

# Educational Practice of Information-Literacy Education in Special Schools

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**Abstract:** In this study, 255 examples of teaching in the area of *joho kyouiku* (information-literacy education) in special schools were analyzed. The analyses were conducted from the following perspectives: 1) type of disability, 2) educational subject, 3) educational content, 4) educational methodology, and 5) educational outcomes. Interpretations of results, current states of the educational practice of information-literacy in special schools were discussed. Finally, efforts to improve the teaching of information literacy to meet the educational needs of children with disabilities are presented.

**Key Words:** Information-literacy education, Special schools, Educational practice

## I. Purpose

Information-literacy education utilizing computers will be expanded in the new courses of study implemented from 2002. Thus, the enhancement of information-literacy education for students with disabilities has become an important issue in the area of special education.

The Ministry of Education (now Ministry of Education, Culture, Sports, Science and Technology) published the results of its 1999 survey on information-literacy education in public schools<sup>2)</sup>. The results revealed that in FY1999, 100% of schools for the visually impaired, 100% of schools for the hearing impaired, and 99.5% of schools for the otherwise disabled had computers installed. The average number of units was 25.9 for schools for the visually impaired, 23.1 units for schools for the hearing impaired and 13.3 units for schools for the otherwise disabled.

Moreover, 75% of schools for the visually impaired, 76.9% of schools for the hearing impaired and 56.2% of schools for the otherwise disabled had Internet access.

On average, 33 types of software were used at schools for the visually impaired, 37.9 types at schools for the hearing impaired and 39.1 types at schools for the otherwise disabled. The proportion of software purchased was 91% at schools for the visually impaired, 86.5% at schools for the hearing impaired and 88.6% at schools for the otherwise disabled. Conversely, the proportion of teacher-developed software was 3.1% at schools for the visually impaired, 5.4% at schools for the hearing impaired and 6.7% at schools for the otherwise disabled. With respect to improvements made in hardware and software, which are the foundation of information-literacy education, the results of these surveys show that improvements are being steadily made.

At special schools, where the infrastructure for

information-literacy education is already in place, what steps were taken to utilize computers?

Nakamura (1997) carried out an analysis of the utilization of computers and the introduction of multimedia at special schools<sup>3)</sup>. He analyzed survey data collected by the National Institute of Special Education on research implemented each year by schools for the visually impaired, the hearing impaired, and the otherwise disabled as well as by prefectural centers for special education and educational research institutions. He then proposed that distinctive features of research issues addressed can be observed in accordance with the type of school. At first, there were many Braille-related issues at schools for the visually impaired, whereas, the addition of captions to videotapes, the presentation of picture cards for linguistic instruction and software development through arithmetic and mathematics drills could be observed at schools for the hearing impaired. In addition, since a newly invented method of inputting became the focus of schools for children with physical and motor disabilities, the development of software to meet these inputting means could also be observed. At schools for children with intellectual disabilities, despite various issues, it was suggested that in many cases the motivation of learning could be enhanced by utilizing computers. At schools for the health impaired, there were many issues associated with the learning of subjects, therefore issues concerning the utilization of personal computers as a communication tool were observed.

It is pointed out that the distinctive features of such research issues in accordance with the type of school could be observed through the approaches taken by the special schools, and we can therefore infer that research topics are created to meet the educational needs of students who attend these various types of schools.

Now that information-literacy education in special education is being promoted, and if we can assess efforts taken by special schools using computers, it might be of some benefit when examining the directions for improving future information-literacy education.

In due consideration of such recognition, from the viewpoint of approaches that must be taken to meet the needs of children with disabilities at special schools on a nationwide scale by focusing on the answers to practical models of computer instruction, which are regarded to be part of the “Survey on Implementing Conditions of Information-Literacy Education at Various Special Schools” conducted in March 1999, the purpose of this study is to examine the types of steps being taken in computer utilization.

## II. Method

### 1. Subject of Analysis

The subject of analysis in this study was data from practical models of instruction utilizing computers taken from the “Survey on Implementing Conditions of Information-literacy Education at Special Schools” conducted as part of the “Basic Study on Curriculum Development for Children with Disabilities Adaptable to an Advanced Information-Oriented Society”.

A total of 983 special schools were targeted by the survey in March 1999, and the major survey contents included the number and type of computers, their usage in computer-based instruction, the hardware and software improvements, use of the Internet, and teacher training.

In this survey, responses were obtained from 797 schools in total, including 59 schools for the visually impaired, 89 schools for the hearing impaired, 388 schools for children with intellectual disabilities, 142 schools for children with physical and motor disabilities, 83 schools for the health impaired, and 30 schools where several types of services were provided. In all, 81.1% of those surveyed responded.

The subject of the analysis was the response data for Question 15 of the survey: “If you have any practical models for instruction utilizing computers, please give details.” This question asked subjects to provide a description of the disability of the children, stage of education, subject areas/subjects, instructional content, and instruction methods and effects.

There were 255 responses to this question in total, 18 from schools for the visually impaired, 28 from schools for the hearing impaired, 98 from schools for children with intellectual disabilities, 58 from schools for children with physical and motor disabilities, 41 from schools for the health impaired, and 12 from schools where several types of services were provided.

In some of the responses, several practical models were described in a single answer, and if clear patterns could be identified, they were treated as individual practical models.

Furthermore, these practical models were published in March 2001 for use as reference materials for the “Basic Study on Curriculum Development for Children with Disabilities Adaptable to an Advanced Information-Oriented Society”<sup>1)</sup>.

### 2. Analysis Method

#### 1) Description of Practical Models

The description of practical models includes a description of the disability of the children and stage of education to which the children belong.

Children were categorized as either visually impaired, hearing impaired, intellectual disabilities, having physical or motor disabilities, health impaired, or having multiple disabilities.

However, in the responses from schools for the visually impaired, since the categories were more detailed, and included such classifications as partially sighted and blind, their responses were also classified according to partially sighted or blind.

The description of the stage of education was summarized by classifying the responses into kindergarten (3-5 years old), elementary (6-11 years old), lower secondary (12-14 years old) and upper secondary education (15-17 years old). When a description of several stages of education was provided, each individual stage of education was categorized as one case.

#### 2) Subject Areas/Subjects

In the responses to subject areas/subjects, the types of approaches utilizing computers and subject areas/subjects were described. In the description for this item, some responses described subject areas/subjects. In such cases, the names of subject areas/subjects are included. In addition, the descriptions of *seikatsu-tangen gakushu* (learning based on life activities) and *sagyo gakushu* (learning based on work activities) were classified as instruction integrated subject areas/subjects.

Moreover, in the responses concerning subject areas/subjects *yougo-kunren* (nursing and training activities) were mentioned. In the new national curriculum standards, the subject area was renamed as *Jiritsu Katsudou* (activities for independence), however, during the implementation of the survey the new national curriculum standards were not yet in effect. Therefore, *Yougo-Kunren* was used, which was what it was called at the time of the survey.

When several subjects were described as one practical model, each subject was categorized as a single case.

3) Instructional Contents

In the responses concerning instruction contents, approaches taken toward computer utilization were described.

A short title describing the contents of individual responses was provided. Then, all the titles were categorized.

4) Instruction Methods

Responses on instruction methods described the type of instruction provided for utilizing computers.

From these responses, we extracted and accumulated information on the type of software utilized, devices utilized, and means of obtaining information. When several types of software and information devices were described as one practical model, each was categorized as a single case.

5) Effects

The items covering effects include a description of approaches taken using computers.

These descriptions were classified into the following categories according to the aspect most affected by learning.

- Improved understanding.
- Enhanced interest.
- Improved motivation.
- Improved skills.

If one practical model fell under several categories, several categories were selected. In the case of total categorization, each one was considered to be a single case. When responses on the effects did not fall under any of the above categories, a summary was provided.

**II. Results and Discussion**

**1. Approaches Taken by Schools for the Visually Impaired**

1) Practical Models at Schools for the Visually Impaired

The practical models were divided into ten cases for partially sighted, eleven cases for blind, and three cases where no description of partially sighted or blind was indicated.

Responses for each stage of education are shown in Table 1.

**Table 1: Number of Responses for Practical Models at Schools for the Visually Impaired**

Stage of education	Number of Cases
Elementary	8
Lower secondary	5
Upper secondary	9
No description of stage of education	2

1) Subject Areas/Subjects

Answers concerning subject areas/subjects are shown in Table 2.

For approaches taken in science, which was the most common subject areas/subjects, there were four cases for partially sighted and one case for blind. By stage of education, there were two cases for elementary and three cases for upper secondary.

For approaches taken in *yougo-kunren* (nursing and training activities), which was also the most common subject areas/subjects, there were two cases for partially sighted and three cases for blind. In terms of the stage of education, there was one case for elementary, two cases for lower secondary, one case for upper secondary and one case where no description of the stage of education was indicated.

**Table 2: Number of Responses for Practical Models by Subject Areas/Subjects at Schools for the Visually Impaired**

Subject Areas/Subjects	Number of Cases
Japanese Language	3
Social Studies	1
Science	5
Industrial Arts and Home Economics	2
Foreign Language	1
Commerce	1
Special Activities	4
<i>Yougo-Kunren</i> (nursing and training activities)	5
Indefinite subject areas/subjects	2

2) Instructional Contents

Figure 1 shows that there were more than two cases in the total categorized contents of approaches taken at schools for the visually impaired.

In one case, the following contents were observed; study of the natural environment, astronomy, key inputting, study of characters, statistical calculation, and preliminary study of school trip (*shugaku ryoko*).

As shown in Figure 1, the most common practical model at schools for the visually impaired was “composition”, followed by “research” and “free activities utilizing computers”.

For the most common practical model “composition”, there were two cases for partially sighted and four cases for blind. There were two cases for elementary, one case for lower secondary and three cases for upper secondary. Furthermore, by subject areas/subjects, there were three

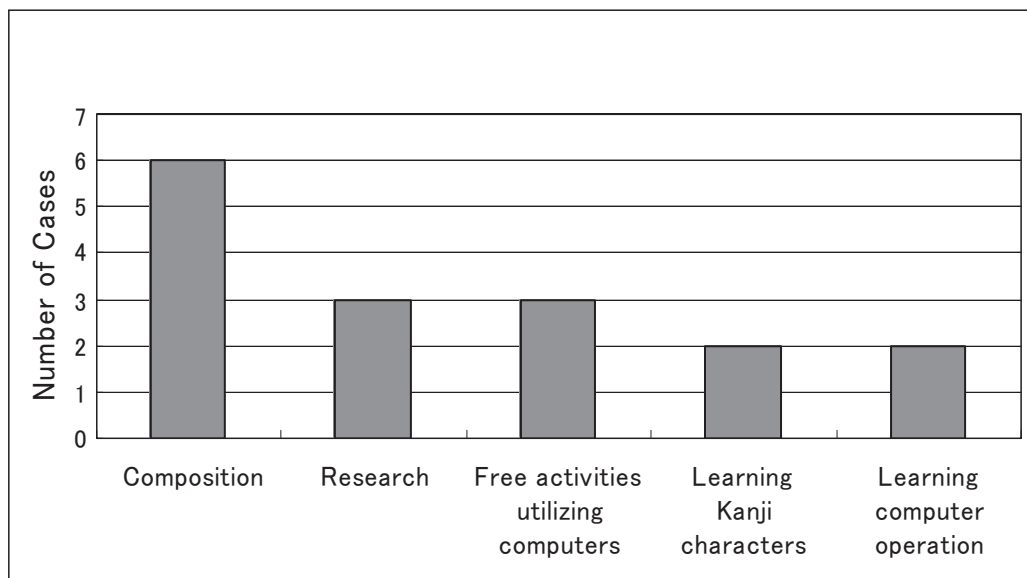


Figure 1: Contents of Approaches in Practical Models at Schools for the Visually Impaired

cases for *Yougo-Kunren* (nursing and training activities), two cases for Japanese language and one case for commerce.

3) Instructional Methods

Figure 2 shows that there were two or more responses related to software and information devices in practical models at schools for the visually impaired.

In one case, the following contents were observed: utilization of educational software, utilization of image

processing software, utilization of screen magnification software, utilization of Japanese language dictionary software with sound information, utilization of game software, utilization of key inputting practice software, utilization of word processing software, and utilization of e-mail.

As shown in Figure 2, the most common practical models at schools for the visually impaired were “utilization of Braille translation software” and “surfing the Web”. As mentioned earlier, these results support the top ranking contents “composition” or “research”.

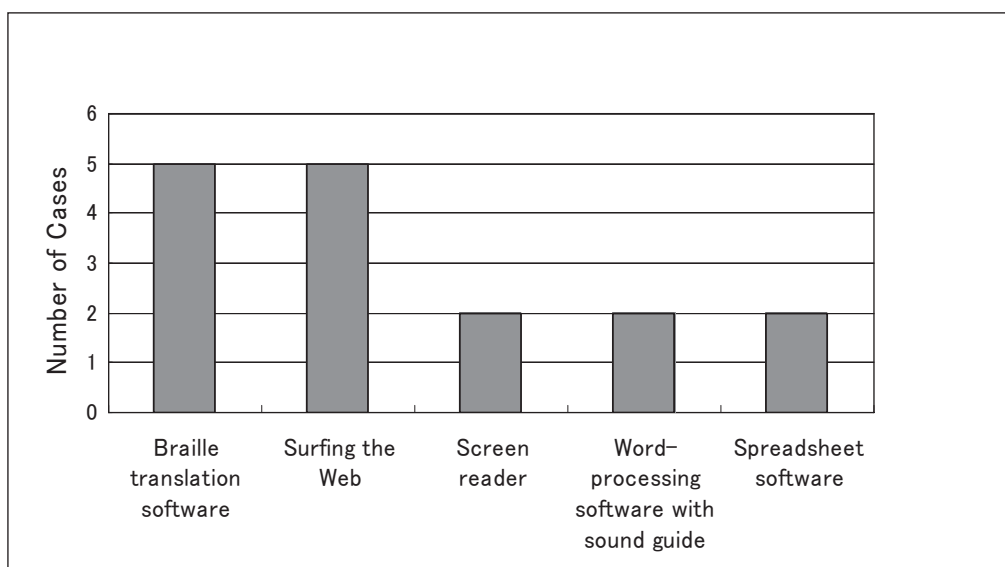


Figure 2: Software and Information Devices Utilized Practical Models at Schools for the Visually Impaired

For the most common content, “utilization of Braille translation software,” there were four cases for blind and one case where partially sighted or blind was not indicated. By stage of education, there were two cases for elementary, one case for lower secondary and two cases for upper secondary. In addition, by subject areas/subjects, there were two cases each for special activities and *Yougo-Kunren* (nursing and training activities) and one case for Japanese language.

For “surfing the Web”, which was also the most common content, there were two cases for partially sighted, one case for blind and two cases where partially sighted or blind was not indicated. By stage of education, there were four cases for upper secondary and one case where the stage of education was not indicated. When examining subject areas/subjects, there were two cases for science, one case each for social studies and foreign language, and one case where subject areas/subjects was not indicated.

4) Effects

Figure 3 shows the results for the effects of practical models at schools for the visually impaired.

Other points included the following.

- Effective as a method for presenting teaching materials.
- Attitude of self-learning was cultivated.
- Students were amazed.
- Enjoyable.
- Not very effective due to limited lesson time.

As shown in Figure 3, the effect “better understanding” was the most common for practical models at schools for the visually impaired.

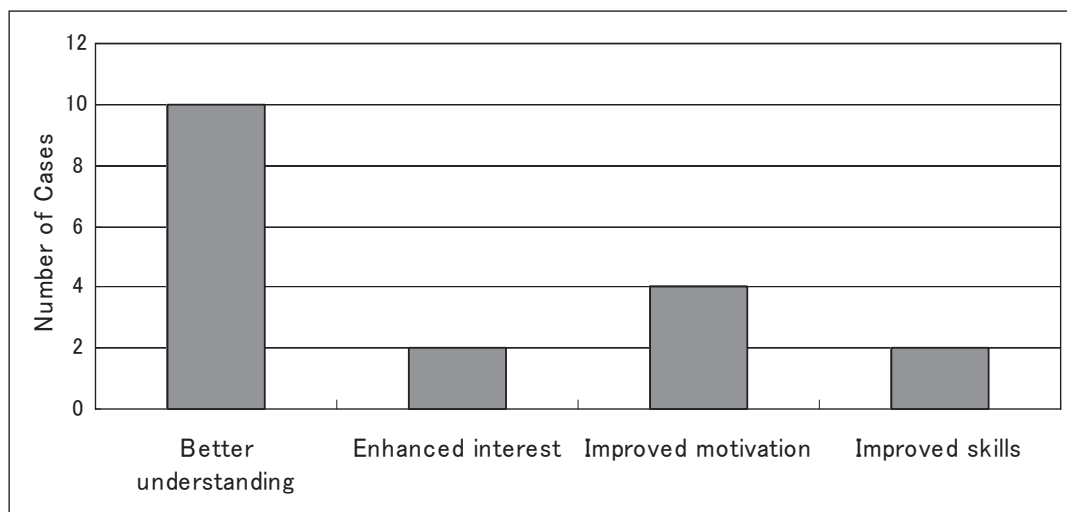


Figure 3: Types of Effects of Practical Models at Schools for the Visually Impaired

For responses classified as “better understanding” there were three cases for partially sighted and seven cases for the blind. In terms of stage of education, there were four cases for elementary, two cases for lower secondary, two cases for upper secondary, and two cases where the stage of education was not indicated. There were two cases each for Japanese language, science, industrial arts and home economics, and *Yougo-Kunren* (nursing and training activities), one case for foreign language, and one case of indefinite subject areas/subjects. From these, we could see that the response “better understanding” covered a relatively wide range of subject areas/subjects.

2. Approaches Taken by Schools for the Hearing Impaired

1) Practical Models at Schools for the Hearing Impaired

Twenty-five practical models were classified into hearing impaired and three models into multiple disabilities.

Responses by stage of education are shown in Table 3.

Table 3: Number of Responses by Stage of education for Practical Models at Schools for the Hearing Impaired

Stage of education	Number of Cases
Kindergarten	1
Elementary	9
Lower secondary	10
Upper secondary	7
No description of stage of education	2

2) Subject areas/subjects

Responses concerning subject areas/subjects are shown

in Table 4.

For the most common subject, science, there were five cases for elementary, three cases for lower secondary, and one case for upper secondary.

**Table 4: Number of Responses by Subject Areas/Subjects for Practical Models at Schools for the Hearing Impaired**

Subject areas/subjects	Number of Cases
Japanese Language	1
Social Studies	3
Arithmetic	2
Science	8
Drawing and Handicrafts	1
Physical Education	1
Industrial Arts and Home Economics	4
Foreign Language	1
Commerce	5
Special Activities	1
<i>Yougo-Kunren</i> (nursing and training activities)	3
Indefinite subject areas/subjects	2

3) Instructional Contents

Figure 4 shows that there were two or more cases in all categories of approaches at schools for the hearing impaired.

In one case, the following contents were observed: learning to express an intention, research, newspaper

preparation, preparation of event records, calculation study, introductory learning and review of arithmetic, learning about the human body, learning about sound, collection of works, utilization to present information, communication study through e-mail, operation of image processing and illustration software, inputting and editing of letters and image data, learning for effective utilization of hearing, language and number games, sex education, and preparation of research materials on various issues.

As shown in Figure 4, the most common practical model at schools for the hearing impaired was “astronomy”.

When we examine “astronomy” by stage of education, there were three cases for elementary and one case for lower secondary. In all the above cases, the subject area/subject was science.

4) Instructional Methods

Figure 5 shows two or more responses for any category of software and information devices utilized in practical models at schools for the hearing impaired.

In one case, the following contents were observed: use of e-mail, projectors, and text editors.

As shown in Figure 5, the most common content was the utilization of educational software, followed by the utilization of digital cameras.

When examining the “utilization of educational

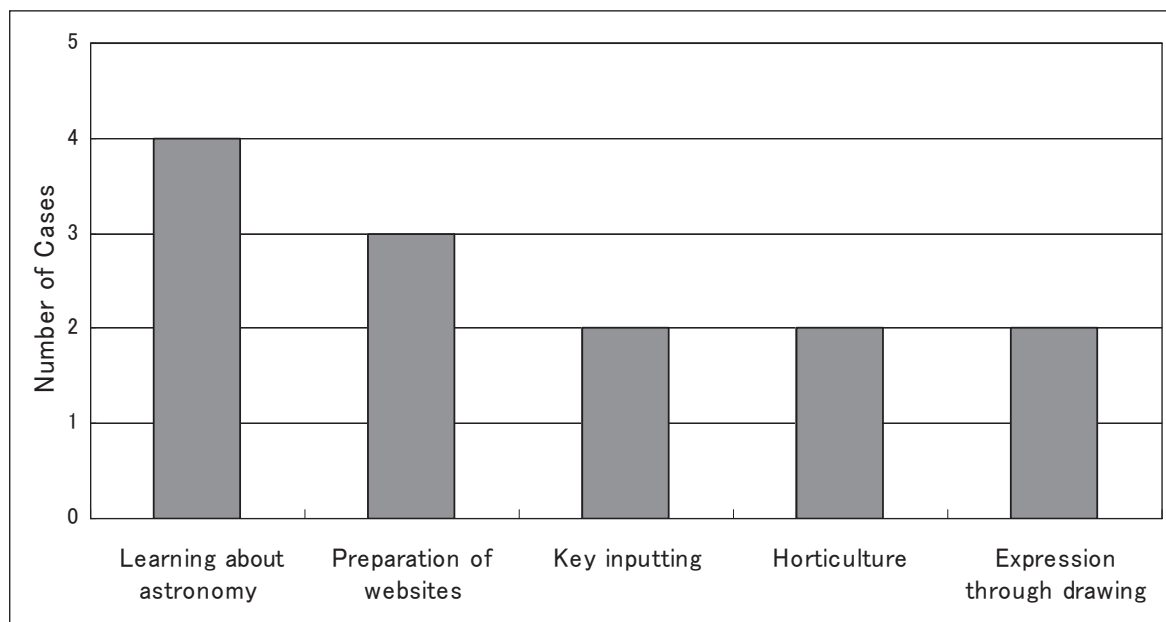


Figure 4: Contents of Approaches in Practical Models at Schools for the Hearing Impaired

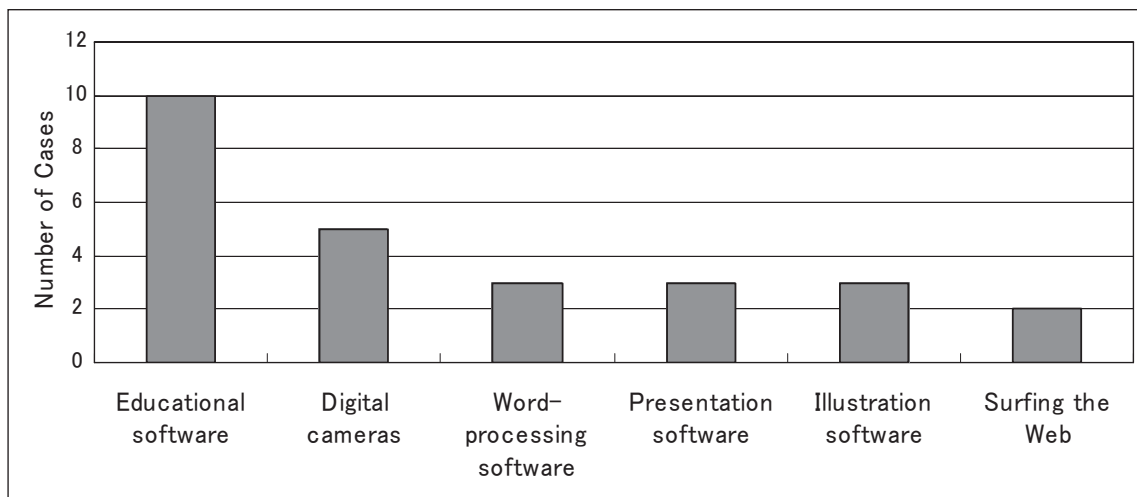


Figure 5: Software and Information Devices Utilized in Practical Models at Schools for the Hearing Impaired

software” by stage of education, there was one case for kindergarten, seven cases for elementary and two cases for lower secondary. By subject areas/subjects, there were five cases for science, two cases for arithmetic, and one each for physical education, *Yougo-Kunren* (nursing and training activities), and indefinite subject areas/subjects.

For “utilization of digital cameras” there were three cases for elementary, one case for lower secondary and one case for upper secondary. By subject areas/subjects, there were two cases for science, and one each for Japanese language, industrial arts and home economics, and indefinite subject areas/subjects.

5) Effects

Figure 6 shows the results of the classification of the effects of practical models at schools for the hearing impaired.

Other descriptions included the following.

- Feeling of satisfaction.
- Impressed by the huge display.

As shown in Figure 6, responses classified as “enhanced interest” were the most frequent. When we look at the response “enhanced interest” by stage of education, there were two cases for elementary, four cases for lower

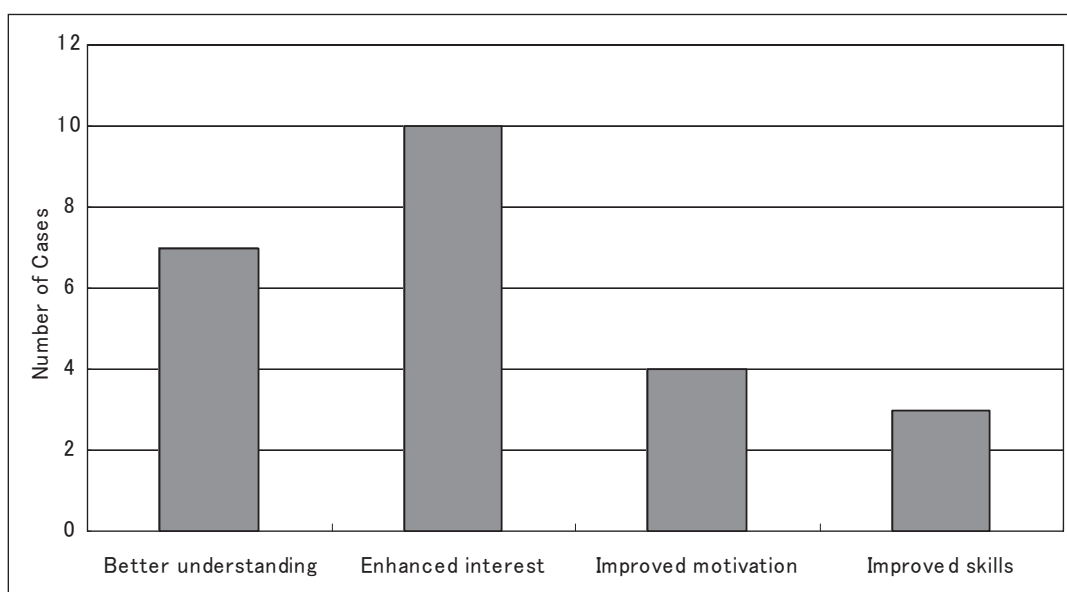


Figure 6: Types of Effects of Practical Models at Schools for the Hearing Impaired



secondary, and four cases for upper secondary. By subject areas/subjects, there were two cases each for social studies, industrial arts and home economics and commerce, and one case each for arithmetic, science, drawing and handicraft, physical education, foreign language, and indefinite subject areas/subjects. From these results, we could see that the response “enhanced interest” covered a relatively wide range of subject areas/subjects.

**3. Approaches Taken by Schools for Children with Intellectual Disabilities**

1) Practical Models at Schools for Children with Intellectual Disabilities

There were ninety-seven cases of practical models classified into intellectual disabilities and two cases classified into of physical and motor disabilities.

Responses related to the stage of education are shown in Table 5.

**Table 5: Number of Responses Related to Stage of Education for Practical Models at Schools for Children with Intellectual Disabilities**

Stage of education	Number of Cases
Elementary	16
Lower secondary	17
Upper secondary	36
No description of stage of education	32

2) Subject Areas/Subjects

Responses related to subject areas/subjects are shown in Table 6. As shown in the table, the most common was for instruction integrated subject areas/subjects, followed by Japanese language.

For instruction integrated subject areas/subjects, there were four cases for elementary, six cases for lower secondary, eleven cases for upper secondary and eight cases where the stage of education was not indicated.

For Japanese language, there were six cases for elementary, four cases for upper secondary, and six cases where the stage of education was not indicated.

**Table 6: Number of Responses Related to Subject Areas/Subjects for Practical Models at School for Children with Intellectual Disabilities**

Subject areas/subjects	Number of Cases
Japanese Language	16
Social Studies	2
Arithmetic	6
Mathematics	6
Science	2
Music	3
Drawing and Handicrafts	1
Arts	4
Home Economics	1
Vocational	2
Manufacturing	1
Commerce	2
Special Activities	13
<i>Yugo-Kunren</i> (nursing and training activities)	4
Instruction Integrated subject areas/subjects	29
Indefinite subject areas/subjects	11

3) Instructional Contents

Figure 7 shows that there were two or more cases in each of the categorized contents of approaches at schools for children with intellectual disabilities.

In one case, the following contents were observed: learning of Kanji characters, learning to express one’s intention, numerical figures, study of charts, astronomy, the weather, presentation of lyrics, operation of word processor, summarizing events, reading illustrated books, newspaper preparation, pronunciation, preparing a picture diary, study of laundry jobs, introduction and conclusion of orientation at school, supplementing the morning meeting, study of personal grooming, preliminary learning of study provided outside the school, and summarize learning provided outside the school.

As shown in Figure 7, the most common content was “learning characters”, followed by “preparing assigned work” and “research”.

For the most common content, “learning characters”, there were seven cases for elementary, two cases for upper secondary, and two cases where no description of the stage of education was indicated. When examining this task by subject areas/subjects, there were nine cases for Japanese



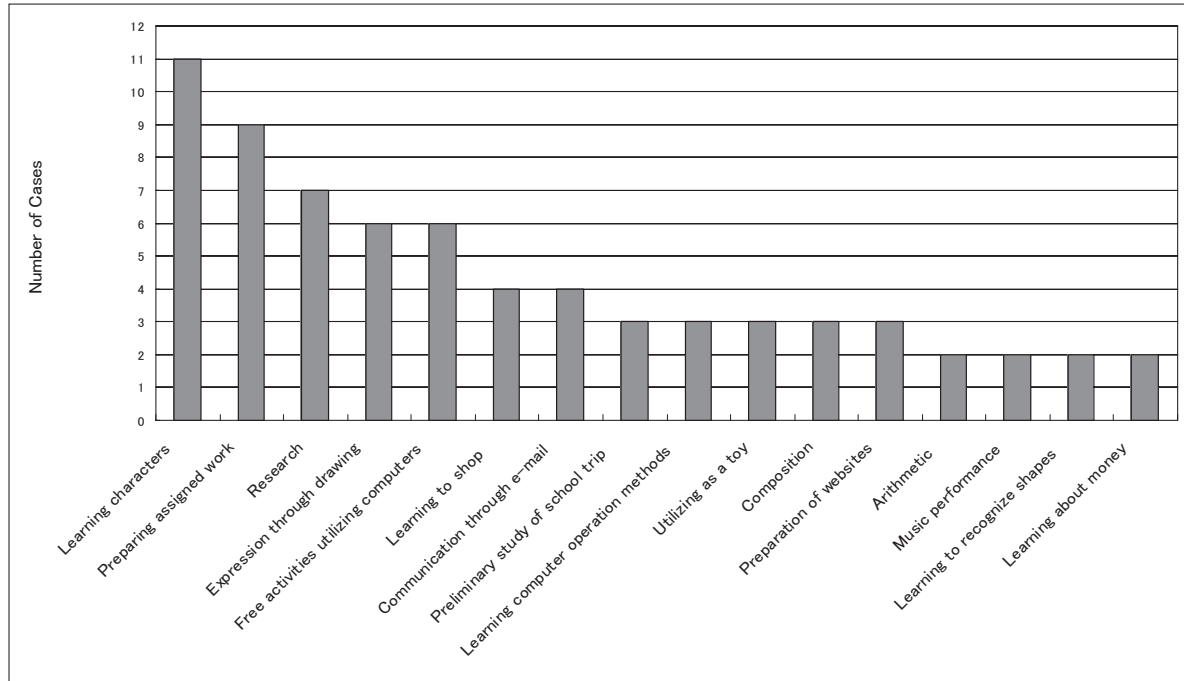


Figure 7: Contents of Approaches in Practical Models at Schools for Children with Intellectual Disabilities

language, one case of *Yougo-Kunren* (nursing and training activities) and one case of indefinite subject areas/subjects. From these results, approaches for “learning characters” were frequent in the elementary stage, and Japanese language was also often observed.

When examining the 2<sup>nd</sup> ranking content, “preparing assigned work,” by stage of education, there was one case for lower secondary, four cases for upper secondary, and four cases where there was no description of the stage of education. In terms of subject areas/subjects, there were four cases for instruction integrated subject areas/subjects, two cases for art, and one case each for drawing and handicraft, homemaking and special activities.

For the 3<sup>rd</sup> ranking content, “research”, there was one case for lower secondary, five cases for upper secondary, and one case where there was no description of the stage of education. By subject areas/subjects, there were four cases for instruction integrated subject areas/subjects, and one case each for social studies, vocational, and indefinite subject areas/subjects.

#### 4) Instructional Methods

Figure 8 shows more than two responses related to software and information devices utilized in practical models at schools for children with intellectual disabilities.

In one case, the following contents were observed: utilization of image database software, website preparation

software, and utilization of switches.

As shown in Figure 8, the most common contents were “utilization of educational software” followed by “utilization of drawing software”, “utilization of word-processing software” and “surfing the Web”.

For the most common content of “utilization of educational software”, there were ten cases for elementary, one case for lower secondary, eight cases for upper secondary, and six cases where no description of the stage of education was indicated. By subject areas/subjects, there were ten cases for Japanese language, four cases for arithmetic, three cases each for mathematics and *Yougo-Kunren* (nursing and training activities), one case each for science, special activities and instruction integrated subject areas/subjects, and four cases for indefinite subject areas/subjects. From among these, educational software was the most actively utilized in Japanese language.

When examining the 2<sup>nd</sup> ranking content, “utilization of drawing software”, by stage of education, there was one case for elementary, two cases for lower secondary, four cases for upper secondary, and five cases where no description of the stage of education was indicated. By subject areas/subjects, there were five cases for special activities, three cases each for arts and instruction integrated subject areas/subjects, and one case for manufacturing.

For the content, “utilization of word-processing

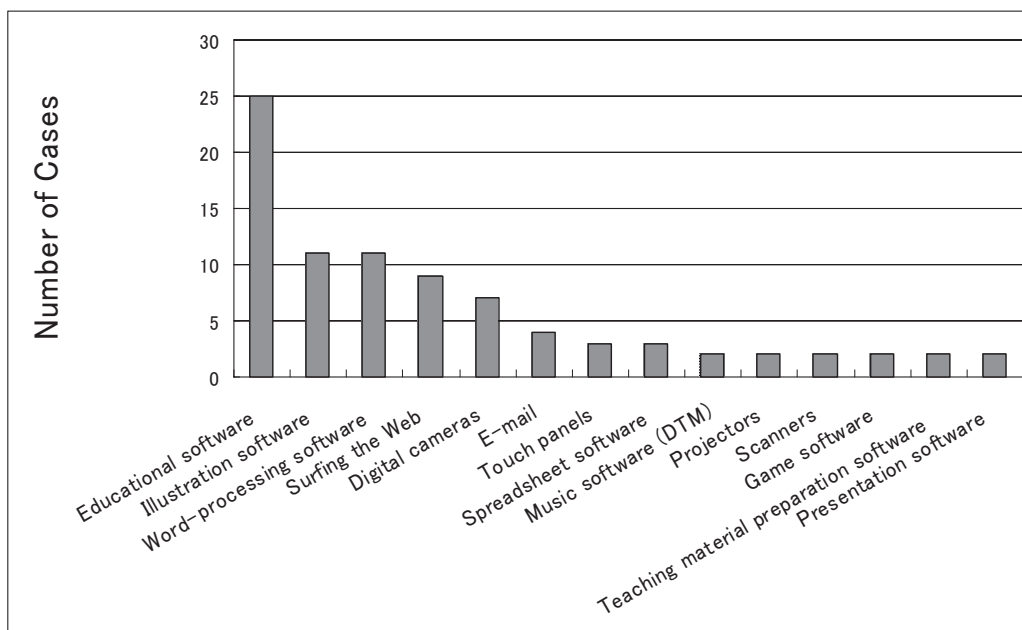


Figure 8: Software and Information Devices Utilized in Practical Models at Schools for Children with Intellectual Disabilities

software”, which was also the 2<sup>nd</sup> ranking, there was one case for elementary, four cases for lower secondary, three cases for upper secondary, and four cases where no description of the stage of education was indicated. By subject areas/subjects, there were two cases for special activities and instruction integrated subject areas/subjects, one case each for Japanese language, mathematics, home economics, vocational, commerce and *Yougo-Kunren* (nursing and training activities), and two cases of indefinite subject areas/subjects.

For the 3<sup>rd</sup> ranking content, “surfing the Web”, there was one case for lower secondary, five cases for upper secondary, and three cases where no description of the stage of education was indicated. By subject areas/subjects, there were five cases for instruction integrated subject areas/subjects, one case each for social studies, vocational, special activities, and indefinite subject areas/subjects.

5) Effects

Figure 9 shows the classifications of the descriptions of the effects of practical models at schools for children with intellectual disabilities.

The following other descriptions were also given.

- I could feel a sense of achievement.
- It was fun to learn.
- Children were very happy.
- Children were not bored during break time.
- Leisure time was effectively spent.

- Unclear because the number of days for which the study was implemented was limited.
- The abilities of some, but not all, students improved.

As shown in Figure 9, in the practical models at schools for children with intellectual disabilities, the response “enhanced interest” was frequently observed. By stage of education, there were eight cases for elementary, seven cases for lower secondary, two cases for upper secondary, and nine cases where no description of the stage of education was indicated. By subject areas/subjects, there were nine cases for instruction integrated subject areas/subjects, five cases each for Japanese language and special activities, three cases for mathematics, two cases each for arithmetic, vocational and *Yougo-Kunren* (nursing and training activities), one case each for social studies, science, music and arts, and four cases for indefinite subject areas/subjects. From among these, the response “interest was enhanced in a wide range of subject areas/subjects” was often observed.

**4. Approaches Taken by Schools for Children with Physical and Motor Disabilities**

1) Practical Models at Schools for Children with Physical and Motor Disabilities

There were fifty-three practical models classified into physical and motor disabilities and five classified into multiple disabilities.

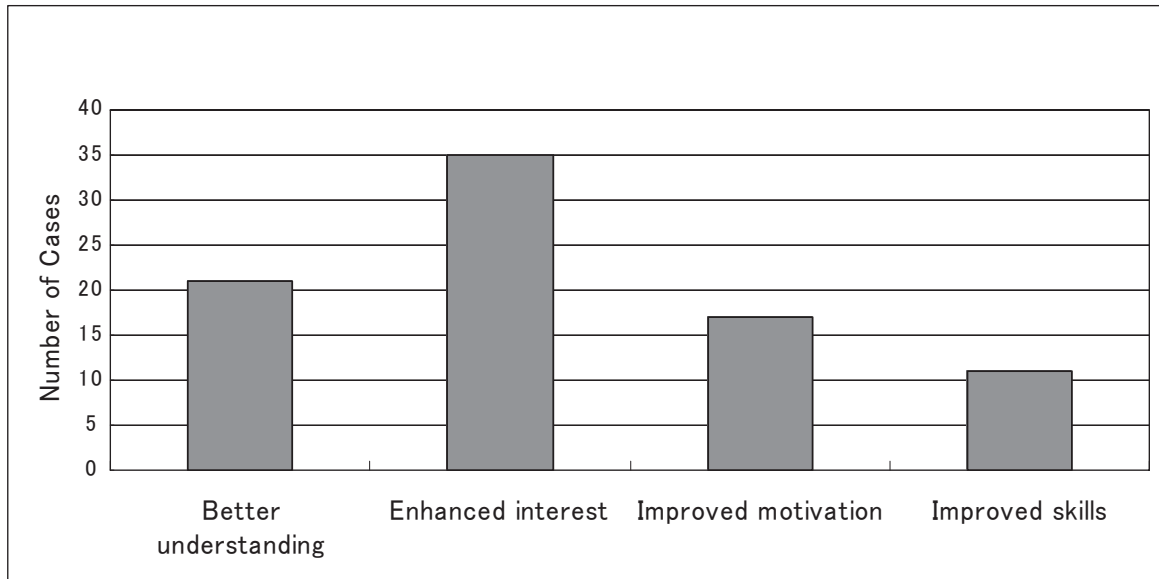


Figure 9: Types of Effects of Practical Models at Schools for Children with Intellectual Disabilities

Responses by stage of education are shown in Table 7.

**Table 7: Number of Responses by Stage of Education for Practical Models at Schools for Children with Physical and Motor Disabilities**

Stage of education	Number of Cases
Elementary	14
Lower secondary	15
Upper secondary	9
No description of stage of education	20

2) Subject Areas/Subjects

Answers related to subject areas/subjects are shown in Table 8.

For the most common content, *Yougo-Kunren* (nursing and training activities) there were six cases for elementary, five cases for lower secondary, two cases for upper secondary, and twelve cases were no description of the stage of education was indicated.

**Table 8: Number of Responses by Subject Areas/Subjects from Practical Models at School for Children with Physical and Motor Disabilities**

Subject areas/subjects	Number of Cases
Japanese Language	6
Social Studies	3
Arithmetic	2
Mathematics	2
Science	4
Music	1
Drawing and Handicrafts	1
Arts	2
Industrial Arts and Home Economics	1
Vocational	2
Commerce	1
Special Activities	3
<i>Yougo-Kunren</i> (nursing and training activities)	25
Instruction Integrated subject areas/subjects	3
Indefinite subject areas/subjects	2

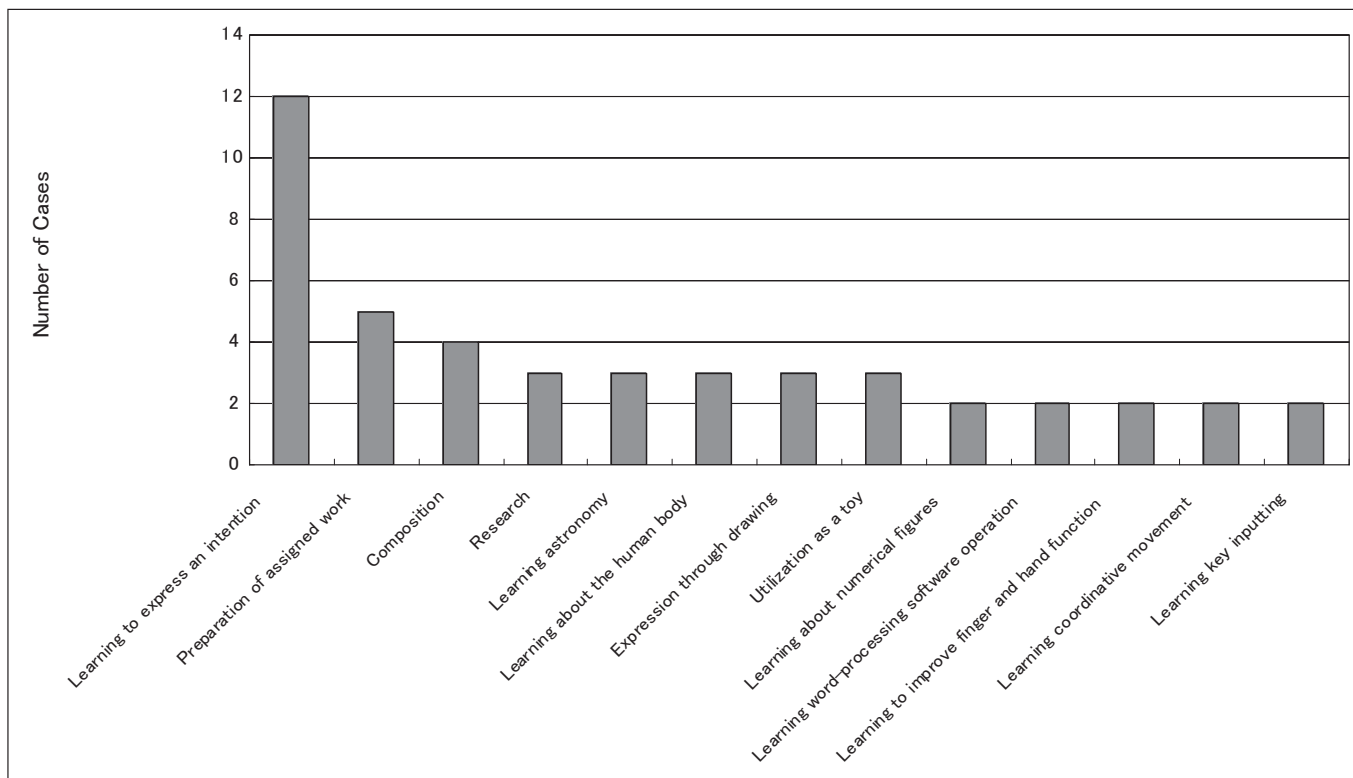


Figure 10: Contents of Approaches in Practical Models at Schools for Children with Physical and Motor Disabilities

3) Instructional Contents

Figure 10 shows two or more cases categorized into the contents of approaches taken by schools for children with physical and motor disabilities.

In one case, the following contents were observed: studying Kanji characters, studying means of transportation, learning multiplication tables, learning about time, learning about plants, learning about the weather, learning about rockets, playing music, preparation of websites, presentation of assigned work, learning pronunciation, preliminary study of school trip (*shugaku ryoko*), learning computer, word-processing and spreadsheet software operations, learning about the local community and schedules, and utilization of present information.

As shown in Figure 10, in the practical models at schools for children with physical and motor disabilities, “learning to express an intention” was a frequently observed approach.

For the most common content, “learning to express an intention”, there was one case for elementary, three cases for lower secondary, two cases for upper secondary, and six cases where no description of the stage of education was indicated. By subject areas/subjects, there were eight cases for *Yougo-Kunren* (nursing and training activities), two cases for Japanese language, and two cases for indefinite subject areas/subjects. From among these, learning to express an intention was the most frequently conducted task in *Yougo-Kunren* (nursing and training activities).

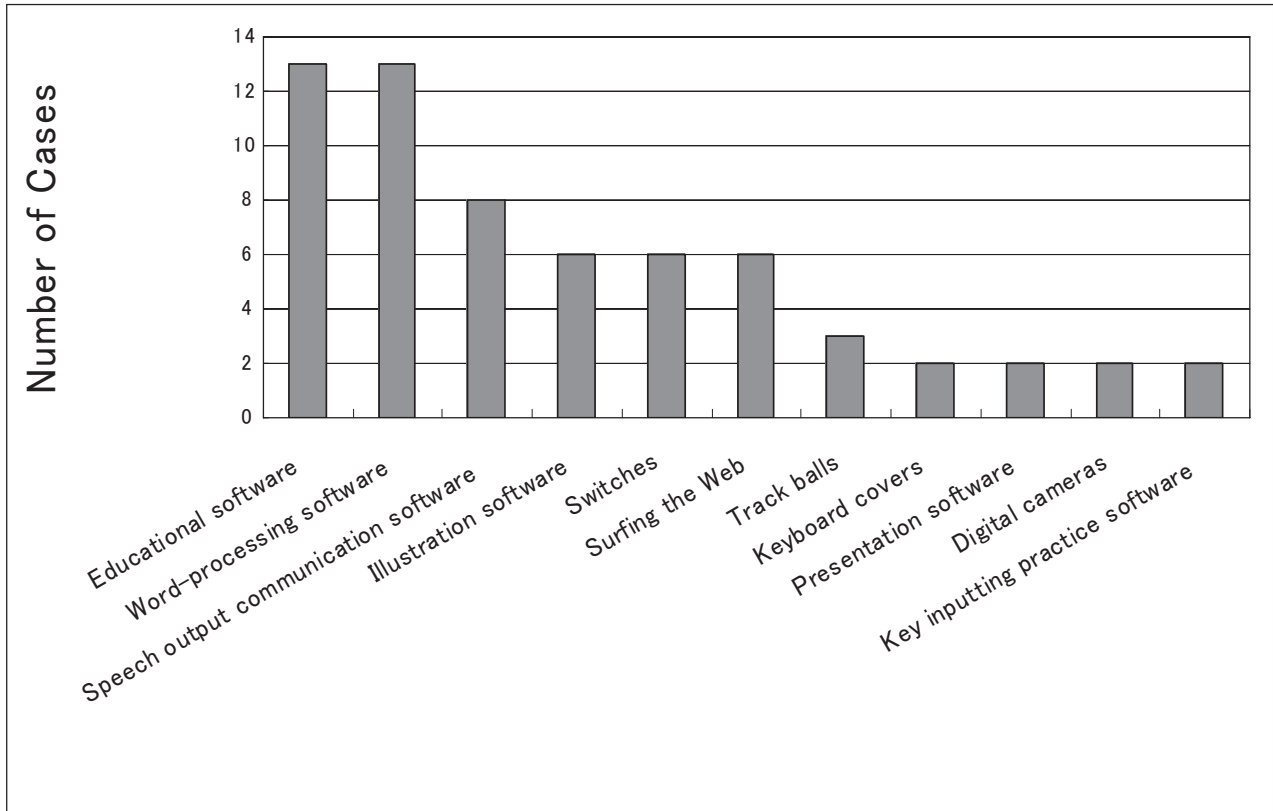


Figure 11: Software and Information Devices Utilized for Practical Models at Schools for Children with Physical and Motor Disabilities

#### 4) Instructional Methods

Figure 11 shows that there are two or more cases related to software and information devices utilized for practical models at schools for children with physical and motor disabilities.

In one case, the following contents were observed: utilization of e-mail, utilization of software to search for a means of transportation, utilization of music software (DTM), utilization of image-processing software, utilization of scanners, utilization of authoring software, utilization of spreadsheet software, utilization of game software, and utilization of joysticks.

For the most common content, “utilization of educational software”, there were three cases for elementary, four cases for lower secondary, and six cases where no description of the stage of education was indicated. By subject areas/subjects, there were three cases each for Japanese language, science and *Yougo-Kunren* (nursing and training activities), and two cases each for arithmetic and mathematics.

For the content, “utilization of word processing software”, which was the most common, there were three cases for elementary, two cases for lower secondary, three cases for upper secondary, and five cases where no description about stage of education was indicated. By subject areas/subjects, there were seven cases for *Yougo-Kunren* (nursing and training activities), two cases for Japanese language, and one case each for vocational, special activities, instruction integrated subject areas/subjects, and indefinite subject areas/subjects. From among these, the utilization of word-processing software was frequently observed in *Yougo-Kunren* (nursing and training activities).

For the 2<sup>nd</sup> ranking content, “utilization of speech output communication software”, there was one case for elementary, two cases for lower secondary, two cases for upper secondary, and three cases where no description of the stage of education was indicated. By subject areas/subjects, there were six cases for *Yougo-Kunren* (nursing and training activities), one case for Japanese language and one case for indefinite subject areas/subjects. From among these, the utilization of speech output communication software was also frequently observed in *Yougo-Kunren* (nursing and training activities).

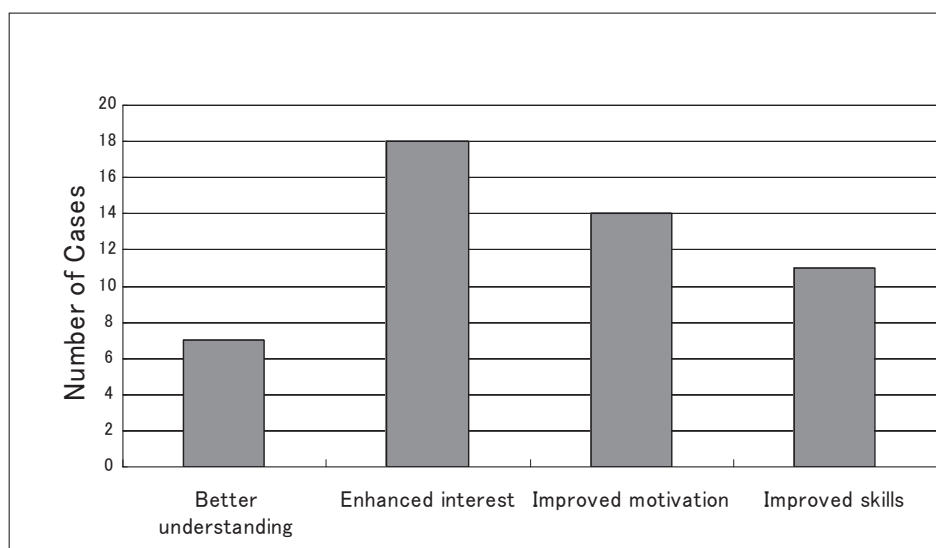


Figure 12: Types of Effects of Practical Models at Schools for Children with Physical and Motor Disabilities

5) Effects

Figure 12 shows the results of the classification of descriptions related to the effects of practical models at schools for children with physical and motor disabilities.

The following other descriptions were observed.

- It was fun to create something.
- Means of expression could be extended.

As shown in Figure 12, responses classified as “enhanced interest” were frequently observed in descriptions related to the effects of practical models at schools for children with physical and motor disabilities.

For responses classified as “enhanced interest”, there were seven cases for elementary, five cases for lower secondary, two cases for upper secondary, and four cases where no description of the stage of education was indicated. In addition, by subject areas/subjects, there were four cases for Japanese language, three cases each for social studies and *Yougo-Kunren* (nursing and training activities), two cases for science, one case each for music, drawing and handicrafts and instruction integrated subject areas/subjects, and two cases for indefinite subject areas/subjects.

5. Approaches Taken by Schools for the Health Impaired

1) Practical Models at Schools for the Health Impaired

There were forty-one practical models classified into health impairments and two classified into intellectual disabilities.

Responses by stage of education are shown in Table 9.

Table 9: Number of Responses by Stage of Education for Practical Models at Schools for the Health Impaired

Stage of education	Number of Cases
Elementary	15
Lower secondary	13
Upper secondary	8
No description of stage of education	8

2) Subject Areas/Subjects

Answers concerning subject areas/subjects are shown in Table 10.

For the most common subject, science, there were two cases for elementary, five cases for lower secondary, one case for upper secondary, and one case where no description of the stage of education was indicated.

Table 10: Number of Responses Related to Subject Areas/Subjects in Practical Models at School for the Health Impaired

Subject areas/subjects	Number of Cases
Japanese Language	3
Life Environment Studies	1
Social Studies	6
Arithmetic	4
Mathematics	6
Science	9

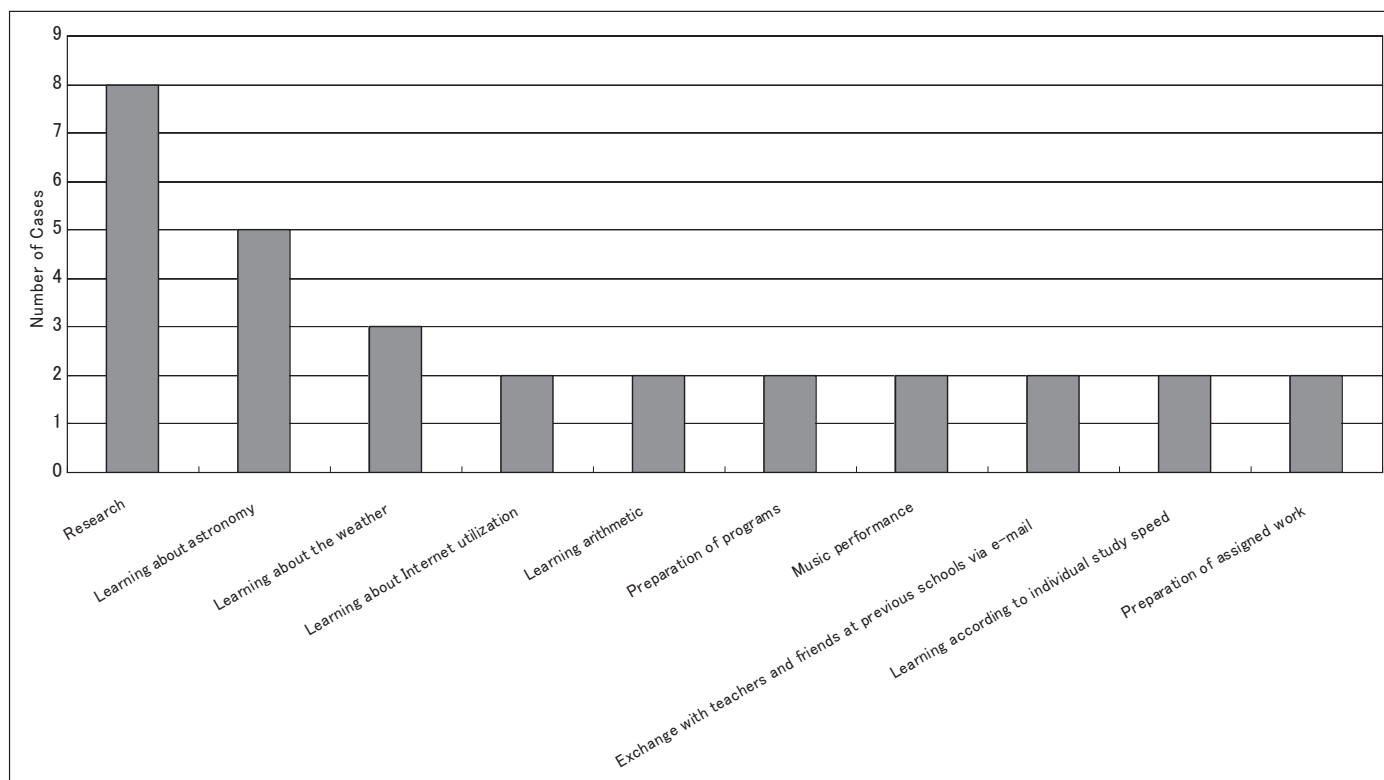


Figure 13: Types of Approaches Taken in Practical Models at Schools for the Health Impaired

Music	3
Arts	1
Physical Education	1
Industrial Arts and Home Economics	2
Foreign Language	2
Commerce	3
Special Activities	2
<i>Yougo-Kunren</i> (nursing and training activities)	6
Instruction Integrated subject areas/subjects	4
Indefinite subject areas/subjects	2

### 3) Instructional Contents

Figure 13 shows two or more cases for each of contents of approaches taken by schools for the health impaired.

In one case, the following contents were observed: supplementary learning from the main school to additional classes, research within the school, learning to resolve problems posted on the Web, learning about the human body, learning about waves, utilization in experiments, utilization in personal health, instruction of Japanese language for foreign nationals, learning computer operation,

exchange with students overseas, preparation of websites, learning about the causes of seizures, activities on expression through drawing, and learning about shopping.

As shown in Figure 13, “research” was most frequently observed in practical models at schools for the health impaired.

When examining “research” by stage of education, there were four cases for elementary, one case for lower secondary, one case for upper secondary and two cases where no description of the stage of education was indicated. By subject areas/subjects, there were four cases for social studies, two cases for Japanese language and one case each for music and arts.

### 4) Instructional Methods

Figure 14 shows two or more responses related to software and information devices utilized in practical models at schools for the health impaired.

In one case, the following contents were observed: utilization of TV conferencing, utilization of authoring software, utilization of music software (DTM), utilization of MIDI equipment, utilization of encyclopedia software, utilization of scanners, utilization of drawing software, and



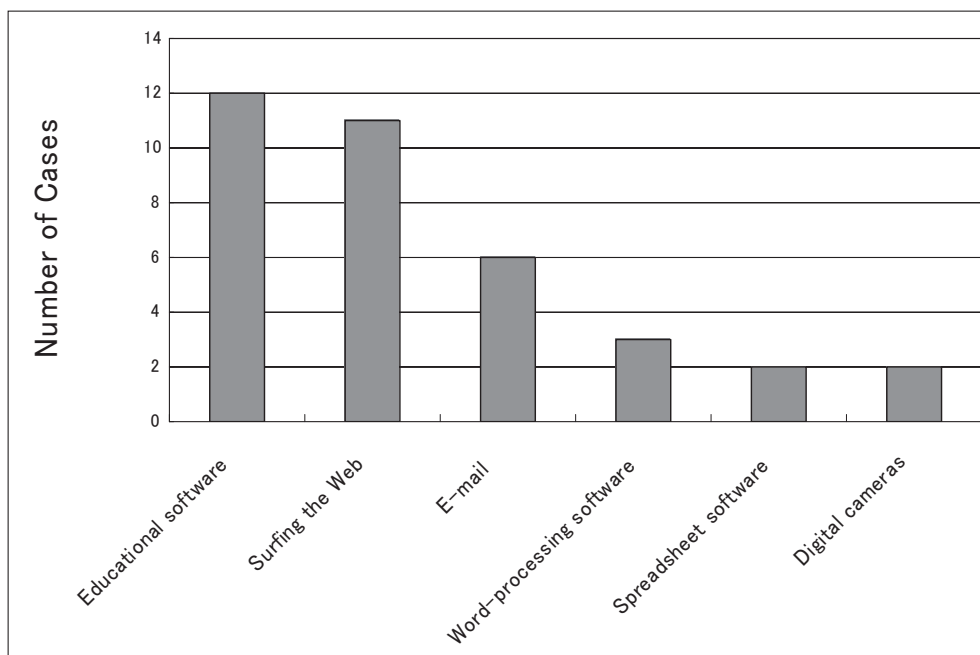


Figure 14: Software and Information Devices Utilized in Practical Models at Schools for the Health Impaired

utilization of presentation software.

As shown in Figure 14, the most frequently observed content was “utilization of educational software”, followed by “surfing the Web”. As mentioned earlier, one reason why surfing the Web was ranked high could be that many types of research activities were undertaken.

When examining the most common content, “utilization of educational software”, by stage of education, there were five cases for elementary, five cases for lower secondary, two cases for upper secondary, and two cases where no description of the stage of education was indicated. By subject areas/subjects, there were seven cases for science, four cases for arithmetic, three cases for mathematics, one case each for social studies, industrial arts and home economics, and *Yougo-Kunren* (nursing and training activities), and one case for indefinite subject areas/subjects. From among these, the utilization of educational software was most frequently observed for science.

For the 2<sup>nd</sup> ranking content, “surfing the Web”, there were four cases for elementary, four cases for lower secondary, one case for upper secondary and two cases where no description of the stage of education was indicated. By subject areas/subjects, there were three cases each for social studies and science, two cases for Japanese language, and one case each for music, arts, and indefinite subject areas/subjects.

For the 3<sup>rd</sup> ranking content, “utilization of e-mail”,

there were three cases for elementary, two cases for upper secondary, and one case where no description of the stage of education was indicated. By subject areas/subjects, there were two cases for special activities, and one case each for social studies, foreign language, commerce, and *Yougo-Kunren* (nursing and training activities).

#### 5) Effects

Figure 15 shows the classification of effects of practical models at schools for the health impaired.

The following other descriptions were observed.

- Lessons could be provided by the main school.
- The self-education competency was enhanced.
- Simulated experience could be gained through the Internet.
- Helped to eliminate unease of returning to previous school.
- Lack of learning could be alleviated.

As shown in Figure 15, responses classified as “enhanced interest” were frequently observed in descriptions of the effects of practical models at schools for the health impaired.

When examining responses classified as “enhanced interest” by stage of education, there were three cases for elementary, four cases for lower secondary, two cases for upper secondary, and two cases where no description of the stage of education was indicated. By subject areas/subjects,

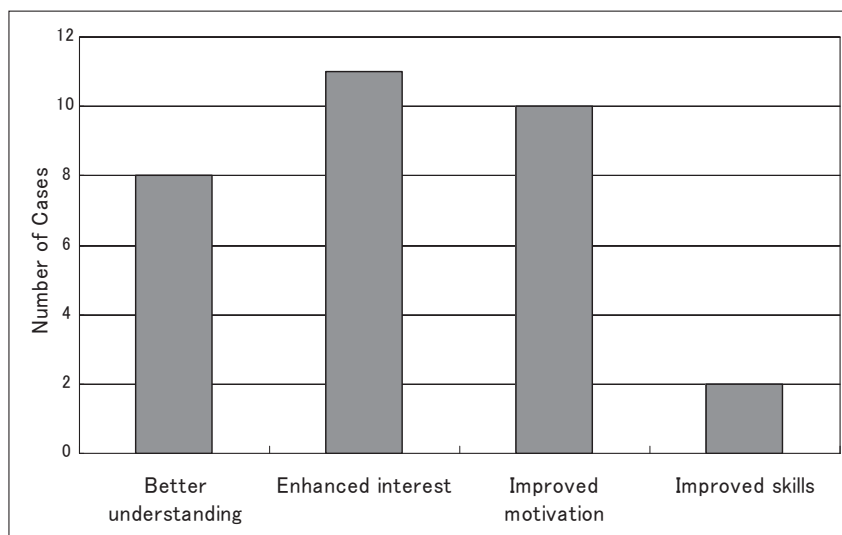


Figure 15: Types of Effects of Practical Models at Schools for the Health Impaired

there were three cases of science, two cases for music, and one case each for Japanese language, life environment studies, arithmetic, mathematics, arts, commerce, *Yougo-Kunren* (nursing and training activities), and instruction integrated subject areas/subjects. From among these, “enhanced interest” was observed in a wide range of subject areas/subjects.

### 6. Approaches Taken by Schools Providing Several Types of Services

#### 1) Practical Models at Schools Providing Several Types of Services

There were five practical models classified into intellectual disabilities and six classified into physical and motor disabilities, and three classified into health impairment.

Responses by stage of education are shown in Table 11.

Table 11: Number of Responses by Subject Areas/Subjects in Practical Models at Schools Providing Several Types of Services

Stage of education	Number of Cases
Lower secondary	4
Upper secondary	7
No description of stage of education	1

#### 2) Subject Areas/Subjects

Responses related to subject areas/subjects are shown in Table 12.

Table 12: Number of Responses by Subject areas/subjects in Practical Models at Schools Providing Several Services

Subject areas/subjects	Number of Cases
Japanese Language	1
Science	1
Arts	2
Industrial Arts and Home Economics	2
Vocational	1
Commerce	1
Special activities	1
Instruction Integrated subject areas/subjects	1
Indefinite subject areas/subjects	2

#### 3) Instructional Contents

There were two or more cases of “preparation of assigned work” (four cases) and “activities to express oneself through drawing” (two cases) in schools providing several services.

In one case, the following contents were observed: newspaper preparation, research, communication via e-mail, learning word-processing software operation, preparing a collection of works, and learning how to spend leisure time.

When examining the instructional contents by category of disability, the approaches taken by students with intellectual disabilities included three cases of “preparation of assigned work” and one case each of “preparing a collection of works” and “activities to express oneself through drawing”. By stage of education, all cases were for upper secondary

school. By subject areas/subjects, there was one case each for arts, vocational, special activities, and instruction integrated subject areas/subjects.

In the approaches taken by students with physical and motor disabilities, there were two cases of “activities to express oneself through drawing” and one case each of “preparation of assigned work”, “learning word-processing operation”, “newspaper preparation” and “learning how to spend leisure time”. By stage of education, there was one case for lower secondary, four cases for upper secondary, and one case where no description of the stage of education was indicated. By subject areas/subjects, there was one case each for Japanese language, arts, industrial arts and home economics, vocational, and commerce.

In the approaches taken by students with health impairments, there was one case each of “research”, “preparation of assigned work” and “learning communication via e-mail”. By stage of education, all cases were for lower secondary school. By subject areas/subjects, there was one case each for science, arts, and industrial arts and home economics.

#### 4) Instructional Methods

There were two or more cases of software and information devices utilized in practical models of services provided by several schools, two cases each of “utilization of word-processing software” and “surfing the Web”.

In one case, the following contents were observed: utilization of image-processing software, utilization of e-mail, utilization of illustration software, utilization of digital cameras, utilization of spreadsheet software, and utilization of integrated software.

Of the approaches taken by students with intellectual disabilities, there was one case each of “utilization of image-processing software”, “utilization of integrated software”, “utilization of digital cameras” and “utilization of spreadsheet software”.

Of the approaches taken by students with physical and motor disabilities, there were two cases of “utilization of word-processing software”, and one case each of “utilization of illustration software”, “utilization of image-processing software” and “surfing the Web”.

Of the approaches taken by students with health impairments, there was one case each of “surfing the Web” and “utilization of e-mail”.

#### 5) Effects

Responses concerning the effects included, from most to least, five cases of “improved motivation”, two cases of “better understanding”, and one case each of “enhanced interest”, and “improved skills”.

The following other descriptions were also observed.

- I began to think about my own future as a result of improved self-confidence.
- I could easily improve my composition.

Of the approaches taken by students with intellectual disabilities, there were two cases for “enhanced interest”, and one case each for “better understanding” and “improved skills”.

Of the approaches taken by students with physical and motor disabilities, there were three cases for “enhanced motivation”.

Of the approaches taken by students with health impairments, there was one case each for “better understanding”, “enhanced interest” and “improved motivation”.

### III. Comprehensive Consideration

In this section, the special features of computer utilization by type of school, inferred from the analysis of practical model data obtained through this study, and common areas observed among various types of schools will be considered. Furthermore, on the basis of the results of this examination, the direction of improvement of information-literacy education in the future will be considered. Finally, future issues will be mentioned.

#### 1. Distinctive Features and Common Areas by Type of School

Before examining the distinctive features and common points by type of school, we will discuss the nature of the practical model data analyzed in this study. The analysis was designed for the purpose of obtaining response data for questions on existing practical models of instruction utilizing computers, which was one of the items of a survey conducted for special schools. Of the 797 schools that responded to the survey, only 252 answers were received for these questions. Therefore, the number of answers for these items was small.

In the questions, free descriptions were usually requested and hence it should have been possible to gain a fair amount

of information. However, having to give free description is regarded to be one of causes for the number of answers being so small. In fact, many more types of practices are probably being implemented. Consequently, when interpreting the results of the analysis, we should take into consideration that the survey time was March 1999, and that practical model data was obtained from free descriptions in the above-mentioned survey.

Furthermore, with respect to schools providing several services, since the number of answers was small, hereinafter, we consider only the results for practical models at schools for the visually impaired, schools for the hearing impaired, schools for children with intellectual disabilities, schools for children with physical and motor disabilities and schools for the health impaired.

Regarding the number of cases of practical models of utilizing computers at special schools, in all types of schools, approaches utilizing computers in each stage of education were actively taken.

On the other hand, with respect to subject areas/subjects approaches utilizing computers showed, distinctive features in accordance with the type of school, Firstly, these approaches were most frequently taken in science and *Yougo-Kunren* (nursing and training activities) at schools for the visually impaired, and in science at schools for the hearing impaired and schools for children with health impairments. On the other hand, at schools for children with intellectual disabilities, these approaches were most frequently taken in instruction integrated subject areas/subjects, and in *Yougo-Kunren* (nursing and training activities) at schools for children with physical and motor disabilities.

Furthermore, in computer-utilization approaches, the contents most frequently observed were “composition” at schools for the visually impaired, “astronomy” at schools for the hearing impaired, “learning characters” at schools for children with intellectual disabilities, and “research” at schools for the health impaired. Therefore, distinctive features could be observed in the contents of the most frequently taken computer-utilization approaches in accordance with the type of school. Therefore, computers are being effectively utilized to address the needs of children who attend the various types of schools for learning.

In other words, at schools for the visually impaired, it has been suggested that there may be a considerable need to train students to become competent in using Braille translation software or screen reader.

Computer-utilization approaches in science were frequently undertaken at schools for the hearing impaired. In the case of instruction for children with hearing disabilities, by utilizing various types of educational software, rich visual images such as photographs or motion pictures can be presented, so instruction is considered to be made more effective.

At schools for children with intellectual disabilities, since many computer-utilization approaches to learning characters were observed, learning characters through software utilization, particularly educational software, helped to motivate students that have difficulty learning characters. Therefore, the need for effective instruction is high.

At schools for children with physical and motor disabilities, since learning to express an intention was common, when instructing children and students who have difficulty expressing their intentions due to motor or vocalization disabilities, the need for approaches that expand the means of communication through the use of computers is regarded to be great.

At schools for the health impaired, since research by surfing the Web was conducted in various subject areas/subjects, the need for lessons in Internet usage is deemed to be quite significant.

With respect to software and information devices utilized, since “educational software” was the most frequently listed at schools for the hearing impaired, schools for children with intellectual disabilities, schools for children with physical and motor disabilities and schools for the health impaired, at these types of schools, instruction utilizing educational software in lessons appeared to be fairly common.

In addition, “surfing the Web” utilizing the Internet ranked fairly high at all types of schools: the highest at schools for the visually impaired, 4<sup>th</sup> at schools for the hearing impaired, 3<sup>rd</sup> at schools for children with intellectual disabilities and schools for children with physical and motor disabilities, and 2<sup>nd</sup> at schools for the health impaired. From these results, we can see that in steps taken by special schools, even in March 1999 when this survey was implemented, the utilization of the Internet in lessons was common.

With respect to the effects of computer-utilization approaches, responses classified as “better understanding” were most frequently observed at schools for the visually impaired, whereas, responses classified as “enhanced

interest” were most frequently observed at schools for the hearing impaired, schools for children with intellectual disabilities, schools for children with physical and motor disabilities, and schools for the health impaired.

Since the response that computer-utilization approaches had an effect on understanding was frequently given by schools for the visually impaired, where Braille translation software, screen reader and magnification software are utilized, it is probably one cause behind the effect that information could be presented to visually impaired children through easy-to-understand methods.

Furthermore, at schools for the hearing impaired, schools for children with intellectual disabilities, schools for children with physical and motor disabilities, and schools for the health impaired, we could see that approaches utilizing computers were widely recognized to have an effect on enhancing the student’s interest in learning.

## **2. Improvement in Information-literacy Education**

In due consideration of the above-mentioned analysis on approaches taken at special schools, improvements to information-literacy education in the future are investigated.

In the responses concerning practical models analyzed in this study, the use of various types of software and information devices was indicated. Moreover, they were utilized at each type of school because of their unique features. By promoting the improvement of conditions at each school so as to enable smooth utilization of software and information devices on the basis of the results of the practical model analyses in this study, further promotion of computer utilization at special schools is anticipated.

Furthermore, we could also see that many schools actively utilize educational software. Accordingly, since the need for educational software that can be utilized in lessons appears to be extremely high, the enhancement of the cognitive characteristics of students or educational software according to educational need is deemed to be an urgent task.

The purchase or improvement of various types of software to meet the learning needs of individual students at individual schools is considered to be limited from a budgetary viewpoint. Therefore, with regard to the direction of future enhancement of educational software, one effective solution would be to ensure that all schools have access to teaching materials at websites via the Internet.

According to the results of the analysis of practical model

data in this study, surfing the Web as a means of obtaining information was ranked fairly high at each type of school. Approaches that promote the utilization of the Internet are expected to continue to increase in the future. Therefore, one might say that the enhancement of teaching materials at websites, which are accessible to all schools, is one important way of improving educational software.

Furthermore, in the future, computers will be utilized not only independently, but also in a network. Accordingly, high-speed and mass-volume communications should be promoted and budgetary steps taken. At the same time, security approaches are also regarded to be extremely important. It is considered important to create the infrastructure for future information-literacy education at special schools to enable, the rapid expansion of the utilization of networks.

## **3. Future Issues**

In this report, we presented an examination of practical models of instruction utilizing computers and part of the results of the “Survey on the Teaching of Information-Literacy Education at Special Schools” implemented in March 1999. However, in order to accurately grasp the level of computer utilization at special schools on a nation wide scale, practical models should continue to be surveyed through questionnaires. Moreover, in line with the progress of information technology and the rapid expansion of its utilization as a network, new and effective types of utilization are expected at special schools. Further surveys should be implemented so that trends associated with new approaches implemented at such special schools can be fully understood.

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