Evaluation of Integrated Learning using NHK's Web Site "OKOME"

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Abstract: "OKOME" or "rice" is a digital course material on the Web produced by NHK (Japan Broadcasting Cooperation). "OKOME" course materials are designed so as to combine the TV program, Web sites and Video database that are provided by NHK and activities or real experiences that depend on each school or class. With the start of the distribution of these digital course materials in April 2001, a research team was formed to evaluate the effect of these materials. 13 elementary schools were appointed as pilot schools and various data from these schools have been collected. In this paper, data from those schools were analyzed to examine pupils' change before and after a year-long integrated learning. Three tests were used: "Image map test", "Words test" and "Questionnaire for research planning". The comparison of the data between the pretest and posttest showed that the children's quantitative and qualitative knowledge and initiative attitude toward research and presentation were promoted through the course. Further research questions concerning evaluation of long-term integrated learning are discussed.

Keywords: Full-Digital materials, TV program, Web site design, Elementary school, “OKOME”

1. What is “OKOME”?

“OKOME”, which means “rice” in Japanese, is the first digital course material for Integrated Study for the fifth to sixth grade children (10 to 12 years old) produced by NHK (Japan Broadcasting Corporation). “OKOME” course material was provided in two ways, through TV broadcasting and through the Internet, which was started in April 2001.

“OKOME” focuses on rice, which is Japanese staple diet and the most important agricultural product. As rice can be discussed in relation to many aspects like science, agriculture, environment, local community, culture, festival, health, cooking and so on, each school or child can choose a specific topic of their interest. The topic “OKOME” was chosen to serve as a common theme for various activities in the “Period for Integrated Study”, which was added from April 2002, to Japanese primary and secondary school curricula.

2. The contents of “OKOME”

The overall structure of the “OKOME” full-digital material is shown in Figure 1 (Ujihashi, et al, 2002). There were four main parts in the “OKOME” Web site: (1) Review the TV Program, (2) Video Clips, (3) Internet, and (4) BBS. Each of these parts will be described below:

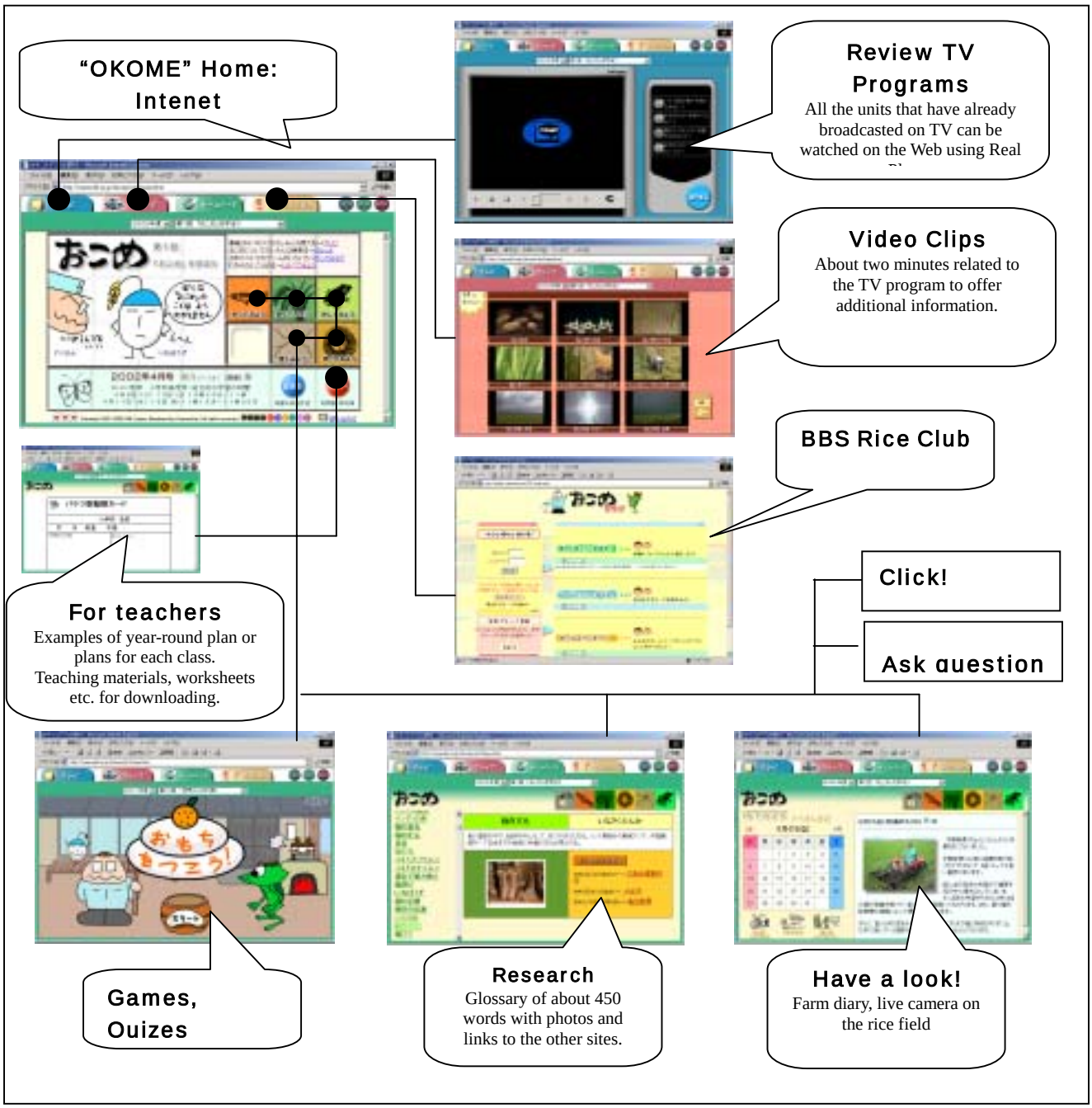

Figure 1 Map of "OKOME" Web Site (NHK, 2001-2)

(1) Review the TV Program: There were 15 minute-long 20 programs throughout the school year. All the "OKOME" TV programs were made available using Real Player on the file server only at the 13 pilot schools during the school year 2001-02. In April 2002, "OKOME" became one of first 5 educational programs that were made available to the general public via NHK's public Web site.

(2) Video clips: Adding to the TV programs provided through the Internet, video database with about 200 video clips on the themes of rice, each about two minutes in length, could be watched on the Web.

(3) Web: "Try!" provided diverse quizzes and games using many pictures and animation. "Research" had a glossary of about 450 words with photos and links to the other sites.

"Click!" contained some questions for children to vote. "Ask questions" allowed children sent their question about rice to get answers from the cooperators or NHK staffs.

(4) BBS "Rice Club": Created to promote large and high quality collaboration between distant classrooms with four types of BBS (Inagaki, et al, 2001).

3. Pilot Schools and Access Log Results

With the start of the distribution of "OKOME", 13 elementary schools from all over Japan were appointed as pilot schools to measure the effects of the digital material, which was called "OKOME 13 Schools Project". In those pilot schools, all the Web contents were placed on the file server at each school and the utilization of digital course material was encouraged. A log data collection mechanism was built into all of the file servers provided for the 13 pilot schools. Each time the Web site was used, all the clicks were recorded so that the names of file (page) and duration of its uses would be kept in record. The purpose of this data collection was to see how much information provided in each file was utilized and in what patterns of combinations.

Table 1 shows overall access log data during September 2001 – March 2002. A total of 25,000 accesses was recorded during 7 months at 10 of the 13 pilot schools. Proportion of access to TV was 9.1%, Clips 16.6%, Web 45.7%, and BBS 28.5%. Most schools used Web the most, but School C used clips the most, and School E and G used BBS the most. The differences were found due to the nature of activities each of the schools undertook. The Web site was used most heavily in October, 2001 (about 6,200 access). The peak hours were during 10:00-11:00 (about 4,500 access) and during 13:00-14:00 (about 4,200 access). Web contents associated with broadcast program prior to September 2001 were also used during the period that access log data was recorded. A long-term utilization of Web contents was seen, that suggested that the Web was used to review the contents related to the TV programs, even long after the broadcast.

Table 1: Access Log Result (September 2001- March 2002)

	# of PCs*	Total Access	TV	Clips	Web	BBS	Close
Total of all pilot schools	250	24,899	2,084	3,791	10,448	6,518	2,058
Proportion (%) *3		100%	9.1%	16.6%	45.7%	28.5%	-
School A	43	7,406	556	982	3,478	1,634	756
School B	40	3,467	424	352	1,934	494	263
School C	21	2,832	239	966	839	572	216
School D	20	2,828	328	357	1,033	787	323
School E	11	2,603	81	423	625	1,375	99
School F	19	1,508	227	158	819	236	68
School G	11	1,254	26	93	101	964	70
School H	18	1,194	17	118	678	162	219
School I	42	1,163	130	231	641	141	20
School J	21	630	56	105	298	153	18
School K*2	4	14	0	6	2	0	6
School L	No Data	0	0	0	0	0	0
School M	No Data	0	0	0	0	0	0

Note: *1: Number of PCs represents PC numbers in access log, not entire numbers of PCs of that school
*2: Accesses were made during night, not by pupils.

4. Evaluation Team and Methods of Student Data Collection

Evaluation team was formed for “OKOME 13 Schools Project”. Data from these 13 schools have been collected and analyzed from diverse points of view. Beside the Web log data, three types of test were conducted to see the changes before and after the year-long activities related to “Okome”: “Image map test”, “Words test” and “Questionnaire about research planning.” Each test was given two times in the same school year for comparisons. These test data were collected in 15 classes of 9 schools out of the 13 pilot schools.

4.1.Image Map Test

“Image map test” was originally developed by Mizukoshi et al. to evaluate the ability to learn with audiovisual aids. It is based on the assumption that (1) the internal image can be reflected on the map made by a learner in which the learner arranges all the information received from the audiovisual aids, (2) the changes in the internal image of the learner can be shown in the changes of the maps.

The process of the test was as follows:

(1) The key word (“Rice” in this case) is written in the center of two concentric circles.
(2) A respondent writes words associated with the key word on the internal circle as many as possible.
(3) A respondent writes words on the external circle, which are associated with the words on the internal circle, and connect the associated words on the internal and the external circle by line.

10-minute limit was set for writing all the responses. Figure 1 shows a blank form used for “Image map test”.

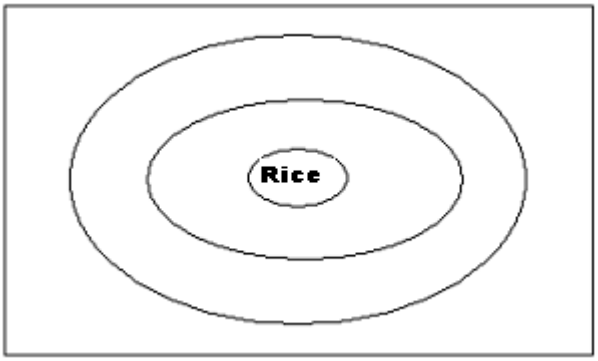

Figure 1. Blank form for “Image map test”

The data collected from “Image map test” can be analyzed from three points of view: “Fluency of idea”, “Spread of idea” and “Structure of idea”. “Fluency of idea” stands for quantitative increase of the image, as measured by the total number of words appears on the image map. “Spread of idea” stands for qualitative spread of the image as measured by the

number of categories. "Structure of idea" indicates to what extent the image of the learner was formed structurally, as measured by the total number of categories appears on the external circle and the number of multi-links between the internal and external circles. Multi-link means that there are more than 2 words on the external circle linked to the same word on the internal circle. The data from a pilot school collected in April 2001 and in July 2001 were analyzed from these three points of view and reported elsewhere (Kurokami, et. al., 2002), and "Fluency of idea" was analyzed for all of participated schools for this report.

4.2.Words Test

"Words test" was given to evaluate pupils' subjective understandings of the terms related to rice. Thirty (30) words, such as "rice planting", "breed improvement", "drought", "agricultural cooperative association" etc., were selected for the test from "OKOME" Web contents, 10 words from each three areas: farm work, agricultural culture, and agricultural economy. Children evaluated their understanding by themselves by choosing "I can explain it", "I know it" or "I don't know it" for each word. Pretest and Posttest data were compared.

4.3.Questionnaire about Research Planning

"Questionnaire about research planning" was used to measure the shift in the knowledge, the interest, and the attitude toward research and presentation. In this questionnaire, pupils were asked when "potato", instead of rice, would be the target of the research:

Q1 What detailed theme do you choose for your research?
Q2 How do you plan to carry out your research?
Q3 How do you plan to present the results of your research?
Q4 How do you tell the results of your research to your friends living in a foreign country?
Q5 Which do you prefer, to study by yourself, or to be taught by your teacher, or to study in both ways?

5. Results and Discussion

5.1. "Fluency of idea" from "Image map test"

Figure 2 shows the average number of words appeared on the image map in each class as they were measured during the 4 3-month periods: April-June, 2001, July-September, 2001, October-December, 2001, and January-March, 2002. As activities related to "Okome" progressed the fluency of idea increased. The average of class averages of the words in the map increased from 14.6 words (*SD*=4.3) in the 12 tests conducted during April-June period, to 33.4 words (*SD*=11.4) in the 10 tests during January-March, 2002. All the classes that reported test scores in pre-activity period (April-June, 2001) and post-activity period (January-March, 2002) had an increase in class average scores: the average increase to be 302.8%, the minimum increase to be 134%, and the maximum increase to be 575%. Pupils had wider and more fluent images of "Okome" at the end of the year, compared to the beginning of the year.

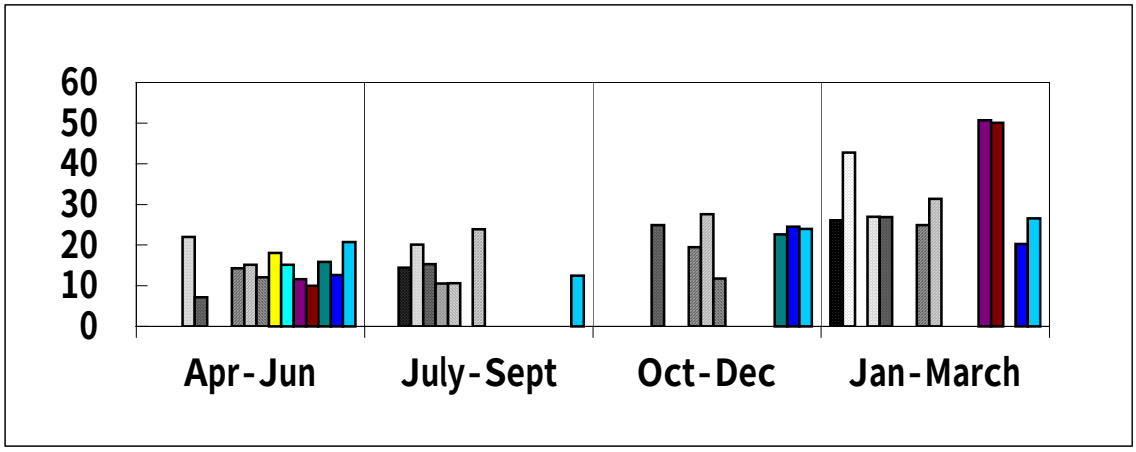

Figure 2. Comparison of number of words appeared in the image map by class averages

5.2.Analysis of “Words test”

Figure 3 shows the overall changes in the percentages of self-evaluated words understanding, for a total of all the words of the all classes. Sixty-three (63) percents were unknown words prior to the activities, whereas 28% were unknown words at the end of the year. The portion of “I know the word” increased from 26% to 40%, and the portion of “I can explain the word” also increased from 11% to 32%. The average point of “Word test” increased from 47.3 points (*SD*=7.0) in the 4 tests conducted during April-June period, to 105.1 points (*SD*=33.1) in the 9 tests during January-March, 2002.

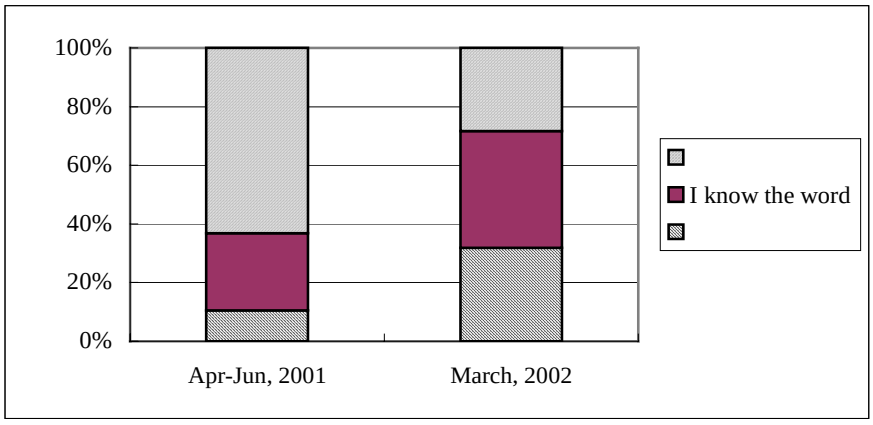

Figure 3. Self-evaluation of word understanding (the total of 30 words and all the classes)

5.3.Analysis of “Questionnaire about research planning”

Data from four classes (116 pupils totally) were obtained both pre- and post- activity periods. By comparing the answers of the questionnaires during Apr-June, 2001 and during January-March, 2002, following points were found:

1) More students mentioned “computer” and “Internet” as means of research after the course. (54: before, 81: after) (Q2)
2) In one class, many students mentioned “Poster session” and “Presentation (using computer software)” as means to present the results of research after the course (9: “Poster session”, 13: “Presentation”), while no student had mentioned those before. The number of pupil increased who mentioned not only what medium they used for presentation, but also the points they should keep in mind for presentation (23: before, 44: after) (Q3)
3) As methods to tell the results of research to friends living in a foreign country, the total number of methods that pupils listed increased from 125 to 168. The number of electronic means such as “Internet”, “Video conference”, “E-mail”, “BBS” etc. was also increased. (43: before, 64: after) (Q4)
4) The answers to the question “Which do you prefer, to study by yourself or to be taught by your teacher?” are shown in Figure 4. The children’s initiative attitude towards research or study was progressed after the course. No child answered “Only by teacher” at the end of the year. (Q5)

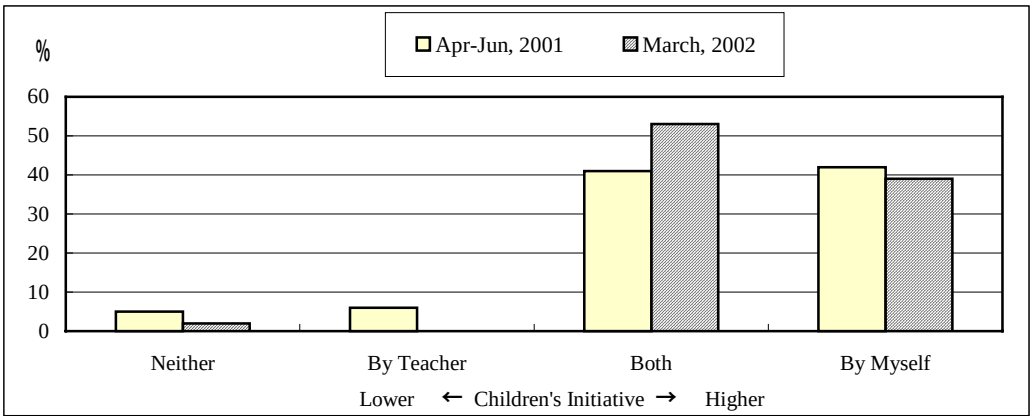

Figure 4. Shift in the initiative attitude for independent learning

6. Conclusion

In this paper, the data using three types of test from a pilot school showed that pupils’ images of the subject they studied became more fluent as measured by the Image map test. Also shown were the increases of their subjective understandings of the words related to the theme OKOME, and of their willingness for independent learning when another topic was hypothetically assigned in the integrated learning. These changes were presumably brought by learning OKOME with NHK’s digital course material, although a comparison group would have confirmed our hope in a surer manner.

From “Image map test”, the expansion in children’s knowledge was shown not only quantitatively but also qualitatively and structurally. This method of evaluation showed possibilities of capturing pupils’ changes as learning progresses. It can be used how much a certain activities foster pupils’ images, if it is administered just after such an activity. It can also be used to capture changes in a longer period, as used in this study. Since it takes time and energy to analyze the results from the test, it would be helpful for more frequent utilization of this test to have a semi-automatic tool for analyzing the data.

The fact from “Word test” that the children’s knowledge about the terms increased even in the words that was not mentioned in the class suggests that children used the contents on the Web sites or video database when they pursued their own learning activities. Their answer “I can explain this word’ does not necessarily mean that they actually can explain it in a expected manner. However, it does reflect their confidence that they can explain well. Although more objective measurement would be needed to verify accuracy of pupil’s own evaluation, it is sure that pupils became more confident in their understanding, which in turn would give them motivation for more independent learning. Shift in children’s initiative attitude towards research was shown in “Questionnaire about research planning”, which may have indicated such increase in their confidence. At least it suggests that “OKOME” digital material and the class activities combined with it were received favorably by the pupils.

Besides “OKOME”, NHK had made 4 more education series fully available on line, starting in April of 2002. Using the evaluation scheme described in this paper, and some expansion of evaluation methods, the effects of such digitalization or expansion of educational broadcast programs with the Web were investigated for the year 2002-3. It is our hope that conducting evaluation will not only make clear the effects of the new materials, but also help teachers evaluate their pupil’s progresses as they go along, so that they can use such evaluation data to make their practice more effective at the end.

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