



Transformational Play: Why Educators Should Care About Games

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Video games have become one of the most popular forms of entertainment in our society, recently surpassing Hollywood films in annual sales. Games are popular in part because they are fun, but also because they offer the player a chance to take on new roles and identities, and experience worlds in which they learn and problem solve. Recognizing the power of this medium, many games are now being designed specifically for education, however, these games are vastly different than past computer software that were simply bright packaging for drill-and-practice. Instead, these games offer something new to learners; unlike any other form of curriculum, these games can offer entire worlds in which learners are central, important participants; a place where the actions of a ten-year old can have significant impact on the world; and a place in which *what you know* is directly related to *what you are able to do* and, ultimately, *who you become* (Gee, 2003; Gee & Levine, 2009).

In the games we design, children can become environmental scientists, investigative reporters, statistical consultants, and even historians who travel back in time (see Figure 1, screenshot of Digital Prometheus World). Accountability in these worlds is not based on some external test separate from the learning experience, but on the learner making both physical and conceptually-informed choices that actually *transform the virtual world*. In this context, a student is not only learning content, or even how to investigate and pose solutions; he or she also learns what it means *to be* an historian, scientist, or mathematician. In our vision, ensuring that “no child is left behind” involves offering students opportunities to establish a passion for engaging curricular content, an appreciation for its value (beyond passing tests), and an occasion for seeing themselves as *capable of solving interesting problems*.

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We invite you to view games the way we do, as vehicles for establishing environments that make the content a necessary tool and position the learner as a hero who can use their evolving understandings to transform a virtual world. Based on this conviction, as part of our Quest Atlantis project (see <http://QuestAtlantis.org>), we have designed hundreds of these curricular gaming units to teach disciplinary content and simultaneously allow us to generate new theory about how students best learn. The designs discussed here have been used by literally thousands of children around the world and have passed through multiple iterations as we have learned more about best practices. Through these implementations, we have developed a clear vision of what we call *transformational play* that we seek to foster in students, and a coherent set of goals to guide our designs.

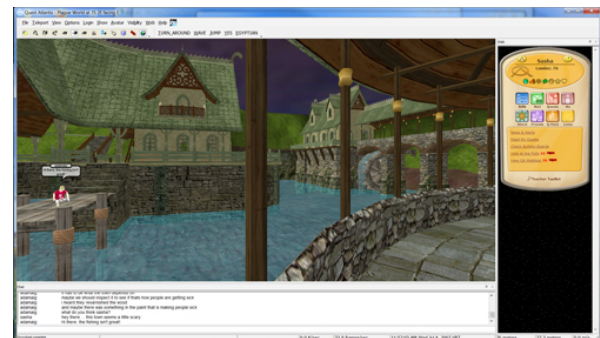


Figure 1. Screenshot from Digital Prometheus World with Quester on left side and homepage on the right.

Transformational Play

Merely playing a game does not ensure that one is engaged in *transformational play*. Instead, students who play transformationally become protagonists who use the knowledge, skills, and concepts of the educational content to first make sense of a situation and then make choices that actually transform the play space and the player—they are able to *see* how that space changed because of their own efforts. Positioning students in this way sparks their interest, but even more importantly, can lead to deeper engagement with content. As one teacher noted:

“The kids [are] not [acting as] fifth graders. They had a task. They had a mission, and anytime you ask the kids, invite the kids to be something other than a student, you’re going to automatically see motivational gains. There’s a lot more perseverance. There was a lot of reading to be done, but there were kids that were sticking with it. If I handed them a textbook, I would not have the same endurance, and it’s because of the role playing.” (5th grade teacher, interview, 12/07)

Learning through transformational play can be motivating, as this teacher suggests, because when students have a legitimate purpose for their effort, the outcome of their work is not solely to get a good grade or please a teacher. Instead, students are embodied in a role with a legitimate task to solve; the outcome of their engagement can be seen through the ways the game world changes (for better or for worse), based on their choices.

Designing for transformational play (see Figure 2, elements of Transformational Play) involves situating students and the curricular content within a virtual world. While our commitment is to support students' learning of that content, the spaces that we design expand on the already powerful design strategies associated with traditional project-based curricula. In particular, our focus is on building contexts with (1) problems that engage (personal intentionality), (2) content that matters (legitimizing content), and (3) outcomes that teach (experiential consequentiality). This is best illustrated through an example of this framework in an actual curriculum, one of the virtual worlds within Quest Atlantis called *Digital Prometheus*. This world was designed to foster persuasive writing by immersing students in the themes and ethical dilemmas from Mary Shelley's *Frankenstein*. In this unit, players travel to a village named Ingolstadt. As they interact with the local villagers, they are asked to develop a claim about whether it is acceptable for the local doctor (Dr. Frank) to create a life in the hopes of finding a cure for a town afflicted with a devastating plague.

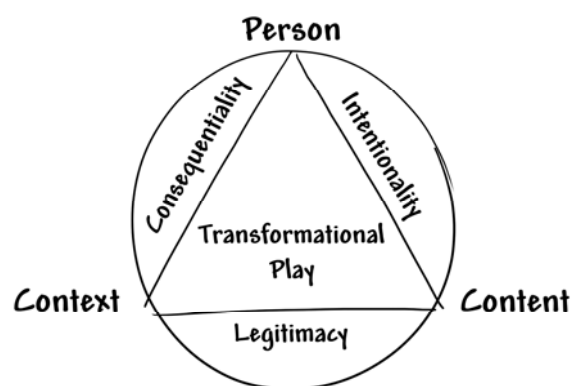


Figure 2. Diagram showing Elements of Transformational Play.

Students entering Ingolstadt are immediately drawn into the drama of the storyline. They see the effects of the plague, and they encounter a variety of opinions as they interact with the citizens. The player's job is to talk to the local townspeople, examine the facts, choose one of the sides of the issue (for example, either allow the doctor to continue his research or prohibit the doctor from conducting his experiments), and then collect convincing evidence to support her argument. As

game play unfolds, the narrative *context* evolves and changes based on the player's efforts and decisions (if she decides that it is illegal for the doctor to continue, the doctor might stop his work and the plague spreads). At the same time, the *player* herself also evolves, because she is treated differently by other in-game characters and real-world players based on her accomplishments and decisions. In addition, her actual tasks in the game change require increasingly sophisticated *content* usage, as the more advanced investigative reporter is now able to take on more difficult assignments when writing for the newspaper. Designing for these interactive trajectories requires careful attention to the interplay between *person*, *content*, and *context*.

Intentionality of Person: Problems that Engage

John Dewey (1938/1963) argued that education is about revealing possibility and exciting passions, thus empowering learners with both the expertise and motivation to meaningfully act in problematic contexts where applying that knowledge is important. His vision of schooling is quite different from the educational experiences most students have. The learning experience, in Dewey's thinking, doesn't begin with academic content, but should first involve a situation that fosters a desire for inquiry ('reasonable doubt'). Toward this end, our work involves building a curricular drama designed to draw students into a storyline in which they must master academic content in order to successfully resolve the game scenario. In this way, students act with intention in order to solve authentic problems and experience their real-world application within a virtual scenario. For example, when teaching the differences between mean, median, and mode, we work to identify those contexts in which using one of these measures of center changes the outcome of the analysis. In one of our scenarios, children take on the role of statistician and are asked by a game-based child of a virtual town to help determine which brand of bicycle is better for the city park to offer at their new rental center: the brand that stops more consistently, or the brand that has a shorter average (but less consistent) breaking distance (Gresalfi, Barab, Siyahhan, & Christenson, 2008). As students test the virtual bicycles, they collect the data and then represent their data using graphs that allow them to see what the mean as opposed to median communicate about the bikes. Rather than simply representing the data for its own sake, the task invites them to reflect on how these mathematical tools inform them about what recommendation to give the mayor.

Legitimacy of Content: Content that Matters

Disciplinary knowledge serves as one of the most fundamental tools for acting in and making sense of the world. Students must understand the relations of

pH to water quality, for example, so they can recognize the larger socio-scientific implications of a particular land use policy; likewise, understanding the literary power of simile and metaphor can help in writing a persuasive essay to a congressman. However, these building blocks of pH and simile and metaphor must be put into a context for them to move beyond the state of mere rote memorization or isolated facts. It is through narratives that we provide the context, backdrop, and future value of academic subject matter. For us, this commitment requires discovering situations in which content has legitimate value, and then designing virtual worlds that allow children to *enter* these situations. In the Digital Prometheus world discussed earlier, players initially receive a letter from their mother, pleading with them to visit Ingolstadt, which is being destroyed by a plague, and to talk to Dr. Frank and the local newspaper editor. The player, as an investigative reporter, interviews in-game characters, each of whom have opinions about the doctor and experiences with the plague the doctor is trying to stop. The player gathers these opinions in order to collect evidence about whether the doctor should continue his work. The player chooses whether to save opinions and quotes in her reporter's notebook based upon which are most relevant to her argument, and will prove to be most compelling supports for her eventual claim. Because her notebook can only hold ten quotes at a time, the player is required to prioritize which quotes are most useful to her argument. This activity serves to bind content with person by creating a legitimate dilemma that can only be resolved by accurately using disciplinary content.

Consequentiality on Context: Outcomes that teach

The power of transformational play is that students are immersed in contexts that engage them intellectually and push back on their thinking and their actions. Thus, rather than working on problems in which they have to imagine the implications of their actions or decisions (which is common in most project-based work), the context of the game creates opportunities for students to actually experience consequentiality. As an example, in our water quality unit, *Taiga*, students are asked by a park ranger to investigate what is causing the fish decline in the virtual park, and asked to come up with a solution that will support the sustainability of the park (Barab, Zuiker et al., 2007) (see Figure 3). Students might choose simply to outlaw logging in the park, because it causes erosion, or require that no one farm near the river bank, because the runoff from the pesticides changes the pH of the water. Once they make this decision, they are able to experience the consequences of these simple solutions; they are taken forward in time to see and experience the park 10 years in the future, based on the outcomes of their decisions. If they discover that the park has gone bankrupt, they then explore this future world in order to better

understand what caused the park to fail. They can then return back in time to reflect on the errors of their solution and consider a better solution—one that demonstrates a better balance for the ecosystem, the scientific issues involved, and the socio-economic issues at play.



Figure 3. Screenshot of Taiga Virtual Park.

Supporting Games in the Classroom

We have outlined three design features that we see games as having the unique opportunity to support: intentionality (of person), legitimacy (of content), and consequentiality (of context). Research in online videogames, especially those intentionally designed to support learning, demonstrate that games afford significant opportunities for students to engage with content in novel ways, in part because they are so interactive. Research supports that these immersive technologies can make a difference in student learning. For example, in a comparison study, we created a science curriculum that was embedded in Quest Atlantis, and the equivalent curriculum was taught (by the same teacher) in a traditional classroom. The students in the QA class learned significantly more science concepts than the traditional classroom students, showed higher levels of engagement, and demonstrated increased evidence of intrinsic motivation (Arici, 2008; Hickey et al, in press).

What's more, when we tested these same classes two months later, the QA students remembered significantly more science content than the traditional classroom students (Arici, 2008). Thus, students learning the same curriculum in a 3D immersive world were able to remember more science concepts and remember them longer. One of the many explanations for the QA students' success is that virtual worlds are intrinsically motivating to students and even the most basic 3D world narrative can capture their imagination. However, the real potential of educational games is realized **when the teacher joins with the students** in engaging these narratives and role play. While the games we design are more interactive than traditional textbooks, they do not teach themselves. Quest Atlantis is not a teacher, nor an auto-pilot software; it is a dynamic curriculum. In short, teachers take on new roles

as they teach with these new technologies; they become players, facilitators, advocates, allies, and bridges, helping to foster learning in these innovative worlds.

- **Becoming a Character in the Game.** One of the most fundamental and enjoyable aspects of teaching in an educational videogame is the opportunity for the teacher to play alongside the students. It is essential for teachers to engage in these virtual worlds as integral characters because, even in this non-typical context, teachers still drive and shape student learning. As teachers take on virtual roles in the game, they help the narrative to unfold, they motivate students with appropriate feedback at opportune times, and they highlight and reveal key concepts embedded in the scenario.
- **Supporting Core Concepts.** In supporting content learning in these worlds, it is helpful for teachers to consider three types of content understandings or ways of engaging: procedural, conceptual and consequential. First, we want students to learn the procedures necessary for completing a task. *Procedural* learning is common in traditional classrooms, and fairly straightforward. Students need guidance to see the bigger picture, to gather these steps and formulas into a larger *conceptual* understanding. Sometimes this involves lectures about key concepts, sometimes having the teacher pose ‘what if’ scenarios, and sometimes engaging individuals or the class in Socratic questioning. Third, *consequential* understanding occurs as students and teachers see the relevance and apply the concepts to impact particular situations.
- **Using Outcomes to Teach.** It’s hard to get students to use both their failures and successes to improve their thinking—making mistakes is often embarrassing. Of course, as teachers we know that students’ mistakes can be as illuminating as their successes; the key is to help students to use this feedback more strategically, and not place penalties on failures during the learning process. An important way to leverage outcomes as teachable moments is to create an expectation for both success and failure. Creating an “expectation for needing revision” will go a long way in

helping students think about outcomes as an opportunity to improve, rather than simply be information about failure.

- **Allowing ‘Off-Task’ Behaviors.** In a game students spend much time exploring the narrative, interacting with game characters, and even engaging content not usually associated with the to-be-learned academic content. This is because building a narrative frame to provide meaning to academic content takes time. Clearly, the teacher must find a balance between a tight focus on content that limits opportunities to explore and problem solve with a loose structure in which students learn little academic content. At first, we, and the teachers we work with, were wary of allowing students to engage any off-task behaviors. However, over time we have begun to see informal communication as an important part of the overall impact of the medium.
- **Supporting Transfer of Experience.** While we wish to contextualize the learning experience in terms of a particular story, we also want students to see the value of the content for other situations; that is, we want to support transfer of the ideas. If the teacher moves too quickly, the experience itself is undermined in the privileging of the academic subject matter knowledge, but if the learner never realizes how the experience relates to other experiences, then learning was engaging but not productive in terms of life preparation. Remember, it is our hope that these experiences aren’t worlds unto themselves; but through these experiences, students can come to see themselves as people who have a very real possibility of using the content to successfully transform other contexts and continue their own growth as a scientist, historian, or writer.

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