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ABSTRACT
              This paper presents a World Wide Web-based distance learning
system to support professional training for librarians. The system is taking
the place of a current training course that the National Institute of
Informatics (Japan) offers to university libraries nationwide. The course
offered is about a system to support interlibrary loan service and is made up
of multimedia information such as narration and animation. The course
features: repetitive and clear presentation of the current location of the
learner within the course; a simulator to learn operation of the system; and
learning modes that support stepwise learning. The initial evaluation showed
good acceptance of the distance learning system on the whole. (Contains 22
references.) (Author/MES)

A Web-Based Distance Learning System to Support Professional Training for Librarians

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Abstract: This paper presents a WWW-based distance learning system to support professional training for librarians and its initial evaluation. The system is taking place of a current training course that our institute offers to university libraries nationwide. The course offered by the system is about a system to support inter-library loan service, and is made up of multimedia information such as narration and animation. The course features: 1) Repetitive and clear presentation of current location of a learner 2) A simulator to learn operation of a system 3) Learning modes that support stepwise learning. The initial evaluation by questionnaire showed good acceptance of the system on the whole.

Introduction

The importance of education has been recognized anew globally. G8 Summit at Köln in June 1999 and G8 Education Ministers' Meeting at Tokyo in April 2000 were symbolic events. There the importance of lifelong learning and the importance of using information and communications technology in education were reconfirmed (G8 99)(G8 00). Research on distance learning has been active with the development and growth of information and communications technology, typically the Internet, WWW, and low-priced PCs. The circumstances are the same in Japan, but a great part has directed to elementary and secondary education. Some of the initiatives to elementary and secondary education were the 100-School Networking Project, the E square Project (Center for Educational Computing 99), and the "infomationization" of education in the millennium project(Prime Minister of Japan 99). The research and deployment of distance learning in other educational categories such as higher education and professional education are themes from now on. The higher education council organized by the Ministry of education, science, sports and culture (now the Ministry of education, culture, sports, science and technology) pointed out the importance of the provision of distance learning environment using information and communications technology (Monbusho 00). We have been conducting a research project of distance learning under those circumstances (Inoue 00).

This paper deals with a web-based distance learning system to support professional training for librarians and its initial evaluation. It is a practical research that uses an existing professional training. Also it is a project that shifts a training course in a room to a distance learning setting. Such a case will be increasing as distance learning becomes widely accepted.

The initial evaluation resulted in good acceptance of the system and the course on the whole. We could have a prospect that a use of distance learning to this type of professional training is possible through this case. Also we had many comments on our distance learning service.

An inter-library loan system and its training course are presented in the next section. Then a web-based distance learning system and its course are explained, followed by its initial evaluation.
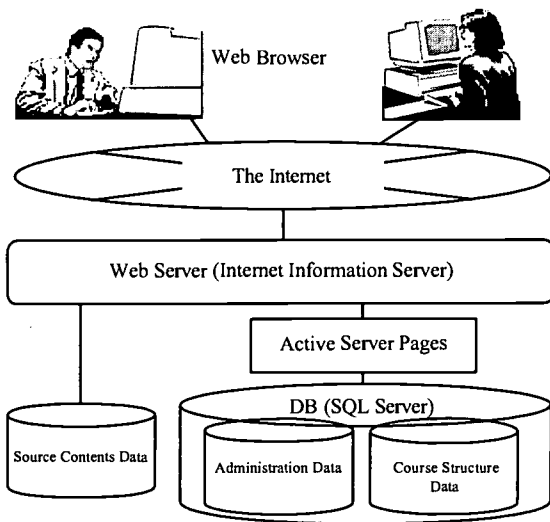
Figure1: System structure

Chapter	Contents
1	Overview
2	Catalog search
3	Copy operation
4	Loan operation
5	Request cancellation
6	Declination of a request
7	Inquiry of a request
8	Inquiry of requested documents
9	Request by reference files
10	Request without bibliographic record
11	Request to NDL or BLDSC
12	Participating organization files
13	Other operations
14	Appendix

Table 1: Table of the contents

Training Course of the Inter-Library Loan System

Our institute gathers, organizes and provides scholarly information and relevant systems nationwide. One of the tasks is catalog information service. The inter-library loan system is used to provide a part of the service. It supports to manage exchange of information that is needed when academic documents are exchanged between university libraries.

We have conducted a training course of the inter-library loan system, which offers lecture and practical training of the system to librarians. Current training course is 2-day course in a room Thus time and places for holding is limited. As a result, less than 60% of those who would like to take the course have been allowed. Booking a number of lecturers has been also a problem.

Web-Based Course of the Inter-Library Loan System

A web-based distance learning system has been developed to offer opportunity of the training widely. It is a self-paced learning system based on a commercial product. It has three-tier structure that uses a Web browser, Internet Information Server and Active Server Pages for the Web server, and SQL Server for the data base. The data base stores administration data and course structure data. The source contents are stored as HTML files, and are linked from the course structure data. The Active Server Pages script files control the system (Fig. 1).

The web-based course of the inter-library loan system succeeds the current training course in its contents. A textbook of the training course that has been revised many times so far is used as a base of the web-based course. The web-based course has the table of contents and has the structure of chapters, sections, and subsections. From the table of the contents, the chapters and the subsections are linked to the corresponding pages that enables users choose a specific topic directly. The contents are shown in (Tab. 1). Yet the course is enhanced by animation, video, and audio.

To learn the operation of the inter-library loan system is a major part of the training course. To know the whole figure of a job in advance is helpful when learning steps within. The course shows task flows and explains them before going into smaller steps. Specifically a whole figure of a job is shown and is explained in the beginning of a chapter, because typically a chapter corresponds to a job. Then a page such as (Fig. 2) is shown in the beginning of each section. Here the figure on the right is the same as presented in the beginning of a chapter. More detailed explanation for a procedure, which is a part of a job, is given in a section. In the figure, a procedure to be explained is a highlighted arrow on the right. The procedure is represented as a sequence of tasks, which are shown on the left, and is explained step by step with animation and narration. A learner is able to locate himself/herself in a way of learning because of this clear and repetitive presentation of whole figure.
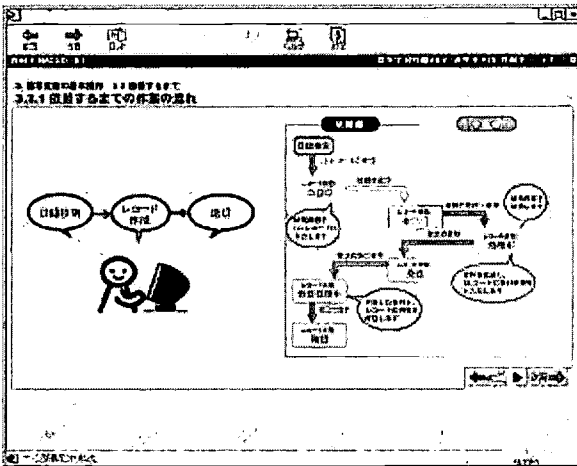
Figure 2: Explanation using a task flow

Figure 3: Instruction in the lecture mode

Figure 4: Instruction in the guided mode

The course has three modes of learning, which are lecture mode, guided mode, and practice mode. In the lecture mode, the objective and outline of each chapter is explained. The operation is instructed by animation and narration. A learner learns passively in this mode. (Fig. 3) is an example. An exercise is given in the upper left. On the right is a screen of the inter-library loan system that shows the answer operation by animation. The instruction is presented on the bottom left by text and narration. The lecture mode is followed by the guided mode and the practice mode in the sections to learn operations of the system. In these modes, a learner can practice several exercises including the ones that are presented in the lecture mode by using a simulator of the inter-library loan system. The use of the simulator corresponds to a practice that uses the inter-library loan system in the current training course. (Fig. 4) is an example of the guided mode. An exercise is given in the upper left. The simulator that is on the right allows operations such as input to the blanks from a keyboard, selection of options, and putting the buttons. The screen changes to the next screen by the correct operation to the simulator. An error message window that prompts another try pops up by the wrong operation. Clicking "the operation guide" button on the bottom left calls the guidance window.This interactive environment is intended to give a learner a real learning experience. The guided mode is the same with the practice mode with the guidance window in implementation. Typically a learner begins a exercise without guidance first. When he/she is stuck on the way of the operation, he/she may call the guidance window and follows the instruction there to complete the operation. Each learning mode is intended to relate closely so a learner can progress gradually by himself/herself.

Pre test and post test are placed at the beginning and at the end of the course to assess learner's achievement by the course. The course also has exercises that are located at the end of each chapter and an comprehensive examination that is located at the end of the course. They have marking function.

Initial Evaluation

Initial evaluation of the system was conducted. Total of 34 subjects (10 men and 24 women) from 19 university libraries participated as a learner. This section describes the result as well as the improvement afterwards.

Method

The subjects filled out a web-based questionnaire after use of the system. The number of the items of the questionnaire was 15 including affiliation, name, the sections of the course you went through. Other 12 items are shown in the left side of (Tab. 2). Both structured questions that used five-point Likert-like scale and open-ended questions were applied to the questions about usability and the course.

Two thirds of the subjects went through the whole course, and most of the subjects went through more than a few chapters. The subjects were classified in terms of experience of the inter-library loan system. Majority of those had experience over a year, while rest of those were novices. Appraisal by experienced users was considered to be useful because they knew what was important for actual work and what should be learned in the course. Appraisal by novices was useful as well because they were the prospective users of the system.

Usability

"Mouse-base usability" concerns clicking operation by a mouse to move between pages. "Good" and "Neutral" were most selected. Some users would like to use short keys for buttons.

"Good" was most selected in "Narrative explanation." Repeating from the start was the only function to listen to the narration in a page. There were requests for a function to stop at and repeat from any part of the narration. A stop button was added to each page then. There was a comment that it might be a case that a course with sound like this was undesirable when used in actual work environment. We thought this was worth listening. Its situation of use should be considered when designing a course. Design of a course is not closed within the course.

"Very good" was most selected in "GUI appearance understandability." There was a comment that a repeat button of narration was not easy to find. It was a triangular icon between two arrow icons for the previous page and the next page.

"Neutral" was most selected and "Long" was also selected by several subjects in "Duration before narration." It seemed to depend much on the network conditions.

Contents of the Course

Time required

"Less than 3 hours," the shortest choice, was most selected in the "Time required for the course." It was the same as in the "Average time required for a chapter." "Less than 0.5 hours" was most selected. Wide range of choices was prepared considering that the current training course use 2 days. However more useful result might be gained if there were choices in shorter range. The relation between "inter-library loan experience" and the "time required for the course" in (Tab. 3) shows that experienced subjects tended to use shorter time than novices. Yet even novices use much shorter time than 2 days. It is known that self-paced CAI system such as this decreases learning time compared to class lecture (Yamamoto 97), although the biggest reason of the result is supposed that this use was not for actual learning but for evaluation of the system. Additionally, the net time required for the course, the time only for listening the narration once that does not take network conditions into account, is shown in (Tab. 4).

Inter-library loan system experience	None	Less than 3 months	Less than 6 months	Less than a year	More than a year
	8	1	1	2	22
Time required for the course	Less than 3 hours	Less than 6 hours	Less than 12 hours	Less than 18 hours	More than 18 hours
	23	10	1	0	0
Time required for a chapter	Less than 0.5 hours	Less than 1 hours	Less than 1.5 hours	Less than 2 hours	More than 2 hours
	25	8	1	1	0
Mouse-base usability	Very good	Good	Neutral	Poor	Very poor
	7	14	12	1	0
Narrative explanation	Very good	Good	Neutral	Poor	Very poor
	10	15	7	1	1
GUI appearance understandability	Very good	Good	Neutral	Poor	Very poor
	16	3	5	0	0
Duration before narration	Very short	Short	Neutral	Long	Very long
	0	2	18	8	6
Difficulty of the contents	Very difficult	Difficult	Neutral	Easy	Very easy
	0	1	31	2	0
Difficulty of the expression	Very difficult	Difficult	Neutral	Easy	Very easy
	0	2	32	0	0
Difficulty of pre/post test	Very difficult	Difficult	Neutral	Easy	Very easy
	1	2	31	0	0
Difficulty of exercises	Very difficult	Difficult	Neutral	Easy	Very easy
	0	1	30	3	0
Difficulty of comprehensive examination	Very difficult	Difficult	Neutral	Easy	Very easy
	0	1	31	2	0

Table 2: Result of the questionnaire

Time required for the course	Inter-library loan system experience: None	Inter-library loan system experience: More than a year
Less than 3 hours	4	16
Less than 6 hours	3	6
Less than 12 hours	1	0

Table 3: Relation between inter-library loan system experience and time required for the course

Chapter	Time (sec.)
0 (Start page)	25.4
1	585.1
2	428.0
3	670.6
4	819.6
5	229.7
6	227.9
7	315.4
8	314.5
9	160.2
10	138.7
11	665.1
12	139.2
13	228.3
14 (Appendix)	N/A
Total	4947.7

Table 4: Minimum time required

Difficulty

"Neutral" was most selected in each of "Difficulty of the contents," "Difficulty of the expression," and "Difficulty of the examination." Succession of the contents from the current training course was highly appraised. The task flows were evaluated highly as useful for understanding. In the each job of inter-library loan, a learner could be the one who send a request or the one who receive a request. We had a comment that a novice was often confused by the nature that was essential for an exchange. So we changed the background color according to the sender's side or the recipient side of a request to make the distinction clearer. It also appreciated. The examination was evaluated affirmatively on the one hand in that a learner could realize his or her own understanding. On the other hand, it was demanded to change to show explanation to the result and to show the referential part of the course.

Conclusion

Distance learning, which is getting popular, does not mean to make a big gap between conventional education in terms of the things learned. It is more likely that the contents do not change even if the form or the expression of the contents changes. This is applicable to the research presented in this paper. We explained how we had been changing our professional training course into the form of web-based learning. Development of the web-based distance learning system was carefully conducted especially in its course design. Specifically we applied a few ideas that would help learners master the contents easier. They were repetitive and clear presentation of the current location in a whole procedure, the use of a simulator of the actual system, and the application of stepwise learning modes. The course design was not totally new, but was improved substantially based on the current training course and its textbook. The course produced through such a procedure was not surprisingly fantastic, but was easy to accept for the users. It is thought to be one of the reasons that the contents of the course gained good evaluation.

From the result of the initial evaluation, we could conclude that web-based distance learning is a realistic solution to make professional training like this widely available. Besides, we could get many comments. Some of them clarified a couple of important points that should be considered when providing distance learning services. One thing was that it was currently necessary to take the network conditions into account. Those who selected "Very long" in "Duration before narration" also mentioned that point. It showed that it was important not to wait. The other was that a learner felt the course monotonous when he or she takes it continually. Long-time continuous use was often seen because the use was for evaluation this time. However it would be applicable generally. Because it is different from something that could be solved by using multimedia, it is desirable for example to give opportunities to suspend learning in the course.

Although the subject of this research is professional training of the inter-library loan system, the course elements employed in this research such as a task flow, a simulator, and a learning mode could be applied to a similar course that contains routine operations. This type of training course is presumed to be fairly common.

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