GAME AS A DESIGN INSTRUCTIONAL TOOL

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Abstract. We propose to use games as instructional supports in architectural design studios. Games used in this context, or design games, exhibit six structural factors: rules, goals, outcomes/feedback, conflict/competition/challenge/opposition, interaction, and representation. With these factors in mind, we develop a “Design Concept Trading Game.” Our aim is to improve students’ ability in three aspects: to articulate design concepts, to assess design alternatives, and to integrate partial designs (developed from various design concepts) into a coherent whole. The pilot study of this “Design Concept Trading Game” generated encouraging results. Continuing efforts are underway to establish a framework of using games as design instructional tools.

1. Introduction

As design studio instructors, we believe students learn best and are most creative when they are motivated, or even better, self-motivated. Recent years, however, we find students to have become easily discouraged and lack of motivations. From previous experience of working with games (see, Chien, 2002), we propose to employ the enjoyable features of games to stimulate students’ interests and provoke their motivations. The key challenge of using games is to establish a tight correlation between games and design. In this paper, we review related literature to discuss this correlation and describe structural factors that are essential to
the games for design learning. Furthermore, we illustrate a “Design Concept Trading Game” and report the result of its pilot study. Finally, research issues and future works will be discussed.

2. The Framework of Design Games

Design related games are often developed based on two similarities: the setup of a game is similar to a design problem; the human cognitive behavior when playing a game is similar to that when designing. For example, Habraken and Gross (1988) developed games of design decision-making and collaboration. Their games are research tools to help researchers understand design behaviors. For the other type of example, Radford (1997) employed form-making games in design studios. Scholars in the Playful Design Forum (http://www.arch.adelaide.edu.au/games/forum/) moved further by demonstrating associations between games, design and pedagogy.

In addition to design learning, games are also used to assist other types of learning. Prensky (2001) promotes game-based learning. He identifies six structural factors of a game to encourage learning. These factors are rules (to make games fair and active), goals (to drive players to perform and to win), outcomes and feedback (to enable players to measure advancements toward goals), conflict/competition/challenge/opposition (to make games exciting), interaction (to involve players and make games dynamic), and representation (to create an alter-reality).

Based on these structural factors, we propose a framework for design instructional games (design games, for short).

2.1. RULES

An architectural design is the act of creativity within the bounds of design requirements. Designers often work within a constrained frame of an existing design (Woodbury, Shannon and Radford, 2001). Therefore, all design games have rules. Rules define limits and force students to determine the range of appropriate actions and let them know what is in and out of bounds. Rules of a design game may relate closely to a studio design project.

2.2. GOALS

Design games are goal-directed activities. Achieving the goals of a design game should be a great motivation for students. Goals of a design game should relate directly to that of the studio design project.
2.3. FEEDBACK

Design games should provide prompt feedback. Feedback allows a student to know immediately what she/he has done is a positive or negative move toward a goal. Feedback from a bad move would encourage a student to try again or to seek help. Therefore, the learning occurs. For a design game, feedback should assist students to learn constantly how a design result performs.

2.4. COMPETITION

Competition makes students excited about the game and promotes their creativities. In a design game, competitions may be internal, that is, self-competitions (for example, by resolving a conflict). External competitions are those among students. A design game should provide both internal and external competitions.

2.5. INTERACTION

Interaction is important for game, it injects a social or interpersonal element into the event, and it transforms the nature of the competition from passive (internal) to active (external). Habraken and Gross (1988) stated, “design is a social activity that takes place among people who negotiate.” A design game should encourage social interaction to promote learning among students.

2.6. REPRESENTATION

Design games encourage learning about abstraction and representation, the relations between form and meaning, the manipulation and ordering of space and form. In addition, design games can provide a vehicle for pointing out and discussing metaphors of design, such as design as conversation between designer and medium, and metaphors for the designer, such as the reflective practitioner (Radford, 1997).

In addition to the six structural factors, our framework takes the problem-solving approach. A design game contains a problem space and a solution space. The problem space needs to be carefully analyzed according to conflicts of design constraints. The solution space contains of alternative solutions, each of which has certain advantage and disadvantage. A design game should encourage students to explore the problem space as much as possible.
3. Design Concept Trading Game

We develop a “Design Concept Trading Game.” Our aim is to improve students’ ability in three aspects: to articulate design concepts, to assess design alternatives, and to integrate partial designs (developed from various design concepts) into a coherent whole. In studio learning, it is important that students learn to reflect on their own strategies and heuristics. In addition, students need to be able to assess the conditions of the given situation quickly, and to flexibly adjust their own path of action depending on the requirements of the situation (Gross and Do, 1997).

In this game, design concepts are valuable assets. The articulations of design concepts, partial design solutions, are the commodities traded in this game. Every student creates commodity to sale. By buying other students’ products, a student collects more design concepts.

- **Rules:** Students price their products and sell the valuable commodity to earn benefit. A student buys others’ products to integrate into her/his own design.
- **Goals:** Best completed design with success concept integration.
- **Feedback:** Students are encouraged by the immediate and explicit value benefits for selling their design concepts. During the game, the constantly growing number of design concepts provides an interesting and very engaging kind of feedback.
- **Competition:** To win the game, students need to provide better products.
- **Interaction:** Students sell and buy products to and from one another. The interaction will reduce the mismatch between individual knowledge and the complexity of value judgments of social group.
- **Representation:** Buying represents the generative and explorative design process. Selling represents the comparative and selective design process.

4. A Pilot Study

We conducted a pilot study of the “Design Concepts Trading Game” in December 2002. One instructor, one teaching assistant and 12 students participated in the study. All students have one year of architectural design training. The studio met once a week to work on a “student dormitory” project. Each class lasted 6 hours. Within the 6 hours, first two hours were spent the trading game. Based on the results of the game, students get more design concepts and confirm their good concepts on the original work. Then, after four hours, the instructor helped students to integrate newly acquired concepts into their design works.
The pilot study took five weeks. Initial findings from the game show encouraging results.

- The game is enjoyable and motivates most students.
- The game forces students to articulate design concepts into partial design solutions every week. The design progress of each student is recorded along this game.
- The game requires students to price their product. This requires self-assessment. When students market their products, they learn to express the attractive design concepts.
- Trading is the most exciting part.
- Students have difficulty integrating newly acquired concepts into personal designs.
- The final jury shows that students in the pilot study produce more complete project than those did not participate.
- A small portion of the students do not like the game because they consider design should be original and creative and do not wish to trade.

5. Conclusion

The “Design Concept Trading Game” is under revision. During our pilot study, several other studio instructors had expressed their interests. We are continuing the game in a slightly larger context to understand the effects. Given our limited results, we are not able to verify or validate the framework of design games. In the near future, we plan to expand the framework to utilize information technology, first. Finally, we envisage the framework to be an established method of design education.

References


Radford, A.: 2001, Let the games begin: philosophy, pedagogy and pragmatism, Playful Learning Forum, Adelaide, Australia,
