Practice of a Debate Support System for Energy and Environment Education and its Evaluation

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1. INTRODUCTION

In order to solve energy and environmental issues, it is necessary to improve technologies and political system, however, the essence of the issues is improvement of our consciousness and knowledge. The energy and environmental issues are complicated related with human, society and technology. It is, therefore, important not only to improve their knowledge but also to gather information, analyze it, discuss it and form their own sense of value by themselves.

Taking notice of our education system, since it is difficult to foster such abilities by the conventional lecture-based education, a debate based education has tried to be introduced in high school and university education. It is, however, difficult to introduce it to the conventional education system. Aiming at solving this problem, an educational debate support system, DEEV system, has been developed and applied to 431 students in total from 2003 to 2006.

2. OPERATION OF DEEV SYSTEM

It is important not only to deveop DEEV system itself but also to design its effective operation method. Through our experience when applying it to actual course, we have developed a procedure of debate education using DEEV system as follows;

(1) The debate education is conducted in 90 minute lelcture time with two weeks. The fisrt week is for preparation and the second is for argument.

(2) In the first week, the purpose, method and attention points are first explained to the students, then practice of DEEV system is conducted. After that, theme, standpoint, ID and password to log in the system are given to each student.

(3) The students gather the data and knowledge related to the given theme and digest its point of issue.

(4) They log in the system and input their first argument based on the gathered data and knowledge until the second week. This makes efficient use of time in the debate in the second week.

(5) In the second week, 90 minute debate is conducted in computer room. They argue the given theme with the given standpoint against three other students with the opposite standpoint.

The procedure of the debate consists of the first argument, question / counterargument, refutation and the second argument. In 2005, the students who took "Socia-environmental energy science I ＆ II" in Graduate School of Energy Scicence, Kyoto University, were given the debate education using DEEV system. In course I, 71 students were given one of the following two theme and a standpoint (pro or con).

(a) The government should take a protective and prior action for the new participant to promote a free electricity market.

(b) The government should promote the introduction of photovoltaic among new energies.

In the course II, 83 students were given one of the following three theme and a standpoint.

(c) The government should intervene the countermeasure of protection of wild animal from extinction.

(d) Kyoto city should prohibit entering downtown and sightseeing area by car and introduce LRT(Light Rail Transit).

(e) Disaster prevention of earthquake should be taken the initiative by specialists including sturcture designers of architecture and civil engineering, and researchers.

3. EVALUATION OF DEEV SYSTEM

As the evaluation method, a questionnaire was conducted to the students after the debate in the second week. It consists of 8 itmes for education effect, 13 items for system function and 2 free descriptions. On the other hand, another questionnaire was conducted to the teachers to evaluate the evaluation support function of the debate records.

As the result of the questionnaire for education effect, it was found that the system is effective especially to foster abilities of multiple viewpoint, deep and critical thinking. As the result of system function, it was found that prior input of the first argument, discussion support based on Toulmin model and remaining time display are effective. On the other hand, it was also found that keyword input is not necessary. As the result of free description, the answers of "It was fun", "I can well understand the point of the issue" and "I want the debate education to continue to the next year" were often found, however, the answer of "I need more time for the argument" was also found. And as the result of questionnaire for the evaluation support function, better answers were obtained in total.

4. CONCLUSIONS

In this study, the operation method for DEEV system has been developed and applied to actual courses in our graduate school. In addition, a questionnaire was conducted to evaluate its educational effect and to find the system functions to be improved. As the result, it was found that the system is effective to foster abilities of multiple viewpoint, deep and critical thinking. And it was also found that 90 minute argument time was short for the students to argue with three other students.