A CASE STUDY OF THE FEEDBACK DESIGN IN A GAME-BASED LEARNING FOR LOW ACHIEVING STUDENTS

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ABSTRACT

The purpose of the study is to explore the effects of text-based and non-text-based feedback in a game-based learning system. The pilot study is a case study to find low-achieving math students' comprehension and motivation in using the game-based systems. Four low-achieving students from a suburban middle school participated in the study. Data collection includes observation and in-depth interview about the use of the GBL. The results will be provided for future design and revision the math GBL.

KEYWORDS

Game-based learning, Feedback, Low achieving students in mathematics

1. INTRODUCTION

Recently, there is a growing concern about increasing number of underachieving students in high schools. Students underachieve in mathematics result from many reasons, for example, lack of learning motivation, culture deprivation, low SES, or unpleasant learning experiences. A number of remediation instructions and strategies have been proposed, basic skill instructions help students to familiar and master skills for reading and comprehension, peer tutoring for students to collaborative learning, online learning programs provide personal learning resources for students to learn on their own pace inside and outside of classroom. Researcher also found that games may be helpful for digital natives.

Educational researchers suggest that learning is most effective when it is active, experiential, situated, and problem-based and provide immediate feedback (Gee, 2007 Prenksky, 2001). Many studies found that computer games help learners on knowledge acquisition, improving reasoning, space reasoning, problem solving ability as well as motives and attitude (Killi, 2007; Wouters, van Der Spek & Oostendorp, 2009). However, some studies found that most of computer games were designed for drill and practice; few of them were required to apply special subject content knowledge, or connect to curriculum standards (Ke, 2008).

Researchers point that feedback is one of fundamental elements of games (Kapp, 2012; Prensky, 2001). Studies found that students received immediate, elaborative, text-based feedback led to more effective learning and higher motivation (Corbalan, et al., 2010; Kleij, et al., 2012). Another study showed that emotional feedback for empathetic encouragement had direct effect on intentions to use CBA (Terzis, et al, 2012). The proposed game-based learning system is focus on the various types of feedback design. The overarching research question is how text-based and non-text based feedback design support low-achieving students in mathematics? And what motivate low-achieving students in mathematics engaged in the game-based learning system?

2. METHOD

A case study method is used to understand the various feedback designs for low-achieving math students. Four 7th grade students (2 males and 2 females) are selected from a suburban middle school. Student's

selection is based on their math achievement tests, math teachers' recommendations and their wiliness to participate the study.

Math Jungle is a game-based learning system for junior high school students to practice algebra questions. The GBL includes practice and test mode. In the practice mode, students receive 15 questions. Students will read the question stem, and answer the multiple choice types of questions. Students are allowed to answer the question twice. When the students answer the questions correctly in the first time, they will receive full scores. If they fail in the second time, the correct answers will be presented. During the answering questions, students can ask for help. Two types of feedback will be provided. The first type of feedback is elaborative, conceptual prompts, the second types of feedback is step-by-step solutions to the questions. Students can decide which types of feedback they would like to receive. If they still can't resolve the problem in the second time, the step-by-step solutions will be provided. As the results, points will be taken from the total scores. In addition to text feedback, an animated animal (leopard cat) works as an agent to guide through the practice mode. The leopard cat will have different facial expression and actions depend on the correct or incorrect answers. In the test mode, no prompts or hints will be provided. Students will randomly answer 10 questions in the unit without any immediate feedback. All the feedbacks and answers will be provided at end of the test mode. A database will record the time and answers that students spend on the practice and test mode. The record will provide teachers and parents for further remedial instructions.

In this pilot test, students will practice the first degree equation as study content. Students will use the math jungle GBL in a computer lab individually. Each student will have 50 minutes to finish the practice mode. Students can take as much time as they like to practice the 15 questions. Later, students will take the test mode to assess their math achievement. After the GBL session, students will take in-depth interview to describe their understanding and reaction of the feedback design.

3. DATA ANALYSIS AND EXPECTED FINDINGS

To understand the effects of feedback design, students' answers of math questions will be analyzed. Students will be interviewed for their thinking process in the incorrect answers. Student will be required to describe their affective reaction toward the GBL as well. The interview transcripts will be analyzed qualitatively. It is expected that students are able to demonstrate the problem solving process and use of the feedback in the GBL. Game designers and students can discuss the depth and length of the short instruction provided in the GBL, and the effects of feedback designs.

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