

## Development of Simulation Game Model for Enhancement of Strategic Thinking of Undergraduate Students

Kampanat Coosirirat<sup>1</sup>, Tipparat Sittiwong<sup>2</sup>, Brayat Jiraworapong<sup>2</sup> and Rattana Buosonte<sup>2</sup>

### บทคัดย่อ

การวิจัยนี้มีวัตถุประสงค์เพื่อพัฒนารูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี โดยมีวัตถุประสงค์เฉพาะดังนี้ 1) เพื่อศึกษาข้อมูลพื้นฐานของรูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี 2) เพื่อสร้างและหาประสิทธิภาพของรูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี 3) เพื่อทดลองใช้รูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี โดยเปรียบเทียบผลสัมฤทธิ์และการคิดเชิงกลยุทธ์ก่อนและหลังของนักศึกษาที่ใช้รูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ 4) เพื่อศึกษาความพึงพอใจต่อรูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี โดยเป็นการวิจัยและพัฒนา ซึ่งมีขั้นตอนดำเนินการวิจัย 4 ขั้นตอน คือ 1) ศึกษาข้อมูลพื้นฐานของรูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี 2) สร้างและหาประสิทธิภาพของรูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี 3) ทดลองใช้รูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี 4) ศึกษาความพึงพอใจต่อรูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี กลุ่มตัวอย่างคือ นักศึกษาระดับปริญญาตรีที่ลงทะเบียนเรียนรายวิชาหลักการตลาด ภาคเรียนที่ 1/2556 โดยสุ่มอย่างง่าย จำนวน 30 คน เครื่องมือที่ใช้ในการวิจัย คือเกมคอมพิวเตอร์จำลองสถานการณ์ แบบประเมินการคิดเชิงกลยุทธ์ก่อนเรียนและหลังเรียน แบบประเมินผลสัมฤทธิ์ก่อนเรียนและหลังเรียน แบบประเมินความพึงพอใจ สถิติที่ใช้วิเคราะห์ข้อมูลได้แก่ ความถี่ ร้อยละ ค่าเฉลี่ย ส่วนเบี่ยงเบนมาตรฐาน และสถิติ t-test

<sup>1</sup> Doctoral Student Educational Technology and Communications, Faculty of Education, Naresuan University, Phitsanulok, Thailand Tel.084-1393930 E-mail : ajdankampanat@gmail.com

<sup>2</sup> Faculty of Education, Naresuan University, Phitsanulok, Thailand

ผลการวิจัยพบว่า

1. รูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ของนักศึกษาระดับปริญญาตรี ประกอบด้วยองค์ประกอบหลัก 6 องค์ประกอบคือ (1) เนื้อหาการเรียนรู้ (2) สภาพแวดล้อมสนับสนุนการเรียนรู้ (3) บทบาทผู้เรียนและผู้สอน (4) คุณลักษณะของเกมคอมพิวเตอร์จำลองสถานการณ์ (5) กิจกรรมการเรียนรู้การเรียนรู้ด้วยเกมคอมพิวเตอร์จำลองสถานการณ์ (6) การประเมินผล สำหรับขั้นตอนการเรียนรู้ มี 3 ขั้นตอน (1) ขั้นก่อนเรียน มีกิจกรรมคือ ปฐมนิเทศ แจ้งวัตถุประสงค์การเรียนรู้ ประเมินการคิดเชิงกลยุทธ์ก่อนเรียน ประเมินผลสัมฤทธิ์ก่อนเรียน กำหนดบทบาทผู้เรียน ผู้สอน แนะนำกฎกติกาการเล่น แนะนำการใช้คู่มือ สาธิตการเล่น (2) ขั้นระหว่างเรียน มีขั้นตอนย่อยคือ (2.1) ขั้นตอนเริ่มต้น มีกิจกรรมคือเลือกตัวแสดง นำเข้าสู่เนื้อหา กำหนดเป้าหมายและวัตถุประสงค์กลยุทธ์ เกริ่นสร้างบรรยากาศน่าสนใจ (2.2) ขั้นการรับรู้สถานการณ์ มีกิจกรรมคือ รับปัญหาจากสถานการณ์ มีส่วนร่วมในสถานการณ์ กระตุ้นจากสถานการณ์ วิเคราะห์สภาพแวดล้อม (2.3) ขั้นการตอบสนอง มีกิจกรรมคือ ปฏิสัมพันธ์กับผู้เรียน ทำการแก้ปัญหา ประเมินสถานการณ์ กำหนดกลยุทธ์และลำดับกิจกรรม วางแผนปฏิบัติและวางแผนสำรอง ปฏิบัติตามกลยุทธ์ (2.4) ขั้นสร้างการรับรู้ มีกิจกรรมคือ ประเมินกลยุทธ์ ยอมรับการตอบสนองต่อสถานการณ์ เกิดคุณลักษณะเชิงกลยุทธ์ (3) ขั้นหลังเรียน มีกิจกรรมคือ ประเมินการคิดเชิงกลยุทธ์หลังเรียน วัดผลสัมฤทธิ์การเรียนรู้หลังเรียน ประเมินความพึงพอใจต่อเกมคอมพิวเตอร์จำลองสถานการณ์ ผู้เชี่ยวชาญจำนวน 21 คน ได้ประเมินความเหมาะสมของเกมคอมพิวเตอร์และการนำไปใช้อยู่ในระดับมากและผู้ทรงคุณวุฒิจำนวน 5 คน ได้รับรองรูปแบบดังกล่าวคิดเป็นร้อยละ 96.47

2. นักศึกษาที่เรียนด้วยรูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ มีการคิดเชิงกลยุทธ์หลังเรียนสูงกว่าก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .01

3. นักศึกษาที่เรียนด้วยรูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ มีผลสัมฤทธิ์การเรียนรู้หลังเรียนสูงกว่าก่อนเรียน อย่างมีนัยสำคัญทางสถิติที่ระดับ .01

4. นักศึกษาที่เรียนด้วยรูปแบบเกมคอมพิวเตอร์จำลองสถานการณ์ เพื่อส่งเสริมการคิดเชิงกลยุทธ์ มีความพึงพอใจอยู่ในระดับมาก

**คำสำคัญ :** เกมคอมพิวเตอร์จำลองสถานการณ์ การคิดเชิงกลยุทธ์ นักศึกษาระดับปริญญาตรี

## Abstract

The purposes of this research and development study were to develop and to find the efficiency of the Simulation Game Model for enhancement of strategic thinking of undergraduate students. The research procedure was divided into 4 phases: 1) study the basic information of the Simulation Game Model for enhancement of strategic thinking of undergraduate students; 2) construct and find the efficiency of the Simulation Game Model for enhancement of strategic thinking; 3) conduct an experiment using the Simulation Game Model with the sample group; and 4) investigate the satisfaction towards the Simulation Game Model. The sample, derived by means of simple random sampling, consisted of 30 undergraduate students of the Faculty of Business Administration and Accountancy, Pathumthani University, in the 1/2013 Semester. Research instruments included the Simulation Game, a structured interview form and a questionnaire for experts, a pretest-posttest evaluation form of strategic thinking, a pretest-posttest evaluation form of academic achievement, and a satisfaction evaluation form. Frequency, percentage, mean, standard deviation, and t-test were statistical devices used for the data analysis.

The findings revealed as follows:

1. The Simulation Game Model was composed of 6 major compositions: (1) Learning subject content; (2) Favorable learning environment; (3) Learner and instructor roles; (4) Characteristics of the Simulation Game Model; (5) Instructional activities through the Simulation Game Model; and (6) Evaluation of learning, comprising (1) Pre-learning: orientation, stating learning objectives, evaluating strategic thinking, evaluating academic achievement, determining learner and instructor roles, introducing game rules, introducing game manual, and demonstrating playing game; (2) While-learning: (2.1) Starting with selecting characters, introducing subject content, identifying strategic goals and objectives, and creating interesting atmosphere; (2.2) Perceiving situation: accessing problem from situation, engaging with situation, being aroused by situation, and analyzing the context; (2.3) Responding to situation: having interaction with learners, solving problems, evaluating situation, determining strategies and sequence, planning for implementation and backup, and proceeding with strategies; (2.4) Forming perception: evaluating strategies, accepting response to situation, and forming characteristics of strategic thinking; (3) Post-learning: evaluating strategic learning after learning, assessing academic achievement after learning, and investigating satisfaction towards the Simulation Game Model. The result of appropriateness and application of the Simulation Game Model by 21

experts was at a high level; and the result of model certification by 5 experts was at 96.47 percent.

2. There was a significant increase ( $p < .01$ ) of strategic thinking of students after learning through the Simulation Game Model for enhancement of strategic thinking.

3. There was a significant increase ( $p < .01$ ) of academic achievement of students after learning through the Simulation Game Model for enhancement of strategic thinking.

4. The satisfaction levels of students learning through the Simulation Game Model in all aspects were at a high level.

**Keywords :** Simulation Game, Strategic Thinking, Undergraduate Students

## 1. Introduction

Problems are found in the development of thinking process among students at the undergraduate level because education has been mostly restricted in classroom, focusing mainly on recitation rather than analytical thinking and synthesis, which have been ignored totally, thus resulting in the lack of thinking skills among students. Such problems should be addressed urgently, in particular among students in the field of Business Administration, to be given primary requirements for analytical, synthetic and strategic thinking skills, considered necessary for analyzing business vision, or even the development of business models or structures. After having trials with the organization's conditions, these business models or structures can lead to strategic initiatives that fit each organization. Thus, there should be strategic thinking class as deemed fit for students.

The Simulation Game Model is considered an appropriate teaching model because students will be in a real situation where proper decision should be made. When they participate in the decision-making process, there will be transfer of their thinking process to a real-life situation. An interesting feature concerning the use of the Simulation Game Model in the instructional method is to enhance their learning and decision-making skills. It will lead to students' engagement in the learning process. It is also a fun and challenging process for problem solution in given surroundings in which students can choose their own decisions.

From said background and significance of problems, the development of the Simulation Game Model for enhancement of strategic thinking of undergraduate students is an integrated learning process to enhance strategic thinking, which will enable students to enjoy studying, to have

enthusiasm to learn, and to eliminate boredom in classroom. Students can apply knowledge as deemed fit, which will lead to a lifelong learning process and progress in the production of high-quality graduates among the Thai educational institutions.

## 2. Research Objectives

### General Objective

2.1 To develop the Simulation Game Model that enhances strategic thinking of undergraduate students;

### Specific Objectives

2.2 To study the basic information of the Simulation Game Model for enhancement of strategic thinking of undergraduate students;

2.3 To construct and find the efficiency of the Simulation Game Model for enhancement of strategic thinking of undergraduate students;

2.4 To conduct an experiment using the Simulation Game Model for enhancement of strategic thinking of undergraduate students by:

2.4.1 Comparing strategic thinking among students using the Simulation Game Model for enhancement of strategic thinking of undergraduate students;

2.4.2 Comparing the academic achievement among students using the Simulation Game Model for enhancement of strategic thinking of undergraduate students;

2.5 To investigate the satisfaction towards the Simulation Game Model for enhancement of strategic thinking of undergraduate students.

## 3. Research Scope

The research has been conducted under a Research and Development (R&D) approach, in which the researcher has defined the scope of data, scope of content and scope of variables, as detailed below:

### 3.1 Scope of Data:

#### 3.1.1 Population and Sample

The population in this research included undergraduate students of the Faculty of Business Administration and Accountancy, Pathumthani University, in the 1/2013 Semester, totaling 423 persons.

The sample, derived by means of simple random sampling, consisted of 30 undergraduate students of the Faculty of Business Administration and Accountancy, Pathumthani University, in the 1/2013 Semester.

### 3.2 Scope of Content

3.2.1 The Simulation Game Model for enhancement of strategic thinking of undergraduate students includes composition, procedure, stages, and activities with virtual simulation presentation, competition with players having interaction under the rule, regulation and condition as specified based on two dimensions.

3.2.2 The subject content used in this research was “Marketing under Variable Surroundings”.

### 3.3 Scope of Variables, i.e.

3.3.1 Independent Variables are, i.e. the Simulation Game Model for enhancement of strategic thinking of undergraduate students.

3.3.2 Dependent Variables are, i.e.

- 1) Academic achievement of undergraduate students;
- 2) Strategic thinking ability among undergraduate students;
- 3) Satisfaction towards the Simulation Game Model for enhancement of strategic thinking of undergraduate students.

## 4. Instruments

4.1 A structured interview form concerning experts' opinions towards the Simulation Game Model for enhancement of strategic thinking of undergraduate students.

4.2 A questionnaire concerning experts' comments on the Simulation Game Model for enhancement of strategic thinking of undergraduate students.

4.3 An evaluation form of strategic thinking among undergraduate students using the Simulation Game Model for enhancement of strategic thinking of undergraduate students.

4.4 An evaluation form of pretest and posttest academic achievement of students using the Simulation Game Model for enhancement of strategic thinking of undergraduate students.

4.5 An investigation form of satisfaction towards the Simulation Game Model for enhancement of strategic thinking of undergraduate students.

## 5. Research Methodologies

The research procedure was divided into 4 phases as follows:

5.1 Study the fundamental information in terms of the simulation game and strategic thinking for undergraduate students; summarize the result of data analysis of the experts' responses from the structured interview form; make a conclusion from the simulation game and strategic thinking obtained from the analysis and synthesis of concepts, theories and related documents; and, from the result obtained, determine the compositions, stages, and activities of the Simulation Game Model for enhancement of strategic thinking of undergraduate students.

5.2 Construct and find the efficiency of the Simulation Game Model for enhancement of strategic thinking of undergraduate students by designing the prototype model of the Simulation Game. The Simulation Game Model were examined by 21 experts who examined for twice its appropriateness, application, and recommendations in terms of major and minor compositions of the Simulation Game Model, the stages of learning activities; after having adjusted as recommended by the experts. There are 5 stages of instruction model: Stage 1 Analysis, Stage 2 Design, Stage 3 Development and Experiment, Stage 4 Application, and Stage 5 Conclusion and Evaluation. It is recommended that there are three relevant factors: goal, interaction, and revision of all-stage activity arrangement and development to support and develop the instruction model. After that the quality evaluation of the Simulation Game Model were certified by 5 experts on educational technology and communication in order to test the efficiency for 3 sample groups: individual, small group , and large group.

5.3 The experiment of the Simulation Game Model for enhancement of strategic thinking of undergraduate students was conducted with the sample consisting of 30 students from Faculty of Business Administrator and Accounting who have enrolled in marketing principles subject in the academic year of 1/2013. The data was collected and analyzed by comparing the score of strategic thinking and academic achievement of students using the Simulation Game Model between the pretest and the posttest by implementing t-test, and then the researcher made a conclusion of the experiment results.

5.4 Investigate the satisfaction of 30 students towards the Simulation Game Model for enhancement of strategic thinking of undergraduate students by letting them do the satisfaction evaluation form and then taking the data for analysis.

## 6. Research Summary

6.1 The result of the fundamental information concerning the simulation game and strategic thinking from the study of information obtained from an individual interview of 9 experts who have responded from the structured interview form and was used for determination of concepts and principles as well as instructional activity design, based on the questions covering the structure of instructional system.

6.2 The result of conceptual framework development of the Simulation Game Model for enhancement of strategic thinking of undergraduate students can be summarized in the form of a diagram displaying the compositions, stages, and activities as shown in Figure 1.

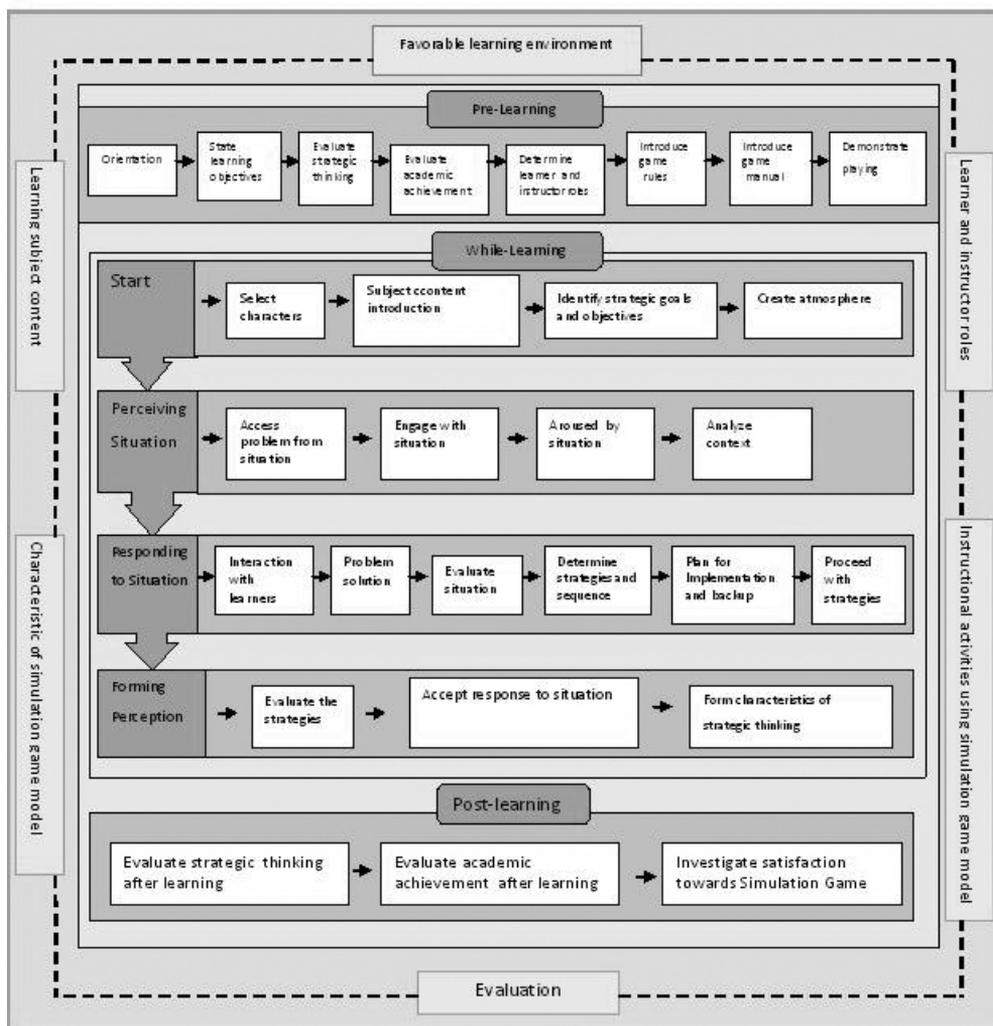


Figure 1: Simulation Game Model for enhancement of strategic thinking of undergraduate students.

6.3 The result of the analysis of 21 experts' opinions towards the appropriateness, application, and recommendations of the Simulation of Game Model for enhancement of strategic thinking of undergraduate students, as a whole, revealed the appropriateness at a high level ( $x=4.38$ ). When considering each particular aspect, the aspect of compositions was found appropriate at a high level ( $x=4.34$ ), and the aspect of instructional stages also at a high level ( $x=4.35$ ). Regarding the overall opinions towards evaluation on application of the Simulation Model Game, it was found at a high level ( $x=4.42$ ); however, when each particular aspect was taken into consideration, the aspect of compositions was found appropriate at a high level ( $x=4.41$ ), and the aspect of instructional stages also at a high level ( $x=4.42$ ).

6.4 The result of the investigate of the efficiency of the Simulation Game Model for enhancement of strategic thinking of undergraduate students obtained from the experiment, by evaluating the students' strategic thinking and academic achievement after using the pretest and the posttest, revealed the efficiency value ( $E1/E2$ ) of strategic thinking as 70.80/73.60, which was higher than the set criterion at 70/70. With reference to the efficiency of academic achievement on Marketing Management, the efficiency value ( $E1/E2$ ) was found as 70.89/73.89, which was higher than the set criterion at 70/70.

6.5 The result of the experiment of using the Simulation Game Model for enhancement of strategic thinking of undergraduate students with 30 students indicated the increase of strategic thinking score after learning compared with that of before learning, with the pre-learning average score at 40.70, and the post-learning average score at 43.53, which was significantly different at the level of .01. Thus, it can be concluded that the Simulation Game Model can support learners to be able to analysis, evaluate, plan strategy, follow-up and solve problem in order to increase of strategic thinking. Likewise, the increase of academic achievement score of the students after learning compared with that of before learning, with the pre-learning average score at 24.00, and the post-learning average score at 26.50, which was significantly different at the level of .01. Consequently, it can be concluded that the Simulation Game Model can support learners to be able to understand content and get more knowledge concerning marketing principles subjects.

6.6 The result of the investigation of overall satisfaction improves of the sample group towards the Simulation Game Model for enhancement of strategic thinking revealed a high satisfaction level ( $x=4.34$ ). When considering in each particular aspect, the satisfaction levels of the subject content and the content presentation were found at a high level ( $x=4.28$ ). The average scores of

the satisfaction level of the image, message, voice, and appropriateness of interaction were at a high level (4.38), and the average score of the application was found at a high level of satisfaction ( $x=4.31$ ).

## 7. Discussions

7.1 The basic information of the Simulation Game Model is significant for learners in order to analyze and solve problem based on strategic thinking of undergraduate students in accordance with the National Education Act B.E. 2542 in Section 4. The major content stated that educational provision must focus on the learner-centered approach, cultivation and building up desirable characteristics for learners, the learning process focusing on thinking process development, ability to confront various situations, and application of knowledge for prevention and problem solution by learning from real experiences with the combination of various kinds of knowledge to create the body of knowledge by themselves.

7.2 The construction and investigation of the efficiency value of the Simulation Game Model for enhancement of strategic thinking of undergraduate students are in accordance with the Jump Game Design Model designed by Meagan K. Rothschild in which various compositions are displayed. Furthermore, the concept of the Simulation Game Model is in congruence with that of Brad Paras and Jim Bizzonchi (Brad and Jim Bizzonchi, 2005) stating that motivation must be created to motivate the learners, and that motivation should be divided into sequential stages with challenges to overcome and get rid of the obstacles in order to achieve the goal of motivation as well as interaction and responses. The research result in that the Simulation Game Model can enhance strategic thinking is relevant to what Atchara Sukontha (Atchara, 1983) stated in her research study that application of computer games for instruction enabled the learners to develop their thinking process, facilitated in the instructional evaluation, and assisted the learners to demonstrate their individual ability. Besides, using computer games for instruction can help the learners to search for knowledge and find out facts by themselves, which certainly results in authentic learning. This is also in accordance with John Dewey's educational philosophy stating about learning by doing. Meanwhile, the learners can have development in various aspects, especially in the aspect of strategic thinking. Regarding the result of investigation of the efficiency of the Simulation Game Model, it is confirmed by the experimental result indicating that the Simulation Game Model for enhancement of strategic thinking of undergraduate students, developed by the researcher, has the efficiency in

the instruction for enhancement of strategic thinking, which supports the research question set by the researcher. This is because the instruction using the Simulation Game Model for enhancement of strategic thinking has the strong point in designing the instruction by using the simulation game in which the interactions occur between the learners and the subject content. The learners can choose alternatives for problem solution according to their own idea in various kinds of situations as determined and designed.

7.3 The experimental result of using the Simulation Game Model for enhancement of strategic thinking for undergraduate students indicated that the outcomes of both strategic thinking and academic achievement are significantly increased at the level of .01. It is because the subject contents in the field of Business are designed and arranged as the plot of the Simulation Game Model. The learners can control the game by themselves. While the learners are playing, there will be some events necessary for them to find solutions to the problems on the basis of strategic thinking process. Consequently, the students have to analyze and make decision to choose the alternatives. This process makes the students have engagement and interaction with the given situations. The result of this study is congruent with the study of Galvao, et al. (2000) on using a simulation game in cooperative learning, in which there must be competitions causing the learners to have participation by running the activities under the game rules and contexts in the simulated situations. The result also supports Prensky's (2001) opinions towards using computer games in instruction in that it can arouse the learners to have fun while learning; moreover, it can provide rules and regulations, competitions, goals, problem solution, interactions, and the same mood sharing with the game. Instructional computer games, based on Marlowe's theory of motivation, must comprise challenges, curiosity, imagination, and feeling of lesson control. Finally, the result of the study also indicates that enhancement of strategic thinking can be done through a process of continuous training. Instructors should provide instructional activities to stimulate learners' strategic thinking in order to serve and achieve the learning objectives.

7.4 The result of satisfaction investigation towards the Simulation Game Model for enhancement of strategic thinking of undergraduate studented revealed a high satisfaction level in general. When considering in each particular aspect, the satisfaction levels of the image, voice, message, and appropriateness of interaction were of the highest average score, followed by the application, the subject content, and the content presentation. The high satisfaction levels of all aspects towards the Simulation Game Model were resulted from the well-planned design of the simulation game.

The researcher has studied concepts, theories of learning development for higher education students and applied this knowledge and information to the design and construction of the simulation game to enhance learners' strategic thinking. The Simulation Game Model was designed with compositions and details relevant to the problem issues requiring students to use strategic thinking process. In addition, it was designed to have interactions with the learners by letting the learners have engagement in determining and operating the story.

## 8. Recommendations

### 8.1 General Recommendations

1) It is necessary to have high quality media equipment for using the Simulation Game Model for enhancement of strategic thinking of undergraduate students in order to facilitate the learners and to equip the learners with the Computer skills.

2) The instructors' roles are to arouse and suggest the learners concerning face to face communication for the usage guideline in order to encourage the learners from learning through the simulation game.

3) The simulation game should be supported and developed to be readiness for being used through the internet networks by buiding server or through a tablet by buiding files.

### 8.2 Recommendations for Further Research

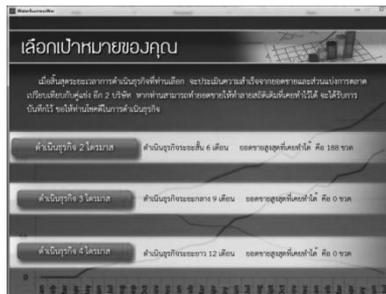
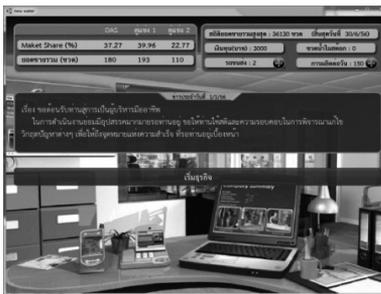
1) Further research should be conducted on development of the simulation game model for enhancement of other thinking skills.

2) Guidelines of this research study should be applied to any subjects contents considered appropriate for learners to be able to analysis, evaluate, plan strategy, follow-up and solve problem in order to increase of strategic thinking.

3) The simulation game constructed by the researcher in this research study is in the form of two-dimensional. A three-dimensional simulation game or a game developed by using other forms of technology should be developed and designed to have virtual reality.

4) Further research should be conducted as a comparative study of using the simulation game for enhancement of strategic thinking with other instructional methods or approaches.

9. Sample of the Simulation Game



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