**Amy Price**

**St. Mary’s University, Twickenham**

[**amy.price@stmarys.ac.uk**](mailto:amy.price@stmarys.ac.uk)

**Introduction**

*‘How do you get someone to learn something long, hard, and complex and yet enjoy it?’* (Gee, 2007, pg. 2). This is the question that digital video game developers must consider, so that gamers are motivated to persevere through the game, and achieve the game’s overall goal. McGonnigal’s (2011) statistics, which claim half a billion people worldwide play digital video games for at least an hour per day, suggest it is evident that digital video game developers are successful at enabling gamers to feel a strong desire to engage in digital video games. The same question should also be asked of those at the forefront of driving young people’s involvement in physical education and physical activity, if learners are to feel motivated to be active for life, which is the premise of the key stage three and four national curriculum (2014) for physical education.

This case study investigates how one physical education practitioner integrates design features of digital video games into invasion games pedagogy, so that students are motivated to play and learn games.

**Games: Long, hard and complex?**

Indirect instructional models for physical education and sports coaching, such as Teaching Games for Understanding (TGfU) (Bunker & Thorpe, 1982), the Tactical Games Model (Griffin, Oslin & Mitchell, 1997), and Games Sense (Den Duyn, 1997) adopt a game centered approach to learning, which suggest that technical, tactical, physical and social development of the learner is interdependent and interconnected. However, more importantly, all learning occurs within the context to which it is applied; within the game itself. This approach to learning is known as situated learning (Lave, 1988), which values the opportunity to learn through application, and experiences of that application. With reference to Bloom’s (1956) taxonomy for learning within a game centered approach to teaching invasion games, a situated learning perspective also enables learners to analyse, synthesise and evaluate application of skills within a game situation, whilst the game is happening. This creates a learning environment that is authentic for a games player, because skills, decisions and reactions are performed quickly, and in relation to the actions of other players in the game.

The success of the game player is therefore bound by making quick and meaningful actions, based upon the consequences of the actions from the other players in the game. Using Bloom’s Revised Taxonomy (Anderson & Krathwohl, 2001), the greater challenge is to perform an action that will create (or help the team to create) a solution to the current game problem, which would consequently pose a problem for the opponent. This idea of meaningful action is reminiscent of Schon’s (1991), reflection-in-action which suggests that by reflecting in action, one is able to use previous and present game experiences to think about what action to take next in the game, and to take this act straight away. By taking constructive action in the game, Rahimi (2013) informs that the game player is demonstrating their critical thinking skills.

Within a game centered approach, scholars argue there is no optimal technical performance model, and instead skills are performed in relation to the demands of the game situation (time, space, opponent, team mates). Consequently, the game players are less reliant on the teacher to provide performance feedback. Therefore, game players are encouraged to take independent action in the game using various means of performance feedback, but most notably, reflecting-in-action on the consequences of own and others actions. The context of games therefore aligns itself naturally to Vygotsky’s (1978) zone of proximal development, a learning theory that facilitates independent problem solving using measured and progressive support from a significant other. Within a game centered approach, the significant other could be teammates, opposition, the teacher, or even the game itself (depending on how it is designed).

**Gee’s (2013) Good Game Design Features**

The design of digital video games always uses a situated learning perspective, (Lave, 1988) which signifies Gee’s (2013) concept of meaningful action, resulting in children (and adults) feeling especially motivated to play video games. Gee (2013) highlights specific good game design features, which are considered to have a high potential for learning, due to their ability to place the gamer in a state of Flow (Ciskszentmihalyi, 1975). This is a psychological state whereby the gamer is totally immersed within the game, and consequently is more susceptible to enhancing learning or performance. Gee’s (2013) good game design features are categorised into three learning principles: empowerment, problem solving and understanding.

**Opportunities: How can Gee’s (2013) good game design features be implemented in invasion games pedagogy?**

Gee’s (2013) good game design features can be categorised into three underpinning principle for learning. For this case, the principle of ‘Problem Solving’ will be used.

**[Insert Figure One]**

**Measuring Learning in Invasion Games: Getting students to *learn* something long, hard and complex, and yet enjoy it**

Pedagogy that is integrated with Gee’s (2013) good game design features has pedagogical similarities to the game centred approach. Salen & Zimmerman (2004) describe games as a (calculated) balance between rules and freedom. The rules of the game are in place so that players can interpret the logic of the game (Grehaigne, Richard & Griffin, 2005), whilst freedom in the game enables players to engage in critical thinking, in order to explore the most efficient way to solve a game problem. The freedom within a game is the reason why games have an element of unpredictability, whereby the context to which a skill or action is applied, is rarely the same. Subsequently, the process of measuring learning within games has proven to be problematic (Memmert & Harvey, 2008).

Learning in a digital video game is measured according to the gamer’s progress through the game, and therefore assessment of learning (AfL) and assessment for learning (AoL) occurs within the game itself. When the gamer is finding the game particularly difficult, the game adapts to provide the gamer with feedback that is just in time and on demand (Gee, 2003). In this instance, the game is acting as the gamer’s significant other (Vygotsky, 1978), so that the gamer can maintain a state of Flow (Ciskszentmihalyi, 1975). The same principles apply in physical education, although in order to break down the contextual complexities of game play (time, space, positioning of opponents and team mates), a practice-referenced approach has been adopted, which Rovegno, Nevett & Babiarz (2001), Kirk (2005) and MacPhail, Kirk & Griffin (2008) recommend in order to reduce the number of variables that are to be examined. This means that attacking play has been used as a ‘unit of work’, with the intention of contextualising the game player’s progress through the unit.

**Unit of Work: Considerations for future practice**

Gee’s (2013) good game design features were blended with a game centred approach for a key stage three physical education unit of work on attacking play in invasion games. Informal observations of one game player over the course of the unit of work, raised the following questions:

**Question 1:** To what extent does the game centred approach focus on *game design* as a means to embed learning?

**Question 2:** Is it possible that the game centred approach uses too much ‘play’ (or freedom), to the detriment of the game player?

**Question 3:** How might the game centred approach use repetition (through variation) to enhance skill mastery?

Learning in games occurs in peaks and troughs; no skill performed is ever the same. In this unit of work, once the game player thought the problem was mastered, the game reacted back to pose something different (but similar), forcing the game player to respond in another way. Nonlinear learning (peaks and troughs) is characteristic of the game centred approach (Chow & Atencio, 2012), due to the freedom in games for players to think and act. In digital games, players feel like they have freedom (which to some extent, they do), however, the careful design of games means that game players are actually engaging in a process of repetition (through variation). The idea of repetition in physical education practice is traditionally aligned to linear learning, using a skill-drill approach. This case study reflects on how Gee’s (2013) design features can be used to provide repetition, whilst still working within a nonlinear pedagogical framework, namely a game centred approach.

***Gee (2013) Cycle of Expertise***

Gee’s (2013) outlines the ‘Cycle of Expertise’ as a good game design feature, that facilitates the learning principle of problem solving.

a) Expertise is formed by repeating the practice of a skill until nearly automatic, then having those skills fail in ways that encourage the learner to re-think and re-learn

b) Digital games are well paced; cycles of expertise include extended practice, tests of mastery, a new challenge, and then a new extended practice

c). Players require the ability to reflect on performance and learning

Gee’s (2013) cycle of expertise suggests that video games encourage practicing a skill, and then performing some kind of mastery test (usually defeating the ‘Boss’), followed by using this skill again under different problem based scenarios which encourage a ‘rethinking process’. In a game centred approach, the idea of ‘rethinking’ is one reason why learning and performance is not linear, and explains the critical thinking process of the game player to select, modify and apply skills to progress through the game.

**Conclusion**

Since Bunker & Thorpe’s (1982) introduction to TGfU, the game centred approach, is still considered as innovative practice, despite it’s grounding in major learning theories, such as Vygotsky (1978), Lave (1988) and Schon (1991). According to Harvey & Jarrett’s (2013) review of literature concerning the game centred approach, the issue of assessment (for and of learning) is still an area that requires further investigation, in order to support the practice of physical education practitioners who adopt the game centred approach.

This case study proposes that physical education may be able to learn from the way good digital game designers use game design as a strategy to encompass both learning and assessment within the game itself, to create conditions where game players want to persevere to the game’s end goal. Hence, How can Gee’s (2013) good game design features be translated into a pedagogical instructional model for physical education practitioners?

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