

Self-educate Function Added on Gakuzai System

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Abstract. We give the electronic textbook (e-textbook) that the student can edit. When the student understands hearing the teacher's explanation, leaving only an important term, and obscuring the part where it explains it on the e-textbook, they remakes the textbook into them notebook. Because work to copy the content of the blackboard disappears and the teacher's explanation can be heard enough, the student can be expected to acquire knowledge in a short time. The WEB application that remakes the e-textbook into the notebook has developed. Now added the function of self-study work at home. The function makes problem-solving exercise automatically with reduced e-textbook content. The marked up items on e-textbook collect for selector that use in exercise. The student keep trying problem-solving exercise by new problem. The function provides learning opportunities for self-study work.

Keywords: ICT-based learning, e-textbook, reduction edit, learning style.

1 Introduction

In recent years, it becomes the spread of the portable information device, and familiar the computer book. There is a project that starts introducing the electronic equipment and the computer book into school lessons [1] and evaluate the educational effect [2], [3]. However, it is difficult to dramatic improve the education effect only by learning environment computerization. It is thought that a new education method to obtain a high education effect and a new learning method are needed.

In Japanese classrooms, teacher talks one-sidedly and write the aid of explanatory notes on blackboard that is similar to the content of the textbook. The students just listen to them and copy the content that the teacher wrote on the blackboard. The copied information has had a student, though work to copy it during the lesson should be useless in time and the labor, and be reduced.

We give the electronic textbook (e-textbook) that the student can edit. When the student understood hearing the teacher's explanation, leaving only an important term,

hide the understood part on the e-textbook. The student remakes the textbook into them notebook. Because work to copy the content of the blackboard deletes and the teacher's explanation can be heard enough, the student can be expected to acquire knowledge in a short time. The e-textbook is rewritten by an electronic operation. The part that understood and became needless is not deleted but is only obscured. Therefore, even degrees of the cancellation and the edit of work how many can be done.

In the classrooms, an important word and the equation will be able to markup in the electronically. They can be easily achieved to make the wordbook by extract the markup word, and to make the problem-solving exercise preparing void sentences of the markup term. These functions might be useful so that the student may review or homework. When the learning method that uses the electronic textbook is used, it will be supported to be able to take note more easily than the current, and to memorization study and to solving the problem exercise. As a result, the education might be improved.

The WEB application that remakes the e-textbook into the notebook has developed. We call this framework "Gakuzai system". "Gakuzai" is a compound word of two Japanese words. The word of "gaku" same as "manabi", manabi means all the learning processes until knowledge is acquired and the word of "zai" is the material. The Gakuzai system offers the environment to support all process of study from a class by teacher to homework by student. This paper proposes a suitable next generation learning method in the e-textbook generation, and aims at system preparation that doesn't depend on Operating System and the browser.

2 Gakuzai System Overview

The Gakuzai system should have the following functions.

1. The e- textbook should be able to edit quickly during the lesson.
 - (a) Function that the unnecessary part is hidden or replaced a short word.
 - (b) Function that the markup an important word (text color, under line, bold-faced type, highlight).
2. The content of 1) must be reproduced in next classroom time.
3. The content of 1) is required to be able to learn at home.
4. Two or more learners are able to edit jointly.
5. The collaborative learning that shares the edit result among learners.

All processes from individual study to the group study can be supported by these functions. The EPUB and the PDF are formats of a general computer book, which doesn't adopt, though there depends on software/hardware for specific inspection large, number of degrees of freedom of customizing low. We adopted HTML from depended on Operating System and the devices low, customized easy.

The server computer was prepared to distribute the e-textbooks and to keep the edited data. The Gakuzai system was constructed by using the PHP language and JavaScript on this server computer. Now implemented functions are 1st and 2nd function of the Gakuzai system in above.

2.1 Classroom Phase

Sentences that could be understood enough are hidden on the e-textbook or replaced by a short key word. The e-textbook makes is changed the formulary or the wordbook by this function. To explain study that uses the Gkuzai system, Kirchhoff's current law is made an example. [Text from Wikipedia: Kirchhoff's current law, (2014)]

This law is also called Kirchhoff's first law, Kirchhoff's point rule, or Kirchhoff's junction rule (or nodal rule).

The principle of conservation of electric charge implies that:

At any node (junction) in an electrical circuit, the sum of currents flowing into that node is equal to the sum of currents flowing out of that node, or:

The algebraic sum of currents in a network of conductors meeting at a point is zero.

Recalling that current is a signed (positive or negative) quantity reflecting direction towards or away from a node, this principle can be stated as:

$$\sum_{k=1}^n I_k = 0$$

n is the total number of branches with currents flowing towards or away from the node.

Only a formula summation of I is left because the chapter of the explanation will only have to record only the name and the expression of the law that becomes not necessary for the student who understood this content, and the rest will be concealed.

2.2 Home Study Phase

If the under line is pulled during the lesson importantly, - in the example above, the under line has already pulled -, the exercise that removes this term from the explanation can be made from the automatic operation. The automatic generated exercise can help the self-learning. Therefore, the education effect can be expected to rise.

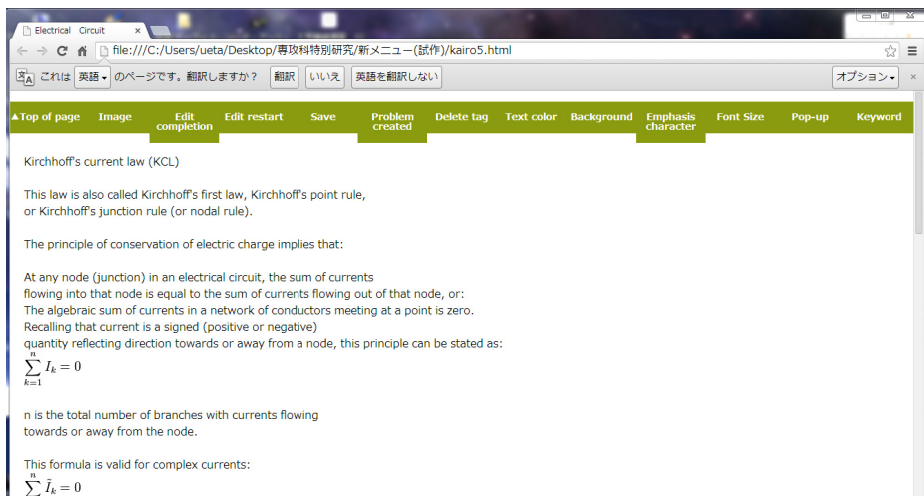


Fig. 1. The e-textbook edits form in Gakuzai sytem. The content of the textbook is displayed left side. User selects the strings for edit on this screen and edits with the top menu.

It responds to the fact of adding words because the replacement of the character only doesn't shorten the long one. Moreover, the image can be added same as words though the Gakuzai system can use taking the note with traditional style.

It did not implement the function to be used for self-learning. The results are shown below was prototyped a function of automatically generating the problem.

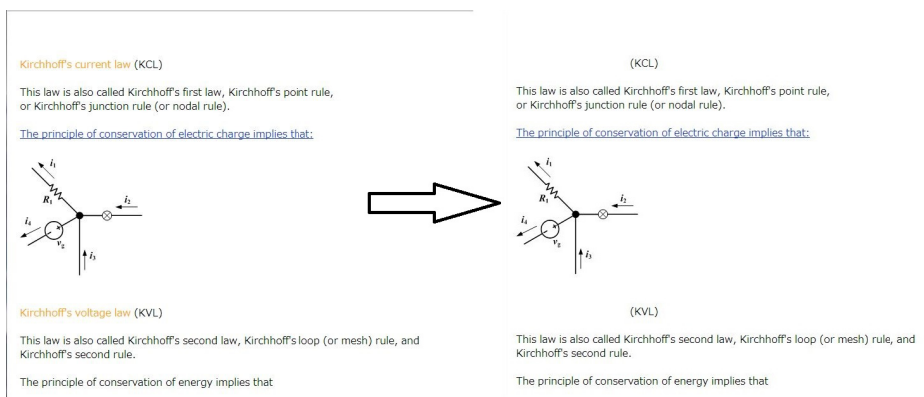


Fig. 2. Was withdrawn terms that you edited in class. This form can support the rote learning. State after editing (left). After creating a practice exercise (right).

This function was implemented as the ability to create automatic a practice question using the e-book that individuals are editing. Is used to create a practice question of a specific color text after editing. The rote learning, can be performed by pressing the button "creating problem". Text of a specific color is converted to white.

Unlike the above-mentioned functions, we implemented the ability to automatically create alternative practice exercise in terms that are registered with pop-up function. The contents of the statement blowoff with the input string that is chosen by pop-up function is stored in the database by pressing the pop-up Add button. How to create a Practice question, select a question from the words that are stored in the database. Then, the random arrangement can be extracted three words and correct answers. Practice question is changed each time you make an update.

3 Conclusions and Future Work

It was possible to implement the rote learning support functions and a practice question creation function. Therefore, iterative learning that could not be performed conventional has become supportable. We proposed a new education / learning method with the e-textbook. The WEB application software wear to practice this method was developed. Using this system practices the classroom, and the education effect will be evaluated in the future.

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