

Education System to Learn the Skills of Management Decision-Making by Using Business Simulator with Speech Recognition Technology

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ABSTRACT

In this paper, we propose an educational system that involves a business game simulator and related curriculum. To develop these two elements, we examined the decision-making process related to business management and identified some significant skills thereby. In addition, we created an original simulator, named BizLator (<http://bizlator.com>), to help students develop these skills efficiently. Next, we developed a curriculum suitable for the simulator. We confirmed the effectiveness of the simulator and curriculum in a business-game-based class at Aoyama Gakuin University in Tokyo. On the basis of this, we compared our education system with a conventional system. This allowed us to identify advantages of and issues with our proposed system. Furthermore, we proposed a speech recognition support system named BizVoice in order to provide the teachers with more meaningful feedback, such as level of students' understanding. Concretely, BizVoice fetches students' speech of discussion during the game and converts the voice data to text data with speech recognition technology. Finally, teachers can grasp students' parameters of understanding, and thereby, the students also can take more effective class using BizLator. We also confirmed the effectiveness of the system in the class of Aoyama Gakuin University.

Keywords: Decision-Making, Business Game, Educational System, Speech Recognition

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1. INTRODUCTION

'Business games' are an educational tool developed

to enable students to acquire management-related skills efficiently and cultivate individuals with outstanding management capabilities. Business game can be regarded as

implementation of Kolb's model of learning through experience (Kolb, 1984), and it is an effective method to provide student with virtual experiences in business.

Numerous business games have been researched and developed to date (e.g. Kimura and Matsunaga, 2004; Motodera *et al.*, 2008; Nakashima, 2011; Suziki *et al.*, 2009), and they are used in universities and other educational institutions. They are called serious game (Abt, 1970). Serious game is defined as activity among two or more independent decision-makers seeking to achieve their objectives in some limiting context. Through the experiences and reflection during the game, student can lean managerial tacit knowledge (Armstrong and Mahmud, 2008)

Due to the rise of sophisticated computing technology, business game becomes more complex, and the embedded simulation mechanism of market is shown as a black box and is difficult for students to understand. As a result, students tend to focus on the result of the game without reflecting on the process of their decision-making.

Conventional business games have become just that—games that stage decision-making processes divorced from reality and they fail to accurately reflect the processes involved in actual business management. In the real world, for example, markets operate amidst a constant stream of information in the form of news relating not only to corporations, but also to governmental monetary policy, changes in consumer preferences, and other key factors. Governmental monetary policy has impacts on interest rate and foreign exchange. Interest rates influence on company's money procurement strategy. Foreign exchange would affect the demand in market and cost in supply chain.

In most researches, there seem to be issues with verification of learning effect in business games. The effectiveness is typically measured and validated by the game scores and/or questionnaires to students. (e.g., Minami, 2008, 2009; Sakamoto and Nakamura, 2008; Takei, 2009). Park (2011) did a causality analysis to statistically confirm the direct contribution of business game to the comprehension of financial statements. Nakano and Terano (2008) verify the effectiveness through a comparison between past failures in business case and students' decision-making results. Their evaluation focus is more on the result of the game than the learning process and is dependent on subjective evaluation by students.

The purpose of this study is to provide a business game simulator offering a news feature and more realistic input to better simulate actual management decision-making processes. Learning effect is evaluated not only by the game score and written tests result but also by the learning process. The learning process is observed by the vocabulary sets shared among students. They are captured using speech recognition technology.

We also propose an effective educational curriculum using the simulator.

2. THE PROPOSED EDUCATION SYSTEM

2.1 Target Skills

Business management can be described as the process of conducting business in a sustained manner by systematically making decisions and implementing them to accomplish goals. Thus, high-quality decision-making could be described as an essential prerequisite for good business management. In accordance with these general points, we employed Herbert A. Simon's theory of decision-making (Simon, 1997) to elucidate the processes that take place during decision making, and used those to identify some fundamental skills required for it.

Simon's theory regarding decision-making as being composed of the following four stages:

- Intelligence: Gather information and analyze it to identify issues
- Design: Devise several strategies for resolving the issues
- Choice: Select the most appropriate strategy for resolving the issues
- Review: Implement the selected strategy, evaluating and analyzing the outcomes to inform the next decision

Broadly speaking, the four stages of the decision-making process require three skills. The Intelligence and Review stages entail gathering information from financial statements and news relating to both the decision maker's own company and other companies, such as competitors. These stages, therefore, require the ability to assess current circumstances. Design and Choice, on the other hand, require the decision maker to use the information available to devise potential strategies, and then to decide which strategies to adopt. An ability to formulate viable strategies is, therefore, necessary for these two stages of the process. In addition, teamwork ability helps the four stages progress smoothly and fosters consensus building within the team.

The purpose of the educational system proposed in this study is to enhance the development of the three abilities highlighted above. To do so, target skills were defined as follows:

- Assessing current circumstances
- Formulating strategies
- Teamwork

2.2 Mapping Teaching Methods and Target Skills

We developed a set of teaching methods to enable students to effectively acquire the skills mentioned above. They include interactive methods employing our business game, as well as the usual lecture-based methods, the intention being to leverage the advantages offered by each teaching style. The teaching methods employed are as follows:

Lectures

Lectures impart basic knowledge and operating skills necessary to play the business game, as well as some tips for decision-making. The instructions detailed below are offered so that even students with no business management knowledge can participate fully in the lectures. The lectures focus on such topics as interpreting financial statements, the cognitive framework of decision-making, and discussion techniques.

Game

In the business game, teams comprising three or four students represent each company. The instructor determines the number of teams according to the number of students present.

Discussions

Discussions are intended to improve teamwork and communication skills. Students can be encouraged to think and discuss matters at hand from three different perspectives—those of their own company, other companies, and investors. Discussion themes are as follows:

Theme 1 (Students’ own companies): Students brainstorm as a means of discussing what strategies their company will adopt to generate profits. They also examine whether they have been successful in managing their company in line with its adopted strategies by discussing their management practices and results from multiple perspectives. They take minutes of their ‘company meetings’ to be submitted as reports (identifying issues and including data graphs and related discussion).

Theme 2 (Other companies): Students analyze other companies and submit questions they would like answered during the subsequent general shareholders’ meetings.

Theme 3 (Market scenario analysis): Students use news as their primary resource to analyze potential market scenarios chronologically over the long term from the past to the future, and forecast how markets will change (e.g., interest rates, market size, etc.).

Theme 4 (Investing): Students analyze all the companies from the investor’s perspective. At this juncture, they may use ‘points’ held by their company to invest in other companies based on the discussion at the general shareholders’ meetings. In the final ‘quarter’ the points invested by each company are multiplied by a pre-determined factor giving the investment results. Time spent on other companies’ financial statements and related materials may be increased as necessary.

General shareholders’ meetings (overall presentations)

Students produce written materials for their general shareholders’ meetings based on their company meeting minutes and the questions received from other companies, and present them at these meetings. Companies designating specific jobs for their member students should require them to take responsibility for their own roles and present relevant content.

Table 1. Correspondence between teaching methods and skills

	Assessing current circumstances	Formulating strategies	Teamwork
Lectures	√	√	√
Game	√	√	√
Discussions	Students’ own companies	√	√
	Other companies	√	
	Market scenario analysis	√	√
	Investing	√	
General shareholders’ meetings (overall presentations)	√	√	
Reports	√	√	

Reports

At the end of the final ‘quarter,’ students re-analyze the market conditions and decisions made throughout the course submitting the results as a report.

Table 1 below depicts the relationships between the teaching methods given above and the skills previously identified (in Section 2.1).

The lectures give students what they need to acquire all three skills, albeit from a knowledge-based perspective only. The game also addresses all three skills affording the students an interactive learning experience in addition to knowledge-based learning. Of the discussion themes, only ‘discussion of one’s own company’ and ‘market scenario analysis’ allow students to acquire both the ability to assess current circumstances and the ability to formulate strategies. This contrasts with ‘discussion of other companies’ and ‘investing,’ where the focus is exclusively on teaching students to assess current circumstances. The general shareholders’ meetings and reports that follow the discussions have a dual focus addressing students’ ability both to assess current circumstances and to formulate strategies.

2.3 Development of BizLator

We developed a new business game simulator in order to physically demonstrate and test the educational content and methods required to realize the highly effective educational system described above. The simulator is called BizLator. It runs on a Web browser, so anybody with an Internet-enabled PC can start playing the business game immediately irrespective of the number of students in the class. An additional advantage is the fact that unlike with business board games, there is no need to deal manually with complicated accounting processes, and so no time is wasted.

BizLator enables the instructor to create multiple virtual companies in virtual markets at his or her discretion. The instructor then assigns the students to the various companies. The students learn business management interactively by making management decisions every ‘quarter.’ The companies generate profits by manufacturing ‘products’ and selling them on the ‘market.’ Natu-

rally, there is a limit to the companies' 'funds,' and when they are insufficient to cover needs, companies must take out 'loans' at the prevailing 'interest rate.'

The concepts of market size and customer strata govern the markets. Market size fluctuates from one quarter to the next as do the relative sizes of the customer strata, of which there are three: 1) price-oriented customers, 2) quality-oriented customers, and 3) advertising-oriented customers. Each of the strata accounts for a certain percentage of the market. Depending on the decisions made by students, a product may sell very well or not at all, even though the size of the market remains unchanged.

Two distinctive features offered by BizLator are the news feature and the market research feature. The news feature releases virtual news information into the virtual market as determined by the instructor, thereby allowing students to forecast future changes in the market to some extent. Thus, in addition to enabling students to learn one of the skills mentioned in Section 2.1 (formulating strategies), the news feature also ensures that one of the teaching methods mentioned in Section 2.2 (market scenario analysis) can be put into practice. The market research feature, meanwhile, for a fee, provides students with such information as current market size and the percentages accounted for by the respective customer strata. The degree of detail provided increases in line with the amount spent. This feature reinforces students' acquisition of another skill identified in Section 2.1 (the ability to assess current circumstances).

BizLator calculates each company's market share based on its managers' (that is, the students') decisions, returning profits to each company according to the volume of product sold. Figures 1 and 2 below sets out the fundamental BizLator concept.

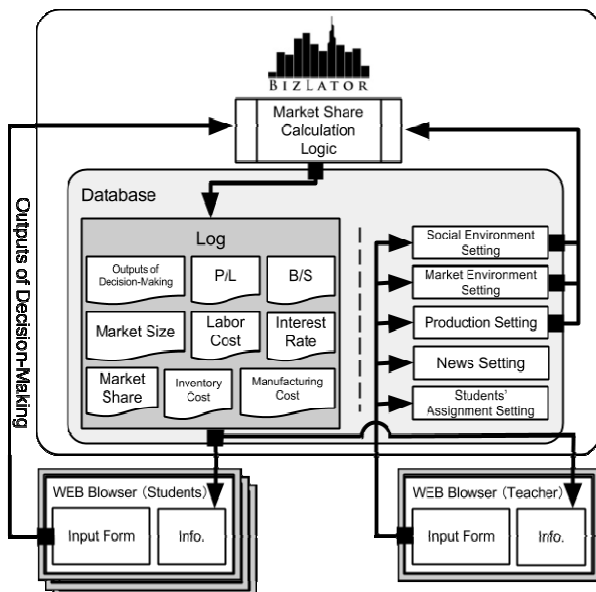


Figure 1. Schema of BizLator concept.

Figure 2. Screenshot of BizLator decision-making screen (Japanese edition was translated).

Thus, students use information, such as financial statements and news relating to their company and other companies, to engage in decision-making—setting their marketing price of their product of their company, allocating an advertising budget, and determining production volume, among other tasks. The instructor determines how the market will move by manipulating market environment settings within the game (e.g., settings for interest rates, market size, news, etc.).

2.4 Standardized Lesson Flow

We developed a standardized lesson flow depicted in Figure 3 so that we could take advantage of the teaching methods facilitated by the use of BizLator, as described earlier. The flow shown below is designed to adapt easily to participants' existing level of knowledge or to other conditions; the instructor can follow the flow flexibly depending on the particular material he or she wishes to focus on or any time constraints that may apply. The basic lesson is as follows: Before the students actually engage with the game itself, the instructor imparts the necessary knowledge (how to interpret financial statements, discussion techniques, etc.) in a lecture. During the game, students use the techniques learned during the lecture to manage their virtual company. The game may be interrupted as necessary to hold discussions, as a means of reviewing how the companies have been managed up until that point. Once the game is finished, students discuss the content of their presentations and then make their presentations in front of all the students at the general shareholders' meetings. Finally, after

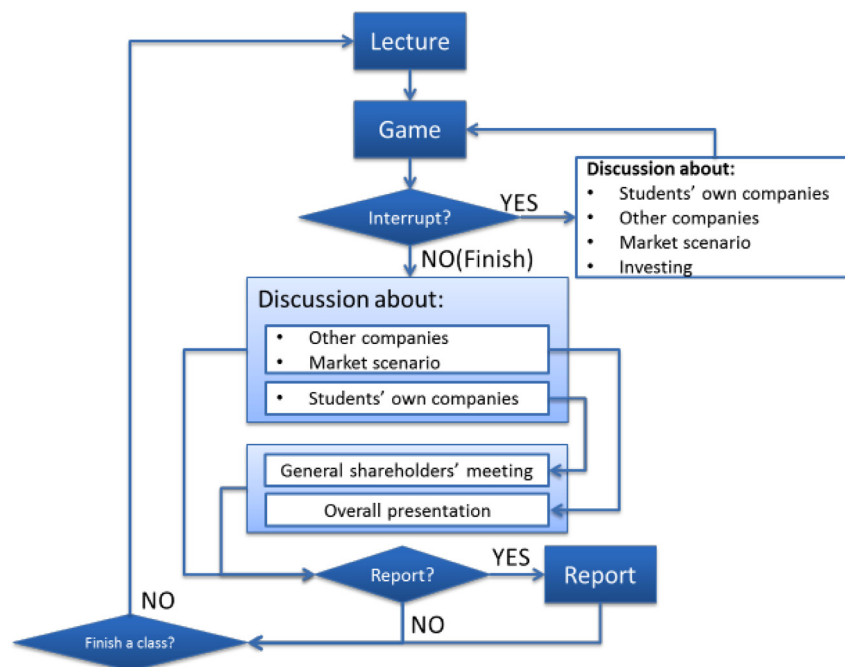


Figure 3. Teaching methods and standard lesson flow.

the meetings, students may be required to submit a report reviewing the activity. That completes the system’s standard lesson flow.

3. IMPLEMENTATION OF THE EDUCATIONAL SYSTEM IN ACTUAL LESSON

3.1 Lesson Structure and Environment

The educational system was implemented in a ‘Business Games’ class; this is one of the courses in the Department of Industrial and Systems Engineering within College of Science and Engineering, Aoyama Gakuin University. There were 36 students taking the course not only from the Department of Industrial and Systems Engineering but also from the Department of Integrated Information Technology and the Department of Mechanical Engineering. As BizLator is an online business game, each student needed their own PC, so classrooms equipped with PCs were used. Each virtual company comprised approximately four students for ten companies. During the first half of the lesson, the students played an existing business game called BG21 in order for them to later be able to compare its educational efficacy with that of the new business game. They were divided into eight companies to play BG21, then organized into teams for the new game bearing in mind their departments and BG21 results. As there were approximately 40 students, eight people were involved in conducting the lesson—a professor, a research associate, four teaching assistants, myself (as part of my role as a

researcher), and another of the researchers who worked on this study. Lessons employing BizLator took place on six occasions between November 21, 2012 and January 9, 2013. The time allocated for each lesson was 90 minutes, but since activities, such as discussions and presentations, could not be strictly time managed, we were careful to ensure that ample time would be allocated for the lesson.

3.2 Setting Market Conditions

The game settings were as follows. Each company was an automaker operating within the Japanese market, and market size in the first quarter was set at 1 million units. The products for sale were middle-range automobiles at an affordable price of JPY 2 million to 4 million per car, with a cost of goods sold of approximately JPY 1.8 million per car. We set changes in market conditions in a way that corresponded to the actual news in order to teach students about current market conditions in Japan and how events, such as natural disasters, affect management decision-making. Initial business capital was set at JPY 200 billion reflecting levels of capital at actual automakers as well as the need to ensure a well-balanced game.

Two news reports were released each ‘quarter,’ one indicating changes in parameters, such as market size and manufacturing costs, and the other signaling market trends, such as changing customer needs. As mentioned above, the content of the news reports drew primarily on actual news affecting Japan at the time covering international current affairs, changes of national government, and the Great East Japan Earthquake of March 2011.

4. EDUCATIONAL SYSTEM RESULTS

4.1 Game Results

The actual results of the students' business games are explained as follows. Figure 4 below is a graph showing cumulative net income for each company. The horizontal axis represents Quarters 1 to 8, and the vertical axis, cumulative net income. In the early stages, there were deviations in the performance of some companies, partly because the students were not accustomed to the game, but from the middle stages onward all the companies saw steady improvements in performance.

The graph divides broadly into two separate trends. This was because we conducted the game with two separate classes each subject to different market movements. The divergence in results was not due to differences in the starting parameters for the respective markets of which there were none.

Although the participants play the game pursuing higher profit, it does not reflect the educational effect. Learning effects are measured by focus level and understanding level that are discussed in Section 5.

4.2 Questionnaire Results

We used a questionnaire to ask students whether they felt they had fully mastered the education system's three key target skills, namely assessing current circumstances, formulating strategies, and teamwork. Of the 36 students, valid responses were obtained from 31.

Figures 5 and 6 below show that the vast majority of students attempted to understand their own current situation by interpreting the financial statements of their own and other companies.

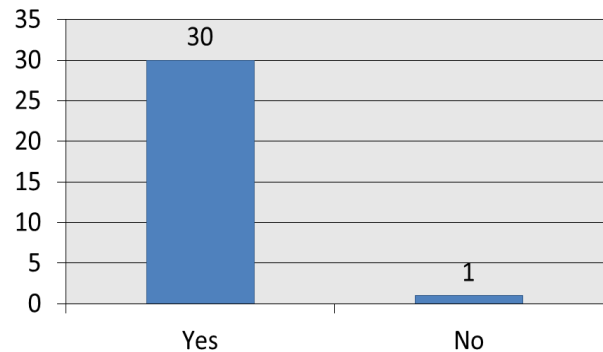


Figure 5. Did you run your company using data taken from your own financial statement?

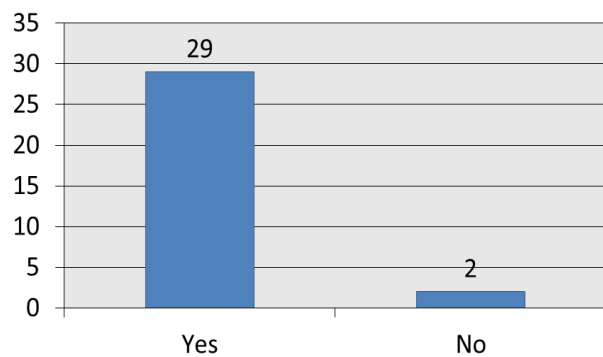


Figure 6. Did you run your company using data taken from other companies' financial statements?

This result indicates that the lessons delivered effective education in terms of fostering the ability to assess current circumstances. Similarly, Figure 7 shows that students formulated their company's strategy according to the news available suggesting that the lessons also delivered

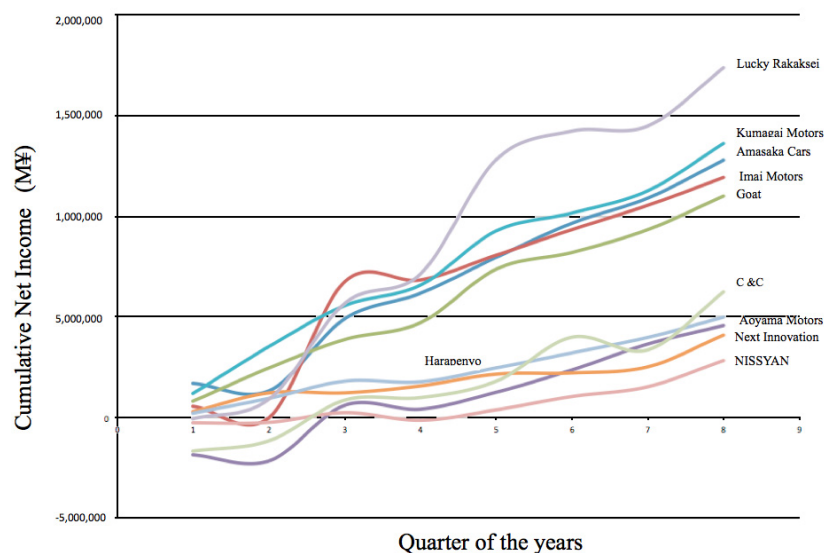


Figure 4. Cumulative net income by company.

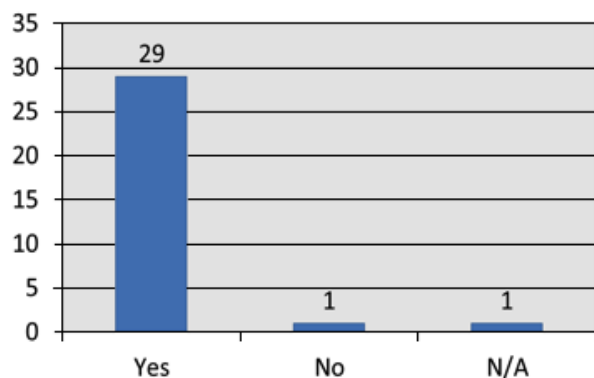


Figure 7. Did you think of strategies based on the news?

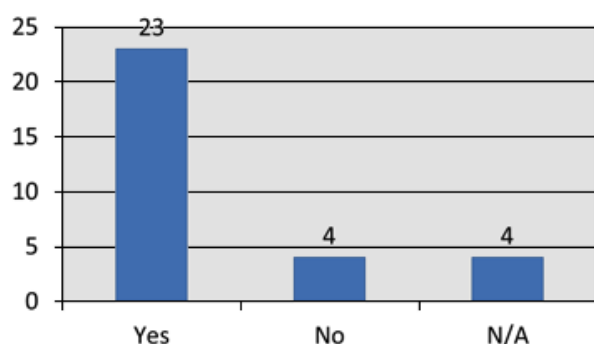


Figure 8. Did you feel the importance of teamwork?

effective education in terms of the ability to formulate strategies. Figure 8 shows that almost all the students appreciated the importance of teamwork implying that the education was also effective in terms of that skill.

5. SPEECH RECOGNITION EDUCATIONAL SUPPORT SYSTEM (BIZVOICE)

With the implementation of BizLator, instructors can analyze students' conversational content acquisition with the results being sent to instructors. Based on these results, instructors may control the students' viewpoints, confirm their degree of understanding, and implement additional measures for student teams who do not fully understand. This process permits a model for precise instructor follow-up and supports a more effective, educational environment for business decision-making than found in classes using traditional business games. We named this system BizVoice.

5.1 An Approach to the Problems and Solutions Related to Student Viewpoints

It is nearly impossible to confirm what students are thinking when they make decisions, and whether or not they consider the instructors' educational advice when they play the games. For example, even if an instructor would like students to manage while thinking about re-

turn on equity (ROE), they are often interested in different things.

To resolve such situations, instructors periodically need to bring students' attention to their educational intentions. However, even when students are made aware of such intentions, instructors do not know whether they take them into consideration while making decisions, so they need to listen to each team's discussion, which is impossible in a large class.

To address this problem, first students' inner thinking process must be rendered visible. In BizLator, students belong to virtual companies and to undertake managerial decision-making as a team, they hold discussions to unify their group opinions. By gaining access to the conversations taking place in teams through speech-recognition software, instructors may assume to understand students' thinking, design an approach in accordance with this, and finally, test its effectiveness.

5.2 An Approach to the Problems and Solutions Related to the Degree of Student Understanding

As the game progresses, students deepen their understanding of the instructor's educational intention. However, depending on the team, it often occurs that students take the class without understanding or without making an effort to understand. To address this issue, instructors periodically give short tests to assess students' level of understanding, and if it is deemed low, they provide additional teaching measures.

However, it is difficult for a single teacher to do this in a large class, and as a consequence, other staff must be found to distribute and grade the short tests.

To resolve this problem, instructors may acquire the students' conversational content using the same speech-recognition software mentioned in Section 2. By analyzing this content, they may grasp students' level of understanding in real time, create an adapted approach based on this, and finally, assess the effectiveness by setting a test.

5.3 Methods to Measure Students' Level of Understanding and Focus Based on Utterance Data

5.3.1 Measuring the level of focus

Viewpoints can be measured by observing how much content vocabulary for each viewpoint appears in the students' conversations. For example, for a team focused more on financial statements than other teams, one would observe a greater amount of vocabulary related to financial statements (profit and loss statements, balance sheets, current liabilities, etc.). In other words, the number of times that a vocabulary set appears in a conversation provides an indication as to the level of focus on a given topic.

5.3.2 Measuring the level of understanding

The level of understanding can be measured by cal-

culating the ‘understanding points’: the higher the number of points, the deeper the understanding of the topic.

More specifically, understanding points can be calculated using the vocabulary sets related to the topic in question (topic vocabulary sets confirming understanding) and the expected vocabulary sets studied in relation to a topic (studied vocabulary sets). This can be calculated by increasing the number of points when content vocabulary from studied vocabulary sets appear within a given timeframe after the appearance of content vocabulary from topic vocabulary sets confirming understanding. Here, the given period of time should be treated as a ‘time limit’ for the appearance of the words.

For example, after one appearance of the content vocabulary from the topic vocabulary sets confirming understanding during a given period of time $t = 10$, one content vocabulary item from the studied vocabulary set is recorded in the time period $t = 14$. If the ‘time limit’ for the words’ appearance is $t = 5$, one understanding point can be attributed because the studied vocabulary appeared within the time limit. However, if the time limit were $t = 3$ and a studied vocabulary did not appear in the time period $10 \leq t \leq 13$, then an understanding point would not be given.

Further, if more than one vocabulary item from both sets appeared within the given time limit and was thus recorded, points would be attributed for the lower number of the two appearances. For example, in the scenario given above, if after $t = 5$, one topic vocabulary for confirming understanding and three studied vocabulary items were recorded within the given time limit, then three understanding points would be given.

5.4 Test Effectiveness

5.4.1 Overview

The effectiveness of BizVoice was tested in a corporate finance class taught in the Management Systems Engineering Department at Aoyama Gakuin University. The class details are as follows.

Lecture title: Corporate Finance
 Time: Wednesdays, 9:00 a.m.–10:30 a.m.
 Number of students: 100
 Classroom: Computer room (1 computer per student)

The class was divided into twenty-five companies each comprising four people, while five virtual markets were created from A to E so as to set up one market for five companies. In addition, students were set up with microphones as shown in Figure 9 with voice recognition being activated.

5.4.2 Measured data

The game took place during five class periods (total of 7.5 hours) from October 30, 2013 to November 27, 2013 in eight quarters of the years. During this time, a total of about 20,000 utterances were recognized as data.



Figure 9. Student using a microphone.

5.4.3 Viewpoint measurement and results

To record students’ viewpoints, topic vocabulary sets were created as shown in Table 2. The frequency of students’ viewpoints for each term with regard to the topic groups are summarized in Figure 10.

Table 2. Vocabulary sets for the viewpoint topics and content vocabulary

Title of viewpoint topic	Related vocabulary sets
Selling price	Selling price of produced goods
ROE	Return of equity
IEQC	Industrial engineering quality control cost (expenses to reduce production costs)
Market surveys	Market survey
Production	Goods production
Research development	Research development
News	Ongoing news that appears during the game
Loans	Loans
Input	Volume of the input into the goods market
Advertisement	Advertisement of goods
Financial statements	Financial statements

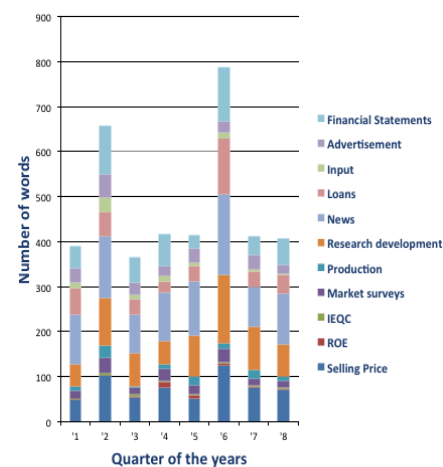


Figure 10. Students viewpoints for each term.

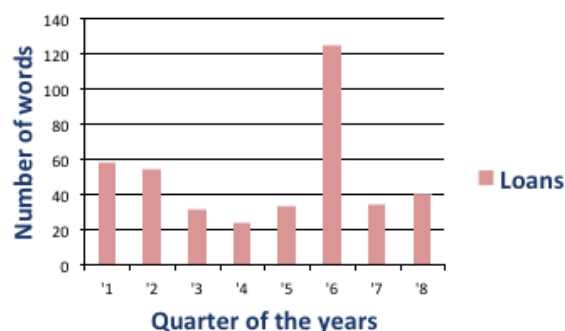


Figure 11. Graph extracted from only the ‘loans’ topic of Figure 10.

Figure 10 above depicts the observations of an instructor using the BizVoice system. We may note a drop in focus from the third to fifth quarter along with the effects of instruction on students’ viewpoints. However, this is not affects the trend of cumulative net income or game result shown in Figure 4.

To be more specific, in the fifth quarter, the instructor held a lecture for the entire class on ‘management using loans’ because the educational intent was for students to manage with an awareness of ROE. The increase in the numerical value of ROE was thus an indicator that loans were used well, and as a result, the instructor was able to determine that the drop in interest in the topic of ‘loans’ did not follow on from the instructional intention. As Figure 11 shows, after the lectures finished, in the next quarter, the frequency of loan vocabulary increased approximately fourfold.

In short, the instructor was able to comprehend students’ viewpoints, and when these strayed from the educational intention, the instructor could promptly take action. In other words, by visualizing students’ viewpoints, it was then possible to further guide students closer to the instructor’s intention and thus improve educational efficiency. From this perspective, educational effectiveness was successfully increased by visualizing students’ level of understanding and then incorporating these results into the teaching framework.

5.4.4 Measuring the level of understanding and results

To visualize the level of understanding, the topic vocabulary sets confirming understanding as well as the studied vocabulary sets were organized as shown in Table 3.

This time, we wanted to confirm each company’s or team’s understanding of ROE. ROE cannot be used without an in-depth investigation of financial statements, and therefore in the topic vocabulary sets confirming understanding, the same words were used as in the previous Section 5.3 on the content vocabulary for financial statements. Furthermore, in the studied vocabulary sets, the words ‘high’, ‘low’, ‘many’, and ‘few’ were used when considering the values of amounts, ‘calculation’ when the calculating indicators, and ‘about how much’ and ‘how much’ when investigating the reasonable numerical values.

Table 3. Topic vocabulary sets confirming understanding and studied vocabulary sets

Topic vocabulary confirming understanding	Words for study
Operating profits, debts, and other vocabulary sets related to financial statements	About how much, high, low, and other vocabulary expected when studying financial statements.

Table 4. Understanding points for each company

Market	Company	Understanding points	Adjusted understanding points
A	A1	21	24
	A5	14	17.5
B	B2	7	10.8
	B3	10	11.8
	B4	5	8.7
C	C1	19	23
	C4	8	8.9
	C5	5	6.9
E	E1	13	16.3
	E2	8	8.4
	E3	22	22

The above vocabulary sets were analyzed in accordance with the methods described in Section 4.2. In addition, as the teams that did not meet the average frequency of observed vocabulary could not be analyzed using these methods, they were excluded from the analysis.

The results are shown in Table 4. For the adjusted understanding points, in order to account for the difference in points depending on how many team members were absent from class, the understanding points were multiplied by 20 and divided by the accumulated number of absences. For example, if in one team, four people were absent during a game held over five periods, the accumulated number of absences would be $4 \times 5 = 20$.

A written test is carried out to measure the understanding level of students in order to compare with the understanding point. The test contains the problems concerning the ROE calculation and other financial indicators. In almost all markets, the adjusted understanding points well corresponds with the average test points. The results are shown in Table 5.

Finally, the adjusted understanding points (Table 4) as well as the average points from the short test (Table 5) were compared for each market. Figures 12 to 15 below show the results.

As shown in Figure 12 to 15, the adjusted understanding points and the average points gained on the short tests corresponded for each team.

These results show that even without setting tests for each individual, it becomes possible using this system for the instructor to take additional teaching measures to help teams with a relatively low level of understanding. From this perspective, educational effectiveness was successfully increased by visualizing students’ level of understanding and then using these results.

Table 5. Results for the short tests to confirm understanding

Market	Company	Average test points
A	A1	2.25
	A5	2
B	B2	2
	B3	2.25
	B4	1.5
C	C1	1.25
	C4	1
	C5	0.5
	E	E1
	E2	1
	E3	2

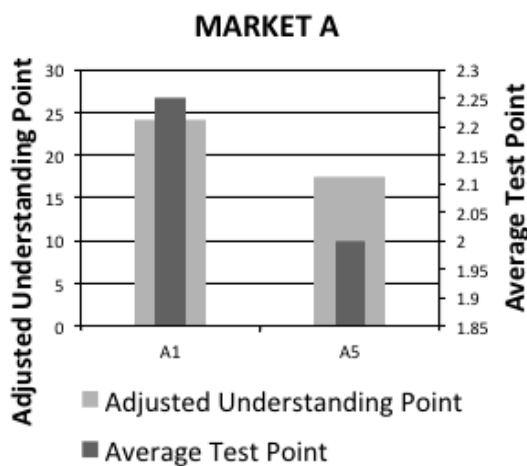


Figure 12. Market A comparison results.

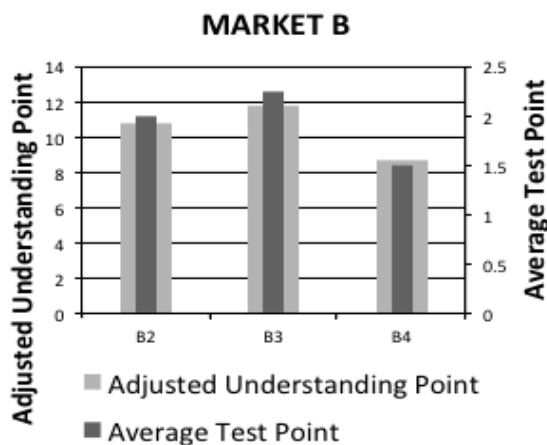


Figure 13. Market B comparison results.

6. CONCLUSION AND REMAINING ISSUE

6.1 Conclusion

This study required us to develop teaching methods and a standard lesson flow in order to effectively accomplish the essential aim of the business game, namely,

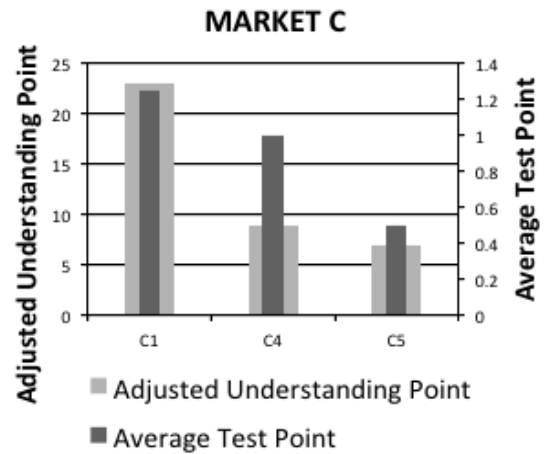


Figure 14. Market C comparison results.

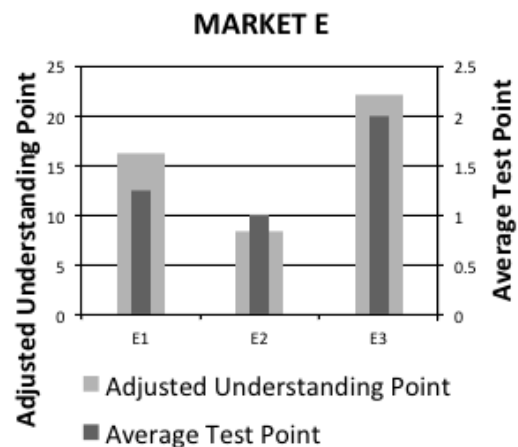


Figure 15. Market E comparison results.

the improvement of skills for management decision-making. It also involved the construction and evaluation of a curriculum designed to improve the skills necessary for decision-making allowing students to participate actively. The results showed that we were able to take advantage of BizLator's strengths to offer education that is more effective and structured than that provided by the previously existing business games.

A particular problem was the fact that other business games do not adequately address the issues of real-world relevance and making predictions. However, Biz Lator's distinctive news feature enabled us to offer a curriculum that effectively encouraged students to engage more deeply with these issues. In the past, students had to base their decision-making process on financial statements and information relating to current market conditions alone. It was, therefore, difficult to develop their ability to predict future developments, an essential skill in real-world business management. However, the educational system developed for this study employed Biz Lator's news feature to overcome that problem, and the new system was successful in creating a more realistic management environment.

We also examined the decision-making process to identify and clearly define the educational content required by the system, which we used to develop a standard lesson flow structured in such a way that enables students to experience the advantages of both types of lessons—interactive lessons using the business game as well as conventional lecture-based lessons. The burden on the instructors was thus reduced when they taught business-game-based lessons following the standard lesson flow, and they were able to conduct lessons in a flexible manner depending on the time available.

Finally, we also proposed BizVoice (Speech Recognition Educational Support System) and implemented the system on BizLator, thereby, a teacher can grasp students' viewpoint in the game and figure out their understanding of the lecture with business game.

6.2 Remaining Issue

This study measures the learning effect for each group. The method of grasping to what extent each individual understanding level is improved in a group is an issue of subsequent research. Under the current speech recognition technology level, we could not analyze the text data of students-speech by using text mining. If we could use the method, we would get more meaningful results. Thus, we need to search for a higher speech recognition rate technology.

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