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Collectible card games as learning tools

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Abstract

This paper will present powerful aspects of collectible card games (CCGs) and what these games might bring to a learning ecology by examining how CCGs stimulate creativity, cognition, and logical reasoning, and how these elements could aid players synthesizing knowledge, and develop skills that might be difficult to teach in a classroom setting. We will also present some key findings and implications of a survey study about CCGs that we conducted with players of a multi-player CCG (N = 365), *Vampire the Eternal Struggle* (VTES). We will conclude with recommendations for future studies on this topic.

Keywords: Collectible card games; learning; survey study; Vampire the Eternal Struggle community.

1. Introduction

Collectible card games (CCG), or trading cards games (TCG) combine the collection of trading cards with strategic deck building and gameplay. In 1993, Richard Garfield introduced *Magic: The Gathering* (Wizards of the Coast, 1995), a CCG, to the world. By 2008, the worldwide market for CCGs had grown to $2.1 billion and North American sales were estimated to be around $800 million (David-Marshall, van Dreunen, & Wang, 2010). The number of CCGs increases every year thanks to their low production cost, and popularity as part of the media mixes (Ito, 2005) for TV shows or massively multi player online games such as *World of Warcraft*.

Despite the popularity of CCGs, and use of games in learning, the lack of thought pieces or experimental studies with CCGs is surprising. This gap was the motivation of our research with CCGs. We started our inquiry with the question: "Can CCGs have value, either as direct teaching tools, or as part of a larger learning ecology?" We envision potential research on this question in three stages: First, to map possible common areas between learning or cognitive theories with player's reports about how they think and feel about a CCG; Second, to investigate that common ground with learners, to see whether playing a pre-existing CCG contributes to their growth in cognitive areas or learning; Third, to create a custom CCG with learning content, while being careful to retain any facets of CCGs identified in stage 1 as crucial to engagement, and determine its efficacy as a teaching tool. This paper reports our progress on the first stage and it will be organized in three sections.

The first section will talk about types and defining properties of CCGs. The second section will discuss learning aspects of CCGs and delve into the results of the online survey study conducted with a multiplayer CCG called *Vampire: The Eternal Struggle* (VTES) (White Wolf, 2000). The last section will reference the first two in the hopes of synthesizing ideas for use of CCGs in education and providing a starting point for such discussions.

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2. Background

Game based learning has never been as popular as it is today. Using digital games for learning or gamifying (Schell, 2010) education are topics we come across in mass media as well as academic literature. When compared with design and development of digital games, producing a custom CCG has lower requirements, both during the design process, and during deployment in a learning environment. The use of card games in education is not a novel idea. Effective use of card games in enhancing learning of mathematics (Rowe, 2001), science (Odenweller, Hsu, & DiCarlo, 1998) and literacy (Byrne & Fielding-Barnsley, 1991) has been widely researched. However, CCGs have not been studied in formal or informal learning environments. For example, Steinman and Blastos (2002) developed a card game to teach about immune systems. The game was reminiscent of CCGs but without the card collection and deck creation aspects central to CCGs. They basically used the card design of CCGs, including some artwork, what the effect of the card was, what the restrictions are and so on. They were able to achieve pithy representation of information by using symbols and keywords. The authors found that the card game was effective to teach basic facts and concepts about host defense to adolescents.

The popularity of *Pokémon CCG* and *Yugioh* among school age children, despite their complexity, intrigued many academics. For instance, *Pokémon's* metanarrative of the acquisition, training, and competing of hundreds of "pocket monsters," each with unique statistics and evolutionary potential, demands a mastery of complex knowledge and active interaction on the part of its intended audience(s) that is unique for a line of children's toys (Tobin, 2004). Ito (2005)'s ethnographic studies on *Yugioh* illustrated how various mechanics of the game contributed to its market penetration of Japanese youth.

Using the popularity of existing CCGs, educational institutions can partner with game companies to make expansions on science or history topics. One example of this was the partnership between NASA and Pokémon. NASA's Center for Distance Learning and the Pokémon Trading Card Game developed an in-school program that incorporated science, technology, engineering, and mathematics (STEM) themes into activity units for K-6 students. Specifically, activities aimed to help students learn the science behind DNA and other topics. (Land, Anderer, & Nelson, 2005).

An example of a CCG designed with learning in mind is *Phylo* (Phylo the TCG, n.d.) which is described on its website as "a card game that makes use of the wonderful, complex, and inspiring things that inform the notion of biodiversity". The game is a community project where anyone can contribute cards and can be played by printing cards. The website contains any information from rules to example card decks to be able to play the game.

Next, we will talk about types and defining characteristics of CCGs.

2.1. Types of CCGs

A CCG is generally made up of several components such as the rules governing the game, cards, Intellectual Property (the theme, or content), and sometimes: Beads/counters, dice or other secondary paraphernalia (David-Marshall, van Dreunen, & Wang, 2010). Most CCGs are played by two players, such as *Pokémon* and *Magic:The Gathering*. Others, such as Shadow Fist or VTES were designed for more than two players. Based on the rules and the number of players in the game, the table dynamics change. Figure 1 shows the dynamics of attack, defense, and possible cooperation in two different CCGs. While the relationships in a two-player game are symmetric, multiplayer CCGs bring different dynamics into game play, marrying the need for social interaction to achieve players' goals with effective deck construction. CCGs may allow multiple strategies, such as politics where a player has to negotiate his/her goals by making deals and strategic planning.

VTES, which was designed by Richard Garfield in 1994, might be the most well designed multiplayer CCG to date. Several aspects of the dynamics of VTES are notable: First, it requires a minimum of three people to play, with five being optimal; Second, unlike many other multi-player CCGs, VTES is not a free-for-all, but rather functions on a predator-prey system of relationships (see Figure 1); Third, as an extension of that predator-prey system, the game does not always boil down to "last player standing" or "whoever reaches the end first". It is possible (albeit rare) for a player who has been ousted from the game to emerge as the winner at the end; Last, VTES encourages a great deal of negotiation, both as a result of the predator-prey system limiting a player's offensive actions, and as a result of a system of politics that is built into the game.

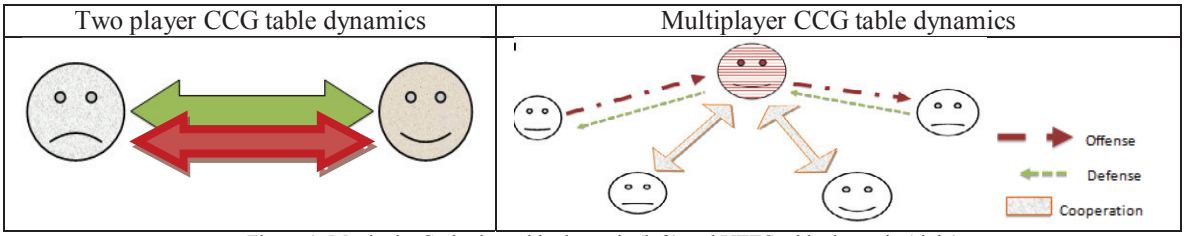

Figure 1. Magic the Gathering table dynamic (left) and VTES table dynamic (right)

2.1.1. Defining Properties of CCGs

Collection, creation and community aspects are unique combination for CCGs. Since they are further explained elsewhere (Adinolf & Turkay, 2011), we will briefly talk about these aspects here. Collection refers to the mechanism by which players buy packs of random cards from various sets, as they attempt to collect all the cards from those sets, or at least enough copies of the cards they want to play with. Creation is the process during which the player decides the strategy his/her deck will use to win. They select from their collection, which cards, and how many copies of each will make up their deck. This lends a sense of ownership to the game, as players have the opportunity to demonstrate their skills, as players *and* as creators. Even between relatively similar deck designs, individual tastes and choices can be seen. Community is the social system in which people play the game, trade cards, and advise each other on strategies.

2.2. CCGs and Learning

The possible benefits inherent in CCGs have been speculated on, and a few schools have run programs that encouraged CCG play to forward social and analytical skills (Joseph, 1998, as cited in Lenarcic & Mackay-Scollay, 2005, p. 67). The genre, as a whole, encourages its players to develop various skills, including analytical thinking, empathy, social manipulation, iterative design, and communication. Below we'll briefly discuss three learning aspects of CCGs.

2.2.1. Learning Aspect 1: Motivational

Malone (1981) identified three aspects of games that make them motivating to players: fantasy, challenge and curiosity. Close examination of the collection, creation and community aspects of CCGs reveals that each of these can be motivational to players based on Malone's (1981) model. It might be possible to take advantage of this motivation in a learning environment. For example, using a CCG as a reward for certain performance in the learning environment might provide extrinsic motivation (Chen, Kuo, Chang, & Heh, 2009).

2.2.2. Learning Aspect 2: Social

Various social behaviors are often practiced or developed by players. Among these are cognitive apprenticeship (Brown, Collins, & Duguid, 1989), negotiation and persuasion, cooperation through mutual self-interest, and creative socializing. For example, experienced players share insights into game mechanics with less experienced players. Concrete examples allow less experienced players to see principles in practice. In a multi player CCG, players will sometimes negotiate a mutually beneficial exchange. In these negotiations, each player often will hope that the exchange is more beneficial for them, which involves further analysis. Such negotiation practices may prepare players to negotiate in other situations in real life.

2.2.3. Learning Aspect 3: Play dynamics and mechanics

Notable properties of CCG systems include pithy representation of information via symbols and keywords, and resource management. From learning point of view, scientific representations might be used as symbols on cards, taking advantage of prolonged exposure to breed familiarity. If you ask any average CCG player, s/he can memorize tens of card names as well as what they do, and in which situation they can be used. Creating a similar motivation

for students may encourage them to learn specific concepts, such as chemistry or biology. The resource management aspect may encourage practice of estimation skills and basic statistics, as well as strategy development and increased metacognitive awareness. Training in such skills might be useful for school aged children, giving them a tool to problem solve in curricular activities as well as to develop lifelong learning skill.

3. Methodology, Participants and Data Analysis

An online survey was used to collect quantitative and qualitative data through snowball sampling on public and private VTES forums and players' personal blogs. A total of 365 players ranging in age from 18 to 59 (M = 32.17, SD = 6.4) filled out the survey. On average participants have been playing VTES 9.82 years (SD = 4.95). 57.7 % of them were from European countries and 35.3% were from North America (USA and Canada). In addition to the demographic data, we collected data on participants' play habits (e.g. how do you construct decks?) with five multiple-choice, three 7-point Likert scale and seven open ended questions. We also used Need for Cognition scale (Cacioppo, Petty & Kao, 1984) to measure players' inherent desire to "think." It includes statements such as "I would prefer complex to simple problems," "I like to have the responsibility of handling a situation that requires a lot of thinking." Data was analyzed using the quantitative data analysis software SPSS 18.0 and qualitative data analysis software Nvivo 9.0 by using inductive codes.

4. Findings

Previously, we determined three aspects of CCGs that make them unique. Among the three, collection seemed to be the least motivating for the players. Only 36% of the players indicated that they like the collection aspect of the game from a moderate to a large degree. Far more players seemed to be engaged by deck building. When asked, 74% indicated that they like the deck building aspect of the game from a moderate to a large extent. Deck creation as an iterative process may encourage players to think while they may revise the card proportions and learn more about how the cards play in different settings. In fact, we found a significant correlation between players' frequency of designing their own decks and their need for cognition scores ($r = .127$; $p<0.05$). Also, based on whom the player plays with, the deck may perform differently. VTES players reported that this dynamic experience was one of the qualities of VTES that made the game enjoyable to them.

The community aspect of VTES seems to be the most fun and motivating for players. Seventy six percent responded that they like the community aspect of the game from a moderate to a large extent. Many players travel to play tournaments, or, when they visit other cities, they look up VTES players to play with. As a male player states: "…I've never seen any other game, or non-religious community where you can call someone you've never met and sleep at his place in the evening." The game as the common interest created a large VTES family around the world.

The amount of thinking, strategizing, making deals and trying to win in a highly competitive environment is surely hard fun (Lazzaro, 2004). Most VTES players seem to really like this kind of fun as 88% of them said that they liked the game-play aspect of the game to a moderate to large extent. Here is an example quote from a male player: "Multi-player interaction requires a different skill set from just math and algorithms. But math is important too, which is why I don't win every game (hah)..."

Taking a close look at the social practices in and out of the game play provides insight into why it might have an educational value. Game mechanics encourage players to interact. When asked about their common strategies to win, 20% of the players emphasized negotiation and social manipulation. An example quote is from a Swedish player: "Playing VTES is not about the deck, since bad decks win games. It's about table image, table talk and table control… Most of these things can be achieved by the social interaction within the table…" Players also mentioned their constant desire to learn from more experienced players to develop multiple strategies.

In a 2-hour long complex game, making mistakes becomes inevitable, even for a very experienced player. Mistakes as part of the gaming experience encourage players' metacognitive awareness. When players were asked what their usual reactions are when they make a mistake in a VTES game, 55.4% selected "I better remember this in the future" This indicates that players try to learn from their mistakes and use this as a strength in the future. A

representative quote is by a male player from USA: "I do tend to remember my mistakes more than my successes. I try to learn from them."

5. Conclusion and Discussion

CCGs are engaging, social, community-building games (Bisz, 2009). They encourage players to strategize, communicate and make predictions both during deck creation and game play. At least in VTES, it seems that collection is less important to players' enjoyment than deck building and community aspects. With an aim of using CCGs in a learning environment, this may be good news. Perhaps a teacher could simply give out cards (within reason), allowing students to focus on iterative deck design, and discussion. Those two facets may nurture students' cognitive and social development. Other possible uses for learning might be including an educational payload in cards' "flavor text" (usually a quote or otherwise thematic bit of text to place the card in a narrative context) and including important historical figures as art. In addition, CCGs are portable, and require little equipment. Finally, from a design point of view, they are simpler and cheaper to produce than digital games, as they cut out one third of the digital production trifecta: designer, artist, *coder*.

Based on the results of this study, if CCGs are to be used as learning tools, educators should leverage the motivational power of deck building and social aspect of the game at the same time taking advantage of the fact that CCGs are built on analytical processes, and they require assimilation and interpretation of symbols. As we mentioned in the beginning of the paper, an assessment of performance with CCGs in a learning environment is the next logical step for the study of CCGs as learning tools.

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