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Yet Another Magic Bullet: A Tool for Assessing and Evaluating Learning Potential In Games

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ABSTRACT

This paper will outline a simple, yet effective model that can be used to help in the design of games for educational purposes, as well as in evaluating existing games for their learning potential. Further, this model can help educators formulate strategies for using an existing game within a learning context. The model will be presented along with a few examples of assessments produced using it.

Categories and Subject Descriptors

D.2 [SOFTWARE ENGINEERING] D.2.2 Software: Design Tools and Techniques *User interfaces*; D.2.10 Design *Methodologies*;

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General Terms

Design, Human Factors.

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Digital Game-Based Learning, Instructional Desig n, Instructional Evaluation, Serious Games

1. INTRODUCTION

The model presented in this paper is a simple and effective one that can be used to help in the design of games for educational purposes, as well as in evaluating existing games for their learning potential. Further, this model can help educators formulate strategies for using an existing game within a learning context.

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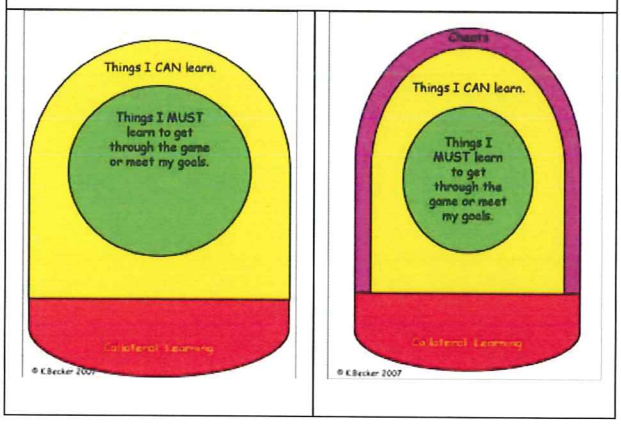
One aspect that sets the medium of the videogame apart from other media is its highly interactive nature - people learn in games by *doing* things, and this experiential quality lies at the core of game design. Games provide an experience - and games designed for learning can do no less. Thus, any epistemology of games must begin with the experience.

The author conducted an extensive informal analysis of several games, including: *Animal Crossing Wild World* and *Phoenix Wright*. The analysis sought to answer the question, "How does a commercially and critically successful modern video game support the learning that players must accomplish in order to succeed in the game?" It is known that not all learning in a game is necessary to win and also that sometimes learning occurs that was never intended by the designers. In the course of this analysis, five broad learning categories became apparent and all learning in and around games can be classified as (non-exclusive) members of at least one of these sets. Several visualizations of the relationships of these five sets were developed, and the final image ended up being somewhat bullet-shaped (see Figures below). Thus, it earned the moniker "Magic Bullet".

The Magic Bullet: "Good" Games



2. THE FOUR (PLUS ONE) CATEGORIES OF LEARNING

The images depict a mapping of the learning that can occur in a game. All games have some things that MUST be learned in order to win. But games also include things that the player *can* learn even though they may not be in direct support of the main

goal. Additionally, many games result in the player learning things not designed into the game (collateral learning) and sometimes they will learn various ways to 'cheat'. The following sections explain these four broad categories and one additional one: the category of things the player actually DID learn.

2.1 Things We CAN Learn

The CAN learn category is intended to include only those things that were intentionally designed into the game. This could also include the cheats that have been left in the game, but it was decided to separate cheats into their own category because they need to be treated separately, especially in serious contexts. The "things we Can learn" are all the things the designers put in there on purpose and includes both minor and major objectives. For *Animal Crossing Wild World* for example, it includes major things like: how to make money (bells), how to fish, how to make and keep friends, how to collect various things, etc. It also includes minor things like the fact that flowers don't need to be watered on rainy days, and that you can walk over a flower safely without damaging it, but running over it will destroy it. There is much there we CAN learn. That's the upper, bullet-shaped part of the pictures.

Many games provide additional 'easter eggs', bonuses, and other elements that are not directly connected to the main game goals, though typically there are few if any rewards for learning many of the things in this category beyond the intrinsic satisfaction of having learned them. On the other hand, unless the game is designed specifically as a short form game, not having enough things we CAN learn is a problem, regardless of how much of that we MUST learn. Even if those two elements are well proportioned relative to each other: if they are too small the game will not be engaging.

2.2 Things We MUST Learn

The elements in this category may vary depending upon the game. Some games allow multiple paths to the win; some games have multiple win states; some have various goals that can be pursued without any single win state.

These things are essential to winning the game in some way. In a game like *Phoenix Wright*, there is really only one path to the win so all players must learn the same things (in this game they must do so in pretty much the same order too - it is essentially a game on rails) but many games have multiple paths to the win and/ multiple win states. *ACWW* doesn't have an actual win state, but allows you to set various goals, like paying off all of your mortgages. If there are multiple win states or multiple paths to the win, then the set of things a player MUST learn can vary and two different players learn somewhat (or radically) different things. Often though at least some of those things will overlap. The nature of the MUST-Learn set depends on the path or endgame the player is trying to achieve. With multiple paths to a single win it is possible for two players to learn different things and each still be able to win.

The more one MUST learn of the total set, the fewer choices players ultimately have. If there is not enough we MUST learn in order to win, there will be insufficient challenge.

2.3 Collateral Learning

This set includes all the things people can and do learn that the designers had never really intended. Without the original design documents, it is not possible to distinguish this kind of learning from the first category with any certainty. This set can be extremely large (infinite?) However, we can sometimes pick them out. For example, *Tekken* is a martial arts fighting game. As a direct result of playing this game, players may research and learn about capoeira, which is a Brazilian form started by slaves that combines dance, aerobics and music with mostly kicking. I'm almost certain the designers of *Tekken* did not plan that.

Collateral learning also includes discoveries within the game that the designers did not foresee. These may be the result of deliberate design elements that combine with each other in unexpected ways - like being able to kill people in the *SIMs* by pushing them into pools that have no water (although, who knows, Will Wright has an odd sense of humour.)

Collateral Learning is most often cited as a detractor by those who do not like the idea of games for education. There is grave concern over what ELSE students may learn and how teachers can CONTROL what students experience. One of the misapprehensions many teachers have is that learning in traditional settings is controlled while learning in games or on the web is not. Control seems to be equated with feelings of safety. Another potential subtext that goes with these concerns is the fear that students may learn something dark, evil, or otherwise bad. One way to address this is to analyse the game being used.

2.4 Cheats

Cheats - One could argue whether or not this should be seen as a category distinct from Things-We-CAN-Learn. Cheats are typically designed into the game for testing purposes, and often left in the game once it ships. So, they are deliberate design elements on the part of the designers, but not really considered part of the normal gameplay. [Note: some game designers may consciously put the cheats into play by assuming people will use them and designing accordingly but they are rarely, if ever, *required*, so they are rarely part of what we MUST learn.

2.5 Things We DID Learn

This category is the set of things the player actually DID learn. It may or may not include all the things above, but if one wants to win it must minimally include the set of things one MUST learn to win, at least for that sub-goal. If it turns out there is something one MUST learn that is not in the game that means that one must learn it from the game community at large. Many MMOs are like this. Some make it impossible to win things without the help of others.

3. CONCLUSIONS

The brevity of this abstract prevents a more complete illustration of this model, but the presentation will show numerous examples of both "good" and "bad" games as identified using this model as well as illustrating several variations on the model itself..