

A Learning Support System for Making a Web Page by Using a Computer Network, and Its Application to Group Learning

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1. Introduction

Recently, the computer is becoming more widely used in educational contexts, and research regarding education utilizing the computer is rapidly progressing. As well, education using the technology of the Internet and WWW (World Wide Web), called WBT (Web Based Training) and e-Learning, has seen a great increase, as has research regarding CSCL (Computer Supported Collaborative Learning) which employs a computer network ⁽¹⁾⁻⁽⁷⁾.

We constructed learning support systems on personal computers and operated those systems ⁽⁸⁾⁻⁽¹⁴⁾. Learning units with which users can learn the systems are “Fundamental Semiconductor”, “Programming Language”, “Electric Circuit”, and “Fundamentals of Computer Science and Information Technology”. Programming languages that are used in learning support systems are “Basic”, “C language”, and “HTML (Hyper Text Markup Language)”. HTML is Web page description language with tags.

Further, we constructed a client/server communication system that was described in Java language, and have tried to develop a learning support system for group learning.

This paper describes the learning support system for making a Web page by using a computer network. In the first part of paper, the concepts for constructing the support system are discussed. In the second part, the character and outline of the system are described. The learning support system is described using HTML on a Web server.

Consequently, a user learns by using a Web browser on a computer. In the third part, an evaluative experiment to encourage subjects to use the system is performed. Finally, we examine the effects of group learning using the system.

2. Concepts of the System Construction

In this paper, we construct a support system for making a Web page by utilizing the following concepts.

- (1) A user doesn't use application software and a reference book for making a Web page.
- (2) A user uses a Web page's data using a "notepad" editor attached to Windows OS directly by means of HTML.
- (3) We carefully selected the sites devoted to making a Web page in Japanese, and allowed the use of Internet resources by introducing those sites.
- (4) Link of a page to a series direction is done in 3 or 4 steps.
- (5) We make the number of characters contained on a Web page as few as possible in an attempt to be able to view an entire page without the need for vertical scrolling.
- (6) The system does not make use of user authentication.
- (7) We make the unit of learning simple and compact, so that a user can learn a unit in one session, and therefore the learning process is not recorded.

3. Character and Outline of the System

The learning support system has several characters, which are - using frame, useful button, Help page, able to copy & paste -, and so on. In this section, the characteristics and the outline of the system are described.

(1) Frame

A user learns the grammar and the functions of HTML by reading an explanation presented by the support system. The system shows the image of a Web page by using Web page data described by HTML. This system is made by using a frame, and the structure of the Web page is shown as contents on the left side of the window at all times. Figure 1 shows the top page of the system.

(2) Useful Button

In this system, the "Back" button and "Next" button are arranged on a lower part of every page (see Fig.2). When a user clicks this button, the page that the system designer fixed in advance is shown. Figure 2 shows the page for which the < BR > tag is necessary to go to new lines of sentences.

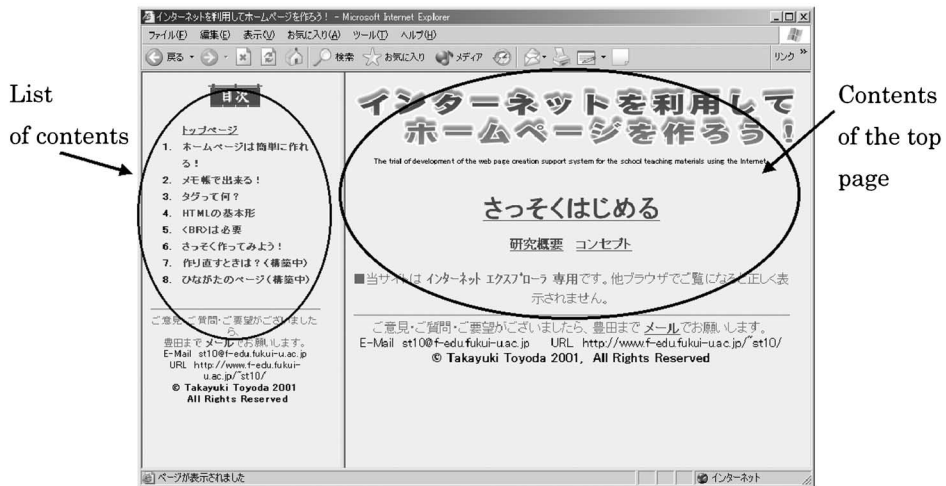


Fig.1 The top page of the system.



Fig.2 The page of "< BR > tag is necessary".

(3) Help page

A user can learn difficult words and phrases by using the "Help page". Figure 3 is the scene of a "Help page" in the system. When the hot text is clicked by the user, the system opens the new window for the "Help page" to explain the word.

The language used in the window of the system is Japanese.

(4) Copy & Paste

Generally, the expression of an image on a Web page is made of image data (GIF, JPEG, and so no). On the other hand, we realize the appearance of the image by making a table by using < table > tag, < tr > tag, and < td > tag in the system. Therefore, the HTML described in the window is able to copy and paste to the user's editor window. Figure 4 shows an example of HTML described using "notepad".

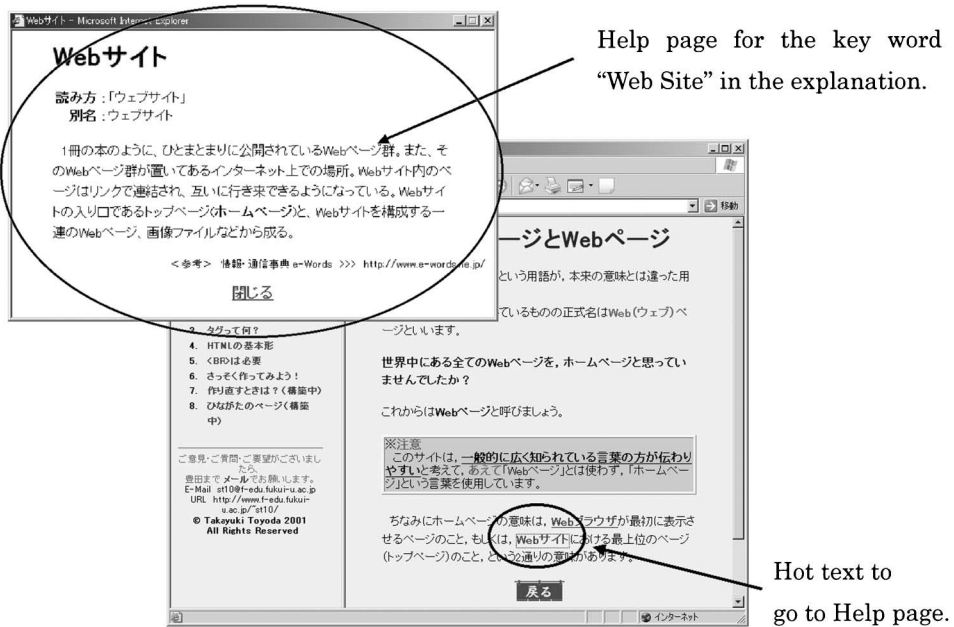


Fig.3 The scene of a "Help page" in the system.

In this study, the HTML files for the learning support system are saved in the Web server, and a user can learn HTML on the Intranet and the Internet.



Fig.4 The image of the system that copied the tags.

4. Evaluation Experiment

(1) Outline of the Experiment

An evaluation experiment in which the subjects are asked to learn the support system is carried out. An evaluation is done regard to the following 7 items:

No.1: Size of the window

No.2: Clarity of explanation

No.3: Quantity of words

No.4: Degree of understanding for making a Web page

No.5: Appearance of contents of the window

No.6: Ownership of one's Home page

No.7: Whether one wants to own one's Home page or not

In regard to window size, we ask the subject whether one changed the size of window. Because the system's window is adjusted the resolution of the computer display using Java Script, the subject do not need to change window size.

The number of human subjects is 19. We asked the subjects about each of the above items (except item No.1) using the semantic differential (SD) method involving 5 classes.

(2) Result of Experiment

In regard to window size, 12 subjects changed the size. Twelve subjects changed window size for the following reasons: to have a consistently large display, to not have to down-scroll, to be able to see other windows, etc. In regard to "clarity of explanation", all the subjects answered "very fine" or "fine". And generally good results were obtained concerning the other questions.

The results of the evaluation item "whether one wants to own one's Home page or not" are shown in Table 1. In Table 1, n is number of subjects, and the *rank* is the degree to which one would like to have a Home page.

Table 1 Result of evaluation item No.7.

<i>rank</i>	A	B	C	D	E
n	4	13	1	1	0

The rank "A" indicates that "one feels very strongly that one would like to have a Home page". And the rank "E" indicates "one wouldn't like to have a Home page".

In this Experiment, the learning support system is able to provide motivation to have one's Home page.

5. Application to Group Learning

Now, we consider group learning based on a concept of a groupware, by using the learning support system with a client/server communication system controlling the Chat Server which is constructed using Java language. While several users operate the system for making a Web page on a computer network, a user submits a question to the Chat Server, and the question is transmitted to all the members (see Fig.5). It is expected that because any user answers the other user's question, the learning advances through the cooperation of the entire group.

This learning support system will be used with a television meeting system, e.g., CU See Me, so we will be able to make use of voice, animation, and still pictures in the near future (see Fig.5).

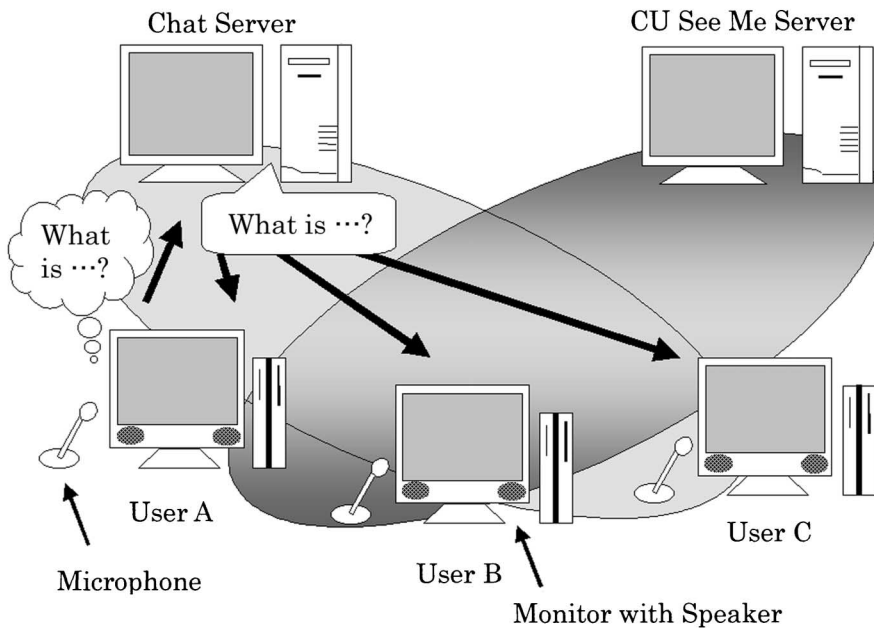


Fig.5 The environment of the system for group learning.

6. Conclusion

In this paper, we described a learning support system for making of a Web page constructed through the use of a computer network. First, the concepts of constructing

the support system were discussed. Next, the characteristics and outline of the system were described. Since the system is described using HTML on a Web server, the system is contained in the category of WBT. An evaluation experiment to make subjects use the system was also carried out showing generally good results.

We consider an effect of group learning using the system. In order to create the best environment for group learning, we must investigate factors such as the number of users, a user's skill in operating computer, quantity of knowledge for learning units and so on.

References

- (1) Special Features "Frontiers of e-Learning"; Journal of the Information Processing Society of Japan, Vol.43, No.4, pp.392-426(2002).
- (2) Nakabayashi, K., Koike, Y., Maruyama, M., Touhei, H., Fukuhara, Y., and Nakamura, Y.: "CALAT: An Intelligent CAI System Using the WWW"; Trans. of the Institute of Electronics, Information and Communication Engineers (D-II), Vol.J80-D-II, No.4, pp.906-914(1997).
- (3) Dansuwan, S., Nishina, K., and Shimizu, Y.: "Computer Assisted Thai Learning System under the Internet Environment"; Trans. of the Institute of Electronics, Information and Communication Engineers (D-I), Vol.J84-D-I, No.6, pp.927-935(2001).
- (4) Inaba, A., Hasaba, Y., and Okamoto, T.: "An Intelligent Supporting of Discussion for the Distributed Cooperative Learning Environment"; Trans. of the Institute of Electronics, Information and Communication Engineers (A), Vol.J79-A, No.2, pp.207-215(1996).
- (5) Ikeda, M., GO, S., and Mizoguchi, R.: "A Model of Computer supported Collaborative Learning -Opportunistic Group Formation-"; Trans. of the Institute of Electronics, Information and Communication Engineers (D-II), Vol.J80-D-II, No.4, pp.855-865(1997).
- (6) Kusunoki, F., Sugimoto, M., and Hashizume, H.: "A Group Learning Support System by Enhancing Externalization of Thinking"; Trans. of the Institute of Electronics, Information and Communication Engineers (D-I), Vol.J83-D-I, No.6, pp.580-587(2000).
- (7) Okada, M., Yoshimura, T., Tarumi, H., Moriya, K., and Sakai, T.: "DigitalEE: A Support System for Collaborative Environmental Education Using Distributed Virtual Space"; Trans. of the Institute of Electronics, Information and Communication Engineers (D-I), Vol.J84-D-I, No.6, pp.936-946(2001).
- (8) Wang, H., Wu, Y., Tsukamoto, M., and Inoue, K.: "A Study of CAI System Based Chinese Language Learning Environment"; Trans. of the Institute of Electronics, Information and Communication Engineers (A), Vol.J75-A, No.9, pp.1516-1519(1992).

- (9) Kobayashi, R., Kawai, Y., and Tsukamoto, M.: "A Learning System for Support of Detecting Errors"; Trans. of the Institute of Electrical Engineers of Japan (C), Vol.115-C, No.2, pp.335-336(1995).
- (10) Tsukamoto, M., Kanemaki, M., Nozaki, S., and Kobayashi, R.: "Cartographic Information Processing Using Verbal Representation And Its Application to Support System for Decision of route"; Trans. of the Institute of Electrical Engineers of Japan (C), Vol.116-C, No.7, pp.875-876(1996).
- (11) Tsukamoto, M., Sato, H., and Kobayashi, R.: "Cartographic Information Processing Using Verbal Representation And Its Application to Support System for Reading Map"; Trans. of the Institute of Electrical Engineers of Japan (C), Vol.116-C, No.9, pp.1072-1073(1996).
- (12) Kobayashi, R. and Tsukamoto, M.: "Construction of Environmental Learning System for Support of Detecting Errors and Its Evaluation"; Trans. of the Institute of Electrical Engineers of Japan (C), Vol.117-C, No.5, pp.585-592(1997).
- (13) Tsukamoto, M., Matsumura, S., Takegawa, M., Kobayashi, R., and Inoue, H.: "Environmental Learning support system with Collaborative Learning"; Trans. of the Institute of Electrical Engineers of Japan (C), Vol.120-C, No.6, pp.895-896(2000).
- (14) Tsukamoto, M., Kobayashi, R., Takegawa, M., Inoue, H., and Miyasaka, K.: "Environmental Learning Support System Constructed by Using Computer Network"; Journal of the Japanese Society of Technology Education, Vol.42, No.3, pp.123-131(2000).