A Practice Report on the Active Learning Using Business Game for the Teacher Training Students

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Abstract. This paper describes a practice of business game using ICT (Information and Communication Technology, hereafter in ICT) prepared for the teacher-training course student. Since the Japanese primary and the secondary education, the environment of ICT in the classroom is improving. Furthermore, the forthcoming educational guidelines from the ministry are insisting on the active learning with ICT; it is more important to learn the active learning using ICT than ever. From the questionnaire survey, we examined how the students can use ICT for learning and what kind of difficulties the students have. As a result, it was speculated that students feel anxiety and difficulty in becoming teachers who do such classes because students have no experience of receiving active learning using ICT. In this study, as an example of active learning using ICT, we aim to make students experience business games using computer agents and aim to think more deeply about the possibility of using ICT for learning. In this paper, we describe the possibility of learning effect given by the design of the game using the computer agents. And we report the practice of business game using strategy agent. In the future, some concrete methods with ICT are also required such as mounting facilitating agents and simulating player agents in the game. This is research in progress.

Keywords: Teacher training course · Active learning · Business game · Computer supported collaborative learning

1 Introduction

The MEXT (The Ministry of Education, Culture, Sports, Science, and Technology) aims to realize education using ICT by 2020 [1]. The environment for classroom with the electronic blackboard, the digital textbooks, and the Internet are prepared. This vision is not merely the education using ICT, but also the spread of new educational methodology that the students can learn more proactively. In other words, the vision of MEXT aims to realize active learning more effectively by ICT than ever. We supported teacher training course for students with simulated lessons using ICT. In this context, the term "simulated lessons" refers to the lessons which the students play the role of teachers and students in the teacher training course lessons. We demonstrated the lessons using ICT such as e-blackboards and digital textbooks. And in next lessons, they did simulated lessons using ICT. Their lessons were used ICT, however, most of

the lessons were not active learning. It is difficult particularly for teacher training students to design useful lessons using ICT and to design lessons based on active learning. They may feel it as anxiety and threat because they lack knowledge of the new material "ICT" and learning experience using ICT [2]. Furthermore, even if they know methods of active learning, they had not experienced active learning when they were students. To realize the educational vision using ICT, it is important for students to integrate technological knowledge, pedagogical knowledge and contents knowledge [3]. Our conventional efforts were focused on only the technological knowledge, but not integrated with teaching knowledge. To fit this issue with the policy, instead of transforming the integrated knowledge, they needed experiences to participate in active learning using ICT as a student. We thought that students could integrate technological knowledge with teaching knowledge on active learning by experiencing business games using computer agents.

The rest of the paper is organized as follows: Sect. 2 gives an overview of agent-assisted active learning. Section 3 discusses practical reports on active learning using business games and its effects. Section 4 describes the issues and prospects of practicing the active learning in the teacher training course.

2   Agent Supported Active Learning

Gaming simulation is known as a teaching method that enhances learners' proactivity. Learners play a game with strategy, the interaction among players create competition. Learners play game with strategy, and the interaction among players create competition. U-mart is one of agent-based gaming simulation to learn the fundamentals of economics [4]. In U-mart, a virtual market is formed which is a combination of a computer agent and a human agent. Agent decisions are reflected in the market in real time. In this game, there are two learnings; such as to develop agents using strategies and to make decisions by looking at other agents. The learning design in which computer agents participate in human agents is a method by which computer agents support active learning. Human agents' strategy is uncontrollable, while computer agents' algorithmic strategy is controllable. There is a possibility of systematically designing active learning.

In this research, business games were employed as a method of active learning using ICT. Business games are materials that learn typical business models through gaming simulation. Like in U-mart, in the business game computer agents also support active learning. We expected that teacher training students could easily experience active learning using ICT.

3   The Active Learning Using the Business Game

We performed two lessons; in the first lesson, we conducted a simulation lesson using ICT and in the second lesson conducted a business game. In this session, (1) we introduce students' impressions to our simulation lesson, and (2) we report the computer agent's strategies and gaming practice. Finally, (3) we discuss students' awareness of ICT and active learning.

In the first lesson, we explained to students how to use ICT materials and showed a short lesson using ICT. We made presentations on the possibility of designing a new lesson using e-blackboards and digital textbooks.

We made a questionnaire about the impression of this demonstration. They mentioned "efficiency" as a good point of classes using ICT. Decreasing the burden on teachers and shortening preparation time is the excellent use of ICT. Moreover, they also mentioned that students' learning outcomes could easily be compared and evaluated. This awareness is about technical and pedagogical integrated knowledge.

On the other hand, as a difficulty, they mentioned the lack of computer skills and anxiety about dealing with trouble such as network connection and operation of computers. Also, some students pointed out the harmfulness given by using computers such as Health hazard such as eye deterioration. Their anxieties were similar to those reported by Mumtaz [2].

In the second lesson, the students experienced a business game called "restaurant game." The restaurant game is developed by Yokohama Business Game (YBG) [5] and operates in the WWW environment. The learner becomes the manager of the restaurant and decides the material cost, advertisement cost, and selling price. The learner's decisions are reflected in the total number of visitors to the restaurant market. The learner's decision is reflected in the number of customers visiting the restaurant and the market demand. Since the model of this game is simple and typical, it is known as teaching material for business beginners. Although the students are not affiliated with the school of business, it was speculated that they had the necessary knowledge to experience this game.

The purpose of learning using this game is not to learn the business model, but to think using the acquired knowledge. They were expected to notice that such thought learning is not natural.

One team consisted of 2 or 3 students and was divided into five teams together. We also mixed three computer agents. We also mixed three computer agents. Agent 1 made decisions without changing the decision to the end with default values. The default values are the market price written in the scenario to read before you start the game. Agent 2 copied the decision of the team having the most operating profit in the previous round as it is. The agent 3 decided on the price of the deviation value 60 from the selling price of the previous round. The agent assumed that the number of visitors is the average value of the previous round and decided the value adjusted so that the operating profit becomes zero. This was an agent that reproduced the high price strategy. However, it did not aim to obtain higher profits than the student team. We did not inform the students of the strategies of these agents and explained after the game.

The students used a calculation worksheet and a calculator application to think their team's decision. We did not in advance inform the learner of the end of the game. The game was ended when it was executed up to 7 rounds. Every team's decisions and outcomes were fed back each time the round was over. Three values for each team in all rounds were decided and three outcomes, sales, operating profit and cumulative operating profit, were indicated in Figs. 1 and 2. After presenting the graph on the e-blackboard to the whole class, its picture was distributed from the e-blackboard to the students' tablet and shared. In this game, they can calculate all outcome of each team

during the game. However, sharing the graphs can give an overview of the decisions and outcomes of other teams in all rounds, and based on that, they can promote reflection of their team's decisions and strategies.
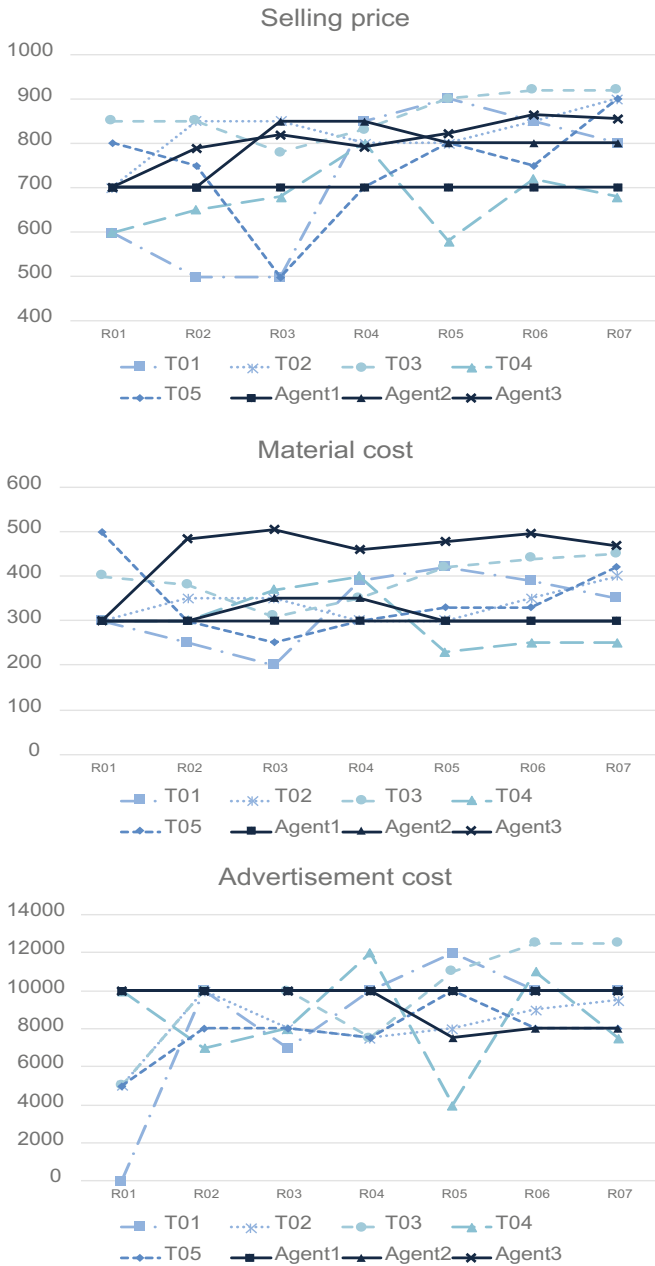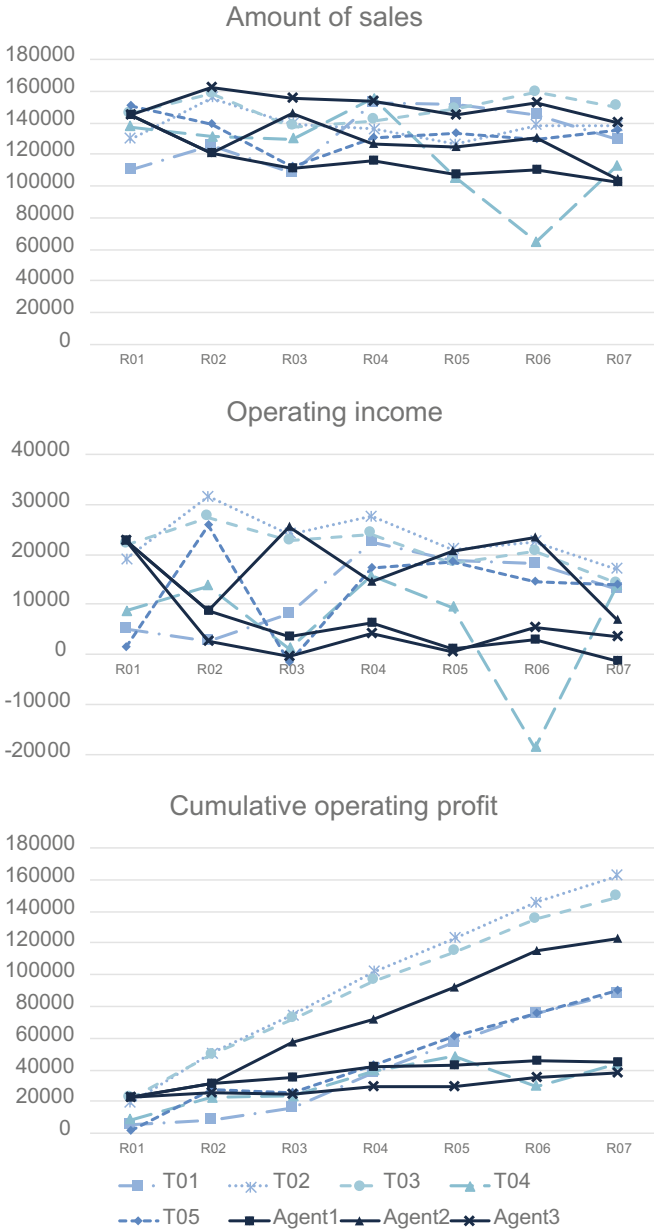

Fig. 1. Players' Decision

Fig. 2. Players' outcomes

The teams did reflection as looking at the graphs delivered to their tablet. They argued about what kind of strategy they were, and what kind of strategy was better. They sent their tablet screen that wrote the points of reflection to the e-blackboard. As shown in Fig. 3, answers of all teams were displayed on the e-blackboard. Each team

presented their strategy, and according to their reflections, the class goal was considered to have been achieved. Team 2 presented that the point of their strategy is to observe the decisions of other players and the stable operation brought the cumulative operating profit at the final round. However, the operating profit in each round has slowed down. The operation of Team 1 that the selling price changed from a low price to a high price, and the margin increased slightly. Some difficult decision for the player, particularly beginners, in this business game is advertisement cost. Team 2 decided 0 (yen) in the first round and team 4 reflected that they did not think about advertisement cost adequately. They thought and decided in their own way, however, there was no awareness as regards computer agents. Our next challenge is to design computer agents to promote their thinking.

In their comments to active learning using ICT, some students pointed out educational efficiency such as quick responses and ease of consideration based on data, and other students were aware of learners' proactivity by gaming.
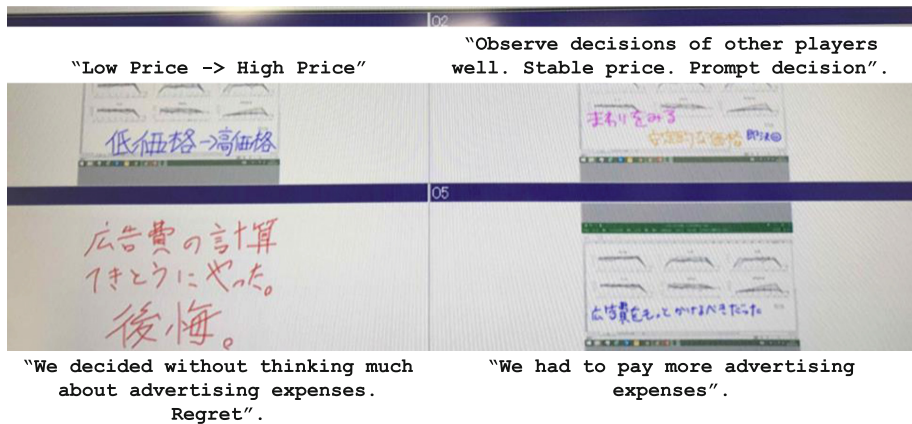

Fig. 3. Students' reflection and decisions on e-Blackboard

4   Conclusions and Future Work

In this paper, we treated a business game using agents as a method of "active learning using ICT" and reported practical practice for teacher training course students. According to their report, students were able to notice the goodness of gaming as an educational method and the possibility of utilizing ICT for designing learner-centered lessons.

The development of computer agents that promote learning challenges in the field of educational gaming simulation [6]. The future work is to design materials and lessons for teacher training students to be aware of the possibility of development of gaming simulation. We will build a teacher training program through gaming simulation and contribute to improving the knowledge and skills to design active learning using ICT.

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