same student who was disengaged before the project, noted in his journal, 'I learned that working on a team is very hard. It taught me to work with people who work different.'"

"... the same student who was disengaged before the project, noted in his journal, 'I learned that working on a team is very hard. It taught me to work with people who work different.'"

Be flexible in how you form groups, but, in general, mix gamers and non–gamers on teams.

There are several ways to organize your groups. Rather than settling on one, we encourage you to use all of the possibilities suggested below as needed to support your learning objectives.

> KateC – "The teacher can use a module within the game for whole group instruction, send students to play for an inquiry type lesson, or use the game for enrichment or practice. Teachers at my school do all of these."

◆ **Mix gamers with non–gamers:** Most of our respondents gravitated to this approach over time. Grouping gamers with non–gamers helps level the playing field and, with EduGames, seems to be more important than academic ability.

> Michelle R – "This took the motor skills that gamers have out of the equation for each team."

> DavidMcD – "I have found that having a gamer grouped with a non gamer makes a lot of sense. The gamer becomes the tutor of the group. And there is something in the gaming mentality that encourages others to be better players of the game. It is fun to watch this happen."

Gamers can dominate initially unless the teacher intervenes.

> ChrisM – "I find that students who game tend to dominate at the start. Men are more enthusiastic than women..usually group dynamics take care of this issue."

> DavidM – "I do on occasion keep certain students away from each other."

◆ **Group by subject matter proficiency:** There are times when grouping students by academic performance helps. This seems to be particularly useful when the teacher wants to focus on one group's needs while others are getting more practice in the game.

> TonySF – "I might organize my students into differentiated groups by the Number Sense data from their FCAT Scores and allow the higher scoring group to go to the computers and play the first mission. Allowing them to help each other and giving them some resources to look up vocabulary on concepts they may need refreshing on. The other group may do some vocabulary review and practice (Exploratory Activities, Thinking Maps…). After the review, they would go and play while other students would come back and expand on what they did, some teacher lead discussion, possibly a Thinking Map and a writing assignment."

"The teacher can use a module within the game for whole group instruction, send students to play for an inquiry type lesson, or use the game for enrichment or practice."

◆ **Mix by learning style:** Games draw on multiple intelligences and a well–balanced team will have an advantage. There are visual, kinesthetic, logical, verbal, interpersonal and even musical aspects to almost all modern EduGames.

> DavidMcD – "Using games allows me to hit multiple learning styles in the same lesson in a much easier way than the normal classroom environment."

An interesting side note is that high achievers (readers) will read text–heavy game screens while the gamers will blow through them and get to the experience. Teachers should focus on outcomes, not the path. Companies need to design for both types of players.

Assign team roles based on student strengths.
Any complex simulation involves a range of activities. Note taking, research, negotiation with other groups and game strategy are just some examples of roles that different people can fill. Assigning students to a role where their strengths can shine will help them stay engaged. The teacher should also be clear that they have a role as content expert.

> ChrisM – "I like the groups because they can specialize their functions in the game. Some are happy to click through research, some like to make decisions, some even like to chat and trash talk to others during class. Personally, I like the interaction compared to single player game scenario."

> Middle School Journal – "Because group work is a vital component of problem–based learning, teachers must set students' expectations regarding individual responsibility for problem–solving and group roles. Teachers must also identify their own role as a content area resource that the students can draw upon as needed."

Use whole class sessions to elucidate core concepts.
It helps if the company provides machinima (created by recording game–produced video frames) that teachers can use in whole class demonstrations/discussions.

One instructor uses a projector when he wants to demonstrate skills that are related to a mission in the game. He will project the game itself and show how the skills is applied.

Grouping increases teacher preparation, but use groups only when the return is worth the effort.
The mechanics of managing groups does increase teacher preparation time.

> JohnR – "There is more preparation time required of the teachers to create the groups, explain member roles, etc. [sometimes it] is more convenient for teachers to simply

"Because group work is a vital component of problem–based learning, teachers must set students' expectations regarding individual responsibility for problem–solving and group roles."

let students tackle the game individually, then follow up with students who need help."

CLASSROOM MANAGEMENT

Classroom management for EduGames is very similar to any hands–on activity. An actively involved teacher providing content expertise and focus moves things along. Games appear to be particularly good at encouraging peer tutoring. To date, behavioral issues like bullying have not been an issue. Backend integration with the school's management systems relieves a lot of the administrative burden from teachers.

Key Findings

- An actively involved teacher is essential.
- Games encourage peer–to–peer tutoring.
- Set clear behavioral expectations.
- Do not use voice chat. It is a marker of real world social status.
- Encourage real–time conversations about the game –between teams as well as among them.
- Integration with administrative systems is a huge time saver. Reducing the administrative load on teachers removes a significant barrier to adoption.

Guidelines

An actively involved teacher is essential.
Teachers are the content area experts who can help students make decisions and they are classroom managers who can help teams stay focused on the learning objectives. These roles should not be delegated.

As discussed in the preparation section, teachers need to be the subject matter experts not the game experts – although such expertise helps smooth the flow.

> DavidS – " My niche when working with the students is helping them understand the math concepts that they must know and utilize. …They seek me out for help when they want to…develop higher scores as math concepts are required for them to generate high scores."

> ChrisM – "I am very involved in helping them contextualize decisions."

> ChrisM – "I walk around and try to engage all the groups, as groups and have them individually explain to me why they are doing what they are doing in game."

Sometimes it is difficult for students to maintain focus with all the distractions available in games. With the limited time available for classroom activities, the teacher needs to keep students focused.

" My niche when working with the students is helping them understand the math concepts that they must know and utilize..."

> TonySF – "Sometimes students get too excited and the role of the teacher is to help keep them focused."

Active engagement of the teacher during game play is essential. Do not use the game as a babysitter.

> ChrisM – "I actively monitor the game over the shoulder of students, or I can click into a view of any of the countries they are playing. My laptop, as the server, saves the game and I can and do a "walkthrough" of key decision points as part of our debriefing discussion. I am very active in this collaboration as instructor."

But teachers must also be comfortable. If you are technical, you can help with this aspect. If you lack technical skills, adjust the game flow so that someone else can be the technical expert while you cover content. It will work either way.

There are no real examples of EduGames with a formal role for the teacher in the game world, but this is a tantalizing prospect if done well. Students could "hand in" work to an in–world teacher avatar, they could seek out the wisdom of a coach in the game, or they could challenge teachers to prove they have mastered a concept.

Teachers who have mastered the game should be warned to avoid playing as an equal with the students. It will distract from the teacher's focus on subject matter expertise and may inhibit or discourage students.

"The collaborative and competitive aspects of EduGames lead naturally to peer tutoring as teams strive to accomplish game objectives. "

Games encourage peer to peer tutoring.
The collaborative and competitive aspects of EduGames lead naturally to peer tutoring as teams strive to accomplish game objectives.

> TonySF – "The learning that is happening with these games is different because of the self motivation that occurs and the peer–to–peer learning that takes place… They want their team to win even if it means being a teacher to others."

> DavidS – "… online gaming leads to tutoring, not the other way…students are not willing to become tutors in the beginning of the school year…after playing the games and interacting with each other, they become much more willing to either tutor or to be tutored by others."

While the teacher is the content expert, student tutors focus on how to play the game (rules), how to navigate the software (strategies) and how to score points (math skills).

> DavidS – "What is different for our students is that they have become teachers to each other. The team competition aspect forced them to stop shooting each other and work together to beat other teams. This involved game strategies and math skills."

> PeggyS – "Students report that they enjoy working collaboratively and that the trappings of middle school culture and peer pressure disappear from the equation when working in the virtual world."

The teacher can actively promote peer tutoring rather than waiting for it to happen organically.

> DavidS – "I utilize students extensively as tutors during the year. I promote this idea by giving extra credit for students who come either before or after school to assist in tutoring sessions leading up to quizzes and exams. I also provide an opportunity for students to serve during regular class as tutors…"

Set clear behavioral expectations.
Setting expectations upfront and active engagement by the teacher are the keys to good student behavior while using games. Getting off–task seems to be the biggest teacher concern, but it should not be a major one. It is just a matter of monitoring and helping kids refocus, as with any small–group activity.

> ChrisM – "The competitive nature of game play tends to keep kids focused. If they go online elsewhere it is usually to research stuff what will help them in the game."

> DavdMcD – "As with any classroom activity, an active teacher keeps many disruptive and inappropriate things from happening. I certainly try to do that while using games with my instruction."

None of our panelists reported significant behavioral problems in school.
Their perspective was that most cyber–bullying takes place in systems beyond the school's control (social networks, IM, etc.). Problems can arise when you use discussion boards to have online conversations about gaming topics. Some kids will go off topic and make inappropriate comments to others. This is best handled one–on–one and is subject to the district's established standards for online behavior.

> DaveMcD – "Making History does have a chat feature that I rarely inform students about. However, some of them figure it out very quickly. I don't really monitor what they say most of the time other than I walk around the room and read what is on their screen."

Have the systems in place to contact adults and track down problems.

Most districts have clear policies about online behavior. If your district has policies in place, you do not need to create anything specific for your game world. But, students should be made clearly aware of the constraints policies impose.

It is important to empower kids to police their online space. They are the best ones to do this because they are most likely the ones to see infractions.

Do not use voice chat.
The Schome project out of the United Kingdom reported that this was a major issue between schools. They simply dropped it and relied on text chat for in–game communication.

> *"The competitive nature of game play tends to keep kids focused. If they go online elsewhere it is usually to research stuff what will help them in the game."*

Encourage real–time conversations about the game – between teams as well as among them.
Giving students a structured time to discuss what they have been doing/learning in the game can help them better understand the content, the play and how other students are using the game.

> DaveMcD – "I do allow students to meet face to face to discuss strategy that has been a nice addition to the classroom."

"I do allow students to meet face to face to discuss strategy that has been a nice addition to the classroom."

ASSESSMENT

Because a game can track and log all actions taken in a game space, there is the potential to conduct extremely sophisticated assessments that go far beyond anything possible with current assessment practices (formative and summative). To date, this remains an area of promise, rather than a reality. In fact, given the novelty of game–based learning, many educators remain skeptical about the learning taking place in the game and of any embedded assessments. It is important to provide external validation of the learning that is taking place. Over time, if games deliver as promised, we expect educators to become more comfortable with in–game assessments.

Key Findings

- Provide in–game and paper based assessments.
- Game logs can provide a map to assess decision making.
- Use external productivity tools (Word, Excel) to track and synthesize game experiences.
- Assessing 21st Century Skills is an untapped opportunity for games to excel.
- Make assessment results visible to all stakeholders to sustain support.

Guidelines

Provide in–game and paper based assessments.
This is a peace of mind issue. Teachers are comfortable with paper–based assessments. You can track and assess students at a much deeper level in a game than you can on paper. But, to prove to teachers that real learning is occurring, they need to be able to see it on assessments they already know. Think of it as suspenders and a belt.

Most companies tried to avoid providing external assessments and were forced into doing it by their customers. Do not wait. Launch with these tools available.

PLATO's Lightspan found they needed multiple assessments to handle formative and summative needs.

Game logs can provide a map to assess decision making.
Seeing when and how students play the game reveals their thought processes and problem solving strategies.

Developers should design their game activity logs so that a non–technical teacher can make sense of them. Cryptic techno–babble is a no–no.

> ChrisM – "My laptop, as a server, saves the game and I can and do a "walkthrough" of key decision points as part of our debriefing discussion. I am very active in this collaboration as instructor."

Use external productivity tools to track and synthesize game experiences.

Using EduGames can lead to new insights for students and it can be very effective to show them how to write about those thoughts – or chart them, or quantify them.

> DavidMcD – "I have certainly found that when students write essays over the subject matter [causes of WWII], they have a deeper understanding of the problems faced at the beginning of WWII."

> ChrisM – "…the essays on appeasement..tend to be more sympathetic to decision–makers and less unrealistic about the complexities of decisions. So it is a very different type of learning than traditional lectures."

> ChrisM asks a final exam question about the subject matter which references the game experience. "Reflection is part of virtual worlds. You need to do it to navigate the space and the activities."

Game logs can serve as a great guide to reflective discussions.

> PeggyS – "Reflection is an inherent element in the virtual world as are constructivist, differentiated tasks."

Assessing 21st Century Skills is an untapped opportunity for games to excel.

In the long run, there are very promising options for technically tracking decision making strategies and providing feedback to the teacher on 21st Century Skills. But this is not a current best practice and the tools are very early stage.

Make assessment results visible to all stakeholders to sustain support.

The assessment results should prove that what is supposed to be learned is being learned. This is important to administrators and parents. If an EduGame is not meeting this hurdle, it should be discontinued.

To add credibility, these assessments should be external to the game. There is too much potential to "game the system" if it is in the software.

"Reflection is an inherent element in the virtual world as are constructivist, differentiated tasks."

SUPPORT RESOURCES

Support resources for EduGames are evolving a bit slower than the games themselves. Many of our panelists found peer–generated content in blogs and discussion boards the most useful resources. This kind of rapid–response user–created content is particularly useful in a field that is as dynamic as EduGames are today. Students can also benefit from these resources, but their use should be consistent with district policies.

Key Findings

- Online content support is the most effective because it is seamless with game play.

- Blogs are a good source information, particularly in an arena that is evolving rapidly.

- Online communities take longer to build for EduGames than for commercial games.

- Discussion boards can be useful for students, but usage needs to be monitored.

- Conferences are good places to meet other practitioners.

- Resources should allow flexibility in how teachers access content – by lesson or by objective.

- Reach out to developer companies. They want to hear from teachers and are accessible.

Guidelines

Online content support is the most effective because it is seamless with game play.
There has been a belief that EduGames can – or should – point students to the textbook for background information. Some of the respondent teachers noted that this forces kids to leave the game environment completely. They felt it was more effective to provide that content online or even in–game.

> TonySF – "They also have web based instructional modules that can be used for pre–teaching a mission, or students can use if they are having trouble with a concept."

Blogs are a good source of information, particularly in an arena that is evolving rapidly.
There are several blogs worth tracking in this space.

> Terra Nova – A coalition of leading academics who are looking at games and learning http://terranova.blogs.com/terra_nova/

> RezEd – An online community clearing house of information on virtual worlds and learning – http://www.rezed.org/

> Educational Games Research – A district tech director's perspective http://edugamesblog.wordpress.com/

Dave McDivitt – The teacher's perspective http://davidmcdivitt.wordpress.com/

Apopnophenia – Teens and social media research http://www.zephoria.org/thoughts/

Richard Carey – The developer's perspective http://www.richardcarey.net/

Education Business Blog – The industry's perspective http://www.educationbusinessblog.com/

AHCI Lunch – The American History and Civics Initiative from WGBH – http://ahcilunch.blogspot.com/

Future Making Serious Games – More of a newsfeed on EduGaming articles with commentary. http://elianealhadeff.blogspot.com/

Online communities take longer to build for EduGames than for commercial games.

Communities of online devotees can be found for almost any game ever written. But, the smaller audience for EduGames means it takes longer for a user base to build up an online repository of useful information. After nine years in the market, Whyville has over 244 companion sites, while Tabula Digita has none so far.

As EduGames gain acceptance, this situation will improve, but the audience for these games will probably never rival those of mainstream commercial games.

Discussion boards can be useful for students, but usage needs to be monitored.

Some people are concerned that accessing these sites is cheating. But whether this is cheating really depends on the game designers. If the game requires students to master the educational objectives, then any research done to learn them is part of the learning experience. If students are motivated enough to do that kind of background reading, we should be celebrating it. However, if the game is designed in such a way that kids can just look up codes to access game content they have not earned, then it is "cheating" in the traditional sense.

When selecting EduGames, evaluate them for how close the game mechanic – the rules of the game – embody the learning objectives. Students will do this kind of research whether you want them to or not, so pick games where it will be stealth learning rather than just taking shortcuts.

Several teachers mentioned that if there was going to be bad behavior, discussion boards are the most likely place for it. Students assume that their chat logs are monitored in a school–sanctioned game. But if you go to a public discussion board, none of those controls exist. A well–enforced district policy on online behavior can deal with most of these issues, but teachers or administrators may be called on to set some examples.

"If the game requires students to master the educational objectives, then any research done to learn them is part of the learning experience."

Conferences are good places to meet other practitioners.
The agendas at conferences are incorporating more game–related presentations. At NECC this past year, there were dozens of presentations on EduGame topics and several vendors on the show floor. Almost all education shows feature a few sessions on games.

Some of the conferences people cited as EduGame friendly include:

> ISTE – National Education Computing Conference (NECC)
>
> Texas Computer Education Association (TCEA)
>
> Florida Education Technology Conference (FETC)
>
> National Council of Social Studies (NCSS)
>
> National Science Teachers Association (NSTA)
>
> Games, Learning, & Society (GLS)
>
> Serious Games Summit at the Game Developers Conference (GDC)

Budget pressures are making it more difficult for educators to attend these conferences. If a developing company has a limited budget, they should initially focus on web–based resources.

Resources should allow flexibility in how teachers access content – by lesson or by objective.
One of the advantages of online resources is their ability to flexibly present material. Developers should make sure that teachers are able to easily find content that speaks to their immediate needs.

> TonySF – "Tabula Digita's Instructional portal is very helpful. When you log in, you can pick a mission and it will tell you which content areas are covered in the mission. It also works in reverse. You can pick the content and it will tell you the missions that correspond."

Reach out to companies. They want to hear from teachers and are accessible.
Companies want to hear from people using their products. If teachers are willing to reach out, they frequently find a receptive ear. There are also the benefits of seeing your ideas implemented.

Better yet, by interacting with the team that built the game, you gain insights into how to use it most effectively. This access may not last forever, but while the companies that are building this market remain small and agile, it is as simple as sending an email or picking up the phone.

> ChrisM – "I found discussion with their designers and their educational design team members very useful in preparing to use games in the classroom."

APPENDIX

PARTICIPANTS

We are extremely grateful for the time and thought our participants put into the project. People made time in their busy schedules to talk with us and provide insights gleaned from hard experience. We hope we have done their ideas justice.

Our focus participants were:
- Teacher users, technology coordinator implementers, instructional leaders (Principals, VPs) who actively used games and simulations in the classroom for at least one year.
- Represented District sizes ranged from individual private academies to the largest public school district in the country and one college professor. Five states were represented.

EDRoom

Through the report, we have shown quotes from participants in the EDRoom discussion. The following list identifies the type of school that the panelists who allowed us to quote them work in, their role, their state and the primary EduGame they use.

- TonySF – Middle School Math Teacher, FL
- DavidS – Middle School Tech Coordinator, FL
- JohnR – District Technology Director, TX
- DavidMcD – High School Social Studies Teacher, IN
- ChrisM – History Professor, MA
- KateC – Principal, FL
- PeggyS – High School Teacher, NY

Company Interviews

We are grateful to the following companies for making their executives available for this project.

- Dana Laureson – Vice President, PLATO Learning
- Michelle Roper – Federation of American Scientists (FAS)
- David Martz – Vice President, Muzzy Lane, Inc
- Ntiedo (NT) Etuk – CEO, Tabula Digita
- Barry Joseph – Director, Global Kids
- Jim Bower – Chairman and Founder, Whyville.net
- Atusi Hirumi – Associate Professor, University of Central Florida

BIBLIOGRAPHY – ARTICLES AND RESEARCH

There are several good omnibus sources for information on EduGames.

> Reference Guide for Games and Simulations in the Classroom – This guide, published by the Software & Information Industry Association (SIIA), lists tools and research on the topic of educational games and simulations. Downloadable PDF – Free. http://siia.net/education/foreducators/games.asp

> Serious Games Squidoo Lens from Richard Carey – Books, blogs and other resources updated in real time. Free web site http://www.squidoo.com/seriousgames

The research base for implementation is fairly thin, since most of the focus to date has been on efficacy rather than practice. Here are three resources we found useful in assembling this report.

> "Changing the Game: What Happens When Video Games Enter the Classroom", Kurt Squire, Innovate Journal of Online Education, August/September 2005. Free subscription required to access. http://www.innovateonline.info/index.php?view=article&id=82&action=article

> "Video Games in the Middle School Classroom by Elizabeth Simpson & Frances A. Clem, Middle School Journal, March 2008 http://www.nmsa.org/Publications/MiddleSchoolJournal/Articles/March2008/Article1/tabid/1627/Default.aspx

> "I Fought the Law: Transgressive Play and The Implied Player" by Espen Aarseth, Proceedings of DiGRA 2007 Conference © 2007 Authors & Digital Games Research Association (DiGRA). Free downloadable PDF. http://www.digra.org/dl/db/07313.03489.pdf

In the report body, we referred to two books that are not directly related to EduGames, but that provide background material that may be of interest to those designing or implementing such games.

> Raph Koster, Theory of Fun for Game Design, Paraglyph, November 2004 ISBN–10: 1932111972

> Stephen Johnson, Everything Bad is Good for You: How Today's Popular Culture Is Actually Making Us Smarter, Riverhead, May 2005, ISBN–10: 1573223077

Other articles by the report author, Lee Wilson.

"Getting It Wrong : Slaying Myths About Video Games", Technology & Learning, September & October 2007. http://techlearning.com/story/showArticle.php?articleID=196604665

"Virtual Worlds = Real Learning : Online Communities Offer Terrific Opportunities for Teaching Science", Cable in the Classroom, March 2008. http://www.educationbusinessblog.com/CIC0308VirtualWorlds.pdf

Other Questions

There are a large number of people at the university and corporate level who are conducting research into the efficacy of games in the classroom. Our intention in this paper is to let that work speak for itself and to focus on what teachers, administrators and companies can do to deploy games. In other words, we start from an assumption that games have positive impacts. This frees us to focus only on best practices for implementing games.

Here are some questions that others address:

Are games effective? To learn more, see the SIIA White Paper References and Resources for Using Games and Simulations in the Classroom published in January 2008. This 12–page paper has a round up of the existing research base, case studies and media coverage of EduGames. http://www.siia.net/education/foreducators/GamesGuide_0108.pdf

Will games be accepted in schools? Others have raised valid questions about whether the subversive nature of transgressive game play – which is at the core of much of what players do – makes games inappropriate for a top down environment whose objective is turning out learners whose learning is aligned to standards. Others are working hard to build acceptance for 21st Century Skills which are employed extensively in game play (team building, communication, problem solving, etc.).

Can we use game design as a teaching tool? There is a movement to have students construct their own games to develop their thinking skills. Some see this as a great initial path into schools while others remain skeptical that most teachers will be comfortable using games in this way.

Are there meaningful differences in the classroom between video games, console games and virtual worlds? We do not make a clear distinction between virtual worlds and games in part because the lines are blurring. Most games, even if they are not online, are supported by extensive online fan networks that serve the same social functions found in virtual worlds.

IMPLEMENTATION CHECKLISTS

FOR DEVELOPERS

Design Issues

- Integration with administrative systems is a huge time saver. Reducing the administrative load on teachers removes a significant barrier to adoption.
- EduGames should be built for slightly older technologies. School systems are not updated as frequently as business or gamer systems.
- Support should always be available during class time.
- Online content support is the most effective because it does not require interrupting game play.
- The game mechanic needs to embody the learning objectives.
- Non–gamers need scaffolding and peer support.

Assessment

- Provide in–game and paper based assessments.
- Game logs can provide a map to assess decision making.
- Assessing 21st Century Skills is an untapped opportunity for games to excel.

Resources and References

Resources should allow flexibility in how teachers access content – by lesson or by objective.

Selling the Idea

To Teachers

- The effective deployment of any instructional resource requires the support of teachers. Teachers cannot feel threatened, be uncomfortable, or lose control when they use something new in the classroom. With EduGames, the potential for all three of these issues is higher, so a well–crafted strategy to address them is essential.
- Give teachers a metaphor that connects EduGames to something familiar (and safe), such as labs.
- EduGames must come with guidelines for classroom management. Teachers cannot feel like they are going to lose control.
- Provide in–game and paper/pencil assessments.
- Explain the benefits clearly. Engagement, motivation and reach are the core benefits.
- Teachers need to understand their role as content area experts.
- Teachers need peer references. "It works and it is safe."
- EduGames need proof of efficacy.
- EduGames must be aligned to standards.

To Administrators

- If an administrator is driving the deployment, he/ she needs to be prepared to support a wide range of teacher familiarity and comfort with EduGames.

- Administrators will need to be equipped with research and references that can be shared with parents and the press.

To Information Technology (IT)

- Advocates for EduGames need to earn the trust of IT early in the process. In the case of IT, it is better to get permission than it is to ask for forgiveness.

- Efficacy is also part of IT's charter in most school districts, so share resources and references with them.

- Simplifying installation and upgrades helps IT's willingness to participate fully.

- Learn the existing policies about port access, games on the network, etc. and work within them whenever possible.

To Students

- Students cannot feel threatened and they need to understand how it will work. They also have sophisticated filters for good games and won't easily tolerate poor design.

- It must be a great game first.

- The game mechanic needs to embody the learning objectives.

- Non–gamers need scaffolding and peer support.

To Parents and Community

- Parent support is an important part of the political process. Widespread misconceptions about games can stall your efforts unless you are prepared to address them.

- Regularly inform parents of the purpose, scope and results of the project.

- Demonstrate the connection to 21st Century Skills to earn the support of the community.

- Where possible invite parents into the process. They secretly want to play too.

FOR SCHOOLS AND DISTRICTS: PREPARATION

Installation and Support

- Implementation services are not optional at this stage of the market. To get sustained rather than experimental usage, schools and districts need to dedicate the time and money to preparing the environment thoroughly.

- Games need extra support and cooperation from IT.

- It takes about 10 days to get new online products up and running in a school. Budget 2–3 weeks in the schedule.

- Infrastructure issues need to be resolved before the school year starts.

- Building–wide implementation encourages sustained use.

Professional Development

- Even teachers who are gamers do not intuitively know how to use games in the classroom. Hand them a new textbook and they can parse the structure and teacher's guide with a little assistance. Give them a game and they are at sea.

- Tightly link professional development and initial student use. Optimally within a few days of first use.

- Teachers need a safe place to ask "dumb" questions and a peer network.

- Plan on a minimum of a ½ day on–site with hands–on time in teams.

- The teacher orientation should cover:

    - Introduction to games as teaching devices

    - Administrative tasks (roster provisioning, etc.)

    - Multiple implementation options

    - The roles and responsibilities of teachers and students

    - An introduction to the structure of the game (no need to cover all the details)

    - The game interface (Being able to help students over this initial hurdle is an important part of getting to the content.)

- Provide quarterly follow up – forever.

Optimal Teacher Leader Profile

◆ Ideally, you want people who are leaders – politically, technically and pedagogically. Several people stressed that you want a core team of 2–3 teachers – not lone rangers.

◆ Content area expertise is more important than familiarity with games.

◆ Being tech friendly helps – particularly in the early stages.

◆ EduGames are inherently student–centered and constructivist. Teachers should have the temperament to work in this fashion.

◆ Familiarity with differentiated instruction is very useful in most deployments.

◆ Politically, it helps to have teachers who can hold the respect of their peers and administrators.

◆ Find teachers who proactively seek effective new tools for students.

Optimal Administrator Leader Profile

◆ In addition to the pedagogical biases noted as helpful in the teacher section, these administrators should also value technology for what it contributes and be sensitive to the needs of individual teachers and how they react to change.

◆ Find instructional leaders who can manage differentiated instruction.

◆ Games are collaborative and cross–disciplinary. Administrators should have strong coaching and team building skills.

◆ Administrators should genuinely value education technology and provide support for teachers who try new things, even if they stumble.

FOR TEACHERS: IMPLEMENTATION

Lesson Planning

- Teachers need to understand how the activities connect to the standards, what the goals are for the exercise and which students it can benefit the most. They should also introduce the games at a pace they are comfortable with.
- Bottom line – EduGames are similar to other supplemental resources.
- Think broadly about who can benefit. Do not restrict access to one group of students since poor performers often show the greatest benefits.
- Allow teachers to choose their own path and you will meet less initial resistance and more long–term success.
- Provide usage structure for new students and teachers.
- Have clear goals – and stick to them.
- Treat it like a lab, an opportunity for students to apply, probe and test what they have learned. Amplify existing behavior.
- Incorporate 21st Century Skills in your objectives.
- Do not let others set unrealistic expectations of how quickly you will see results.

Teaching Strategies

- Incorporate EduGames into a blended learning environment.
- The common experience of a game enhances whole class participation.
- Leverage competitive spirit.
- Make failure fun.
- Plan for transgressive play.
- Stay flexible.

Scheduling

- Game play should accommodate the school's block schedule.
- Teachers have several ways to get started – from full immersion to a quick trial.
- Because there will be a learning curve, plan on extra prep time for the initial lessons .

Location of Game Play

- Optimally, use EduGames in–class rather than in a computer lab or as homework.
- A learning center approach works well with limited technology.
- Make EduGames available in as many places as possible.

Grouping

- 2–4 students per group is the optimal size.

- Grouping forces students to develop collaboration skills.

- Be flexible in forming groups, but, in general, mix gamers and non–gamers on teams.

- Assign team roles based on student strengths.

- Use whole class sessions to elucidate core concepts.

- Grouping increases teacher preparation. Form groups when the return is worth the effort.

Classroom Management

- To date, behavioral issues like bullying have not been an issue.

- An actively involved teacher is essential.

- Games encourage peer to peer tutoring.

- Set clear behavioral expectations.

- Do not use voice chat, text chat is preferable.

- Encourage real time conversations about the game – including between and among teams.

Assessments

- Use external productivity tools (Word, Excel) to track and synthesize game experiences.

- Make assessment results visible to all stakeholders to sustain support.

Support Resources for Teachers

- Peer–generated blogs and discussion groups are a good source of information, particularly in an arena that is evolving rapidly.

- Online communities take longer to build for EduGames than for commercial games and they are not yet as robust as for other game types.

- Discussion boards can be useful for students – but usage needs to be monitored.

- Conferences are good places to meet other practitioners

- Reach out to companies. They want to hear from teachers and are accessible.