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A LEARNING ACTIVITY SUPPORTING SYSTEM FOR LONG-STAYING HOSPITALIZED CHILDREN

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1. Introduction

Under the requirements of Japanese Fundamental Law of Education, every Japanese child has a duty to study for at least nine years. However, some children cannot pursue their education in a traditional classroom setting because of long-term hospitalization. It is necessary to guarantee learning opportunities for sick children that include so called in-hospital classes, taking into consideration a suitable manner of education that meets the needs of their disease conditions [1].

Patients hospitalized for long periods of time at the age of compulsory education (6-15 years old in Japan) can compensate for missed lessons by studying in "hospital classrooms", which can commonly be found in large Japanese hospitals with pediatric wards and in children's hospitals. Nearby elementary and junior high schools dispatch teachers who hold lessons in the hospital classroom [2]. To support this kind of learning activity and to help teachers, doctors, nurses and parents monitor the child's educational and health condition during their hospital stay, we designed and developed an educational support system we named "KOCHI". "KOCHI" is an abbreviation of "KOdomo no tomodaCHI". This "KOCHI" System was developed for Saga University Hospital.

2. Design method

To develop the "KOCHI" System, we used the Waterfall Model, a systematic, sequential approach to software development that begins with customer specification of requirements; progresses through planning, modelling, construction, and deployment; and culminates in ongoing support of the completed software [3].

For the modelling of the system, we used Data Flow Diagram (DFD) to map out the flow of information for any process within the "KOCHI" System.

3. Design and Construction

Based on the models above, the first step of development was to analyze the requirements / needs of the system based on the user specifications. Thus, we interviewed the doctor, teacher, parent, and child. From this interview, we obtained essential points, as follows;

1) For every school level (particularly Elementary School and Junior High School) there is at least one teacher working in the hospital
2) A classroom is designated in the hospital for learning activities. But if the patient is in such severe condition,as to be prohibited from going to the classroom, the teacher will come and teach at their ward.
3) Physical books are still the most common learning resource.
4) There is a weekly meeting between the teacher and the doctor in which they share information about the patient's condition

Based on the results above and our basic concept, we designed a "KOCHI" System consisting of educational and communication parts. The educational part focuses on supporting the learning activity between the child and teacher to enhance the characteristics of the learning activity to be done in the hospital. In our design, it has three subparts: an index of materials, quizzes, and educational games. The communication part focuses on supporting communication among the teachers, doctors and parents. It has two subparts: peer to peer consultation and a report feature. Figure 1 shows the system structure.

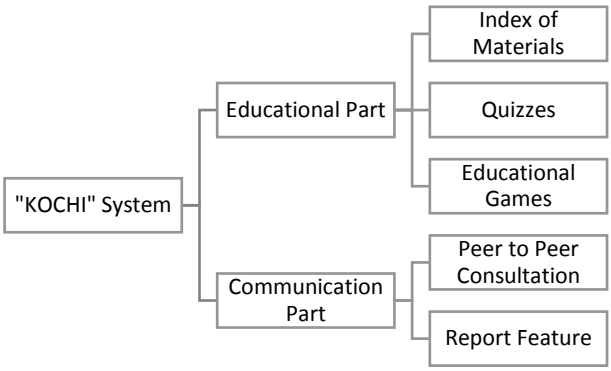

Figure 1. The Structure of the "KOCHI" System

As the first component of the educational part of the prototype system we choose Mathematics. Because the target child was a 4th-grade elementary school student, the substance of the subject needed to be adjusted so that it would fit the condition of the child.

We focused on two parts of the system at this time: educational games and the educational part itself. For the construction of the educational system, we used a Laravel Framework, and for the construction of the educational games Construct 2 was used.

The current status of our construction of the "KOCHI" System is as follows:

- The Index of Materials page has been made and translated into Japanese.
- Two educational games, for Chapter 6 and Chapter 12, have been built.
- Quizzes for Chapters 4 and 12 have been made.

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4. Evaluation

We evaluated the "KOCHI" System prototype at Saga University Hospital with one doctor and one elementary school teacher who work in the hospital.

Based on time limitations due to the tight schedules of the doctor and teacher, we took steps to adjust to the conditions in the hospital. First, Introduction. In this step we introduced the "KOCHI" System to the doctor and teacher and explained what we accomplished to date. Second, System Trial. In this step, the teacher and doctor used the educational and communication functions while teaching the student, and the teacher tested the games. Third, Evaluation. After the doctor and teacher use the system, they answered questions that we provided. The questionnaire consisted of both open and simple answer questions.

The last step was a discussion in which we talked about their experience with the system and in which they explained the condition of the child and expressed their hopes for the "KOCHI" System.

5. Evaluation Results

From this evaluation, we obtained positive, negative, and constructive responses.

The results of teacher's evaluation (Table 1) showed mostly positive responses. There are also three constructive responses. The results of the doctor's evaluation (Table 2) included various responses.

Table 1. Teacher's Evaluation

Section	Question Type		Response
	Closed	Open	
Materials Page	7	1	2 "Strongly Agree", 5 "Agree", 1 constructive
Quiz	7	1	3 "Strongly Agree", 4 absolute "Yes", 1 constructive
Educational Games	10	1	4 "Strongly Agree, 3 absolute "Yes", 3 absolute "No" 1 constructive

Table 2. Doctor's Evaluation

Section	Question Type		Response
	Closed	Open	
Educational Part	2	4	2 "Strongly Agree", 1 absolute "No" (negative), 4 constructive

6. Discussion

The design of "KOCHI" follows the restrictions and characteristic of a learning activity test done in Saga University Hospital. One of the biggest restrictions is that there is no internet connection in the patient rooms of the children's ward. Internet connection only exists in the hospital classroom and in the staff room. A problematic aspect of the learning activity was that when children can't go to the classroom due to their physical condition, the teacher has to go to the child's room and teach them there. Due to the above conditions, we designed the educational part of "KOCHI" in such a way that it would be accessible while offline. This is the most important problem in this research that we had to solve.

The results of the evaluation showed a variety of responses gleaned from the evaluation process, positive, negative, and constructive responses. Most of the responses were positive. Most importantly, from the results of the evaluation we were able to gather information that allowed us to revise the "KOCHI" System to make it more effective. The results show that the "KOCHI" System would be a useful learning aid for use in the hospital.

7. Future Works

Based on the evaluation results, there are some projects to be done in the near future, as follows.

a. Developing the communication part
b. Developing the educational part into a subject area other than mathematics
c. Develop a "KOCHI" System based on the regulations and restrictions of Indonesia

We hope that the "KOCHI" System will become a useful learning activity for children hospitalized for long periods of time.

8. Conclusion

"KOCHI" is an educational support system that presents learning activities for use in hospitals that helps teachers, doctors, nurses, and parents monitor a child's educational and health condition during their hospital stay. The prototype of this system was evaluated by a doctor and a teacher in a hospital setting. There were positive, negative and constructive responses in the results of the evaluation. From the evaluation results, we can conclude that the "KOCHI" System would be a useful learning activity for hospitalized children. In the future, we hope that the "KOCHI" System can be used in other countries, such as Indonesia, based on the regulations and restrictions of the country of use.

Acknowledgment

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