Strategies Emerging from Game Play: Experience from an Educational Game for Academic Career Design

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Abstract. In this paper, we explore the possibility of chance discovery through game play. We describe an educational game for academic career design, and present strategic knowledge that players learned through game play. We discuss the role of game play in acquiring such knowledge in terms of chance discovery, and the validity of the acquired strategies in real-life career design.

1 Introduction

In this paper, we explore the possibility of chance discovery in game play. According to Abe [1], Ohsawa defines a chance as follows:

> A chance is a new event/situation that can be conceived either as an opportunity or a risk.

In this sense, we consider the strategies that players acquire from playing educational career design game could be chances for them as they provoke rethinking of their own strategies for career design and making decisions in real-life career planning. Although the possibility of chance discovery through game play has not been explored much before, our experience tells us that there is a good *chance* that game play which enables player's chance discovery could be used to support her decision making process.

In the following section, we outline the chance discovery process we hypothesize. In Section 3, we describe an educational board game for academic career design, and strategies emerged from our experimental game play. In Section 4, we discuss the issues and future direction of applying game play for chance discovery. Finally, we conclude in Section 5.

2 Chance Discovery in Game Play

What role does 'game play' play in chance discovery process? To answer this question, we first review the definition of chance discovery from the abductive

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point of view. Then, we present a hypothetical chance discovery process involving game play.

Abe defines chance from the abductive viewpoint as follows [1]:

> Chance itself is a set of known facts, but it is unknown how to use them to explain an observation.

He characterizes rules that are abductively generated to explain *inexplicable* observations based on available facts as chance. In this formulation, we regard the game play participant's epistemic state regarding the reality as *facts*, and strategic knowledge applicable in reality as *observations*. In this framework, strategic knowledge can either emerge as a direct result of game play, or it can be a recognition of strategic knowledge in real life (usually in the form of moral or anecdotal events) by the participants. In case of recognition of the strategic knowledge, we assume that even if the participant has some kind of strategic knowledge before game play, she does not fully understand the implication of such knowledge, because of the lack of knowledge about the relationship between elements in reality pertaining to the strategy in concern. What is hampering the participants' understanding of the relationship between elements in reality is the complexity of the reality. They cannot readily see the relationship between facts. As a result, the construction of effective strategies in real-life is hindered.

Game play allows its participants to bridge the gap between *facts* in reality and *observations*, or strategic knowledge. According to abductive definition of chance discovery, we can say that such bridging process is indeed a kind of chance discovery. The process of chance discovery in game play is shown in Fig. 1.

3 Experience with Educational Board Game for Academic Career Design

In this section, we describe an experience with an educational board game for academic career design, *Happy Academic Life 2006* (Fig. 2).

3.1 Game Description

The object of the game is to be the first to achieve one of the seven goals, which represent stereotypical role models of academic career (Table 1). Each role model has different conditions to be satisfied in terms of various parameters (Table 2).

One of the key features of the game is time management. In each turn, a player has 600 hours to spend, which makes one turn corresponding to 3 months period of work. Drawing an analogy with financial accounting, 600 hours given for each turn are a player's revenue. The player has to spend fixed amount of time related to minimal duty of her position. Additionally, she can spend time on duties of her workplace (such as teaching classes, or being a member of departmental or university committee) or duties of academic societies (such as being a member of the program committee for a conference, or reviewing papers

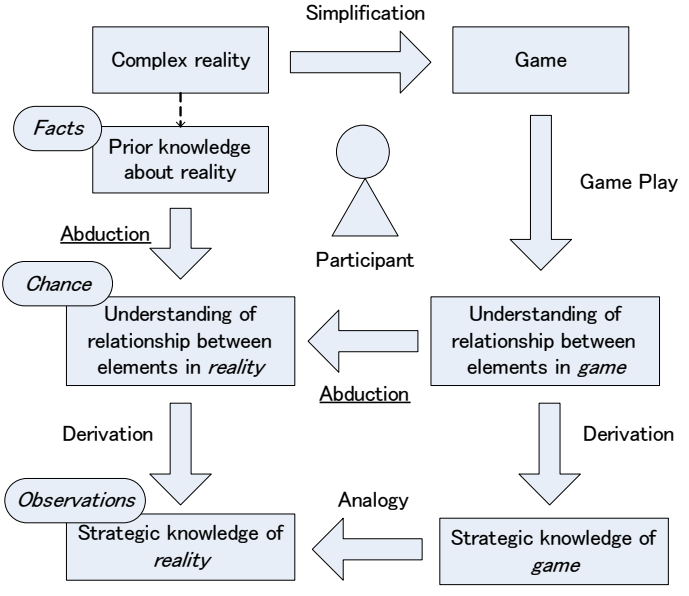

Fig. 1. Chance discovery process in game play. Game play allows the participant to be aware of the relationship between elements in the complex reality, leading to acquisition of strategic knowledge in reality.

for a conference or a journal). Players also have to spend time on their students and postdocs. After deducting the time to be spent on the above-mentioned activities, remaining hours can be spent on doing research. Players always have a subject of study to work with. There is a specific amount of hours to be spent for each subject before one can submit a paper on the subject. After spending enough time on the subject, players draw an *accept/reject card* which tells the result of the review process: i.e. accept, conditional accept, inquiry, and reject. If accepted, the player places a chip representing the accepted paper on the research map (Fig. 2).

Each player starts her academic career as *Joshu* (an entry position in Japanese academic system, usually translated as "research associate"). In each turn, a player rolls a die, and move her piece the number of spaces showing on the die along the track. Each space on the track is marked with a label corresponding to five types of event cards[1] and *Wild*. Players stopped on a space with a label of one of the five types of event cards have to draw a card of the corresponding type. Players who stopped on a *Wild* can draw a card of any of the five types. Event cards provide users with opportunities and penalties. For example, chance cards include cards that announce an open position for a full professor. Players who qualify for the condition of the position can apply for it, and if successful be promoted to a professor.

[1] The five types of event cards are Chance, Private, *Gakkai* ("academic society"), *Gakunai* ("within university"), and *Shikin* ("research grant").

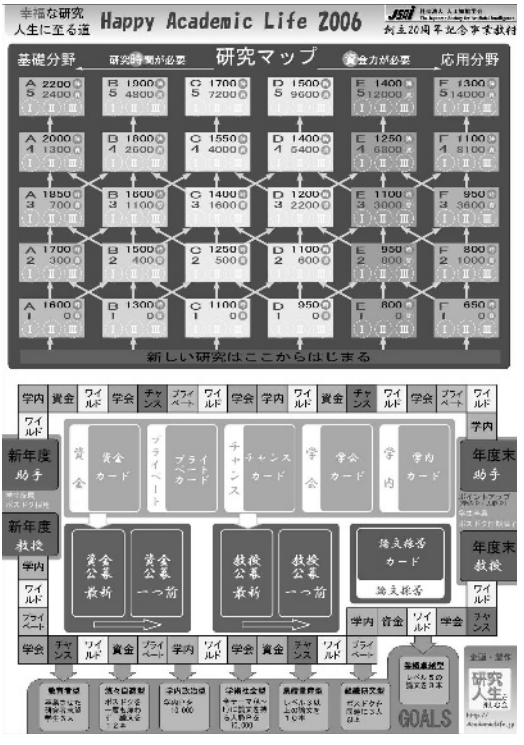

Fig. 2. The board of Happy Academic Life 2006. The upper half region of the board is called *research map*. A player places a chip on a box in the research map when she successfully publishes a paper. The lower half region of the board is called *track*, where players roll a die and move their pieces.

There are two important points of players' decision making in the game. The first one is the choice of the type of card to draw when stopping on *Wild*. The second is the decision on whether to undertake duties other than the minimal one. *Gakkai* and *Gakunai* cards include such cards that represent additional duties of the workplace (such as teaching classes or being a member of a committee of the department or the university) or duties of academic societies (such a being a member of the program committee for a conference or reviewing a paper for a conference or a journal). By undertaking such additional duties, players have less time to spend on research in exchange of gaining workplace points or connections points.

3.2 Strategies Emerged Through Game Play

In analyzing the validity of the strategies acquired through game play, we adopt the EIAG experiential learning model [2]. The EIAG experiential learning model provides a structure of debriefing sessions in order to facilitate participants learning from game play. In this paper, we use the *generalize* stage of EIAG model, in which

Table 1. The seven goals and their conditions in Happy Academic Life 2006. To achieve the goal, a player have to be a full professor in addition to these conditions.

Goals	Conditions
Educator	To have 6 or more research-oriented graduates.
Research Director	To hire 3 postdocs or more at the same time.
Otium Cum Dignitate	To publish 12 papers or more without hiring a postdoc.
Politician	To score 10,000 workplace points.
Pundit	To publish at least one paper in all research field (A-F) and to score 10,000 connection points.
Prolific Author	To publish 10 papers or more, at or above level 3.
Outstanding Researcher	To publish 3 or more level 5 papers.

Table 2. Parameters of the career model in Happy Academic Life 2006

Parameters	Description
Funding Points	Represent a player's competence in earning research grants.
Workplace Points	Represent the status of a player in her workplace.
Connection Points	Represent the scale of a player's network of connections in the academic society.
Publication Quantity	The number of papers published by a player
Publication Quality	The level of papers published by a player, which is represented on the research map (Fig. 2) starting from level 1 up to 5.
Research-Oriented Graduates	The number of graduates who had motivation for doing research, whom a player has advised through out her career.
Postdocs	A player can hire a postdoc for every 5,000 funding points.

participants are asked to draw conclusions about the real world based on experience form game play. We have to consider four elements in generalization stage:

Conclusions Conclusions from the game experience.
Game Data The events happened during the game which support the conclusions.
Judgment Whether the conclusions are applicable in the real world.
Life Data Specific happenings in real life that either support or do not support the judgment.

In the following sections, we present two strategies that were identified in game plays we have conducted.

Strategy 1: Never turn down an offer for a duty

Conclusions "Never turn down an offer for a duty."

Game Data In one game, one of the participants chose *otium cum dignitate*[2] as his goal. He undertook all duties drawn from *Gakkai* or *Gakunai* cards. By coping

[2] A Latin word meaning "leisure with dignity".

with all those duties, he gathered workplace points and connections points just enough to be promoted as a full professor. He was the first to achieve his goal in the game.

Judgment Not necessarily applicable in real life.

Life Data After the game, the participant said, "I was told by my teacher that I should never turn down an offer for a duty, and I have done so in my career." Although the strategy worked for this particular case in game, we can easily imagine that blindly accepting any offers for duty will invariably lead to a very busy life, which is far from the spirits of *otium cum dignitate*. Other wise steps would be needed to achieve such goal in real life.

Although we have to take the words with caution, it still teaches us a lesson: avoiding duties as much as possible to concentrate merely on research is not necessarily a good strategy to achieve *otium cum dignitate* in real life.

Strategy 2: Enjoy the *Joshu* position as long as possible

Conclusions "Enjoy the Joshu position as long as possible."

Game Data In another game, one of the participants chose *otium cum dignitate* as his goal. He collected all the papers required for the goal condition (12 papers) while he was *Joshu*. After collecting the required papers, he was quick in being promoted to a full professor and was the first to achieve his goal.

Judgment Used to be applicable in real life, but not anymore.

Life Data *Joshu* used to be a tenured position in the past. However, in recent years many institutions have converted it into a fixed-term (usually 3 to 10 years) position, and one cannot stay as *Joshu* for a very long time as before.

4 Discussion

In case of strategy 1, the participant had the strategic knowledge as a moral from his teacher beforehand. However, it is after the game play that he recognized his teacher's words and related them to the strategy for academic career design. The game play made him aware of the importance of duties of the workplace and academic societies in achieving one's goal in his academic career. We could say such awareness is the chance that game play provided.

In case of strategy 2, it is not clear whether the participant knew the strategy beforehand. However, he demonstrated the effectiveness of the strategy in the game, and we see that the strategy used to be effective in real life as well at least in the past. As a result of the game play, the participant will reinforce the belief that such strategy is effective, although it may not be effective anymore in real life. The discrepancies with the reality can be attributed directly to the difference between the model in the game and the reality. In the game, players can stay as *Joshu* as long as they want, while it is becoming not the case in

reality anymore. This case tells us that one has to be careful in choosing the model for the game for it to be effective in chance discovery.

Bedemeier et al. describes the effectiveness of frame games in providing "experiential learning about organizational politics, leadership, and decision making" [3]. Frame games are skeletal games that provide generic frameworks of games which can be adapted for a wide range of purposes. The authors discuss that more learning occurs when the participants involve in *redesigning* the frame game, where they construct another real-life game based on the original game. For example, nurses can construct a game modeling the medical world after playing the Academic Game (a type of frame game described in [3]), which models the world of academia. Although Happy Academic Life 2006 was not specifically developed as an instance of a frame game, one would easily see that it can be adapted to games in the fields other than academia, by redesigning the tracks, cards, and other elements of the game. Adding redesigning step to game play will shed light on the difference between game and reality, and allow participants to be aware of the limitation of the strategies in real life, which were effective in game.

In recent years, Gaming-Simulation has drawn attention as a pedagogical tool. It provides an environment for *experiential learning* [4]. Experiential learning is "the sort of learning undertaken by students who are given a chance to acquire and apply knowledge, skills and feelings in an immediate and relevant setting." [5] Kolb created a model of experiential learning cycle consisting of four elements: i.e. 1) concrete experience, 2) observation and reflection, 3) forming abstract concepts, and 4) testing in new situations. In relation to our chance discovery process in game play, we see that game plays provide opportunities to complete the learning cycle where it is difficult in real life. People have little problem in going through step 1 and 2 of experiential learning cycle in real life. However, step 3 and 4 are not easy because of the complexity of real life, and testing is not possible in many cases. Through game play, participants discover chances to overcome the obstacles and can complete the experiential learning cycle.

Although game play is a powerful tool for education, it has some drawbacks because its learning process is basically a type of discovery learning [6]. In discovery learning, students are given a goal, but not a direct way to reach the goal, so that students have to find a way on their own to reach the goal. The strength of discovery learning is that it motivates students, they learn how to learn, and they learn more effectively than conventional methods. However, it has weakness such as missing core knowledge, or overly narrow studies.

Intelligent tutoring system can provide a facility to complement these weakness of discovery learning, and make the learning process effective [7]. Based on domain model, tutoring model, and student model, intelligent tutoring systems can monitor and guide the learning process. By observing events and behavior of the user, it can detect missing concepts to be learned, or misconceptions that the user has acquired, and take remedial action against them. An interesting direction of research is to see how such intelligent tutoring system can be employed to facilitate the chance discovery process in game play.

5 Conclusions

In this paper, we explored the possibility of chance discovery in game play. We described an educational game for academic career design, and the strategies emerged through game plays of it. We outlined the process of chance discovery which involves game play, and saw some evidence from experience that supports parts of our hypothesis. As we showed the possibility of chance discovery through game play, the next step would be to study the validity of the hypothetical chance discovery model of game play.

Acknowledgments

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