Trading Card Game

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Abstract: In this paper, we describe an in-house trading card game which can be adopted by teachers and played freely by students. Teachers can give students cards that can be used by students while playing with others as rewards of their performances on different designated learning activities. Also, since the game can be accessed by anyone in the world and supports multiple languages, students might get more motivated since they can play the game with others who may come from different classes, grades, schools, and even different countries and continents. For students who don't want to compete with others, the game allows them to watch others' matches as audience. Moreover, just like coin, stamp and baseball card collection students may want to collect all cards that the game has and no need to play the game and see others playing at all.

Keywords: Trading Card Game, in-game item, reward, discipline independent, open access

1. Introduction

Winefield and colleagues (1984) argued that rewards positively affect students' learning performance. Past research shows that symbolic educational rewards are meaningless to students; however, at the meantime, students would not appreciate if the real educational rewards are not so useful to them (Marinak, 2007). Although McNinch (1996) considered that cash are attractive for students and could be used as reward to encourage students learning, "money as rewards" shouldn't be considered (Kohn, 1999). According to the above studies, we know that only when students think the rewards they received are valuable or meaningful, the reward mechanism can be effective in terms of engaging students in learning.

Commercial games have become the most popular entertainment in these few years. Online games allow players to create and manipulate their own avatars and to interact with each other via chatting, in-game Emotes (ElderScrollsOnline.info, n.d.), raiding and dueling (Bartle, 2003). Card games are sort of multiplayer games and very common and welcome by students in different ages and even for undergraduate, graduate students, and adults. Despite of paper-based or digitalized form card games are, most of card games are either commercial ones or difficult to take as educational reward systems due to its in-game elements are not free accessed by teachers. Even the game itself is free, teachers may still need to spend a lot of efforts (e.g., time and energy) to stock a variety of in-game items for awarding their students.

Chen and colleagues (2009) designed a trading card game based on three famous ones - Magic: The gathering, Yu-Gi-Oh!, and Aquarian Age. In this paper the research team is demonstrating the developed game and talks how teachers can use the cards in this game as educational rewards. The trading card game is intended for teachers to give students different cards according to their performances in different teacher-designated learning activities (e.g., classroom participation, discussions, assignments, quiz, exams, etc.). Teachers can give students higher-level or rare cards if students did exercises well, actively answer teachers' questions or participate and contribute discussions heavily. Once students receive higher-level or rare cards, they might have higher opportunity to win the match in the game. On the other hand, when students are not doing learning activities well, they probably will not receive cards as rewards or only receive lower-level cards for what they have done.

Since the game is developed by the research team, new and different cards like higher level and much rare ones can be continuously designed and added into the game and available for teachers to provide their students as educational rewards without restriction and limitation. In such case, the game can keep attracting students to play from class to class, course to course, grade to grade and students may always find themselves having card missing in their collection and get motivated in terms of doing better homework, actively join the in-class and out-of-class activities, having better performance on quizzes and exams, etc. It is also worth to mention, the game supports multiple languages and students who study in different countries and use different languages can still play and compete with others.

2. The Game

2.1 The Concept

The game is a discipline independent game, which means, the in-game items can be delivered by any teacher as rewards in any course, grade, and school level. The in-game rewards are cards that students need to use while playing with others. Well-designed peer competitions have been proved as a good way to get students motivated and it is the basic idea of the game. In order to make students have correct perception and positive attitude towards the competitions, a student's ranking among all students is based on her or his credits rather than how many matches she or he has won or lost before. The student can get credits for the efforts she or he has tried to make in the match, so she or he still receives credits even she or he loses the match; sometimes, a student who loses a match could even receive more credits than the winner of that match.

A student might be able to have more options and strategies in the match if she or he has more cards and even might be able to defeat his or her opponents easier. The only way he or she can get new cards including higher-level or rare cards is to have good enough performance on the learning activities the teachers designated.

For those students who don't want to compete with others, the in-game rewards (i.e., the cards) have collectable feature just like coins, stamps, hockey and baseball cards; students may want to see higher level cards as well as rare cards in their collection. The effect of the game-based educational reward mechanism will be kept in student's mind and the learning motivation engaged by the mechanism can be carried to the followed courses, grades, or school levels. The students may want to get better in-game rewards in the followed courses by learning harder and putting more efforts in the assignments, participation, discussions, and etc.

2.2 The Design

The game is turn-based. Each player acts after the previous player finished her or his actions. When all the players take their turns, the circle will restart again from the first player. The game will stop when one of the players achieved the game goal – her or his opponent's life point drops to zero. In the game, there are three kinds of cards: Avatar Card, Magic Card and Trap Card. Table 1 explains their definitions, effects, and attributes.

Table 1: Cards in the proposed trading card game.

Card Categories	Card Type	Definition	Related Attributes
Avatar	Avatar Card	Fight with other Avatar Card.	Attacking Power, Hit Point, Size, Race, Rank etc.
Tool	Magic Card	Active: players can use it actively. Magic Card can alter Avatar cards' attribute values.	Description/Effect, Duration, Rank, Scope etc.
	Trap Card	Passive: players can't use it directly; it will be triggered when opponent attacks.	

Figure 1 below shows a five-star card – Silver Dragon. It has 30 Health Points and has very high Attacking Power (i.e., 15) and its Defending is also high enough (i.e., 7) when it is placed as defending position – a card cannot attack while at defending position and cannot defend itself while at attacking position. Silver Dragon is an extra-large (XL) Avatar card which means its dead will make its player lose a lot of life points. As a dragon can fly, doesn't like most of Avatar cards, its attacking range is 2.

Figure 1. Silver Dragon, one of the most powerful 5-star card currently in the game.

Figure 2 shows the game field, which has two sides for two players (and the game allows two additional players to join a match as audience). Each side has four areas: Hand (H), Deck (D), Graveyard (G), and Field where two kinds of cards, Avatar Card (A) and Tool Card (T), can be placed. Each player can place her or his Avatar Card into one of six places which are presented in three rows. Each row makes a sense of "distance" to the others. Therefore, if an Avatar Card's "attack range" is shorter than the distance between it and its target, the player must first "move" it, from one row to another, and make it closer to its target; of course, she or he can never move or put her or his Avatar Card into the opponent's game field.
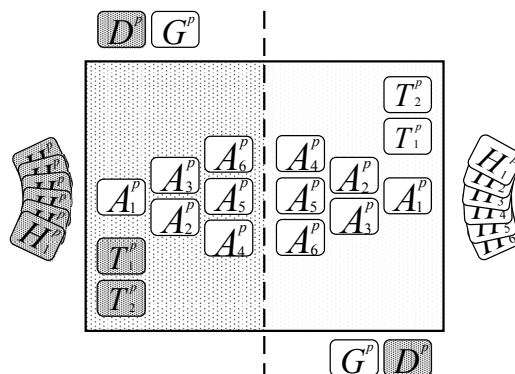

Figure 2. The game field and areas.

2.3 The Mechanics

At the beginning of the game, each player has certain life points (depends on the match settings), 30 cards in the Deck and can draw 6 cards from the Deck for the preparation. The goal is to reduce opponent's life points to zero. On the other hand, if the opponent runs out of her or his cards in the Deck area, the player also win the match. After both players get ready to start, one of the two players begins her or his first turn. Each player has 3 Action Points (APs) to spend for taking any actions. When a player completed her or his turn (i.e., cannot do anything further or find herself or himself has

8

nothing to do even she or he still has action points left), she or he should click the End Turn button. In Figure 3 we can see the two players are maiga and eric. It is the 3rd turn of their combat. They both have 5 life points. It is eric's turn, so he has 3 Action Points and he is now checking the cards he has in hands. Archaierai is a large card and has enough Health Points and its attacking power is also good.
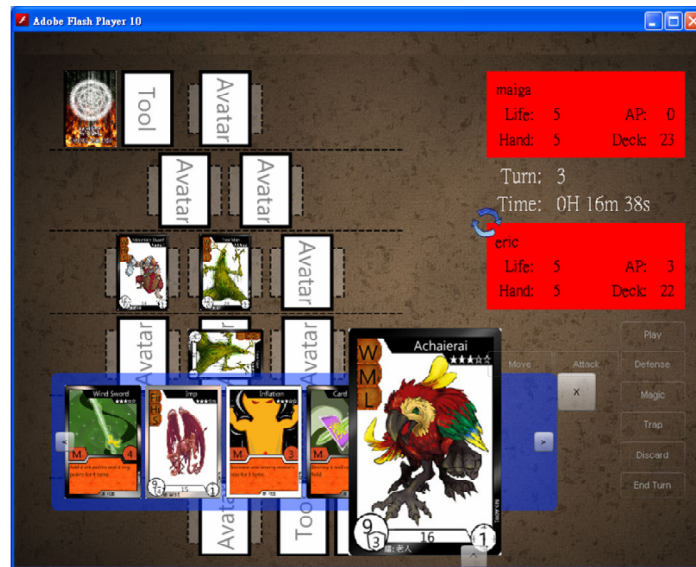

Figure 3. Third turn of a match between players "maiga" and "eric".

3. Experience

We had done a pilot study in a computer software summer camp. During the week of the summer camp, students were taught Microsoft Office suite every day via the day activities and had an afternoon entertainment session in the end of a day. They were allowed to choose and register for playing either Wii games or the proposed trading card game. When they were learning in the day activities, they would receive trading cards as rewards from the lecturers if they performed well. They could then use the cards they got when they played the trading card game with their classmates. At the end of the summer camp, we hosted a championship for students who are interested to register and compete with each other.

In the summer camp, we first found out that all students chose to play the trading card game in the afternoon entertainment session every day and no one chose to play Wii games. This result encouraged us and showed that the proposed trading card game was considered as a real game for students, although we didn't interview students and couldn't rule out the possibility that all students have Wii console and games in their home so Wii games are not attractive for them at all.

The second finding was from the results of the championship. We found that students who had received more, better, and rare cards as rewards of their learning activities did get better ranks in the end of the championship. The results confirmed both of our expectation and hypothesis since students who have better and rare cards do have advantages in the matches with their peers. Although the result was in line with our expectation, one special case needs to mention – the 1st place student (i.e., the gold medal holder) defeat all his opponents by using the beginner's set of cards without using any of the cards he received from the lectures, even he was the one in the summer camp who received most rewards.

When we asked him the reason of not using the rewards in the matches, he told us that he was just wanting to prove that anyone can play the proposed game very well as long as she or he can use strategies efficiently. His words actually revealed one truth and reflect our design concept – the proposed game is fair enough and we do want to make students have correct perception and positive attitude towards the competitions via the game play.

4. Recommended Process of Adopting the Trading Card Game

Before a course starts, teacher can first create accounts for her or his students. All students will then receive a beginner's card set automatically and they can start to play the game by organizing the cards into different decks based on their preferred game-play strategies. Teachers can start to think of when is good timing to give students rewards (e.g., quizzes and inquiries in the class, assignments, and exams) and what cards would be better to reflect the students' performance and could be rewards (e.g., different card types and rarity).

When the course starts, students are going to do many different learning activities in the class, out of school as well as at home; for instances, discussions and question and answering in the class, doing group projects and worksheets in field trip, and writing assignments at home. Teacher can give students different types of cards according to the types of learning activities such as giving student magic cards for assignments, trap cards for discussions, and avatar cards for exams and quizzes. Moreover, better performance the students reach more rare and higher level cards the teachers can give to the students as rewards.

During the course, students can play the game with their peers any time as long as they have a computer which has Internet available and are allowed by their parents, teachers, and schools. When the playing the game, they can freely use all the awarded cards and the more rare and higher level cards they have might make them defeat their opponents easier. Also, since the game allows two players to fight with each other and also two players watch the match as audience, the game's multiplayer feature can attract students to play, watch and watch-only the game. Students may also want to observe their future opponents' strategy beforehand or learn from high ranking players. For students who neither like to play the game nor watch the game, they might want to collect more and more cards to make their card collection book complete.

In either player or non-player case, the students would be engaged to perform better in the learning activities, because players who lose their matches may want to get better, rare, higher level cards to win the game more often; players who win their matches may want to have more powerful cards to keep winning and keep their positions in the ranking list; and non-players who may want to make their card collection book complete by collecting different cards from different learning activities. It would be very important for teachers to plan ahead before the course starts and ensure that students can get different cards as rewards from different learning activities so they can be continuously motivated. If multiple courses in a school are adopting the trading card game, then the effect of the game-based educational reward mechanism will be kept in student's mind and the learning motivation engaged by the mechanism can be carried to the followed course.

5. Conclusion

The game is free access[1] and there are two guest accounts for teachers and students to try the game-play. Also, everyone can self-register an account to start her or his own character and collect high level cards online. The research team can create teacher account which allows teachers (1) to create and manage their classes; (2) to create batch student accounts or individual student account; (3) to add existing student accounts, if students self-registered accounts earlier, to their classes/courses; (4) to create accounts for people co-teaching/collaborating with them; (5) to give individual students cards; (6) and to play the game with their students or to watch their game-plays. We can also create a school administrative account so administrator can (1) create account for individual teacher; (2) grant privilege to existing account if teachers already have a self-registered account, so the particular accounts can use teacher function; and, (3) to grant privilege to existing student account so she or he can use the game for her or his club, school activities, etc.

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[1] http://tcg.is-very-good.org

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