

Chapter 5

Video Game Pedagogy:

Good Games = Good Pedagogy

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Abstract

We have always appropriated whatever technologies are available to us for use as technologies for instruction. This practice may well date back as far as human communication itself. The practice of “studying the masters” is also an old and respected one, and using this perspective we can take advantage of the opportunities afforded us in studying outstanding examples of commercial digital games as “educational” objects, even if they weren’t produced by professional educators. By examining successful games through this lens we can progress towards an understanding of the essential elements of ‘good’ games and begin to discuss the implications this holds for the deliberate design of educational games. There is, however, a caveat: knowing why a game is good is not the same as knowing how to make a game good. It is nonetheless an essential step in that process.

This chapter examines some ways in which a few “good” games implement some well-known learning and instructional theories. “Good” games in this context are defined as those that have experienced both substantial commercial success and broad critical acclaim: the deliberate implementation of one or another learning or instructional design theory is not a prerequisite. In fact most will not have been consciously influenced by formal educational theory at all.

The implications of this study include the notion that learning and instructional design are compatible with good game design and vice versa. Finally, this chapter will present some key distinctions between digital games and other learning technologies and what this might mean for the development of design models and methodologies.

5.1 Introduction

Anyone who makes a distinction between games and learning doesn't know the first thing about either.

- Marshall McLuhan

That games have the potential to be effective learning technologies is no longer news. Such games are already out there: *Making History* (Muzzy Lane Software, 2006), *A Force More Powerful* (BreakAway Games Ltd., 2006), *Real Lives* (EducationalSimulations, 2002), *Big Brain Academy* (Nintendo Co. Ltd., 2006), and *Global Conflict: Palestine* (Serious Games Interactive, 2007) are just a few recent examples. That games deserve a place in the classrooms of our schools and institutions of higher learning is not quite as clear.

The goal of this chapter is to make that second connection a little stronger. Interest in games for learning in formal education is high but so is suspicion. Neither should be surprising. Talk of digital games for learning seems to be everywhere now. The Association for Educational Communications and Technology (AECT) featured several panels and sessions focusing on games in education at its annual conference in 2006 and will provide even more in 2007. Most organizations that deal with the use of technology in learning now feature articles on games and education and several publications have devoted entire special issues to gaming (*Journal of Design Research* v5(2) 2006, *British Journal of Educational Technology* (in press), *ACM Journal of Educational Resources in Computing* (upcoming), *AECT Tech Trends*, v49(5) 2005, *Journal of Media Literacy* v52 (1&2) 2005, to name just a few). Hardly a week goes by that one does not find an article on games in newsfeeds devoted to education and formal schooling. Large and highly respected organizations are saying we need to use games in school. The recent report published by the Federation of American Scientists stated: "There was strong consensus among the Summit participants that there are many features of digital games, including game design approaches and digital game technologies, which can be applied to address the increasing demand for high quality education" (Federation of American Scientists, 2006). At the same time, suspicion remains high: games are blamed for youth obesity (Reitman, 2003) while simultaneously offering promise as a means to combat the very malady for which they are blamed (Lash, 2006), and of course concerns over violence in games and their effects remain strong (Carolipio, 2006; Minton, 2006). With so many conflicting voices, it is important to reassure teachers that games *can* still adhere to the principles of good learning that they have been taught.

Although this is changing, most teams currently engaged in the creation of games for learning have key members who come from the games industry and so they bring to the table considerable expertise in commercial game development where success comes from pleasing the audience. Commercial game buying decisions are based heavily on game demos and word of mouth (Dobson, 2006) so in one way or another it is the game itself that determines its sales, and ultimately its

survival. Game design is critical to game success. The typical shelf-life for commercial games is still on the order of 6 months (Kücklich, 2005) so most don't get second chances. As the interest in using games for learning becomes more common, the demand for new and specific games will grow, and with that demand for design teams able to create these games will also grow. The number of people from the games industry interested in creating games specifically for education is small so we will need to fill that gap by training educational games designers. Along with instructional games designers, there will also be a demand for ways to teach teachers how to become familiar with and make effective use of the medium. One step along that path is to connect the dots between what we already know and do in education and what is currently being done in game design. Educational games design must be a synergy of both game design practices and instructional design practices – neither can be layered on top of the other, and neither can be subordinate to the other either.

5.2 Studying the Masters, and the Scholars

“One of the most difficult tasks men can perform, however much others may despise it, is the invention of good games. And it cannot be done by men out of touch with their instinctive selves.”

- Carl Gustav Jung¹

If we were to take a close look at how the different forms of both classical and modern communication media (theatre, literature, film, television, etc.) have been used for educative purposes and which ‘commercial’ examples have been appropriated by educators, it becomes clear that the majority of the most remarkable and effective “lessons” taught to us in this way have been created by extraordinarily talented writers, playwrights, directors, and producers together with their teams (Hemingway, Twain, Spielberg, Dickens, etc.). One other notion stands out. These significant educational works have, by and large, not been created by professional educators or instructional designers. What does this mean? Should we ignore what instructional design methods and theories have to say? The answer is, “Of course not”. Far from trying to circumvent what educators and instructional designers have learned, we should recognize the opportunities afforded us in studying these outstanding examples as “educational” objects, even if they weren’t produced by professional educators. We should try to characterize what it is about them that make them have the impact they do.

The case for studying the masters doesn’t really need to be made, but let’s review anyways. Looking at the practice of the ‘masters’ is an accepted approach to

¹ as quoted by Laurens van der Post in Jung and the Story of Our Time (New York: Vintage Books, 1977), pp. 411.

education in Fine Arts, the Performing Arts, Literature, and Music as well as a few others. All have a long tradition of learning from the masters. Although the reasons are rarely articulated, we often do the same thing when learning about leadership and Architecture, and one of the most significant modes of learning in Law is still to study famous and ground-breaking cases. They are studying their masters too. When it comes to the Sciences, although we do pay some homage to our icons and eponyms, we don't treat them as guides for the practice of Science – we focus on the results of their research.

In Education, we study the scholars and eagerly try to assimilate their theories. But we tend to align ourselves more with Science than with Art and tend not to study teaching by looking at how the best teachers do what they do. We typically try to adopt a more “scientific approach”, especially in educational technology. As a medium, games are more closely aligned with film and theatre than they are with the more traditional learning technologies like textbooks or even websites. Given that, one could argue that much can be learned about how to design games by looking at the masters of this profession, namely the best games. By “studying the masters”, we can progress towards understanding the essential elements of ‘good’ games and begin to discuss the implications this holds for the deliberate design of educational games. There is, however, a caveat: knowing why a game is good is not the same as knowing how to make a game good. It is nonetheless an essential step in that process. This chapter will make that step.

5.3 Connecting the Dots

One learns by doing a thing; for though you think you know it, you have no certainty until you try.

- Sophocles

Previous work by this author (Becker, 2006b) has focused on connecting commercial video games to accepted pedagogy in a fairly general way. It is not especially difficult to cherry pick specific elements from a wide variety of games in order to support an argument, and while this is useful it also has its limitations. Suppose we are going to examine Gagné's (1985) Nine Events . If we show that nine different games each implement one aspect well, we have still not shown that any one game is capable of embodying Gagné's theory. Further we have no evidence that ANY game that was able to incorporate all nine events would still be a popular game. We all remember films for example that may have had one or two good moments but are otherwise unremarkable or even bad. It is a much more significant feat to look at the whole of a work and see how the various parts fit together.

These steps towards establishing the pedagogy of games are important because the last time we tried to use digital games in education it didn't go so well and a part of that reason was that we did not understand the medium of the digital game (Egenfeldt-Nielsen, 2005). Games are far too complex to create to end up having

them ignored because the target audience finds them tedious, boring, too difficult or too easy. To hear the kids talk, we already have enough learning objects like that. We probably don't need any more. What readers can take away from this chapter is evidence that good games *already* implement sound pedagogy, and on some level, this implementation of sound pedagogy is in fact a major contributor to what makes it a successful game. It is comforting to know that the implementation of sound pedagogy can lead to a compelling game – this may mean that this is also true of other learning technologies. That's not to say that educational games should strive to become commercially successful like their pure entertainment cousins – very few educational objects receive great commercial success. We are working with an entirely different scale than the video game industry at large. They make games that have development teams numbering in the dozens and budgets in the millions of dollars. They also expect profit in the millions. On the other hand commercial success and educational efficacy are not necessarily mutually exclusive.

This chapter examines several commercially successful games using instructional design theories and models as a lens. The implications of such an examination are two-fold:

1. Games work as instructional technology. Thus, established learning and instructional theory can be connected with current design practices in this new medium. Since claims are being made that digital games should be viewed as viable technology for use in education, this forms one facet of the necessary proof of concept.
2. Instructional design works for games. We can verify that games designed along learning and instructional theory lines can and do result in artifacts that remain compelling as games. This does not mean that ID methods can be followed like recipes to produce successful games. We have not yet discovered a formula for generating blockbuster movies or classic literature either, but we still value formal training in film-making and in writing. It helps develop better writers, playwrights, and film makers.

5.4 On Choosing Games for Study

We need to consider whether we are educating children for their futures or our pasts.

Geoff Southworth 2002

Why is it important to justify the choice of game being used as an example in a scholarly article or for the purposes of study? In the early days of games studies there seemed little call for careful scrutiny of one's game choices. We studied what we had handy and wrote about the games we were already playing. How-

ever, if we want to make the case that the game in question is *good* on some level (however we decide to define “good”) then we really should have some evidence to back this up. If we are proposing the use of a game in the classroom or the study of some specific game to learn something applicable to our agenda, then we have a responsibility to explain why *that* game is suitable for our purpose.

Critical and commercial success are both recognizable and accepted (albeit subjective) measures of a game’s popularity, and popularity in turn gives some indication of that game’s perceived quality as judged by players, developers, and game critics. Combining a number of different measures to come up with a single measure is one way to ensure that games that end up at the top of the final list qualify as successful by more than one measure and have been assessed by more than one source. Since the main premise for examining commercial games in this study is to look at how games teach and otherwise support learning by studying ‘at the feet of the masters’, there must be some way to convincingly determine that the games from which the final choices are made are of a stature that would qualify them as among the best. This is not a straight forward task. In a sport like sprinting, determining who the fastest sprinter is can be done quite objectively – it is a matter of comparing competition times and the runner with the fastest time wins. No such objective measure exists for most creative endeavors, and since games are creative designs we can only produce subjective measures. Combining subjective assessments from many sources in a systematic way results in a list with which most (industry, gamers, critics) would agree.

In a recent article offering suggestions for how the Academy could build stronger ties with the Games Industry, John Hopson argues that we should “use examples from bestsellers. A good example from a popular game is more effective than a great example from something they’ve never heard of. Industry people often suffer from an “if-they’re-so-smart-, why-ain’t-they-rich” attitude towards smaller titles. Even if the small title is a perfect example of how the theory works, they’re going to be less likely to listen if they haven’t heard of the game ahead of time. Commercial success is one way of making sure that the audience will respect your examples, but you can also use titles that are well known or critically acclaimed but which weren’t necessarily huge blockbusters. It’s also important to keep your examples as current as possible, because many industry folks will see a three-year-old example as ancient history” (Hopson, 2006).

5.4.1 The Chosen Ones

Three games have been chosen for this study, all of which are well-known to gamers. These games were chosen for their style, and for their critical and commercial success. None are claimed to be of interest as educational games. Two of them, Animal Crossing Wild World (ACWW) (Nintendo, 2005) and Super Mario Bros. (SMB) (Miyamoto, 1985, 1988, 2006) consistently appear on “Best Games

of All Time” lists. The third game chosen, *Phoenix Wright: Ace Attorney* (PW) (Capcom Co. Ltd., 2005) has appeared on fewer lists but in its defense it is also a relatively new game that does not have any predecessors to fall back on like the other two. In all the reviews that are available, *Phoenix Wright* has been consistently rated 80/100 or higher. Two of the games (ACWW, SMB) are rated ‘E’ for everyone, and the third (PW) ‘T’ for teen. It seems reasonable to assume that there is limit to what can be gained from studying games rated ‘mature’ when we are trying to understand how to make games for younger audiences, so no ‘M’ games were considered for this study.

Although all three are produced for the same device: the Nintendo DS portable console) they all belong to different genres with different styles of gameplay. Both *Animal Crossing Wild World* and *Phoenix Wright Ace Attorney* have a considerable amount of written dialogue even though neither includes any actual talking. *Phoenix Wright* uses several phrases, like “Hold it!”, and “Objection!”, but his can not really be described as talk. *Mario* similarly has very little talk other than a very few phrases, but unlike the other two it is almost completely devoid of text.

Throughout the following examinations, dialogue quoted from either of these games will be displayed indented quotation text, identified by ‘speaker’, and located within the game as far as possible. Formal citations of quotes are not possible in most digital games as transcripts are not published, so this will have to be sufficient. Every effort was made to be as accurate as possible, but since dialog was transcribed while the game was running, some minor omissions or inaccuracies are possible, and for that the author apologizes in advance.

5.4.1.1 Animal Crossing: Wild World

Animal Crossing: Wild World (Nintendo, 2005) is an open-ended RPG (role-playing game). The original version of the game, *Animal Crossing* (Nintendo, 2001) appeals to a wide range of ages both male and female and is on many Best Games lists. *Animal Crossing: Wild World* was released for the DS console, but is essentially the same as the original, with respect to the main story, controls, interface, and how it teaches players what they need to know. Ultimately ACWW was chosen for study over the original version for the convenience afforded by the small portable device as opposed to the standard console which must be connected to a television.

This game is situated in a small fictional village whose landscape includes trees, flowers, rocks, an ocean front, and a river with several ponds and waterfalls. Players may choose the name and gender of their character (avatar) as well as the name of the town in which the game takes place. The town has various locations where things can happen: a general store, a town hall, a clothing shop, a museum, and a main gate. Although gameplay is the same, there are some differences between the console and the DS version. For example in the console version there is also a town dump whereas the DS version has a recycling bin inside the town hall.

These are functionally equivalent as they behave much the same way and serve the same purpose. There are other townspeople besides the player which include various permanent residents as well as residents that move in and out from time to time. Curiously, the characters in this game take their houses with them when they leave! There are no required tasks or goals to achieve and no definitive end to the game; instead players decide for themselves which goals they want to pursue. When the game first begins, the player lives in a small house that has a small mortgage held by the owner of the general store. The local currency is called the “bell”. All role-playing games and many other games have some sort of in game economy and this one is no different. Players can earn bells in various ways and can use that money to pay off the mortgage, which is held by the shopkeeper. Each time a mortgage is paid off, the player gets a new addition to her house along with a new, larger mortgage. Although players have no choice about the additions to their house, they can decide not to pay off the mortgage and pursue other goals instead, and they are not penalized for choosing this path. Other goals include various collections (fish, insects, fossils, pictures, clothing, furniture, and a few other items), cultivating flowers, growing trees, designing star constellations, or cultivating friendships among the residents. *Animal Crossing* is a game space where players are rewarded for tending.

5.4.1.2 Phoenix Wright: Ace Attorney

Phoenix Wright: Ace Attorney (Capcom Co. Ltd., 2005) has received consistently high ratings though is a relatively new title. Its format is different from most popular games today and that design makes it of interest for study. For one thing, it is surprising to many that a game featuring a lawyer as the main character should become so popular. Another is that this game is essentially a branching story that ultimately has only a single path to the end. This is a format that is potentially quite useful in education – gameplay is essentially ‘on rails’ with few opportunities for exploration outside of the main goals and yet this game remains very highly rated. Many of the criticisms of this game have to do with the low replay value afforded by the format, but while players expect to be able to play commercial games more than once, a lack of replay-ability may not be a detractor in an educational context – learners in a classroom situation may never have an opportunity to play the game again after they have completed it once. Another aspect of interest to educational game design is that it has very minimal animation so a game such as this could potentially be produced on a fairly low budget. This game is currently only available for the Nintendo DS portable platform.

In this game we play the role of Phoenix Wright, a newly-minted defense lawyer taking on his first cases. The game consists of five separate cases each involving a murder investigation that culminates in a trial which we must win. Each of the main characters has interconnecting back stories, bits of which are revealed from time to time through the five cases. In all cases the person accused of the

crime is innocent and it is our job to gather evidence and other clues which will be used to argue our case during the trial in order to have our client found not guilty. We must also discover who the real killer is. It should be noted that although it is possible to learn some of the terminology associated with the legal system through playing this game, the game's designers make no claim as to the accuracy of the court procedures or any other legal aspect of the game.

5.4.1.3 The New Super Mario Bros.

The New Super Mario Bros. (Miyamoto, 2006) is a ‘simple’ platform game whose original version is more than 20 years old. This game is also on many top 100 lists. The particular version used for study is a remake of the original *Super Mario Bros.* (Miyamoto, 1985). Mario is a game for which any claims to educational value could only be made by either: 1) a profound exaggeration of the content of the game or 2) a radical expansion of the definition of education. Nonetheless, this game is still of interest in the current context for a number of reasons. First, it has remained consistently popular throughout its various incarnations since it was first released over 20 years ago and that kind of staying power deserves further examination. Secondly it bears a strong similarity of form to one of the most popular educational games for that same time period, namely *Math Blaster* (Davidson, 1986) and while *Super Mario Bros.* continues to garner praise from game designers and gamers alike, *Math Blaster* is in many ways its antithesis (Becker, 2006a). Why is one so popular with almost everyone while the other is popular among teachers but panned by everyone else? A closer examination of Super Mario Bros. and its sequels may reveal some clues.

This game has a very simple premise, Bowser and Bowser Jr., the bad guys, have kidnapped Princess Peach, and it falls to Mario to rescue her. Virtually all of the Mario games are two-dimensional platform games where Mario can move from side to side and sometimes up and down but all movements and action occur in a flat, two-dimensional space. The nature of the game’s challenges could perhaps best be described as those of an obstacle course. There is an obvious beginning to each course, obstacles (environmental and other characters and objects) to be avoided or neutralized (no-one dies in this game) and an end goal to reach, all within a pre-determined time period. As in a real life obstacle course, the obstacles themselves may have no logical connection to the ultimate goal – they are merely things that are trying to prevent us from reaching the end. *The New Super Mario Bros.* contains 80 different courses (levels) spread across eight different “worlds”, where the set of courses in one world share similar landscapes and challenges. When the game begins, we see Bowser run off with Princess Peach, but then we do not see her again until we reach the end of the courses in the first world.

5.5 Game Elements

If you must play, decide on three things at the start: the rules of the game, the stakes, and the quitting time.

Chinese Proverb

One of the challenges in examining commercial games as learning objects is that neither structure maps conveniently onto the other. Game design and instructional design both come in many shapes and sizes, but both forms have more structures and elements in common with other designs of the same field than they do with designs of the other field. Thus most games share many structural elements that serve various purposes within those games and looking at existing commercial games as instructional technologies requires an understanding of those game design elements so that their connections to instructional design can be identified. In aid of that the following terminology (see Table 5.1) is included as reference and to clarify how the terms are being used in the remainder of this chapter. This is by no means a complete list of game elements and only terms that relate directly to the type of examination being conducted in this chapter are explained.

Table 5.1 Brief Glossary of Structural Game Elements

| GAME ELEMENT | DESCRIPTION |
|------------------------------|---|
| A.I. Artificial Intelligence | The core ‘engine’ of the game that embodies the game’s rules and conditions for winning, as well as how the characters within the game will interact with each other. |
| Attract Mode | This mode is the one that runs when the game is on but not in a state of active play. In arcades, this mode is the one always running when no-one is playing it. Some console games also have an attract mode that runs until the player restarts or continues the game. |
| Back Story | The story that underlies the game, and sets the stage for the main game goals. |
| Boss Challenges | These are challenges (often physical conflicts) with a major opponent and often mark the final challenge of a level or the entire game. Many games require players to achieve a certain level of achievement or score in order to earn the opportunity to enter a boss challenge. |
| Cut Scenes | These are non-playable parts of the game where part of the back-story or game narrative is revealed, typically in small portions lasting anywhere from several seconds to a few minutes. They can be in the same style and quality as the game itself, but they can also appear as movie quality clips. |
| Game Rules | These are the fundamental mechanics and dynamics of the game and its behavior. |

| GAME ELEMENT | DESCRIPTION |
|--|---|
| H.U.D. Heads Up Display. | Commonly used to refer to the display board that contains the game's vital information such as score, the player's statistics (health, assets, etc.), current game conditions, and so on. This may also include a map and other information. |
| L.O.D. / P.O.V. Level of Detail / Point of View. | Games typically allow players to change the level of detail by zooming in or out. It may also be possible to change the point of view so players can see what is behind them or look at objects from a different angle. |
| Levels | Somewhat similar to chapters in a book, levels are parts of a game that contain one or more complete challenges. Subsequent levels typically build upon previous ones by adding new or more difficult challenges, new abilities, opening up new areas to explore or adding new opponents. Level progression goes from simple to complex or easy to hard. |
| N.P.C. Non-Playable Character | A character that appears in the game with which you may or may not be able to interact but whose behaviour is determined by the game's design. These characters are not controlled by the player. |
| Narrative | The ongoing story as it does or can unfold. It is what comes after the back-story, often adding to it. |
| Outcome | The outcome is the final state of the game. This is a quantifiable (i.e. obvious) state: it will be clear whether or not the player achieved the stated goal. (Salen & Zimmerman, 2004, p. 96). The win state always depends on the valorization of the game. MMOs and other persistent-world games tend not to have an end outcome, but will almost always have missions, quests, or mini-games that do have clear and definite outcomes. (Juul, 2005) |
| Perspective | First-Person (player as character); Third-Person ("over-the-shoulder"); Top-Down (bird's-eye view); Isometric (tilted top-view; slightly to the side); Side-View (two-dimensional horizontal view) |
| Sandbox Mode | Practice mode, where scores do not count towards a win. Some games contain only a sandbox mode as their primary mode of gameplay, such as the SIMs games. |
| Story Mode | That part of the game where gameplay is "on-rails", meaning that the player has little to no control over where they go and what tasks they attempt. They are given specific tasks which must be completed, often to a pre-determined minimum level of competence in order to progress. This device is often used to ensure that the player is exposed to specific story elements, and often makes use of cut-scenes. |
| Time: actual and game-time | The passage of time in games may change between actual real-world time and accelerated, skipped, or even slowed game-time. Often the passage of time during play is reflective of real time, but like in movies, a change of scene or location can also coincide with a change of game time. |

| GAME ELEMENT | DESCRIPTION |
|---------------|---|
| Trailers | These are the game advertisements, often containing cinematic quality clips, screenshots of actual gameplay, and other dramatic devices to give potential players an idea of what the game is like. |
| Tutorial Mode | Often occurring at the beginning of the game but in some games it can also be triggered at the start of a new level or challenge or in response to poor player performance. In this mode the player often receives direct guidance, visual, verbal, and otherwise from the game. This mode's purpose is to help the player acquire sufficient knowledge and skill to manage the basic gameplay. |
| Valorization | Different values are assigned to different outcomes within the game; some are winning outcomes (better) and some are losing outcomes (worse). Often the more highly valued outcomes are more difficult to achieve than the negatively valued outcomes. (Juul, 2005) The values placed on various outcomes as well as the values associated with various choices made during gameplay are determined by the game designers, and may or may not coincide with societal norms, or the value-set personally espoused by the designer. |

5.6 Learning and Instructional Design Theories and Models

The heart of this chapter is broken into two sections: one that deals with several older, well-known, and relatively structured learning and ID models and theorists. Their structured nature allows for relatively detailed analysis both from a generic game perspective and from a more detailed game-case study perspective. Each of these will be examined in both ways. Each of the first three case studies includes a visualization that depicts how these game elements connect generally with elements of the ID theory/model in question as well as a description of how the model can be mapped on to a specific game. The second section examines several theories that are somewhat less linear and for these there is no general visualization. Instead we will go straight to the case studies after a brief explanation of the main tenets of the theory.

In an analysis such as the one that follows in this chapter, there is a necessary trade-off between describing the detailed analysis of one model and one game and offering a more cursory comparison using several examples of each. The second approach is the one to be used here, as it was felt that a few games able to stand up to scrutiny from multiple angles will provide stronger support for the main premise of this chapter, that being that good commercial games already demonstrate the properties of sound instructional design, even in games not intended as educational entities. Throughout the following pages, these connections will be tied together with explicit examples from the games to illustrate the connections.

5.7 The Classics Revisited

There is no subject so old that something new cannot be said about it.

- Fyodor Mikhailovich Dostoyevsky

There are three models used to shape our study of three specific games in the first section. These three models have been used for this purpose before (Becker, 2005, 2006b) but the examples from games were used in a very general sense. Each of the chosen games is paired up with one of the chosen models to show how ‘they got it right’. Many games employ various strategies and there are often multiple support mechanisms for each strategy.

5.7.1 Gagné’s Nine Events of Instruction

The work of Robert Mills Gagné (1916-2002) hardly needs any introduction; next to Bloom’s Taxonomy (Bloom, 1964) it may well be the best known instructional model in existence for teachers in North America. Gagné’s nine events of instruction (Gagné, Briggs, & Wager, 1992) still functions as a useful guide for the design of instruction and it is perhaps fitting that this be the first instructional design model used in our examination of the masters. Game elements can directly and indirectly embody all elements of this model, as is indicated in Figure 5.1. Connecting game elements to instructional design model components serves to illustrate which game elements can be shown to implement accepted instructional approaches, and as noted, this work has been described by this author elsewhere (Becker, 2006b). However, while the previous work did use examples from many different games, it did not analyze any single game to see how it measured up. The next section takes a more detailed look at Gagné’s nine events and how one specific game fits.

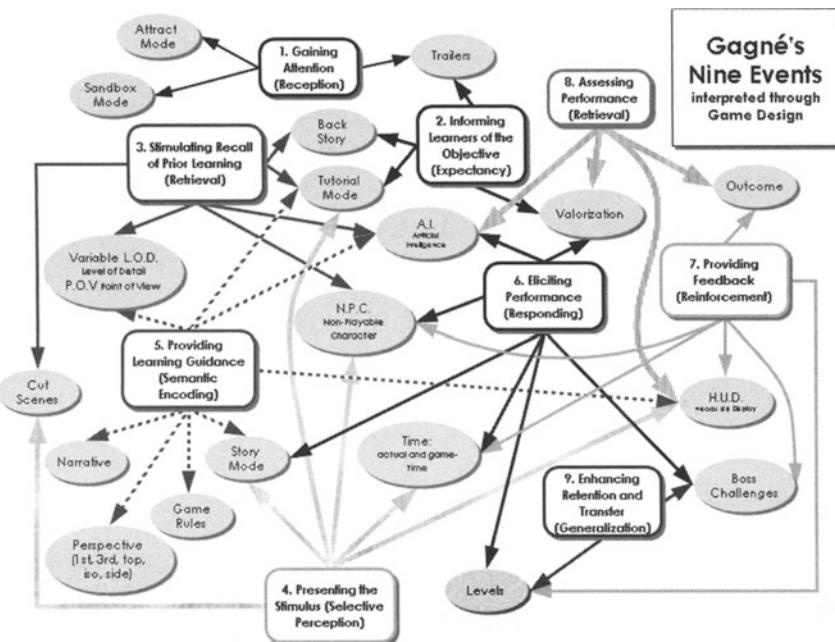


Fig. 5.1 Connections between Gagné's Nine Events and Common Game Elements

5.7.1.1 Gagné's Nine Events of Instruction as expressed in Phoenix Wright

5.7.1.1.1 Gaining Attention: Reception

Capture their attention. The process of gaining attention in games often begins long before the game is even released. Trailers and demos are important for providing advance knowledge of many aspects of a game including the style, back story and main objectives. Just like movie trailers are designed to entice people to watch the film in the theater, game trailers are designed to entice people to buy. However, game advertisement as well as game reviews have only limited influence over game sales - word of mouth plays a significant role and for that the experience of playing the game must be good enough for players to encourage others to buy (Dobson, 2006). Thus, the opening sequences of any game must keep the players attention while providing sufficient guidance to avoid too much frustration.

In the event that players have not seen all the trailers or read the reviews, the game opens with a cinematic device that almost always grabs attention. Phoenix

Wright (Capcom Co. Ltd., 2005) opens with a cinematic clip of sorts - there is very limited animation and the artistic style and quality is identical to that of the rest of the game. The style is similar to that of anime - somewhat cartoon-like. The first episode is called, "The First Turnabout" and opens with images of a crime scene.

gasp... *gasp*...

[A statue dripping with blood and a woman's body lies in a widening pool of blood set the scene.]

Dammit!...why me?

[A man stands over the body holding the statue. We see his face.]

I can't get caught... not like this!

I-I've gotta find someone to pin this on!

Someone like.... HIM.

[We see a silhouette of another man in the hallway.]

I'll make it look like HE did it!

The next screen displays text that gives the date: August 3, 9:47 AM; and a location: District Court Defendant Lobby No. 2. As with most games screen advances during dialog sequences are largely under player control. A small amount of text is displayed and then the player chooses to advance to the next screen when ready. If the game designers have done their jobs right, the player is intrigued by the mystery and continues the game.

The mechanism used to gain attention in this game is very similar to that used in film and television, albeit on a much lower budget. Given the murder-mystery lawyer-show approach to the story, the introduction is consistent with the style. Consistency of style is important if we are to ensure that players buy in to the game and accept the premise.

5.7.1.1.2 Informing Learners of the Objective

Let them know what is expected of them. We already know that our overall objective is to investigate the case and free our client. We learned that previously from either the trailers, or through word of mouth, or both. What we still need to know is the details of the case. The next scene shows the lobby and a double door being guarded by what appear to be security guards. An exchange of dialogue follows which introduces Phoenix, Mia Fey: his boss, and Larry Butz: the defendant.

The opening dialogue sequences serve to introduce the first few characters and to give us some hints about their character and the relationships between them. We find out that Phoenix has a boss named Mia Fey, this is his first trial, and that he and the defendant share some history for which Phoenix feels he owes his client a debt of gratitude. The way this is presented visually is that the background scene remains quite static, and the character we are to meet (either Mia or Larry) appears 'center stage' for a time while the dialogue continues. The person we see does not

change with the dialogue so we cannot use that to tell who the speaker is; instead each dialogue ‘bubble’ is labeled with the speaker’s name. In this game, the animation serves more as punctuation for the dialogue than anything else. The game is very text heavy.

[Scene ends; screen goes black]

Phoenix:

My name is Phoenix Wright.

Here’s the story:

My first case is a fairly simple one. A young woman was killed in her apartment. The guy they arrested was the unlucky sap dating her: Larry Butz... my best friend since grade school. Our school had a saying: “*When something smells, it’s usually the Butz.*” In the 23 years I’ve known him, it’s usually been true. He has a knack for getting himself into trouble. One thing I can say though: it’s usually not his fault. He just has terrible luck. But I know better than anyone, that he’s a good guy at heart. That and I owe him one. Which is why I took the case... to clear his name. And that’s just what I’m going to do!

Now we know.

5.7.1.1.3 Stimulating Recall of Prior Learning

Remind them of what they should already know. In the first case of the game no assumptions are made about prior learning beyond the basic device controls. This game does not have any other games like it, so at the start of this case we are essentially starting fresh. When we get into subsequent cases we will get reminders of things we can do, but that will be described retention and transfer. At the start of the game we are essentially ‘fed’ the background information we need to know to begin this case. This is done through the dialogue exchanges between the first three characters that were introduced.

5.7.1.1.4 Presenting the Stimulus

Present the content. The way content is presented in this game and the kinds of visual queues that accompany it are quite differently presented in this game from most others. It has already been mentioned that the animation is minimal. The format resembles a comic book more than a dynamic game. Most screens display what amounts to talking heads: the character that is currently the focus of attention stands in front of a relatively static background image. It is not until we get a little further into the game that we find out that in many cases the background image (the ‘scene’) can be examined more closely. This is one way that players can interact with the game. When we choose to examine a location, the image of that location is loaded into the bottom screen of the DS (this is the one that is touch sensitive) while the character in the foreground remains in the upper screen (with the

background still visible there too.) The image on the bottom screen then behaves somewhat like a webpage: there are certain ‘hot spots’ on the screen where players can examine the scene more closely or read more information about some item or visible object. We may click on a desk for example and be told about some event that occurred there earlier, or we may discover that there is some object inside the desk which then becomes an item of evidence we can take away with us when we leave the scene.

5.7.1.1.5 Providing Learning Guidance

Help learners encode and assimilate what they have learned. Our tools for this game are kept in the ‘Court Record’ which serves the same purpose as the inventory of other games. Most games provide some place where players can store items they acquire during the game. The Court Record is divided into two sections: one to hold items we find during our investigation, some of which we will later be guided to present in court or to other witnesses. The other section keeps information on the people we have met during the game. At the start of the game our Evidence consists of Phoenix’s attorney badge and Cindy’s autopsy report. We can click on either one to get more information about the item. The autopsy report gives the time and cause of death, but little else. The Profiles section contains information on three people: Mia Fey (our Boss), Larry Butz (the defendant), and Cindy Stone (the victim). An important aspect of this game as in any mystery is the character development and all the people we encounter in this game have peculiarities.

As is typical of many games, certain options are available only at certain times. During a trial sequence when the witness is giving a statement, we can not interrupt or do anything other than page through the dialogue screens. However, when it is our turn to cross examine the witness, we can either press for more information or present some piece of evidence to point out a contradiction after each statement. Guidance is also offered within the context of the game’s story as well: if we seem to be getting off the track or missing some important connection, Mia appears to offer advice.

5.7.1.1.6 Eliciting Performance

Make them practice what they have learned. The first case takes place entirely in the courtroom. As with most games, the first level is simple and takes relatively little time to complete. It serves as orientation to help players understand the game’s interface and acquire the basic skills they will need to play the game effectively. The gameplay choices and ‘courtroom procedure’ as they exist in Phoenix Wright’s world are shown and practiced in the first case. The judge (who is the same for all five trials) gives us a short tutorial to help us figure it out, all embedded as

part of the story. The judge comments that we (Phoenix) look nervous so he will give us a short test. We are asked three questions, the answers to which can be located among the information we already have in our Court Record. One question we are asked is the name of the victim – there is a profile on her in the court record to which we have access. If we answer the question right, we go on to the next question, but if we answer the question wrong, our boss, Mia Fey tells us how to find the correct answer, all in character of course:

Mia

I think I feel a migraine coming on. Look, the defendant's name is listed in the *Court Record*. Just touch the *Court Record* button to check it anytime, okay? Remember to check it often. Do it for me, please. I'm begging you.

The tutorial is not repeated after the first case. As the case progresses, and especially in later cases, the mysteries that must be solved and the details that must be remembered become quite complex and substantial – players must be aware of clues and remember inconsistencies in evidence and testimony.

5.7.1.1.7 Providing Feedback

Tell them how they are doing. There is of course music but it is not strictly needed to play this game and the author played through most of the cases with the sound turn off. This did not noticeably detract from the game, although the sound was amusing. Through the short tutorial, we are introduced to the controls of the game and the significance of some of the details of the interface, such as red colored text, which indicates a clue or important evidence, and that Mia appears to give us hints if we do something wrong. Sometimes the judge also tells us when we have answered incorrectly, and we discover that we cannot proceed in the game until we give the correct response. Later in the game we also discover that we will not be allowed to proceed to the next chapter until we have gathered all the evidence we need and talked to all the witnesses we have to hear from. This game is far more structured and offers the user far fewer choices than most modern games do, and yet this game has become one of the highest rated titles of its year. Clearly, the format in and of itself is not a design liability.

5.7.1.1.8 Assessing Performance

Let them know how they did at the end. This is a game ‘on rails’, which means we must come to the right conclusion and there is only one path to winning this game. In fact there are only two possible outcomes: a guilty or not guilty verdict and if we end up with a not guilty verdict we will be made to repeat what we’ve done until we get it right. We will also be made to repeat individual cross examination

sequences until we either find the right evidence to present, or run out of chances. We can repeat the sequence as often as we like so long as we do not make any unfounded objections. We have a limited number of chances to win each section (usually five – displayed as exclamation marks on the screen) and each time we present evidence that does not help us or raise an objection that is faulty we loose one of those chances. When we run out of chances, our client is pronounced guilty and we must start again from the beginning of the last chapter. We get frequent and immediate feedback on all of our actions, and each time we loose a round, we are given the option of starting back at the beginning of the chapter or the last place where we saved the game. We can save the game at any point where we can normally interact in someway, so we can set a save point almost anywhere.

As is common in most games, we may lose, but we will never be prevented from trying again. Part of what encourages such persistence in gamers is that we always know there IS a way to win, and that we can keep trying until we get it.

5.7.1.1.9 Enhancing Retention and Transfer

Help them remember and apply what they have learned. There are several levels at which retention and transfer occurs in games. The functional details of how to operate this particular game are useful primarily for the duration of this game and any sequels that might follow. More generally speaking, game genres contain similar functional interfaces as well as similar goals, challenges and reward structures. Just as learning about the structure of math textbooks in a general way helps us to get to the ‘meat’ of the next new math book we must use quickly, learning about the structure of various game genres allows players to get to the interesting parts of the next game faster. Having experienced *Phoenix Wright*, players are likely to be able to approach the next branching-story style game with certain expectations of what they can do and what they must do as well as what they should not expect. Ultimately this kind of generalization becomes habituated.

Finally, even though this game makes no claims about value beyond entertainment, there are still higher-order thinking skills that are being practiced in the course of this game, such as paying attention to and remembering detail; looking for contradictions in facts; and matching clues with events. While this game was not designed to be educational, the format, style, and even the lawyer premise could be useful devices to foster the development of these skills more realistically and accurately if used in an educational game than happens now in *Phoenix Wright*.

5.7.2 Reigeluth's Elaboration Theory

Reigeluth's elaboration theory (Reigeluth & Stein, 1983) is a macro level prescriptive strategy that builds on the work of Gagné (1977), Ausubel, Hanesian, and Novak (1978), Bruner (1966), Merrill, Li, and Jones (1991a) and many others of the late 60's and 70's. The goal was to integrate the then current knowledge on how to organize instruction in the cognitive domain. Many of the concepts unified in this model, such as the importance of selection and sequencing, instruction that progresses from simple to complex, and review strategies remain as relevant to modern teaching and instruction as ever. When viewed through this lens, digital games have many elements that connect with an elaborative approach to learning in many games, each level builds on the previous one, incorporating and building upon acquired skills and experiences. To show how this might be, the following concept map in Figure 5.2 shows each of the elements of the elaboration theory connected with various game elements. For example, learner control over both content and strategy is common in and is often embodied in the level of detail and perspectives available within a game, the player's ability to choose to focus on various aspects of a game and ignore others, and the ability to move around the game space. If we examine a single game we are likely to find the one game does not use all the available mechanisms to embody these elaborations, but in any good game, it is highly likely that each elaboration will be supported in some manner. An examination of Animal Crossing (Nintendo, 2005) follows.

5.7.2.1 Reigeluth's Elaborations of the Animal Crossing Space

5.7.2.1.1 Organized Course Structure

Organize the 'course' structure to emphasize its primary focus. The primary underlying principle in this approach is the elaborative sequence from simple to complex, general to detailed, and abstract to concrete. For each distinct (single) type of content there will be a clear emphasis on concepts, principles, or procedures, and this can be seen in ACWW also. The main emphasis in ACWW is on procedures – doing things, and this is reinforced by the game's rule structure and its narrative as indicated on the back of the game box: “Whether you want to decorate your home, join in on special events, or just chat with the locals, there's always plenty to do!”.

However, once players are familiar with the basic procedures, they can choose to focus on either procedures or principles, as one way to take up this game is to try and develop the relationships among the residents, which requires players to develop various theories and principles about how best to foster ‘friendships’ with

the NPCs of the game. The game facilitates both approaches (procedural and principal), but the remainder of this example will focus primarily on the procedural aspects.

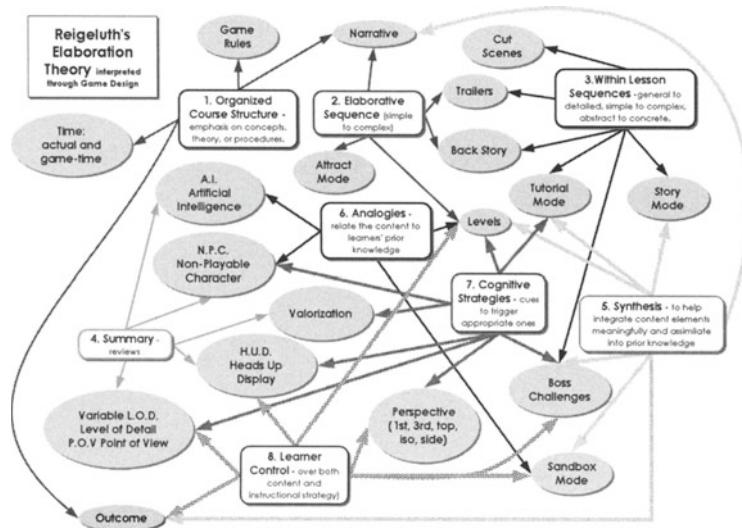


Fig. 5.2 Connections between Reigeluth's Elaboration Theory and Common Game Elements

5.7.2.1.2 Elaborative Sequence

Start with simple and basic ideas and progress to the more complex ones. The simple to complex elaborative sequence is presented initially through the game's back story, such as it is, which is presented to us at the start of the game. Most of the activities one can engage in are first introduced in a simple form. For example, the player's house begins as a small cabin. It is possible to decorate and furnish the main room of the house, but there is a limit on how many items can be placed in the house. As the player earns money and pays off the mortgage, the size of the house grows, and with it the number of items that can be placed inside. Further expansions add new rooms, which mean that each room can be decorated differently. At the beginning of the game we are given a small number of specific tasks to complete over which we have virtually no choice - we cannot continue with other activates until these are done. Our limited options are enforced by the fact that we have no tools or money and the fact that Tom the shopkeeper who hires us to work for him is also the character who will become our main source of income as we sell and purchase items. We are highly motivated to comply because if he does not let us sell items we can acquire very little money. We can shake small

amounts of money out of some trees, and once we have a shovel, we can knock money out of a rock (a different one each day), but we cannot purchase a shovel until we have completed the tasks that the shopkeeper has asked of us. In this way we are forced to go through the ‘training period’. As we complete the tasks required of us during our employment, we are given more information on the kinds of goals we can pursue, as well as specific instructions.

[Player instigated exchange; August; afternoon; outside; third task: furniture delivery]
Gaston:

Oh! Is it a half day for you, **Pixel**?

So anyway, did you want something from me, or what, mon chou?

Delivery!

I’m killing time.

Uh, never mind.

Pixel:

Choose ‘Delivery’:

[inventory page opens; furniture item for Gaston is the only item accessible. Choose ‘give this’; it gets handed over]

Gaston:

Huh? Why are you delivering furniture, **Pixel**?

... Hah! So you’re **Tom Nook**’s little servant? Have fun with that!

If you can’t pay up, you gotta work for it! Eh, mon chou?

... Well, you ARE lookin’ a little sad and pathetic, so I’ll help ya out.

Here... take my shower!

Nahhh! No worries. There’ll be plenty of time for you to do me favors later.

In the mean time, practice your decorating skills with what I just gave you. Just drop it in your room and then tap your head, mon chou!

Then you can slide it around! Just push, pull, or rotate it any way you want.

Don’t forget to tap your head when you’re standing next to some furniture.

... Knowing you, that tip will probably be out of your brain in a hurry.

So run home and try it before it leeks out of your ears, mom chou!

5.7.2.1.3 Within Lesson Sequences

Repeat the simple to complex progression within each task. Each kind of task begins as a simple procedure, and as the game progresses, players become more sophisticated in how they carry out these tasks. The beginning of the game guides us through the basic procedures we will need to be able to explore and make progress: we begin inside the town hall where the character behind the counter will ask us if we need help. We are told about Tom the shopkeeper, and we are given a map of the town with directions to our house.

[NPC INSTIGATED EXCHANGE; August; morning; first arrival (but not player’s first avatar); in Town Hall; player’s character is named Pixel]

Pelly:

Well, this is **KAFBURG**’s town hall...

So, what is it I can do for you today?

I moved in!

I came by cab!

Pixel:

Choose 'I came by cab!':

Pelly:

...Oh. Goodness me! You must be **Pixel!** Welcome!

I'm **Pelly**, and I'm the clerk here!

Tom Nook already told me all about you.

So you'll be living with **Kaffy** and **Minki**, is that right?

That sounds like a lively bunch to live with, now doesn't it?!

Well, we have many residents who live all around **KAFBURG**.

Please let me show you where your house is. It's here!

[map is displayed showing house, circled, and with moving hand pointing to it. Our current location is also shown as a flashing silhouette of a person]

Well then, **Pixel**... I trust you can use this map to find your new home!

Oh, wait! Do you know... how to pull your map out?

What?

Yep

Pixel:

Choose 'What?':

Pelly:

To check your map, tap the arrow in the upper-right corner of the Touch Screen.

Then touch the house icon along the top.

You can also press the X Button on your Nintendo DS.

All right, then, good-bye, and please come again!

Once we arrive at our house, we are met by Tom, who then hires us and gives us seven tasks, one at a time to complete. This serves as a basic orientation for how to interact with the townsfolk (we must interact with each one in order to proceed), change our clothing, plant flowers and trees and do a few other things. During this time the residents also tell us about the four main tools we will likely want: a fishing pole, a shovel, a watering can, and a butterfly net. With the exception of the shovel these each have one purpose which is also explained to us.

We learn about most aspects of the game a little at a time: one our first errand involves delivering a carpet to one of the residents. When we give them the delivery, we are given a little information on how we can decorate our homes, but it is not until we have actually changed the appearance of our room that any residents offer further information. We are never told explicitly that we will receive more hints after we try something, but we are sometimes asked by the residents to do favors. Since the mechanisms exist to monitor and record all activities within the game, it is also possible to provide additional detail as it appears to become relevant. Although these tips may be delivered at any time by random chance, they are ALWAYS elicited under certain circumstances, so for example the comment that flowers don't need watering during rain may appear randomly at any time, but one of the residents is certain to approach you to tell you this if it is currently raining.

5.7.2.1.4 Summary

Review at both the micro and macro level. A key aspect of the elaboration theory is its emphasis on the value of timely review. The theory also dictates that systematic review is important, but games are rarely that structured. Nonetheless, review remains an important and integral feature of ACWW in a number of ways. Certain states always trigger certain responses. The game is after all, a computer program and there can only be a finite (and often small) number of ways the game can proceed from any particular point. ACWW uses various mechanisms to trigger review, most of which are delivered through ‘conversations’ with the other residents, all of whom are NPCs. For example, if you approach one of the residents for a conversation and you have recently been stung by bees, you are likely to experience one of the following exchanges²:

[player instigated conversation; August; bitten by bees; evening; outside; town fireworks are on]

Aurora:

Aaieee!!!

Whoa! Don’t scare me like that, *beefcake!*

Sheesh! Look at you. It’s like you got stung by every bee in town...

Listen, next time, just run straight to the nearest house. Don’t u know!

Bees can’t use doors! In the battle of man versus bee, doors are your savior!

[player instigated conversation; August; evening; in Purrل’s house. I’ve been bitten by bees]

Purrل:

And today’s doofus of **KAFFBURG** award goes to....

Your face!

For the esteemed winner, **Kaffy**, I would suggest some lovely medicine!

These two exchanges give us tips on how to deal with bees – they may be repeated whenever the player begins a conversation while showing evidence of a bee sting.

5.7.2.1.5 Synthesis

Make the content structure explicit with visual and other objects. Synthesizers are used to integrate content in a meaningful way and to help learners assimilate prior knowledge. They can be used to organize elements horizontally (relationships among ideas in a single lesson) and vertically (“relationships between ideas in a group of lessons, and the general and inclusive ideas that contain them” (Reigeluth & Stein, 1983, p. 360)). One of the mechanisms used in ACWW that acts as a synthesizer is that of repetitive patterns. While it may have been included for effi-

² There are in fact more conversation sets that have to do with bees, but these two are representative. The tone of the exchange will always be tempered by the ‘personality’ of the NPC speaking.

ciency of data space and programming in design, the practice would not continue if it did not also help players. Dialogue sets have specific styles, and players quickly learn what kinds of responses to anticipate. For example, residents will ask the player to answer a question from time to time. The appropriate answer is sometimes rewarded by the NPC giving the player a gift and which answer is appropriate depends on the personality of the NPC asking the question. So players learn to associate certain types of responses with certain types of residents.

[NPC INSTIGATED EXCHANGE; August; early morning; outside]

Bella:

Oh, hey there! **Beefcake**, I'm thinking of getting a new pet fish.

So what's a good name for my new fish, eeks?

Ruby

Sushi

Jaws

Mr. Fish!

Kaffy:

Choose 'Ruby':

Bella:

Yeah! That's cool!

I mean, REALLY cool! Thanks, eeks!

OK, **beefcake**, since you helped me name my new fish, I'll give you this!

Here!! It's not much, but I really want you to have my modern bed! Love it like it was your own...because it TOTALLY is now, eeks!

[item is exchanged during last statement]

There are also some fairly sophisticated vertical synthesizers that players can recognize and work with, but the choice to pursue the implications of these relationships is always with the player. If this were a game designed deliberately for education, these may be teacher-lead before or even during gameplay. In ACWW, there are many kinds of collections that can be taken up in this game and each is rewarded in different ways, some of which involve relationships not immediately obvious from the game. One of the most sophisticated ones is that of furniture collecting and the interior design of your house. For example, the manner in which players decorate their houses can be left entirely to personal taste, but this aspect of the game, as almost any other has an underlying principle which can be used to improve one's score in that area. Players have their houses rated from time to time by the "Happy Room Academy" - typically after a new item has been added to the home. The rating of the home makes use of several concepts, including furniture 'collections' (all of the same style), special items, and the house's Feng Shui. In this way the arrangement of items within the house can become more than random or player whim - there is a 'system' that can be discovered and followed.

5.7.2.1.6 Analogies

Use analogies that connect with prior learning. If we look at it from the proper perspective, the entire game can be seen as an analogue of activities from real life: earning a living; building relationships; achievement through contests, etc. One of the main functions of analogy is to relate content to the learners' prior knowledge so learners can assimilate newly presented ideas. Another thing that makes analogy a useful device is the ability to create connections that not only reach backwards to what we already know, but also to provide a path for forging forward connections. When we encounter a new situation we will have a frame of reference already built. ACWW does this too - the concept of a mortgage that must be paid off may be familiar to adult home owners, but probably not to younger people playing this game. Through this mechanism, complex and sophisticated ideas can be introduced and players can be guided towards understanding them.

While there are many analogies to real life in ACWW, it must be remembered that this game was intended as an entertainment and not as a serious trainer in life skills. As such, the 'life' analogies are unreliable. Still, part of what makes the game compelling for many players is its mimicry of life. The mechanisms are effective.

On a more detailed level, analogies are especially useful when introducing difficult and unfamiliar ideas. ACWW is not intended to be difficult and as a result there aren't many places where analogies are required for learning within the game.

[player instigated conversation; August; bitten by bees; evening; outside; town fireworks are on]

Aurora:

Aaieee!!!

Whoa! Don't scare me like that, **beefcake!**

Sheesh! Look at you. It's like you got stung by every bee in town...

Listen, next time, just run straight to the nearest house. Eeks!

Bees can't use doors! In the battle of man versus bee, doors are your savior!

5.7.2.1.7 Cognitive Strategies

Use a variety of devices to help trigger appropriate processing strategies. Most games employ many cognitive strategies intended to help players discover what they need to know and to remember what they have learned and often games use similar approaches, such as different colors of text to mark specific things. Some of these strategies are so common that they could arguably be considered aspects of basic games literacy. The use of color in text displays is one strategy that is commonly used to indicate classes of words, items, clues and so on. In ACWW examples that follow different types of text styles are used instead of colors. The names of items that can be collected are displayed in *italics*, references to the

operation of the game are underlined, names of other residents are **bold underlined**, the name of the town is SMALL CAPS, and the player's name is in ***bold italics***, even if a nickname is being used instead of the chosen name. This way, even if a word is being used for the first time, the player will be able to classify it and thereby know what can be done with it.

Tom Nook:

If you want to use your fishing rod, grab it from your pockets, and you're ready to go, hm?

.....

Pudge:

YAAAAAAWN! Good morning...

Everyone in **KAFBURG** gets up so early.

I'm Pudge... I'm better at wrestling and eating than anybody.

Another common strategy is to restrict the player's options at various times. When trying to sell items at Tom Nook's store, for example, only those items Tom is able to buy are accessible in the inventory even though the player may have other items in the same place. The others are still visible, but appear faded (i.e. in the background) and they cannot be grabbed or moved. In this specific situation inaccessible items include such things as money, which Tom does not buy. In other situations the subset of accessible items will be different, and occasionally the items may be 'grab-able' but cannot be used. It is possible to attach items to letters we may send to other residents as gifts, but some kinds of items (like fish and bugs) can not be attached and simply will not 'stick' to the letter if dragged over to it.

Suppose we decide our primary goal in the game is to pay off the mortgage. The first mortgage amount is 19,800 Bells, and at the start of the game the player has no tools so there are few ways to earn money. If we simply wander around, various residents will tell us that we can shake fruit out of trees and pick up shells at the beach. Tom the shopkeeper will buy whatever we have collected and as soon as we have picked up enough items to buy some of the tools, we can begin to fish, catch bugs, and so on and we are well on our way.

5.7.2.1.8 Learner Control

Encourage learners to exercise control over both content and instructional strategy. Because ACWW is an open-ended role-playing game, one would expect to have much latitude when it comes to exercising control. Player/learner control is possible in many places in the game and at many levels of abstraction, starting from the look and feel of the game and the main character, to how the NPCs sound, but the greatest latitude in this game is afforded in the game play itself. Players may choose to focus on as many or as few aspects of the gameplay as they like. They may decide to focus on collections, making money, interacting with the other residents, or even fashion design.

Text is displayed in small chunks, but users are given the option of scrolling through text faster if they want. Most dialogue is given to the player no more than a dozen words at a time, at the end of which the user must use a control to go to the next bit. Another way that many games provide control is with the appearance of the player's avatar. ACWW players may choose their character's gender as well as various other things before the game begins, but in this game the process is presented as part of the game's introductory sequence rather than a pre-game activity. At the beginning of the game while the character is riding to town in a cab, the taxi driver asks the character various questions and makes various comments. Players have the opportunity to respond at several points, and those responses determine the character's gender, eye color, hair style, and several other things. "The next question asks how you like the name, and is the first step toward determining your character's gender. If you select "That's not it" then you can re-enter a new name in case you made a mistake. If you tell him you think the name is cute, he'll think you are a girl. If you tell him it's burly then he'll think you are male. After this question you will have the opportunity to select "I'm not a boy/girl!" if you chose the wrong one, don't worry." (Eagleson, 2006)

5.7.3 Merrill's First Principles of Instruction

M. David Merrill's career in instructional technology has spanned 40 years, and includes numerous significant contributions to the field. He is probably best known for his component display theory (Merrill, 1999). In the 1990's he was one of the foremost proponents of "second generation instructional design (ID2)" (Merrill, Li, & Jones, 1991b) which acknowledged a more open-ended and less prescriptive approach to ID, and included Instructional Transaction Theory (Merrill et al, 1991a) and ID based on knowledge objects.

The first principles of instruction are the result of a systematic review of instructional design theories, models and research. Each of the principles included satisfies the following properties:

- promotes more effective, efficient or engaging learning,
- is supported by research,
- is general enough to apply to any delivery system or instructional methodology, and
- is design oriented with direct relevance to promoting learning activities.

Merrill defines a 'principle' as a basic method, and describes it as a "relationship that is always true under appropriate conditions regardless of program or practice (variable methods)." (Merrill, 2002, p. 43) There are five principles that constitute a set of fundamental elements common to all effective instructional design. Merrill hypothesizes that 1) "Learning from a given instructional program will be facilitated in direct proportion to the implementation of first principles of instruction",

and 2) the “learning from a given instructional program will be facilitated in direct proportion to the degree that first principles of instruction are explicitly implemented rather than haphazardly implemented.” (Merrill, 2002, p. 43) If true, then illustrating connections between game elements and Merrill’s first principles would suggest that games facilitate learning in substantial ways (See Figure 5.3).

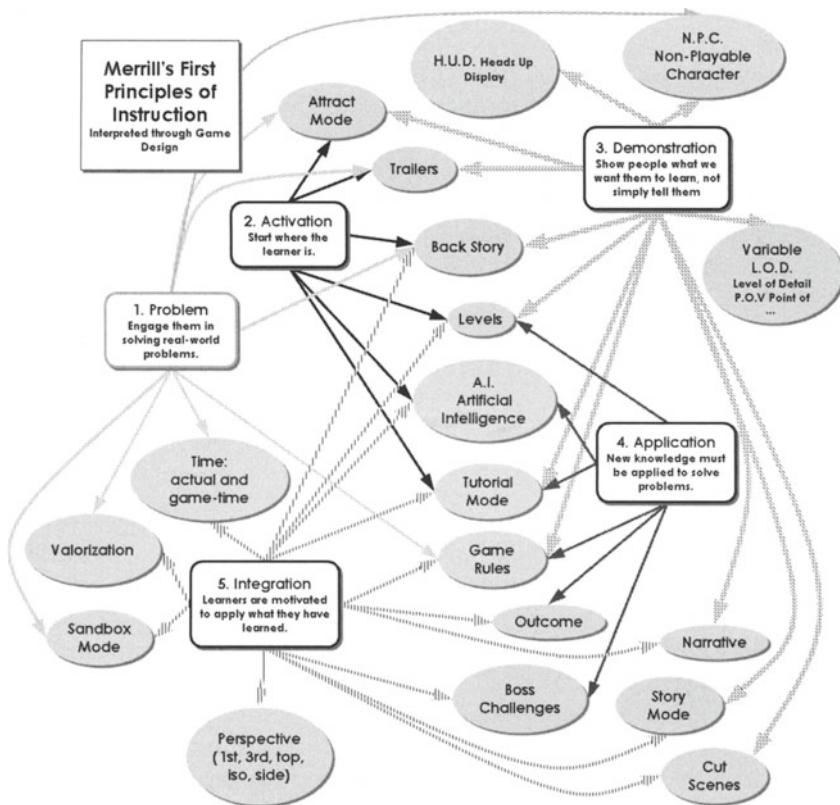


Fig. 5.3 Connections between Merrill’s First Principles and Common Game Elements

5.7.3.1 Merrill's First Principles of Instruction Starring Mario

5.7.3.1.1 Problem

Engage them in solving real-world problems. Obviously, claims that the actions within The New Super Mario Bros. emulate any sort of real-world problem other than an obstacle race would be a stretch. However, if we take it to a higher level of abstraction, the challenges of practice and rewards associated with incremental progress could be described as real-world problems. In this case however, I would argue that the real-world nature of the problem is less important than that it be engaging, and for millions of players, Mario is certainly that. Parables, fairy tales, and fantasies can all be engaging and can all relate, even if only indirectly to real-world problems. Again, in this example it must be remembered that the object of this study is not so much to discover how this game is educational as it is to discover how the mechanisms used in this game embody the educational principles outlined.

5.7.3.1.2 Activation

Start where the learner is. In most successful games trailers, back stories, and tutorials all contribute to helping the player become familiar with the game and its basic rules and objectives. Being a commercial enterprise the designers would naturally want to attract as large an audience as possible, so many ‘first’ games assume little more than basic knowledge of the game equipment, whether it be a console, handheld device, or a PC. Some ‘numbered’ games (Final Fantasy XII, Call of Duty 3, and other sequels) assume prior knowledge through having played previous editions of the game, but those that rely on this too heavily also restrict their audience and that is rarely desirable in a commercial context.

Each *Mario* game has similarities with each other, but players need not know anything about any one of them to play and enjoy any other. Successful games almost always have simple challenges at the beginning that shift more or less gradually to ones that can be surprisingly difficult. Mario allows players to replay any level they have already completed, providing a considerable degree of flexibility and the option of returning to ‘familiar’ territory to regain confidence before attempting a particularly tricky course.

5.7.3.1.3 Demonstration

Show people what we want them to learn, not simply tell them. In an effort to ensure that learners come away from our lessons with all those things we feel are

fundamental or essential, we sometimes provide too much demonstration. This is especially true when the learners are gamers as they are accustomed to trying things out after only minimal tutoring. After all part of the fun in a game comes from discovering unexpected places, treasures, and how to do things while poking around and learning how to play the game. Learning is not usually efficient, and the commercial game designer's desire to keep players engaged with their games as long as possible supports that notion well.

There are a great many devices used to indicate what players need to learn in order to win a digital game. It is assumed that we understand the basic premise, and this is facilitated through the use of an introductory cinematic clip. In this game, we see Mario and Princess Peach out for a walk together, a disturbance at the distant castle distracts Mario and while he is away investigating Bowser sneaks up and snatches the Princess away. In the opening cut scene of the first level we catch a glimpse of Bowser carrying Princess Peach into the tower which is also one of the courses we must complete, but from where we are there is no path by which we can reach it. Thus, we conclude that we must somehow build or generate a path to that tower so we may have a chance to go in and retrieve her. Basic games literacy includes the knowledge that moving, flashing, or otherwise highlighted items in a game are almost always significant, so these should be hit, shot, picked up or otherwise acted upon. It also includes the sure knowledge that there IS a way to win. In *Mario*, the way to generate new pathways is to enter each course, and get to the end while collecting as many points as possible. Along the way we are shown star coins we can grab, and hints at hidden pathways. This is a game after all, so it is assumed that the hidden pathways will reveal something of value. A typical game is expected to offer twenty or more hours of gameplay, so any game that demonstrates too much of what we need to learn and does not allow us enough opportunity for discovery is unlikely to become successful.

5.7.3.1.4 Application

New knowledge must be applied to solve problems. The whole point of a game is to meet some challenge or solve some problem, preferably many of them. Given that Mario lacks a rich back story, the puzzles and challenges are entirely the point of this game. Each level offers several new challenges as well as increasing levels of difficulty on previously mastered skills. The first level of any ‘world’ will introduce the basic maneuvers used throughout that set of courses. After discovering that some blocks release points and others release power-ups one of the first things we will do when we come across a block is to hit it to see what happens. In doing so we also discover (usually too late at first) that some blocks break away when hit, which may deprive us of a needed ledge or jumping off point.

5.7.3.1.5 Integration

Learners are motivated to apply what they have learned. Each course also presents the player with new situations and challenges that call for application of what has already been learned, but in new ways. The set of ‘skills’ required to survive to the end of the first course is quite small, but each time we proceed on to the next course we bring those skills with us. Having learned that we have some control over the speed at which Mario runs, we encounter a log we must cross that teeter-totters. The motion becomes exaggerated as soon as we jump on and so we must move at the appropriate speed to get across without tipping it too far and sliding off. One of the hallmarks of successful games is that they almost always provide the player with many opportunities to practice and apply any skill learned within the game. In fact any time a new skill is acquired in a game it is assumed to have some additional purpose later on. This assumption provides considerable motivation to players to spend both the time and the effort to acquire skills, and a game that requires players to learn skills and gain knowledge that are then never used again tends not to remain popular for long.

5.8 New Frontiers

The will to learn is an intrinsic motive, one that finds both its source and its reward in its own exercise. The will to learn becomes a “problem” only under specialized circumstances like those of a school, where a curriculum is set, students are confined, and a path fixed. The problems exist not so much in learning itself, but in the fact that what the school imposes often fails to enlist the natural energies that sustain spontaneous learning.

(Bruner, 1966, p.127)

This next section looks at a few less structured learning and instructional theories using the same games as were used in the previous section. If the same game can be seen to embody sound pedagogy even if studied through multiple lenses, then that will lend additional weight to the main thesis of this chapter.

The author wishes to apologize in advance if I have not included your favorite theory or model here. I have largely avoided the social learning theories as for this effort I am looking JUST at the game and how its design stacks up against accepted pedagogy rather than the dynamics of communities of players. Even so, it must be acknowledged that any game that includes NPC’s provides a community of a sort, and although all possible behaviors of these NPCs were deliberately designed the effect is still one of social interaction.

Some theories and frameworks do not lend themselves to analysis in the way this chapter proceeds. Others, like legitimate peripheral participation, situated learning, and apprenticeship are important concepts and highly relevant to learn-

ing in game environments, but they do not really provide a clear framework that we can use to develop evidence if our goal is to build an argument that the medium of the game is a legitimate educational technology. Legitimate peripheral experience is the central defining characteristic of how newcomers become part of a community of practice. Knowledge is situated and therefore effective learning should take place within the context in which the knowledge will be applied (Lave & Wenger, 1991). Aside from using these comparisons to argue that commercial games already employ sound instructional design principles, the theories chosen here can also form the basis for the kinds of design principles that will be of use as we move forward and begin to try and teach others about educational game design.

5.8.1 Activity theory

Activity theory is not new, having been developed in the early part of the last century by Lev Vygotsky (Vygotsky & Cole, 1977), A.N. Leont'ev (Leont'ev, 1978), and A.R. Luria (Luriëiia, 1976) in Russia. The main focus of this theory revolves around the interrelationship of the subject (the learner), the object (the goal which leads to the outcome), and the tools (both physical and conceptual) used to mediate between them. It suggests that the relationship between objects in the environment and people are mediated by culture and its rules, the community, and by labor and its roles and development.

Others have already applied this theory to games (Dobson, Ha, Mulligan, & Ciavarro, 2005; Hadziomerovic & Biddle, 2006; Oliver & Pelletier, 2004; Squire, 2002) and have studied it in the context of player learning. The current effort examines games and activity theory from the perspective of the game design (See Figure 5.4) and in that respect also expands on work in human computer interaction (Kuutti, 1996). Very loosely described, in this view of activity theory, the subject is thought to form a relationship with the tool, but that the tool only becomes a tool through the user's activity. While the current examination cannot fully detach the user's relationship with the game, the focus here is more on the design of the artifact (the game) and how that design embodies the concept of this theory. Also, Kuutti (1996) has defined three levels of analysis that are also useful to examination of games through activity theory (Pelletier & Oliver, 2006), namely: strategic level activities (such as paying off a mortgage or completing a collection), tactical actions (like catching a fish or gathering fruit off a tree), and operational actions that follow a particular pattern that can become automatic (like giving Tom Nook items you wish to sell from your inventory, or like fishing) so long as nothing goes wrong causing a contradiction (like being bitten by a mosquito while fishing).

Activity theory is descriptive rather than predictive, and as such offers a useful perspective through which to view the design of games.

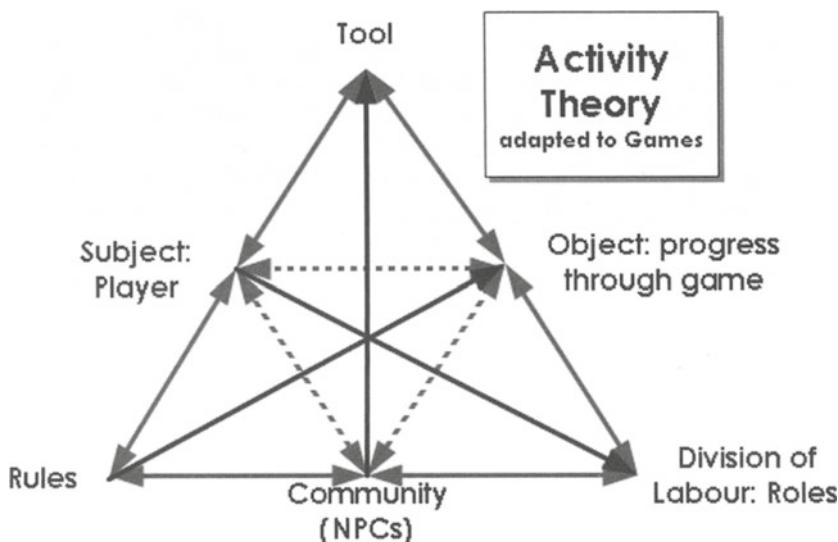


Fig. 5.4 Activity Theory Adapted to Games

5.8.1.1 The Activity Theory of Animal Crossing

5.8.1.1.1 Subject

The player is the subject. The main subject of any game is the player of course, and in ACWW players may take on several characters, but not simultaneously. As many as four player/residents can ‘live’ in one ACWW game but whenever one is awake the others will always be sleeping. These other characters are still distinct in terms of assets like money and possessions, and their relationships with the other residents. This game is played from a third-person perspective so the player, while likely identifying with their character, sees that character act within the game. This perspective adds a degree of distance for the player as the play experience is more akin to playing with a doll than pretending to be someone else.

5.8.1.1.2 Object

What is the objective? In ACWW the choice of object affects how the game will best be played, although this game does encourage some activities more than oth-

ers. The main ones include: relationship building, collections, money making, the “stalk” market (the currency of trade is turnips), and gardening (which includes fruit and money trees as well as flower breeding that can result in the production of various new colors). Different approaches are appropriate for different objects, but they are all introduced early in the game, after which the player is free to focus as desired. Players need not commit to any specific goal and may change their focus as often as they wish.

5.8.1.1.3 Tools

What are tools that help the subject achieve the objective? Tools serve as mediating elements in any activity and can be physical, conceptual or symbolic. They include instruments, signs, procedures, machines, methods, laws, and forms of work organization (Jonassen & Rohrer-Murphy, 1999). If we stretch the notion of physical to include in game artifacts with which the player can interact, then all three exist within many games. ACWW has a great number of artifacts and objects but not many classes of objects, and even fewer actual tools that can be used to achieve goals. There are six primary ‘physical’ tools in ACWW: a shovel, a fishing rod, a watering can, a butterfly net, an axe, and a slingshot. Examples of conceptual tools include: humor (Dormann & Biddle, 2006), relationships that develop between the player and the NPCs with which we interact and over which we have varying degrees of influence, and the use of time, which can be considered a mediating tool as well as having ties to the game’s rules, and will be discussed further in the next section. At its most fundamental level, the entire game is a symbolic tool but that does not help us further our analysis so we look in the game. Here we find that the symbolic tools include such things as special events, changing seasons, lucky furniture items, silhouettes of fish seen underwater, and so on. All of these artifacts can be used by the players to support progress towards the object and outcome.

5.8.1.1.4 Rules

What the rules by which the subject must abide? Among the defining characteristics of any game are its rules to the extent that a game without rules may not even be termed a game, and in a role-playing game, those rules tend to be fairly complex. ACWW has both explicit and implicit regulations, norms, and conventions that constrain individual action and group interaction. There are positive or negative consequences to almost every action, although in this game the connection between the act and the consequence is often not direct. There are for instance ways to increase one’s ‘luck’ when fishing, which include placing lucky items in our house. Fish appear at random according to a predetermined probability but this

can be affected to a certain extent by our own actions. Lucky items placed in our house increase the likelihood of the appearance of rare fish.

Rules of interaction both with the game environment and with the NPCs are enforced in ACWW largely by restricting the user options and also by the way in which the NPCs respond. If we ignore or deflect requests for interaction by residents too often they are likely to stop giving us gifts for example. Residents will move out of our town from time to time, but how we respond to them will often affect when this happens. Since there is no single win state in this game, there is also no single lose state, and the game can continue indefinitely providing essentially endless opportunities to try again even without restarting the game.

In ACWW, game time is intended to match real time and certain events take place on a regular basis (weekly visits by occasional characters, daily replenishment of the shopkeepers stocks, annual special events, etc.). These events are tied to the game's calendar and clock and although players can adjust the clock forwards and backwards, each day that is 'skipped' still exerts influence. For example a small number of new weeds will grow each day (we are supposed to help keep our environment nice by tending the area), if we skip ahead too many days we may find our town overrun with weeds and that the flowers have wilted away. Also the lack of interaction with the residents will prompt many of them to move away.

Rules underpin all progress in digital games.

5.8.1.1.5 Community

What elements and actors form the community for this activity system? All three games being examined are being considered only in the single player mode as it is the design of that game itself rather than the social interaction of various human subjects that is the focus of this discussion. Given that, the individuals or sub-groups who share the same general object include only those NPCs who are "on my side" or who are designed to assist the subject rather than hinder her. In ACWW there are a total of twelve regular residents (such as Tom Nook the shopkeeper), 16 occasional visitors and 144 villagers, each of which has one of six distinct personalities (Eagleson, 2006). The town regulars are largely benign and will help out according to their roles, while the occasional visitors are largely beneficial (although a few are scoundrels!) and each of these also has specific roles as well as peculiarities. Of the 144 villagers, a maximum of eight may reside in your town at any given time. Conversations are not free form and in fact very few modern games offer anything but the most rudimentary forms of language recognition. Most conversations involve a pre-determined (or randomly selected) phrase that is displayed, followed by several potential responses from which you may choose.

5.8.1.1.6 Division of Labor

How are the roles delineated in this activity system? The division of labor in a game activity system comes from the ways in which the community is organized. In most games the division of tasks between members of the community is quite well-defined and it is not uncommon for individuals or groups to exist specifically to serve tightly defined roles but tend to be more mobile. In ACWW the regular residents have roles associated with a specific space. Occasional visitors have similarly specialized roles. Lyle the insurance salesman (a weasel) appears once a week solely to sell insurance, and hangs around out house. Tortimer the Mayor for example is only found outside the town hall, and ONLY during special occasions. Blathers the owl can be found only in the museum. In games this mechanism helps to compartmentalize the behaviors and possible actions, thus controlling the game design's complexity while at the same time allowing for player flexibility. From a learning perspective each character and location becomes associated with specific activities and acts as a mnemonic that players can remember to provide a scaffolding effect.

For the player, activities and roles can change as the tools do, but these roles are the ones that the player decides to take up, whether it be gardener, collector, fashion designer, or what have you. In each case, certain game characters and tools will become more significant while others become less so. Regardless of the player's goals though, the roles of the NPCs and other artifacts rarely change in this game.

5.8.2 Constructivist Learning Environments

The notion of constructivism is by now well-known and should no longer require a lengthy explanation. The fundamental view behind constructivist learning environments is that technologies can and should be used to keep students active, constructive, collaborative, intentional, complex, contextual, conversational, and reflective as illustrated in Figure 5.5 (Duffy, Lowyck, & Jonassen, 1993). To many, suggesting that most modern game environments are inherently constructivist learning environments will not come as a surprise. Still, it is one thing to say they are and another to show that they are through explicit connections. A brief explanation of each of the major elements of such an environment is offered in the next few paragraphs, followed by more detailed examination of one game as seen through this lens.

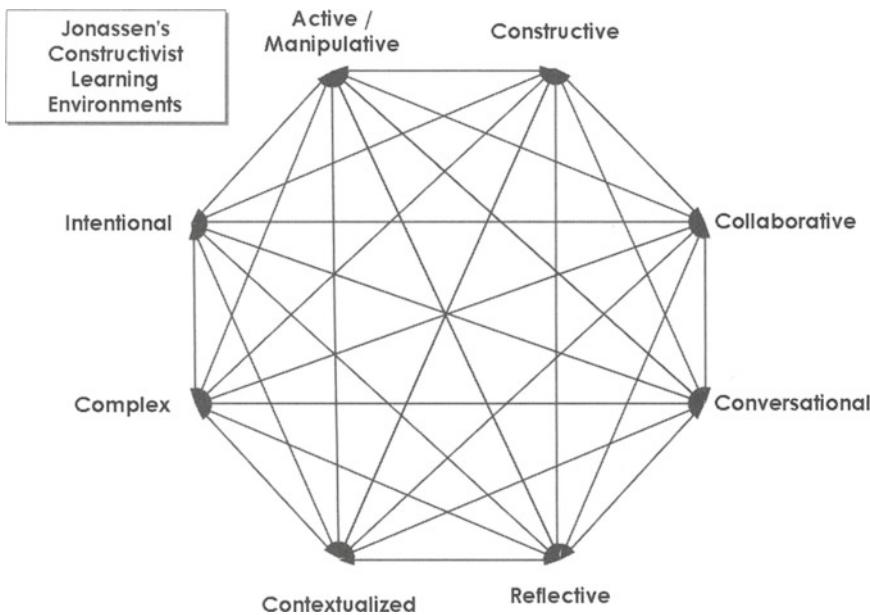


Fig. 5.5 Constructivist Learning Environments

5.8.2.1 The New Super Mario Bros. as a Constructivist Learning Environment

An ideal constructivist learning environment would give the learner a great deal of freedom to interact with it and still present the learner with interesting problems to solve and things to discover. Although Mario is an older style platform game played on a two dimensional plane, it still holds up well when scrutinized as a constructivist environment. In fact the dominant teaching mode, if we can even call it that is through trial and error or discovery learning. While it has already been admitted that Mario hardly qualifies as an educational experience, it is still an excellent example of a game that has remained popular for several decades. It is a game people of all ages willingly choose to play, while *Math Blaster* (Davidson, 1986) a well-known educational game that employs essentially the same style has only enjoyed popularity in schools. Given that contrast, an examination of the mechanisms employed in Mario might provide some hints as to what we should be including in our educational games to make them more engaging.

5.8.2.1.1 Active

“Learners are engaged by the learning process in mindful processing of information where they are responsible for the result” (Jonassen). This notion lies at the very heart of most digital games, and Mario is no exception. There are very few places in each level or course where the player can let Mario stand about and do nothing. This is often cited as one of the great attractions of this game: the game is fast-paced and players are always busy. Various villains are also present in each course and since they move around as well, Mario must be vigilant and ready to act. Mario has almost no dialogue beyond the occasional, “It’s Mario!”, “Bye-bye!”, “Here we go!” and various onomatopoeia, and the music is cartoon-like and up-beat, as is the imagery. Each level is associated with a specific ‘world’, and when the game begins we have access to only a single level on the first world. All other levels must be earned through our satisfactory performance. Success in this game is all up to us, and there is no way to get through the levels except by practice and more practice.

5.8.2.1.2 Constructive

“Learners integrate new ideas with prior knowledge in order to make sense or make meaning or reconcile a discrepancy, curiosity, or puzzlement” (Jonassen). The format of the game is essentially the same as a traditional obstacle course - there are a total of 80 different ones in eight different ‘worlds’, each of which has a different type of landscape - one is made up of deserts and another is entirely underwater. The courses in each world have a similar look and feel to each other with some differences as well and each one builds on some skills learned in a previous world while adding one or more new challenges. The first level introduces us to all the basic skills and ‘power-ups’: here we can learn to jump, run, and dash. We learn how to break blocks, catch star coins and we meet several of the ‘classic’ Mario bad guys: Koopas and Goombas. When viewed from a different perspective the game is constructive literally as well as conceptually in that we begin with access to a single level in a single world and we are given the impression that other levels are there but the pathways needed to reach them do not yet exist. Once we have successfully made it through to the end of the first course the next section of pathway is constructed and we gain access to the second course. Access proceeds in this way with more and more of Mario’s world becoming accessible as more and more pathways are constructed. Once we have made it through the final course in the current world we gain access to the next world.

5.8.2.1.3 Collaborative

“Learners naturally work in learning and knowledge building communities, exploiting each others skills while providing social support and modeling and observing the contributions of each member. Humans naturally seek out others to help them to solve problems and perform tasks” (Jonassen). The current analysis only looks at the single player version of this game and since Mario acts alone and all of the NPC’s are bad guys in this game there is little opportunity for collaboration within the game itself. Outside of the game, however there exists a thriving community of Mario fans eager to collaborate on anything from fan art and fan fiction to sharing tips, techniques and even videos of gameplay. Collaboration and the communities that sustain them are very strong with almost all popular and successful games.

A casual search on the web using the phrase “New Super Mario Bros.” turned up 1,600,000 hits! Almost all of the first page of links (50) were sites offering reviews, previews, cheats, walkthroughs and hints, so there is clearly no shortage of players keen to share what they have learned and add to their knowledge with the help of others. One walkthrough guide is produced in full color and is 87 pages long (Sallee, 2006)!

5.8.2.1.4 Intentional

“All human behavior is goal directed (Schank & Cleary, 1995) That is, everything that we do is intended to fulfill some goal. When learners are actively and willfully trying to achieve a cognitive goal (Scardamalia & Bereiter, 1994), they think and learn more” (Jonassen). The motivational power of fun and humor should not be undervalued (Dormann & Biddle, 2006), and Mario lacks neither. The sights and sounds are amusing and Mario’s reactions are pleasing to the extent that repeating challenging portions of a course over and over until we get it right sustains us. The response of the game when we finally reach the end of a course is also appealing, and we are often additionally rewarded with the release of additional courses. A game that has very little point beyond entertainment MUST succeed here, or players will stop playing. Even worse for the game makers, they will not encourage their friends to purchase the game. Though the goals may be trivial, players will always be able to identify the goal they are trying to fulfill at any given point in this game.

5.8.2.1.5 Complex

We need to engage students in solving complex and ill-structured problems as well as simple problems (Jonassen, 2004). Mario is largely a game of skill and although there are few complex intellectual conundrums, there is no shortage of

complex puzzles. Here is a brief description of how to proceed through a portion of the level five tower course:

“Avoid the two Spiked balls that are rolling around here, getting the ? Block Power-Up, with the following ? Block set (the one on the right) holding a 1-Up Mushroom.

Immediately after this portion get Mario towards the right side of the ledge as a Giant Spiked Ball will destroy the bricks on the left, signaling the point for Mario to start hopping up the ledges ahead, keeping himself above the nasty implement. Keep hopping upwards, fading to the right to get the third Star Coin on that side, followed by getting onto the ledges to leap upwards as soon as ledges appear because that Giant Spiked Ball will get back to the right side soon enough. Punch the bricks on the right to gain one last Power-Up, followed by passing through the large red doors to encounter the boss fight!” (Sulpher, 2006)

Mario presents players with challenge after challenge, some simple enough to meet on the first try and others complex enough to drive all but the most dedicated players to the game playing community for help and hints.

5.8.2.1.6 Contextual

Learning should be situated in some meaningful real-world or case- or problem-based task. Let’s face it, Mario bears little resemblance to any real-world activity, but it certainly presents challenges. In fact, it is the contrived nature of the entire game that makes it an interesting design to study from an educational perspective. Although we are often told how important it is that the game’s premise and storyline be fully integrated into the gameplay in order for the game to be ‘good’, Mario’s story is very weak and most of the activities we must master really have nothing to do with rescuing Princess Peach. Mario is a series of obstacle races so there really is no meaningful context to speak of. Yet, it still works and Mario remains one of the most popular and recognizable characters of all gamedom. Some of the reasons for this enduring popularity are probably similar to those that fuel the popularity of other cartoon characters like Mickey Mouse and Bugs Bunny, but part of it has to do with the integrated style of the Mario games: all have a similar look and feel; nothing seems out of place. This is where context plays an important role in an otherwise meaningless collection of silly activities.

5.8.2.1.7 Conversational

“*Learning is inherently a social, dialogical process* (Duffy & Cunningham, 1996). That is, given a problem or task, people naturally seek out opinions and ideas from others. Technologies can support this conversational process by connecting learners across town or across the world” (Jonassen). Here again we turn to the wider game community because Mario is a single player game. Mention has already

been made of the role played by the internet game communities while discussing collaboration, and it will be mentioned again in the next section, but one aspect that has not yet been included is that of other people likely to be in the same room as the player while they are playing. Mario can be a popular spectator sport. Mario also supports a two player mode which further encourages social interaction during play.

5.8.2.1.8 Reflective

“Learners should be required by technology-based learning to (articulate) what they are doing, the decisions they make, the strategies they use, and the answers that they found” (Jonassen). This is one place where many games are somewhat lacking in design (Prensky, 2001). However, virtually all popular games spawn online fan communities whose main purpose is to allow players to share tips, knowledge, experiences, and artifacts that they have produced, such as fan art and fan fiction. If anything, in these venues popular games suffer from an overabundance of reflection. While they may not be structured in ways educators find appealing, they certainly serve the same purpose, namely to reflect on the experiences of playing the game and discuss what they have learned.

5.8.3 *Problem-based learning*

Problem-based learning (PBL) is intended to build on the efficacy of experiential learning and promote learning through an investigation of a problem which learners must solve in groups or individually, in role-playing or scenario based contexts. Learning is student centered and relies upon self-directed learning (Savin-Baden, 2000). When designed as a formal exercise, PBL includes an introductory exploration of issues, followed by a development of the problem to be solved. It is usually assumed there will be a collaborative group of participants involved in the process who then hypothesize about possible solutions, gather information needed to resolve the problem and then present their solution when they are done (See Figure 5.6).

Let us now follow along as Phoenix Wright and his friends solve one of the problems with which they have been saddled. Each of the five cases in this game can be viewed as a main problem, to which the PBL process can be applied. With each main problem there are also lesser problems and focusing this analysis on one of these provides a fairly complete picture of the process. It also helps to illustrate that the PBL process can be nested within itself in a procedural fashion: there can be one main problem which contains other problems, each one of which can be addressed using the same process.

The design of this game itself matches very closely with the formal PBL approach.

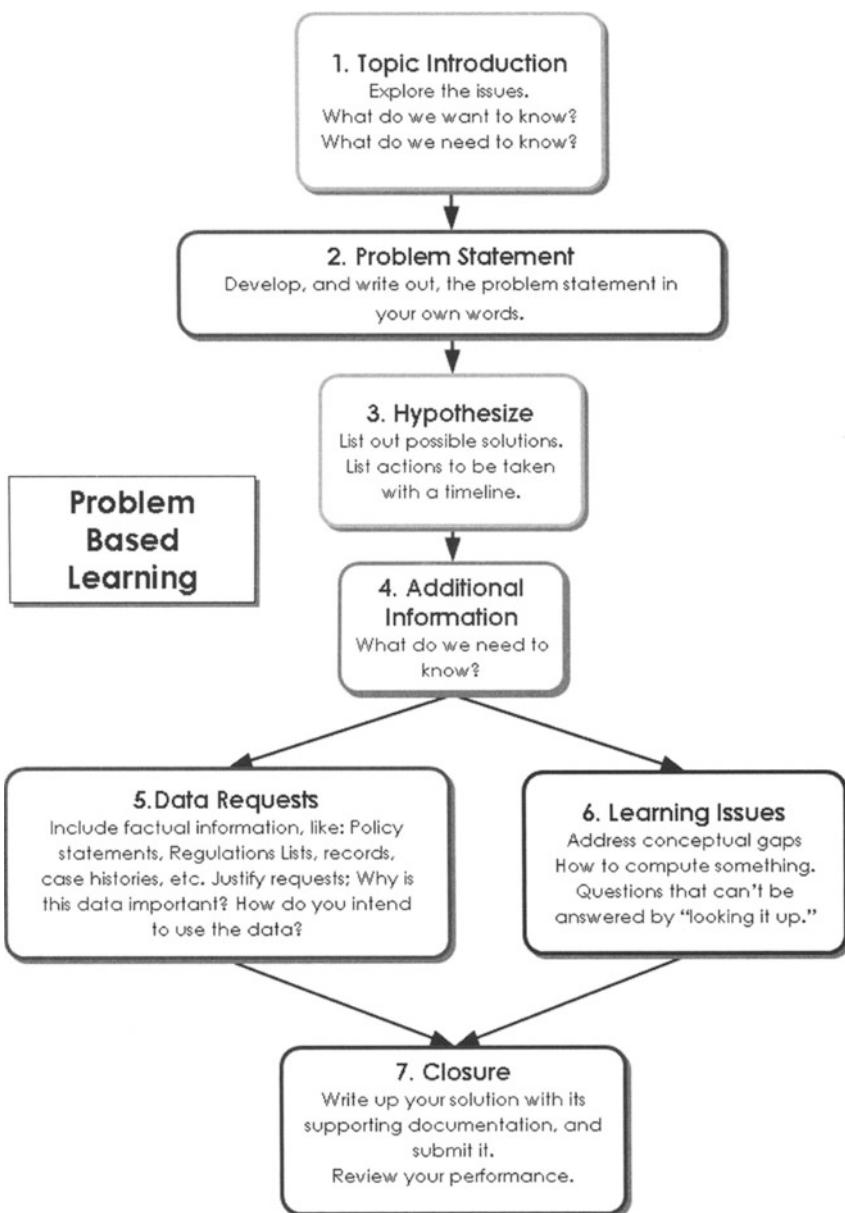


Fig. 5.6 Problem Based Learning

5.8.3.1 Problem-Based Learning with Phoenix Wright

5.8.3.1.1 Topic Introduction

Each case begins with a formal topic introduction. The fifth and final case is the most complex and twisted of all, which should not be especially surprising as we expect a progression of difficulty in almost any game we play. The synopsis of the case is as follows: the district chief prosecutor is accused of murdering a police detective in the underground parking lot of the prosecutor's office building. There is a witness (Angel Star, a former detective) and the chief prosecutor (Lana Skye) has confessed to the crime, but Lana's 16 year old sister is certain she didn't do it and asks Phoenix Wright to defend her big sister. We already know that we must prove her innocent and find the real murderer because that is how this game is played. The cases, although they start off being relatively straight-forward quickly become quite convoluted.

The 'sub-problem' we will use as an example is one that occurs at the end of the first day of the trial. This case is divided into six chapters which alternate between evidence gathering and in-court trial episodes. The game is organized such that when a new problem arises, the judge will call a recess and we are given an opportunity to gather more evidence and uncover more information. Once we have the information and evidence we need we go back into the courtroom. This change from one chapter to the next is controlled by the game, and we cannot choose to go back to a previous chapter once we have passed it.

5.8.3.1.2 Problem Statement

The specific problem that we will examine occurs when during a witness testimony (that of Damon Gant, The Chief of Police) we discover that there had apparently been a second murder inside the Police Department on the same day and at the same time as the one incident of the current trial. The body was not found, and there are indications that a case that was resolved two years ago might somehow be linked to this one. Evidence from the two-year old case was found at the scene of the current crime but has not been shown to be linked to the current victim. The Chief of Police claims that there is no official link between the two murders that occurred on the same day. Through the evidence presented, we manage to prove the connection between the two current murder cases, but there is still no second body. Further testimony and cross-examination shows that the murder victim in the second case appears to be the same person as the victim in our current case. Our problem is now to clear up the mystery of how the victim could have been killed in two places at the same time.

5.8.3.1.3 Hypothesize

The next step in the PBL process involves hypothesizing, and in the game this is accomplished by dialogue exchanges between various characters at the start of the evidence gathering chapter. As players, we have very little to do in this section except to scroll through and read the dialogue. Through the dialogue we are given a brief review of what we know, told what we think has happened and also told what we should do next in order to resolve the problem. In the story, we have two murders that occurred at the same time but there is only one body – this is not very likely. The accused (Lana Skye) will not tell us anything – we suspect she is trying to protect someone or something. Given the nature of this game, we (as players) can hypothesize that most of the information given to us is significant in some way, so it is reasonable to assume that the references to the two-year old case are significant, and in case we didn't get this on our own, we are given hints to that effect. The game essentially points us at the next phase of the PBL process, namely identifying what additional information we will need in order to proceed.

5.8.3.1.4 Additional Information

One of the game mechanisms added in this case is the ability to examine evidence by rotating the image of the object along two different axes as well as to zoom in and examine certain portions of the object more closely. In the previous cases the only things we could do with evidence were to look at a picture of the evidence and read a few details. If the evidence happened to be a piece of paper (note, letter, autopsy report, etc.) we had the ability to read whatever excerpts the game designers decided to put in for us).

The evidence gathering portion of the game is facilitated through a small number of locations we can visit. Most cases have fewer than 10 different locations. At each place, we have at least two options: ‘examine’ or ‘move’. The ‘examine’ mechanism was described in a previous section (Gagné’s), so it will not be described again here, except to add that it is through this mechanism that we can find and collect evidence³. The move option takes us from one location to another, but we can only move along certain pre-determined paths, so for example, if we wish to go from the Police Department to the High Prosecutor’s Office, we must first go to the Underground Parking Lot, because the prosecutor’s office is only accessible from there.

If we arrive at one of the locations and there is another character there, the game will provide two additional options: ‘talk’ and ‘present’. These two options are the mechanisms by which we fulfill our data requirements and our learning issues. Just as in other PBL exercises, it is not always easy to decide which one is a

³ The other way to collect evidence is when it is explicitly given to us by one of the other game characters.

data requirement and which should be labeled a learning issue. In the game there is typically some initial dialogue followed by an opportunity to instigate further ‘talks’. All ‘talks’ are necessary in this game, and sometimes additional ones will become available after others are done – this is one way of keeping the player from seeing hints that they would not yet understand. The ‘present’ option allows us to show evidence to the character to see if it can provoke the character into giving us more information. We always get the same response if the witness finds the evidence unmoving, but there is no penalty for trying.

5.8.3.1.5 Data Requirements (facts)

Another way of looking at the distinction between data requirements and learning requirements is to say the one deals with ‘what’ while the other addresses ‘how’. In the case of “Rise from the Ashes”, the data requirements will include the facts and clues of the case that we will need to gather in order to resolve the problem. In the course of gathering the data we need we will also encounter learning issues, and vice versa, so it will rarely be possible to group items neatly into one or the other category. While they can be listed separately after the fact, since this example follows the process as it is unfolding, the remainder of the discussion follows under the next section.

5.8.3.1.6 Learning Issues (concepts)

In addition to concepts, learning issues include the ‘how’ that goes with the ‘what’. So for example, in order to determine the facts of the two apparent murders, we will want to examine both murder scenes – if we can find conflicting clues, we will be able to pursue those. At the start of the evidence gathering chapter, we find ourselves talking to Ema Skye, the defendant’s younger sister. She mentions something about blood stains, and presents us with a ‘luminol kit’ – a spray that creates a stain when mixed with blood – even trace amounts. One of the learning issues we encounter is how to use this new device, and we are given a short tutorial on the spot. Then, when we use this kit we discover that there are multiple blood stains at the scene of the ‘mystery’ crime and only one at the scene of the current one. After various other talks and examinations, we realize that the evidence suggests that there was only one murder and that somehow the body was moved from one location to the other, which explains the missing body.

5.8.3.1.7 Closure

Rather than spoil the mystery, let it just be said that we eventually find all the evidence we need. This includes the addition of yet another tool – a fingerprinting kit.

This new tool takes advantage of the touch sensitive screen and built-in microphone of the DS, and allows us to choose a suspect print on some surface, dust it by touching the screen, and then literally blow away the excess dust revealing the print. As soon as we are given this fingerprinting kit, our set of character profiles is altered to include their fingerprints so we can compare what we have against our records. The final step in this process is to suggest a match whereupon the game mimics a fingerprint matching program by focusing of several key points on the fingerprint for comparison. This tool illustrates an innovative use of the interface as well as adding a flavor of authenticity.

Ultimately, all the evidence we need is gathered and we can press our witnesses by asking further questions during the cross-examination of their testimony and by presenting that evidence at the appropriate moments. Since this examination was of a sub-problem, the closure of this problem allows us to continue on to the next chapter, and ultimately prove our client's innocence. The format used in *Phoenix Wright* fits very cleanly with the PBL format, and even though this game is essentially a branching story where we are led towards the end in a fairly lock-step fashion, the interactive tools we are given and the opportunity to 'solve the case' ourselves makes for a compelling and enjoyable experience. The genre of the mystery is one that could be used in a great many learning situations, and this game provides a template for how to translate that into a game format, while still retaining the control that might be appropriate in certain learning situations where a 'right' answer must be the ultimate conclusion.

5.9 Digital Games Are Special (Educational Technologies)

I have learned throughout my life as a composer chiefly through my mistakes and pursuits of false assumptions, not by my exposure to founts of wisdom and knowledge.

Igor Stravinsky

None of the games we looked at are educational but we can still see that the templates used by each game maps very nicely onto several well known and respected learning and teaching theories. The medium of the video game supports many traditional approaches to learning as well as many modern ones and some would say it does so better than many other formats. Whether we are looking to develop a full-blown game or just some aspect of game technology, we can learn from the masters.

Phoenix Wright may not teach us anything realistic about being a lawyer or solving crimes, but it is a compelling format for dealing with mysteries, and we could just as easily use this approach to work through an environmental problem along with a team of experts to help solve it. The possibility of controlling both the progress and some aspects of the outcome add dimension to the mystery that

cannot be had with print or cinema alone. It is not coincidence that many other popular games use mystery as a device: mysteries are popular because humans are curious. One of the advantages that technology offers lies in its ability to prevent players from ‘peeking’. In this format we can control very tightly the experience received by players – we can make them work through various parts while still giving the illusion of player control. However, the story itself must be presented in a way that entices players to continue. That is key.

Simply being led through a series of predetermined steps without any other thing to compel the participant will not sustain a voluntary learner, and all players of games are voluntary learners. A counter-example that comes to mind is an otherwise stunning online tutorial that quite literally leads learners through a virtual dissection of a frog called, *Froguts* (Hill & Hughes, 2001). The concept is promising, the facts are accurate, the animation is smooth and the imagery is excellent, but the interaction is so narrowly prescribed that after the first few operations we realize our role in this ‘game’ is simply to perform the next task. The application is in many ways quite engaging – the author happily worked through the entire Owl Scat demo to reconstruct the skeleton of the vole – but to call it a game is misleading as there is very little that is game-like about it, and to call it a simulation does a similar disservice to simulations everywhere. There is no way for us to explore any ‘what if I do this’ questions, which, by the way was the first thing this author tried when exploring the demo. How many children would have tried exactly the same thing? When I saw the quality of the graphics and the smoothness of the interaction, I immediately started to think of things to try that I would never have done in a real dissection but that might be fun to try in an environment where smell was not a factor, where there was no chance I might cut or poke myself, and where I would not be saddled with cleaning up the mess. I wanted to look inside its limbs, to try alternate organ arrangements or to see inside its head (we never got to do THAT with the real frogs in school). Instead, when we first begin, we are shown a frog laid out on a tray and ready, and we are given a box of pins to be used to secure the frog for dissection. We are shown four locations (marked by red ‘x’s) that are presumably the places we should put our pins. It is possible to put the pins anywhere, but once we have placed four pins, we cannot take any more out of the box, even though the box is not empty. Further, we can not proceed to the next step until we have placed the pins in the designated right locations. From there, our options for exploration diminish, and once we get to the point where we are using the scalpel, we must ‘cut’ along the pre-determined lines and in the pre-determined order. We don’t even have a choice over where the scalpel is placed – all we can do is move it along its pre-determined path. We cease to be the ‘scientists’ and simply become the computer equivalent of a page-turner. This particular program is sold by annual subscription, and the ‘home version’ costs more than two *Phoenix* games. The frog dissection is advertised to be usable for one year, and *Phoenix* can be used until the cartridge breaks. The frog dissection is an award-winning program, yet still does not compare well when seen next to *Phoenix*. It is not a game and primarily calls itself a simulation. However, simulation

need not be synonymous with animated film-strip, and this one unfortunately implements just a subset of what is otherwise a high fidelity simulation. I wonder if the folks at NASA would find their shuttle simulators as valuable a learning tool if the astronauts could only make the ‘right moves’ and never crash?

Animal Crossing is not an educational game yet still employs the same kinds of mechanisms we value in instructional design. Even though what is learned may not be valued in society, the players of this game nonetheless learn a large variety of skills, facts, principles and relationships. The game’s content is frivolous, but its format is successful. Imagine what could be done with a format like this if our goal were an increased awareness and understanding of environmental issues? How about “*Wetlands*”, or “*Rain Forest*”? We could make use of a format like this to help learners explore friendships or collaboration. An important element of both this game and *Phoenix Wright* is that of humor, and it is one of the motivators for exploring options in the game that we already know are unlikely to help us towards the overall game goal (Dormann & Biddle, 2006). A *Wetlands* game that was not visually appealing, or that never made us smile would not hold our voluntary interest for long, and part of the power of digital games is their ability to motivate and engage us.

Last but not least, Mario is certainly not a game that is likely to be seen along side games like *Civilization*, and *Zoo Tycoon* on any list of COTS (commercial off the shelf) learning games. Still, there is much that can be learned by studying the way it does what it does. *Mario* can keep people engaged for hours, while its educational counterpart, *Math Blaster* can not. *Mario* gives players constant and regular feedback so players always know where they are and where they need to go, and *Math Blaster* is a mystery tour. *Mario* allows players to back track and re-do completed challenges to gains points, lives, and power-ups; not only does *Math Blaster* offer none of these, the scoring mechanism is tied to the learning objectives of the math facts we are supposed to be practicing and we are given no clue as to how our score maps onto our in-game performance. Winning and loosing is tied directly to the equations we encounter while other game elements have little effect. The equivalent scenario in *Mario* would be if the red coins turned out to be what freed the Princess and defeating Bowser was coincidental. To someone focused primarily on formal learning outcomes these differences may seem trivial, yet they are the very things that compel players to remain engaged with a game for hours or discard it for something else after just a few minutes. Ignoring them is to waste some of the very qualities that make games and game technology useful.

5.10 Conclusion

I am always doing what I cannot do yet, in order to learn how to do it.

- Vincent Van Gogh

Although many references have been included in this chapter, most of the connections drawn between game elements, specific games, and the learning and teaching theories and models are being presented here for the first time. It is true that they are not really based on any prior work other than that of the author. Studies that examine the educational value of games have, for the most part focused on the player and what they get out of it rather than the game itself (Ellis, Heppell, Kirriemuir et al, 2006; Freitas, 2007; Mitchell & Savill-Smith, 2004). It is hoped that this work serves as the start of a conversation rather than the conclusion. It is not meant to be definitive, and will hopefully prompt others to help to clarify the game taxonomy as well as the mappings. The study of game design for educative purposes is still in its infancy.

Learning in games is highly experiential and situated. In that respect they are little different from the kinds of real-life contexts that are currently favored among scholars of instructional design and methodology. As we have seen, many games, while compelling and attractive can also bear little resemblance to anything we encounter in the real world. This does not mean that the format has limited applicability. What it does mean is that we should approach the design of educational games carefully with a thorough understanding of its potentials as well as its limitations. Just as this chapter has endeavored to connect the dots between accepted pedagogy and existing successful games, educator who use these devices must connect the dots between what is learned in the games and how that can be made authentic and applicable in the real world. After all, every learner deserves an answer to the questions, “Why am I doing this?” and “What is it good for?” even if they are being asked to play a game. Perhaps especially so in games.

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