Practice of Installation by Apache System and learning Perl Language by Group Work

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Abstract – We developed a self-study system using Perl language. Students of department seminars and graduate schools must understand tasks ranging from installation of Apache and Perl to maintenance of CGI and servers. Furthermore, students' progress by distance learning is initially slow. We therefore support their study using a distance learning system including blended learning.

Recently, students show difficulties working cooperatively and sharing programs by work jointly. Finishing programs independently is difficult. Therefore, after using a self-study system for teaching students, we analyzed practical problems and effects of group learning. Results revealed that distance learning facilitates knowledge acquisition, but finishing programs independently is difficult. It is extremely important to use mutual teaching and regular communication with students. When active discussion, cooperation, and differing opinions among students are present, new software ideas can take shape more effectively. Nevertheless, group collaboration can also limit a student's freedom of expression of individual ideas. We report the importance of balancing student collaboration with individuals' freedom to make their own decisions. After receiving too much instruction, students' ability is inferior in terms of self-solution. If a teacher is supportive at appropriate times, then independence and ability to find solutions can be enhanced. This report clarifies our results.

Keywords: Apache, Perl, Group work, e-Learning, Programming, Module combination, e-Collaboration

1 INTRODUCTION

In recent years, growing interest has arisen in the progress of information and communication systems, high-speed networking, and multimedia environments. Software development has become large-scale and complicated. Consequently, independent systems are increasingly rare. Student skills related to system design and communication are not good. We must consider learning system which exploits group communication and iteration of practice, in order to develop good quality software.

During co-operating software development, the same thing must be taught repeatedly for it to become practical knowledge. We produced a distance education system that can instruct students repetitively. But it is difficult to complete a program using this distance learning system alone. When a group work technique is used with this distance learning system, it can function effectively.

2 PROBLEMS AND PRESENT CONDITIONS

2.1 Problem of remote education system

From the beginning, remote education systems have presented the problem of whether or not the learner is well accustomed to accessing the necessary media electronically. The learner is isolated: aside from the learning system itself, they can contact only an instructor. Therefore, the learner is usually apprehensive, wondering if the system will behave as expected, if it possible to use the system as expected, and if it is possible to access the necessary contents associated with the received lectures.

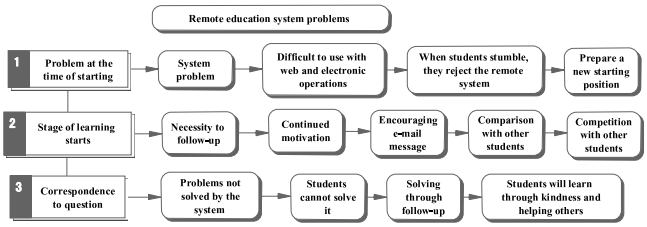

Figure 1: Problem of remote education system

2.2 Problem of group learning

We describe the ability, technique and knowledge by which the individual stands as displayed below. (See Fig. 2)

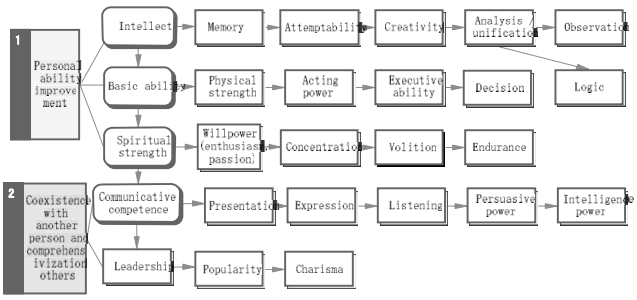

Figure 2: Ability, technology, and knowledge.

After teaching the student through lectures and seminars, we noted a particular problem to the student that we showed below. Primarily, many students cannot concentrate continuously. Concentration does not continue throughout lecturing and seminars. Some students instead surf the net, playing games that grab their interest. Secondly, many students lack self-expression and self-assertion. Moreover, when arguing with another person, students have little patience. Failure to comprehend another's opinion is an inferior ability. Thirdly, they fail to practice independence and self-restraint. They cannot make a plan and need assistance to help them determine a topic for their graduation thesis. Their tolerance for stress is poor. They are unable to bear problems and excessive pressure. Furthermore, they give up immediately and do not attend the university. To deal with these problems, it becomes important for a learning person to make positive behaviors a daily habit.

To deal with these problems, we consider a system that considers using group work technique. Three points of superiority exist by which group learning can be compared with individual learning.

(1) Students raise their intellectual power through argument among groups and learn deepened understanding.

(2) When students interact with other groups and communication, a reinforcement effect takes place, with confirmation of mutual understanding and understanding of self.

(3) When students listen to announcements of other groups, they improve their own understanding and can make a deep evaluation through the process.

3 SYSTEM OVERVIEW

This system comprises basic software ideas from design to programming through learning programming [1][2] . In addition, students learn applications from the basics of programming using Perl language. They learn an argument and communication through a combination and a process of a program among groups. This system has a characteristic by which learners can experience acquisition of important points when they mutually participate in a program.

This system is supported by both Linux and Windows (Microsoft Corp.) operating systems[3][4]. The student accesses the web browser via a personal computer. Students start forward learning, personal learning, and group work by virtue of learning support and communication support. The degree of understanding is shown by solving the issue of confirmation. Learners and lecturers can communicate. Learners can examine a function of a language using a database. This System of Group Work is presented in Fig. 3.

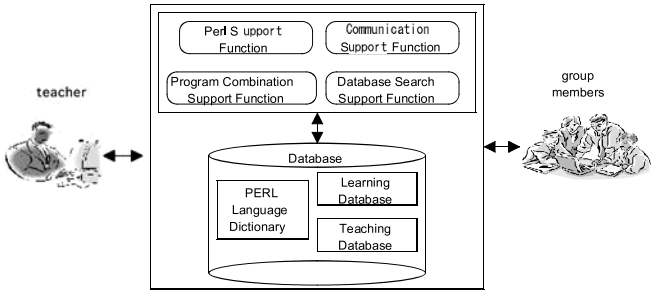

Figure 3: Group work system.

3.1 Support function and usage

(1) Perl language support function

When students resolve a problem of a fundamental program, the system then checks their result. Each of the students can confirm when he completes a program. When an error exists, an error message is sent using the system. Students arrive at a right answer when they revise a program using it.

· Usage of the Perl language

The program classifies items and displays a step-by-step process on how to use Perl language functions. Each function is then displayed entirely, making it easier to examine the parameter. The main functions are printf, scanf, if-else, array, for, and while.

· Exercise to understand The Perl Program

This exercise confirms what contents were understood by the student from using the Perl explanations given. The exercise is selective and provides a percentage representing the degree of comprehension.

· The Perl Program Exercise

This displays both the Perl program's mock validation exercise and the implementation section. Step 1 consists of validation. It displays the content (e.g., the parameters and results of the program). After the students input their functions into the text field, they can confirm the entry by running the program.

When students do not comprehend the basic function, an example answer is displayed. They can confirm it through this step, which creates a simple explanation that is sufficiently clear for a novice programmer to comprehend. Step 2 consists of an implementation in an exercise form. They can experience a mock implementation and debugging of a complicated program. These ideas are displayed in Fig. 4.

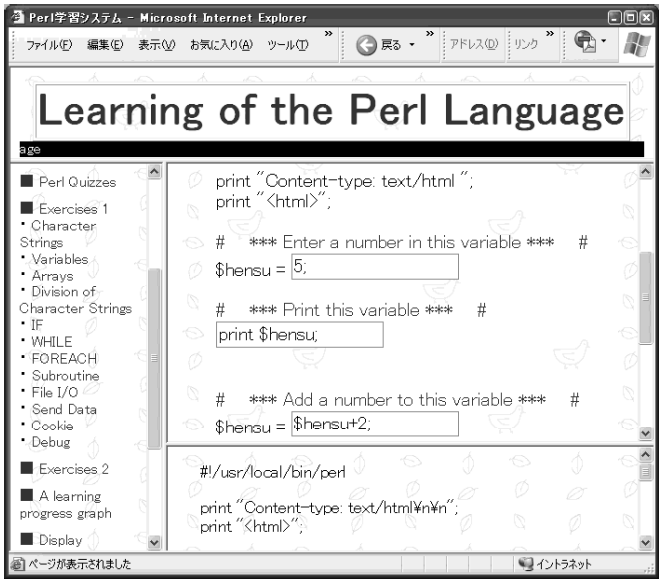

Figure 4: Supporting page of Perl language.

(2) Communication support function

· Discussion Board Q&A

This section is used for the teacher and students to exchange questions and information each other. This section also enables the teacher to respond or create messages. The background color of the page is changed when a new message is arrived in order to alert the students.

· Message Exchange

This section carries sent questions and other information exchanges on a peer-to-peer level. Even with encrypted mail addresses, messages can be sent with a user-defined nickname.

· Mail transmission function and data exchange[5][6]

· Mail receiver function

· Mail transmission and history function

· Learning schedule setting and communication function

(3) Instructor support

As pointed out in the previous section describing the problem, it is important to support the learner at the initial stage. Additionally, maintaining the learner's high motivation is important. Some way must be sought to establish good communication among learners and the instructor. Especially when the learner fails to understand the received lecture, the learner must be supported with inquiries about the matter. If not, a learner might lose the desire to continue learning later. For that and other reasons, it is necessary to provide a function for the learner to examine all questions on an electronic bulletin board, for example, and to search for any one of them when necessary. In addition, it would be necessary to support learners who are not good at sending questions to the bulletin board by providing a function enabling them to communicate with the instructor individually using e-mail, for example.

On the other hand, for work such as installing a piece of software like Apache, we might encounter such a problem that merely acquiring knowledge would be insufficient to accomplish it. In such cases, real-time learner support given from the instructor or such a blended learning system that combines the remote education system with support from the instructor would be efficient.

For example, in case the Apache installation fails to function even after checking with such notes as shown in Table 1, the next step to be provided would be a way to allow the learner to use the electronic bulletin board to discover why it does not work. A further approach would be necessary for the learner to move on to the next step to communicate with the instructor directly by asking questions in a real-time environment if the problem were not resolved after that.

Table 1: Items to check when installing Apache

Items to verify after Apache installation	
1	Is Apache working properly, or is it in a state of START or STOP?
2	If Apache is working, then rewrite the config.conf file or replace it with provided one. Subsequently, START the Apache after it is STOPped once.
3	To determine whether Apache is working or not, one can try executing "index.html" of the public.html folder specifying "http://localhost/index.html" in the browser's address field.
4	If it is not working properly after going through the step described in 3 above, the installation might be incomplete, the "httpd.conf" file is not properly replaced, or it is might not have been replaced by the pre-provided one. Then, it must be re-done.
5	If an error occurred even when the pre-provided "httpd.conf" was given, the learner needs to check whether the apollo, public_html folder is created or not. If not, it must be created.

3.2 Support for module

This support function programming technique lets learners practice basic program linking to enable the learner to experience test trials to learn how to link modules.

Listed below are the practice steps to be followed.

· Practice of maintaining data integrity

· Practice of correcting programs for linking

· Practice of multi-program linking as a test trial

Following are further descriptions for practice.

(1) Practice of maintaining data integrity

This is provided to the learner to learn to show points of caution when exchanging data between modules. Every learner is expected to join a group for this purpose; everyone in the group is expected to enter variable names or real numbers that come to mind. Through this process, among other things, the learner is expected to learn how important consistent variable names must be used in a specification document.

(2) Practice of a correcting programs for linking

The learner practices programming for module linking by giving the learner a program for use to link some modules in which at least one error is included intentionally. Consequently, the learner must correct the erroneous portion

to finish the module linking. In this practice lesson, a mode of giving special attention was provided, by which the color of the program line number changed when the learner corrected the wrong line mistakenly, or when the learner put wrong information on a line, even though the line number itself was correct.

(3) Practice of multi-program linking as a test trial

The learner is provided with a program in which some program statement portions are intentionally missing. The learner is then expected to complete the program to make it work properly while simultaneously reviewing and checking the associated specification. The program is intentionally missing an important portion as to exchange data when linking modules. Then the learner is expected to complete such an incomplete program, thereby learning the importance of data structures taken when modules are linked.

4 GROUP WORK PRACTICE

4.1 Period and method

We used a seminar method and a distance learning system for third-year students of our department[7][8]. The period was four months. The contents that we used were shared with three groups and used as described below. We divided 10 students into three groups with 4, 4, and 3 members.

First, the installation of Apache and the Perl language are expected to be done on the local server. Thereby, the learner is expected to understand how and in what combination the Perl language would work with the Apache server as a system overall. Such a work of understanding would include a problem for which knowledge that the learner has acquired is not sufficient. In other words, support from the instructor is necessary: otherwise, the problem might be difficult to resolve unless a quick response to the questions the learner might have is given through a blended learning technique.

Subsequently, on the premise of understanding C language, students learn about the relation between HTML and CGI. Students learn themselves through self-study about a Perl language function that is supported by Perl language. For the next month, students learn the basics of Perl language to file access. Then they understand the entire Perl language. They learn basic information about connections among programs using a program combination support function[9].

Students started group work seriously in the third month. First, they chose a leader among the members. Next, they argued among groups, and decided the subject of the program they wanted to make. In these circumstances, they learned using this support system, along with communication through mail and chat facilities. Seminars were held twice a week.

4.2 Contents and results

After they argued about which program to make among groups, they chose a title and performed basic specifications design. They decided the charge part of a program among members after having determined an external design and user interface. Students designed the data structure of programs of the charge program. Each member wrote the documentation. After each program that they debugged was completed, they combined the programs and reached completion.

They chose "(1) A bulletin board that recorded an access history; (2) An electronic shopping lacing braid purchasing system; (3) A Web page that combined touch typing with a game".

All groups confronted difficulties related to input and output of a file by CGI and a combination of programs. Programs were finished through group work. They were improved through a combination of a program to arriving at high technology through a generation process. Standardization and documentation were improved at a certain level by this practice as well.

Figure 5 presents a bulletin board screen sample.

Figure 5: Sample screen for an e-Shopping Mall purchasing system

5 QUESTIONNAIRE RESULT AND EVALUATION

· Questionnaire contents

The learning support ability of Perl was evaluated. It differed according to the students' programming level. Students showed difficulty understanding some complex examples. It is a reference with documentation and standardization. Communication via the internet is effective for transmission of knowledge, but it is difficult to explain the complex contents concretely. Therefore, it is necessary to explain complex ideas using not only text, but also animation. Additionally, it is difficult to convey one's feelings in words.

Students are reluctant to ask other class members to review or critique course assignments. However, students excelled when practicing consultation and communication. Total communication improved by having performed group work. Actually, Perl's structures and mechanisms helped to activate group cooperation. Students learned about

documentation before and practiced it. Therefore, their consciousness was high. The necessity of documentation seems to have been realized again at the time of group work.

This is the result that asked a question for ten students. Table 2 presents questionnaire items and their respective count results. The items were rated on a scale of 1–5. Mean ratings were calculated.

Table 2: Questionnaire items and results

	Question item	Last result
Group	Helping each other?	4.1
	Amaong members good output?	3.4
	Communication between members	3.9
	Cooperation between members	4
	Problems about members	2.2
Program	Programming	2.8
	Debugging	2.4
Ability for basics	Ability for completion	2.9
	Responsibility	3
	Concentration	3.1
	Continuation power	2.7
Documentatio Other	Documentation	3.3
	Understanding	3.1
	Planning	2.7
Communicativ competence	Did the communication improve?	4.2
	Did the presentation improve?	3.3
	Did the persuasive power	2.7
	Did the listening closely	3.6
Free opinion		

· Evaluation and consideration

These results are expected to raise the awareness that remarkable room for improvement exists in peer-to-peer communication. Additionally, they collaborated to produce a program through an exercise; they learned cooperation with a program of a person and difficulty when they joined. Furthermore, they understood that a document was affected greatly by the communication and connection of a program. The students themselves noted the importance of their documentation; their improved motivation was noteworthy. The course items of documentation, communication, and listening were particularly well learned.

That the learner is always given correct instruction somehow without fail when failing to understand a point is extremely important. A blended learning approach gives learners a secure feeling in addition to helping the learner to have a more aggressive feeling for learning.

Because we used both electronic media and communication, students reached completion that was mutually supplemented by different learning resources.

6 CONCLUSION AND POTENTIAL

Fundamentally, learning for the learner requires that a student be provided with tools to learn independently. How can a system support that goal? It is true that studying in a group using a remote learning system or some associated supporting functions would be helpful for knowledge acquisition, but it would not be sufficient to master all aspects of a topic. We recognized that group teaching and group learning, and especially discussion with the group, were very efficient. We also noted, however, that such electronic communication increases problems of miscommunication from an emotional perspective. However, that problem was resolved through face-to-face communication that was available in a seminar held twice a week.

Further work in this area will develop a system that can support systemic learning by addressing electronically caused communication gaps and which can fix a group-working framework appropriately. Accomplishing those goals demands an appropriate system support that helps learners to think independently. The author plans to develop such a system to support such instruction as described, in addition to a system to support instructors as they produce guidelines and advice that are available for use in more efficient ways than ever.

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