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Achieving through the Feedback Loop: Videogames, Authentic Assessment, and Meaningful Learning

If you think about it . . . a videogame is just an assessment. All you do is get assessed every moment as you try to solve a problem, and if you don’t solve it, the game says you failed, try again and then you solve it.

—James Paul Gee, Big Thinkers

Oh man! “C’mon.” “Yes!” “Sweet!” “Argh, did that really just happen?” “You’ve got to be kidding me!” “Well, I won’t do that again.” We often hear these terse expressions of disappointment or elation when we observe adolescents playing videogames, as they struggle and either fail or succeed through various portions of gameplay. Though we recognize that these are emotional responses to a game-based performance, we also know that these reactions tell us something about good assessment. That is, when playing videogames, these adolescents have ongoing formative and summative feedback that help them navigate and progress throughout the game in critical, meaningful ways. The players are part of the process, and we emphasize the word process because much of videogaming involves active learning (Gee, What Video) that results from experimentation and revision based on game-related feedback, also highlighted in Gee’s quote above. Though some may only view videogames as frivolous entertainment, research suggests that videogames involve concentrated, student-centered practices that can support literacy activities in and outside of school (Abrams, “Gaming Frame”; Gee, What Video; Gee and Hayes; Gerber; Squire; Steinkuehler, “Video Games”). Further, given that 97 percent of today’s youth play videogames (Lenhart et al. 2), it behooves us to investigate these media even further and contemplate how feedback features in videogames can inform classroom assessment. Therefore, we call on our research of adolescent videogaming to identify how videogame players are involved in the learning and assessment process. Subsequently, we offer practical ideas for integrating such authentic feedback for immediate classroom application.

Authentic Assessment: Feedback That Extends beyond the Brick and Mortar

Almost 20 years ago, Linda Darling-Hammond, Jacqueline Ancess, and Beverly Falk published Authentic Assessment in Action: Studies of Schools and Students at Work, in which they call attention to performance-based tasks and problem solving that are “authentic” because “they require that students demonstrate what they can do in the same ways that workers do in out-of-school settings: by performing tasks that are complex and that require production of solutions or products” (2). In other words, authentic teaching and learning moves beyond the transmission model of instruction and endorses the student-as-thinker who engages in learning that extends beyond the textbook and is “connected to the world that exists beyond the classroom” (Padak...
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and Bardine 127). Today, the out-of-school world also includes interacting in virtual environments, such as those created and supported by videogames, but students do not necessarily recognize their digital practices as learning (Abrams, Gerber, and Burgess 95). Nonetheless, video gaming is a literate activity that inherently involves active participation, experimentation, and collaboration (Abrams, “Gaming Frame”; Gee, What Video; Gerber and Price; Squire), key skills that help students to connect to online and offline worlds beyond the brick and mortar. The authentic forms of assessment featured in videogames that help students achieve within the digital world may also help them succeed in the classroom, and the game-based feedback model is an assessment framework that merits further examination. Thus, in this article, we call attention to the ways such authentic forms of assessment can inform student learning both in and outside of school, and, rather than suggesting causality, we recommend a deeper exploration of this feedback model as it pertains to rethinking academic performance-based tasks and assignments.

What We Know about Videogames, Classroom Learning, and Authentic Assessment

When it comes to videogames and learning, we know that players are actively involved in accomplishing an overarching goal. To do so, players typically negotiate multiple stimuli and tasks and develop spatial and cognitive skills as they learn through discovery and peer collaboration (Gee, What Video; Schrader and McCreery; Squire; Steinkuehler, “Massively Multiplayer”). Videogame players are comfortable with experimentation, as players know they can try to achieve otherwise unattainable game-based tasks—20-foot back flips or 50-yard passes—with little to no consequence; in essence, they can capitalize on multiple opportunities to do-over and revise a move or tactic. As a result, in the videogame world, errors lead to successes because players have the immediate advantage of learning from mistakes and becoming self-assessors of their learning by recognizing and applying moves that can beget progress and improvement. In other words, there is an iteration involved in videogame learning that includes new, revised, or repeated moves based on various forms of assessment that enable players to evaluate and reconsider positioning and progress.

In relation to classroom instruction, this type of feedback-and-opportunity cycle typically is not part of daily routines. There may be forms of iterative learning, such as the drafting process and the writing workshop, that require students to collaborate, reflect, and revise. However, the general concept of the do-over is not necessarily part of educational culture; “technology and school culture are at odds as to what it means to know and do” (Collins and Halverson 46), and, as much as teachers may want to linger on a certain topic or experiment with new approaches or technologies, the reality of scheduled units and anticipated and unanticipated mandates affects educators’ curricular decisions (Collins and Halverson; Olmanson and Abrams). What seems to be the result is instruction that, regardless of common curricular threads, can be segmented into distinct units that, ultimately, can stand alone (Gerber). Further, when students are asked to engage in reflective work and are assessed on their progression, “the learning is often slowed down and de-motivated by the need to record their thinking at every stage, in a paper-based portfolio, and make their ‘working out’ look neat” (McLaren 228). Videogames are relatively fluid and flexible, and unlike unit tests, paper-based portfolios, or traditional summative assessments that herald the movement from one specific topic to another, when students “level up” in videogames they immediately use and integrate prior information because the games continuously build upon interrelated material and themes.

Videogames feature authentic assessment not only because success hinges on students’ application of learned information in a new yet relevant context, but also because students are asked to be creators and/or problem solvers. Videogame players, much like athletes, need to “read the field.” They need to analyze the setting, strategize approaches, and, often, collaborate with others to accomplish a task. One high school student and videogame player, Robbie, explained how he used his knowledge of both history and the videogame environment to defeat his opponent. More specifically, Robbie noted that, when playing Battlefield 1942, he had to consider how infrastructure would affect...
his enemy’s approach: “Like in Battle of the Bulge, they have two main roads . . . well of course they used roads, so I have an M10 tank destroyer. I set it up on the, behind the woodcutting shed, which hides the body of the tank. There’s a little slot on the doorway, so I’d see them coming.” Robbie had to assess the characteristics of the virtual space (the presence of roads and the woodcutting shed) while also considering his positioning in relation to his computer-generated opponent. In-game maps similar to the one displayed in the upper right-hand corner of the screenshot (see Figure 1) helped Robbie use the various real-time information about himself and his enemy to make predictions and strategize. This is no easy feat, and, as noted above, it involves metacognition and critical thinking, analytic skills that can be applied to problem solving both in and outside of the classroom.

Games and Transparent Assessment: Students in the Assessment Process

After succeeding in his strategic maneuver, Robbie reveled in the amount of “control” he had had over the game, and he explained that “I’d do it again,” reinforcing how players will replicate successful moves. At the time, such techniques and repeated play helped Robbie achieve “18th place” in all of online Battlefield. Robbie’s story also helps to call attention to the features of videogame play that support process assessment and learning. More specifically, we focus on three on-screen elements essential in helping a player (re)assess goal-related game play:

- **The Health Bar**—This formative tool tells the players how “healthy” their characters are and gives the players real-time feedback of their playing opportunities. Sometimes health bars will indicate how many lives remain (e.g., of three lives, there is one life or chance remaining). Other times, the health bar can indicate the amount of power, such as strength and ammunition, that the on-screen characters have. Along the bottom of the screenshot in Figure 1 are details for the players’ status, which, in this case, hinges on artillery. Additionally, Figure 2 shows us what a health bar might look like in the game **Guitar Hero**.

- **In-Game Maps**—In-game maps provide players with a view of their location in the game world in relation to major landmarks and game missions, as well as in relation to other players. In the screenshot in Figure 1, there are different forms of maps. In the upper right-hand corner, we see a zoomed-out image of the in-game environment that indicates the position of both the player and the opponent. Some multiplayer videogames include a map divided into quadrants, displaying data for each player’s physical location in the game at any given time. Further, in Figure 1, on the top border of the screenshot, there are additional symbols with titles, such as “confirm,” “request,” and “spotted,” which have interactive functions, such as alerting players to the presence and/or actions of others in the game. These may be understood as another version of a map, as such data refer to positioning and interaction with others, as opposed to character-related strength and health.

- **Leaderboard**—This is a list of the players currently in a game, or those who have played the game at one point, and it shows their in-game rank by their score. When Robbie was ranked 18th, his screen name (different from his given name) was listed in the leaderboard ranking. Generally the player on the top, or upper-end of the leaderboard, has the highest score. Figure 3 illustrates a leaderboard for the popular **FIFA 13** game.
Each of these features—the health bar, the in-game map, and the leaderboard—requires the player to be aware of his or her progress and performance. As a result, one develops an awareness of self, others, and the feedback tools that detail current and direct information intended for immediate application. Though the game engine may provide feedback in these digital forms, the player has a role as self-assessor. The player can self-assess by opting to replicate or modify game moves, to remove himself or herself from the game, and to call on others for assistance. Regardless of the player’s decision, what becomes clear is that game designs empower the player to (re)evaluate positioning, status, and moves, thus giving the player a central, not peripheral, role in the assessment model.

The Feedback Loop: Game-Based Assessment Model

“I know I’m not going to lose because I’m in the green.” Referencing the on-screen Guitar Hero “rock meter” health bar that, like a traffic light, ranged from green to yellow to red according to playing accuracy, high school student J.D. knew that he was successfully hitting the notes. Figure 2 provides a screenshot from Guitar Hero and illustrates what J.D. referred to when he looked at the meters on the bottom right-hand corner to monitor his status. J.D. used his health bar (the rock meter) to assess his overall ability, and he read the in-game map (performance streak) to see the number of notes in a row he successfully played. Though J.D. looked at the health bar and map, he explained that the meters “are kind of distracting,” and, to concentrate on the feedback, J.D. memorized the upcoming set of notes before looking at the bottom of the screen: “if I want to know my, like, streak, I’ll make myself memorize what’s coming up next because . . . I’ll have to look back and know what’s coming up next.” In other words, despite distraction, J.D. had a clear understanding of his progress and status because the game provided immediate and current information based on his performance. Videogames require players to be cognizant of their actions, and, even though students may not be completely aware of their meaning making—mostly due to their constrained understandings of learning (Abrams, Gerber, and Burgess 94)—it is clear that they are conscious of their score and their character’s positioning in the game.

Underscoring an awareness of progress is another scenario, in which adolescents were playing the soccer videogame, FIFA 13, in an out-of-school library gaming experience. The adolescents were bantering back and forth about who was a better player, who had developed stronger skills, and who had the better team. Javier, a high school student, raised his fist and punched the air at the end of the match, exclaiming, “See that, punks, that score right there, that shows that I am the king of this game.” Javier said this in response to seeing his team’s name at the top level of the leaderboard, ahead of the three friends with whom he was playing. Despite such success, when they switched to a different match, Javier noticed that his team was no longer top ranked when compared to others online, and a player-specific leaderboard indicated areas for improvement. Moving from a team-based leaderboard to a player-based leaderboard, Javier could look longitudinally at data from across many playing scenarios and many different players. Figure 3 provides a screenshot of a similar leaderboard from FIFA 13 that indicates where a player ranks, which often can allow the player to see areas in which he or she needs improvement as compared to other players.

The Feedback Loop

At the heart of J.D.’s, Robbie’s, and Javier’s ability to read the screen and succeed in game play is what we call the feedback loop, that is, a series of for-
Subsequent scoring feedback from the game affects progress and positioning (placement in relation to others, moving on, or starting over), which leads to modification or replication, which once again leads into a new or similar game move.

Such a feedback loop is possible because the three in-game assessments we feature allow for ongoing, transparent, formative feedback. More specifically, though its appearance may be game-specific, a leaderboard is present within the game, and players’ points are added to the leaderboard, which allows them to see how they compare to others. There is no secret or waiting; players are always aware of their scores. Further, to keep engagement high, the game continuously presents more challenges to players (often in the form of new quests or missions) where they can accrue more or different types of points or skills, thus keeping them in the feedback loop and keeping them engaged in the game and motivated to climb the leaderboard.

As players continue playing and moving up the leaderboard, they also receive feedback from formative and summative on-screen assessments that work in concert to continually provide immediate and, thus, current information to help the student understand (a) how a tool or technique works, (b) what moves lead to success, and (c) what moves lead to failure. As Figure 4 illustrates, the feedback loop is an assessment cycle within a game environment that a player uses to negotiate the game space and better understand his or her progress within the game. The feedback loop forms as the player begins to play the game, tying objectives, learning, and experience together. Because of the health/status bar, leaderboard, and internal maps, the player can gauge the outcome of his or her actions and make necessary changes to become more successful. As the player begins to play, he or she receives points, known in the gaming world as experience points, or XP points, for tasks well done. In some cases, the player will earn points that are placed within different categories and indicate certain accomplishments within different areas (often known as strengths in the gaming world). This type of feedback on progress (e.g., lost/gained points, lost/gained health) also affects positioning; if one is not doing well, typically he or she will need to restart some—if not all—of the game. Or, if one is doing well, he or she will opt to repeat a move, just as Robbie had, or, after acquiring a requisite skill, the player may choose to move forward because the game engine will allow it. Opportunities to earn skills and/or replicate or revise an action (e.g., a do-over), in turn, affect one’s score and one’s game move.

FIGURE 3. Example of FIFA 13 Leaderboard

![Example of FIFA 13 Leaderboard](www.gameinformer.com)

FIGURE 4. The Feedback Loop: Iteration and Do-Overs

![The Feedback Loop: Iteration and Do-Overs](#)
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May be connections between the feedback loop and extant best practices, we call specific attention to what distinguishes this feedback loop assessment model: the interrelated features of iteration that provide multiple levels of information to support metacognition and growth. Further, the continuous feedback helps students to assess and reassess their real-time progress and realize the immediate application of what they have learned. We believe that, by identifying and understanding the elements of the game-based feedback loop, we can consider how it realistically can be implemented within classroom instruction to help contemporize authentic classroom assessment.

The Feedback Loop and School Assessments

Most videogames include similar variations of formative and summative assessment that, when juxtaposed to school-based assessments, call to light the relative discrepancy between the roles of the teacher-as-assessor in school and the student as self-assessor in the game. As noted earlier, the game may provide the player with real-time status data, but the player is central to the learning and assessment process because he or she uses the feedback to modify or replicate game moves. Unlike a test score, which provides a static indication of student performance (and usually is not administered more than once in the same fashion), game scores, though summative, also help the player rethink moves and apply changes to the same setting, or game space. In so doing, game scores are also formative measures.

Table 1 calls attention to the game-based assessments (the health bar, leaderboard, and in-game maps), whether they typically are formative or summative or both, and the types of school-based assess-
student hone problem solving and argument skills, and have far-reaching implications and applications across content and contexts in school, outside of school, online, and offline.

How can this exist in the classroom? We suggest it can be part of the classroom when teachers create a culture that supports students continuously gauging their progress and learning from their errors. The feedback loop is not specific to an assignment; rather, it involves an integrated understanding that students need repeated opportunities to understand, from multiple perspectives, their progress toward short- and long-term goals. This includes self-, peer-, and teacher-supported evaluations of what is complete or incomplete, the accomplishment of short- and long-term goals, and the ongoing ability to make necessary adjustments to the work in progress.

Figure 5 provides an example of how features of iteration can support students’ learning and their completion of an assignment or activity. Though the questions are placed next to their respective quadrant, the students’ responses will be interrelated, thus helping students learn through the feedback loop. The dashed lines and multidirectional arrows underscore how the features work in concert to engage students in process learning.

Because the feedback loop assessment model is one that needs to be embedded within informal and formal classroom activities, we provide additional suggestions and rationales for incorporating elements of iteration and process learning that can help students solve problems and apply their understandings beyond the classroom walls. One suggestion is to form meta-reflection/metacognition workshops that include guiding questions to help students think about their learning and that of their peers. As thinking matures and deepens, students can begin to develop their own questions for both self and peer reflection. Through such reflection

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**TABLE 1. Forms of Game and School Assessment**

<table>
<thead>
<tr>
<th>Videogame-Based Assessment Feature (transparent in games)</th>
<th>Formative</th>
<th>Summative</th>
<th>Types of School Assessment (not always so transparent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health/&quot;life bar&quot;</td>
<td>Yes</td>
<td>No</td>
<td>Written feedback conferences self-tests/pretests</td>
</tr>
<tr>
<td>Leaderboard/Documented score/rank</td>
<td>Yes</td>
<td>Yes</td>
<td>Test Scores</td>
</tr>
<tr>
<td>In-Game Maps</td>
<td>Yes</td>
<td>No</td>
<td>Peer Review/seeing where others are/where their goals are</td>
</tr>
</tbody>
</table>

ments that can serve a similar function. Given that game scores are temporarily fixed elements, changing only if the player makes moves to increase his or her score or skills, we view such feedback as both summative and formative. However, the health bar and in-game maps are formative features that, as we have illustrated earlier, directly affect the assessment and learning cycle, or the feedback loop.

So what does all of this information on the feedback loop and assessment structures within videogames actually have to do with school assessment? Everything! John Dewey explains that education is about “growth, continuity, [and] reconstruction of experience” (47), and we know that “games don’t really . . . separate learning and assessment . . . . They’re giving you feedback all the time about the learning curve that you’re on” (Gee, *Big Thinkers*). Thus, as with videogaming, good assessment should include immediate feedback and augment learning through process monitoring (in-game maps), comparative measures (leaderboards), as well as progress markers (health bar). We suggest that this can be done in good classroom instruction. Though immediate assessment may be difficult depending on the task, cooperative and reflective settings or tasks help to support relatively prompt, transparent feedback that can have direct applications to school work. Further, if we are looking to involve students in the assessment process (which goes beyond student-created rubrics), we need to give them the opportunity to revise almost indefinitely. This includes revising tests as well as essays and performances, and having the high score be the one that counts.

At the crux of this suggestion is metacognition and process learning, and, therefore, the student will need to explain why he or she has made the modifications and how doing so will lead to an improved performance. This approach will help the
and collaboration, students can see how their thinking complements and/or compares with that of their classmates, and these personal discoveries can motivate and support student improvement. As explained in Figure 5 and Table 2, videogame-based assessment features can be incorporated into the classroom, providing integrated feedback. For example, reflections (a type of health bar) can help students consider their ongoing work, while personal leaderboards can document summative feedback for achievement and progression. Finally, comparing their work to standards and objectives, students can identify supports they may need to accomplish the task, similar to using an in-game map to understand positioning. Though approaches to integrating game features may be classroom specific, Table 2 provides interrelated examples of rationales for creating in-class game-based student self-assessment.

**Conclusion**

In Russell Hvolbek’s reflection on education and learning, he reminds us that “education is learn-
ing to see, to think, to read, and to write,” calling attention to how each of these words is a verb, noting that “education is an activity, a process, and an ongoing involvement done for the sake of the involvement itself.” When we consider assessment in light of videogaming, what comes to the fore is the role of relevant, active learning where students are agents of their own assessment and change. Assessment, like education, is a process, and the first step in reconsidering authentic assessment in contemporary spaces is to recognize the central role of the learner as assessor.

Note

1. To conform with the International Game Journalists Association, “videogames” will be written as one word in this article.

Works Cited


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READWRITETHINK CONNECTION

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One of the great things about video games is the immediate and constant stream of feedback. The ReadWriteThink.org Strategy Guide on “Partner Talk” shares a way to provide students with another learning opportunity to make learning their own through collaboration and discussion. Partner Talk can be used for assessing classwork, making connections to prior knowledge, discussing vocabulary, or simplifying concepts. http://www.readwritethink.org/professional-development/strategy-guides/using-partner-talk-strengthen-30954.html