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# A Study of Legible Braille Patterns on Capsule Paper: Diameters of Braille Dots and Their Interspaces on Original Ink-printed Paper

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**Abstract:** A legibility experiment was conducted using eleven braille readers in order to determine the suitable ranges of braille dot diameters and their interdot spaces on the original image for capsule paper braille. The obtained result shows that the reading of capsule paper braille with few mistakes in the dot diameter range of 1.17 to 1.43 mm and interdot space range of 1.05 to 1.15 times the standard Japanese interdot space took a short time and was rated high. On the other hand, the reading of braille with many mistakes at a large dot diameter and a narrow interdot space took a long time and was rated low. The three-dimensional measurement of braille dot shapes clarified that difficulties in reading braille under these conditions stem from the fusion of dots due to the expansion characteristic of capsule paper.

**Key Words:** Stereocopy, Braille pattern, Reading time, Tactile legibility, Three-dimensional shape

## I. Introduction

Stereocopying is a type of tactile graphic used to convey graphical information, such as maps and charts, to blind people. Due to its simple preparation, it is widely used in schools (Rowell & Ungar, 2003). These tactile graphics can include a graphical image and braille as legends. However, braille on capsule paper, is not sufficiently legible. The reason for this is considered to be that people tend to prepare original ink-printed braille whose dot diameter is the same as that of ordinary embossed braille; swelled dots become larger than ink-printed black dots on original paper because of the expansion characteristic of capsule paper. Thus, it is heuristically said that “fonts for capsule paper should be larger than ordinary embossed braille and dots should be slightly smaller” (Misaki, 1994). However, quantitative data on this have not been obtained yet. Thus, we performed an experiment involving braille readers to determine the suitable ranges of braille dot diameters and their interspaces on the original image for legible capsule paper braille. We also measured the shapes of braille dots on capsule paper produced from the same original ink-printed paper used in a legibility experiment using a laser shape measurement system to explore the effect of braille shape on legibility.

## II. Stereocopying using Capsule Paper

Stereocopying is a method of producing tactile graphics using the heat foaming characteristic of capsule paper. Capsule paper, also referred to as microcapsule paper

or swell paper, is coated with microscopic polystyrene capsules (Way & Barner, 1997). These capsules expand when exposed to heat. Their expansion rate depends on heat temperature; the higher the heat temperature, the higher their extent of expansion.

The following are examples of commercially available capsule paper to date: Capsule Paper by Matsumoto Yushi-Seiyaku Co., Ltd., Japan, Flexi-Paper by Repro-ronics Inc., USA, Swelltouch Capsule Paper by American Thermoform Corporation, USA, and Swell Paper by Zychem Ltd., UK. Prices are around 100 yen per sheet when procured in Japan.

The first step in producing tactile graphics is to prepare original ink-printed or handwritten images. These images are then photocopied onto capsule paper using a standard or specialized copy machine (stereocopy machine). An alternative to the use of a copy machine is directly writing on capsule paper with black ink. A stereocopy production machine or heater, also referred to as a developing machine by its manufacturer and seller Konica Minolta Holdings Inc., is used to heat capsule paper to 120-125 °C to expand the black-printed portions of the paper. As black-printed microcapsules absorb more heat and expand more than other microcapsules, these black portions are raised from the background. The expansion requires only several seconds depending on the type of heater used.

Fig. 1 shows a stereocopy machine, and Fig. 2, a heater. Fig. 3 shows the picture of braille produced on capsule paper.



Fig. 1 Stereocopy machine.



Fig. 2 Stereocopy production machine (heater).

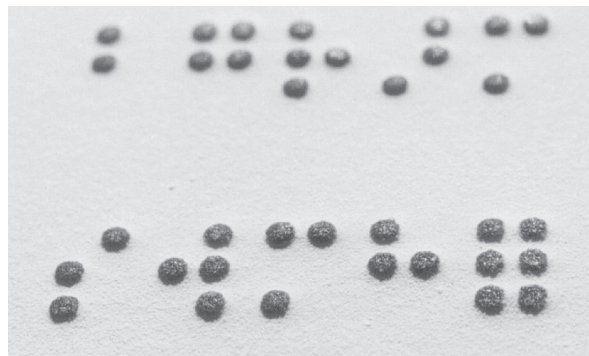


Fig. 3 Braille on capsule paper.

### III. Experiment of Reading Braille on Capsule Paper

An experiment involving braille readers was conducted to determine the suitable ranges of braille dot diameters and their interdot spaces on the original image for capsule paper braille.

#### 1. Method

Subjects were eleven blind people who used braille on a daily basis. Their ages ranged from 26 to 68, the average being 44.2. They have been using braille for 11 to 52 years, and 34 years on the average. They usually read braille of the

Japanese and/or international size and on refreshable braille displays.

Braille dots with three different diameters were printed on the original paper. The Japanese standard diameter is 1.43 mm (Kizuka, 1998). The other two sizes are 1.17 mm, which is less than the standard, and 1.67 mm, which is larger than the standard. In addition, five interdot spaces were selected: 0.9, 1.0, 1.05, 1.10 and 1.15 times the Japanese standard interdot space. The combination of dot diameters and interdot spaces produced fifteen conditions for original ink-printed braille. Table 1 shows these conditions, and Fig. 4, the types of braille interdot spaces. The line spacing was set to be 11 mm for all the conditions.

Table 1 Diameters of braille dots and their interdot spaces on original image used in experiment. [unit: mm]

	<i>Distance between dots 1 and 2</i>	<i>Distance between dots 1 and 4</i>	<i>Distance between dots 4 and 1</i>
0.9 times	2.13	1.92	2.94
standard size (1.0 times)	2.37	2.13	3.27
1.05 times	2.49	2.24	3.43
1.10 times	2.61	2.34	3.60
1.15 times	2.73	2.45	3.76

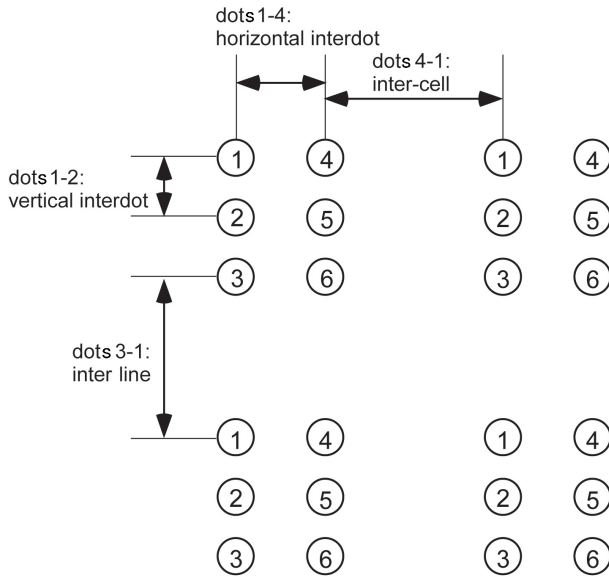


Fig. 4 Braille cells and types of interdot space. A full braille cell consists of six raised dots arranged in two parallel rows each having three dots. The positions of the dots are numbered one through six (cited from AFB's web page). Japanese braille, in essence, uses dots 1, 2, and 4 for presenting vowels and dots 3, 5, and 6 for presenting consonants.

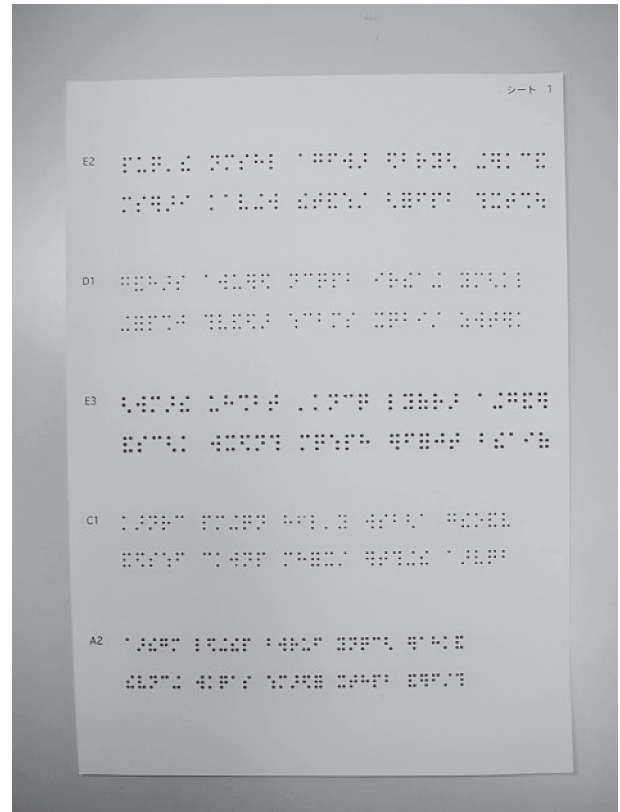


Fig. 5 Stimulus sentences used in legibility experiment.

The interline spaces produced using braille embossers generally range from 8 to 9 mm (Kamoda & Fujimoto, 2001). We added extra 2-3 mm to this range to prevent readers' fingers from touching the next line while reading.

Stimulus sentences were a series of meaningless words formed with five letters in a chunk. Original meaningless words were collected from the appendix "Non-association rate of two-syllable *SEION* (having voiceless consonant)" of "Experiment and Test" (SIG on Psychological Experiment, 1972). Three two syllable words which do not include the same syllables were selected and concatenated to make a six-syllable word. Deleting the last letter from it produced a meaningless word formed with five letters. Ten chunks of five letters produced a stimulus sentence. The produced sentences differed from each other. Each sentence was laid out in two lines, each of which had five chunks, i.e., 25 letters (Fig. 5).

The original image of each condition was prepared with illustration software (Adobe Illustrator ver. 10) on a personal computer (Macintosh G4, Apple Computer) and printed out using a laser printer (LP 8200C, Epson) with a resolution of 600 dpi. This image was then copied onto sheets of capsule paper (ZY-TEX Swell Paper A4, Zychem) using a stereocopy machine (Partner Vision 2051, Minolta), and the ink-printed parts of the paper were foamed by heating with PIAF, Quantum Technology. The time for the sheets to pass through the heat source of the heater

(width: approximately 15 cm) was 6.30 - 6.40 s. One of the stimulus sheets used in the experiment is shown in Fig. 5.

The experiment was conducted in a room. One subject was tested at a time. The subject sat on a chair and read stimulus sentences placed on the desk in front of him/her. He/she was instructed to read braille in the same hand manipulation manner as that in their daily life, that is, using only one hand (right or left) or both hands. Before each trial, the subject was instructed to place his/her index finger at a standby position, expressed as a raised letter, on the left-hand side of the first line of each subject sentence (Fig. 5). When one of the experimenters signed the subject to start, he/she started to read the stimulus aloud. The reading time was measured with a stopwatch. After each trial, the subject was asked to rate the legibility of stimulus braille on a five-point separate scale: "very difficult to read" (score: 1), "rather difficult to read" (score: 2), "difficult to say" (score: 3), "rather easy to read" (score: 4), "very easy to read" (score: 5). The judgment should be made without comparing with the preceding stimuli. The subject was instructed to read the stimulus as fast as possible without making mistakes. Eighteen stimulus sentences were prepared and shown in a random order. The order of presentation was the same for all subjects. The data from the first three stimuli were discarded and the data from the remaining fifteen stimuli were used for analysis. The hand movements of the subject while reading were videotaped. Reading errors were



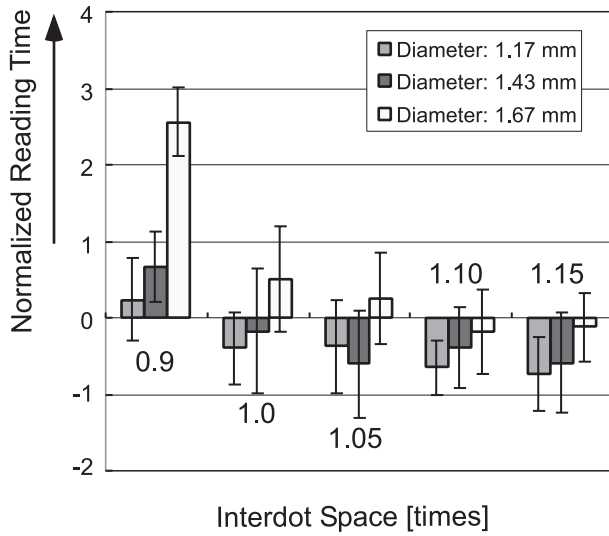


Fig. 6 Mean and SD of normalized reading time.

noted during the experiment and reconfirmed using the videotape after the experiment. After reading all the stimuli, the subject was asked to answer which characteristics made braille easy or difficult to read.

## 2. Results

Reading times differed greatly among subjects. Although seven out of eleven subjects took about 20 s on the average to read, two persons took about 30 s, and the remaining two persons, 37.2 and 47.7 s (Table 2). Nevertheless, the change in reading time based on the conditions used was the same in all subjects; the interdot spaces of 0.9 and 1.0 times the standard interdot space produced a long reading time and spaces larger than these produced a negligible change; under

Table 2 Mean reading time per subject. [unit: s]

Subject	Reading time
1	30.2
2	47.7
3	19.8
4	37.2
5	31.4
6	19.4
7	18.4
8	19.4
9	20.3
10	18.9
11	16.2

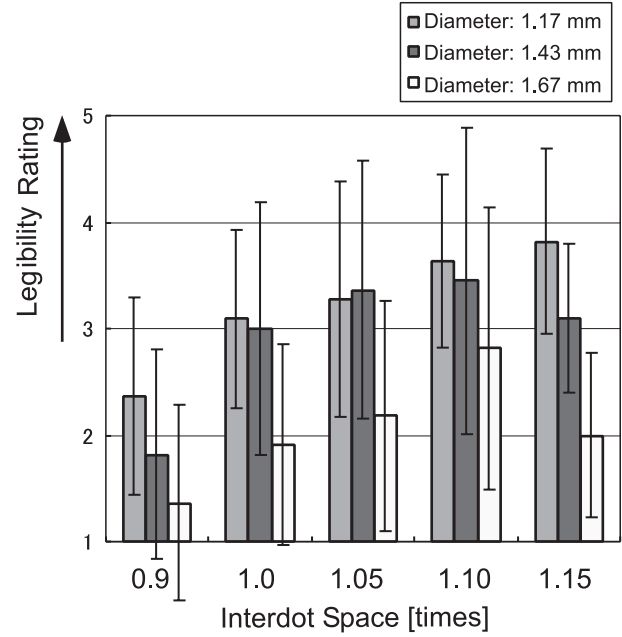


Fig. 7 Mean and SD of legibility rating.

small interdot space conditions, the larger the dot diameter, the longer the reading time. Consequently, in order to eliminate the effect of the difference between subjects in the statistical analysis, reading times were normalized (or standardized) for each subject. Normalization was performed by the following formula for  $X_1, X_2, \dots, X_n$ , where  $\bar{X}$  denotes the average, and  $s$ , the standard deviation (SD).

$$z_i = (X_i - \bar{X})/s$$

The mean of the normalized  $z$ 's is 0 and the SD is 1. Fig. 6 shows the normalized reading times (the average and SD of all subjects) under each condition.

A two-way ANOVA (analysis of variance) of the normalized reading times demonstrates a significant effect of the change in interdot space ( $F(4, 80) = 56.04, p < 0.01$ ) and that of the change in dot diameter ( $F(2, 80) = 70.98, p < 0.01$ ). The interaction effect of both factors was also significant ( $F(8, 80) = 4.62, p < 0.01$ ). According to Tukey's HSD test ( $p = 1\%$ ) (Mori and Yoshida, 1990), the reading times at the interdot space of 0.9 times the standard were significantly longer than those at the other interdot spaces at all dot diameters. At the dot diameters of 1.67 mm, the interdot spaces of 1.10 and 1.15 times the standard yielded significantly shorter reading times than the standard. Let us focus on the effects of the diameter change at the same interdot space. At the interdot space of 0.9 times the standard, significant differences were observed between three dot diameters; the larger the dot diameter, the longer the reading time. At the interdot spaces of 1.0, 1.05, and 1.15 times the standard, the dot diameter of 1.67 mm yielded

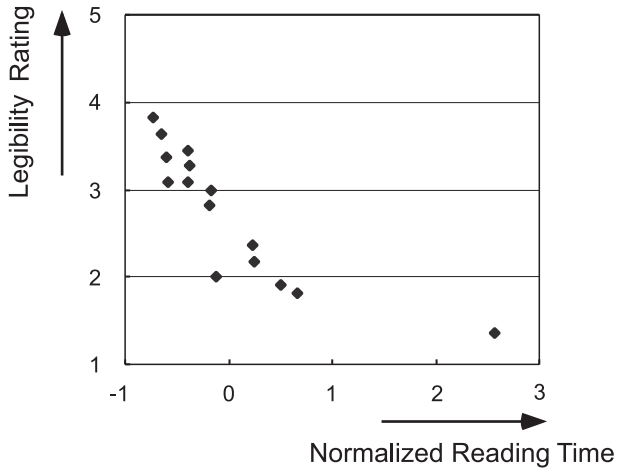


Fig. 8 Correlation between normalized reading time and legibility rating.

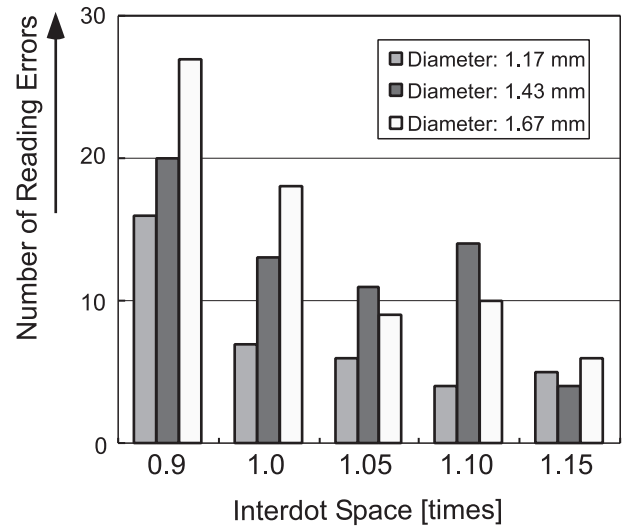


Fig. 9 Number of reading errors.

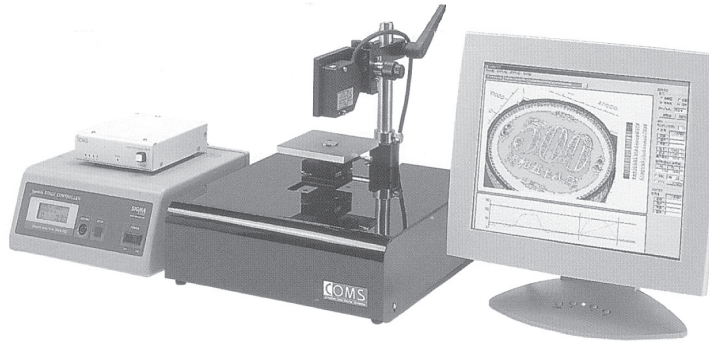


Fig. 10 Three-dimensional measurement system (from a picture in the brochure).

significantly longer reading times from the other two dot diameters. At the interdot space of 1.10 times the standard, a significant difference was observed only between the two dot diameters of 1.17 and 1.67 mm.

Since the rating of legibility was on an ordinal scale, its transformation was performed on an interval scale based on the law of categorical judgment (Nanba & Kuwano, 1998). As a linear correlation was observed between the original category values and the interval scale ( $r = 0.999$ ), we considered the original category values to be on an interval scale.

Fig. 7 shows the legibility ratings (the mean and SD from all subjects) under each condition. A two-way ANOVA of the ratings of legibility revealed the significant effects of the changes in interdot space and dot diameter (interdot spaces:  $F(4, 80) = 15.62, p < 0.01$ , diameters:  $F(2, 80) = 39.01, p < 0.01$ ). The interaction effect of these two factors was not significant ( $F(8, 80) = 1.03, p > 0.1$ ). Tukey's multiple comparison test ( $p = 1\%$ ) revealed that at the dot diameters of 1.17 and 1.43 mm, the stimuli with the interdot space of 0.9 times the standard were rated significantly lower than

those with the other four interdot spaces. Additionally, at the dot diameter of 1.17 mm, the stimuli with the interdot space of 1.15 times the standard obtained significantly higher ratings than those with the standard. At the dot diameter of 1.67 mm, the stimuli with the interdot space of 1.10 times the standard gained the highest rating, and significant differences were observed between the interdot space of 1.10 times the standard and the other four interdot spaces. Here, let us focus, on the effects of the dot diameter change at the same interdot spaces. At the interdot space of 0.9 times the standard, the stimuli with the dot diameter of 1.17 mm obtained significantly higher ratings than those with the other two dot diameters. At the interdot spaces of 1.0, 1.05, and 1.10 times the standard, the stimuli with the dot diameters of 1.17 and 1.43 mm obtained significantly higher ratings than those with the dot diameter of 1.67 mm. At the interdot space of 1.15 times the standard, a significant difference was observed among all dot diameters and the stimuli with the dot diameter of 1.17 mm obtained the highest rating.

When all the trials were finished, the subjects were

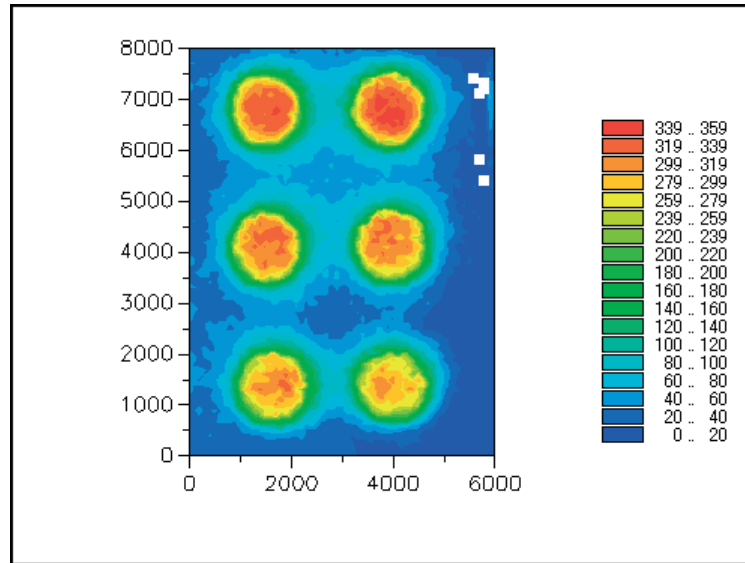


Fig. 11 Three-dimensional measurement of braille dots of “for” produced at dot diameter of 1.43 mm and interdot space of 1.15 times standard. Different colors represent different heights. Units in all axes are  $\mu\text{m}$ .

asked about their criteria for rating legibility. Five subjects explained that the stimuli with large dots were difficult to read. Two of these subjects stated that the stimuli with large dots that were very close to each other were difficult to read. Moreover, one of these subjects expressed that the stimuli with large dots and narrow interdot spaces were difficult to read. In addition to these five subjects, another person stated that the stimuli with dots that were very close to each other were difficult to read. These two different expressions “large dots that were very close to each other” and “large dots and narrow interdot spaces” are considered to carry the same meaning. We presented the comments of the subjects as is. Four subjects explained that the stimuli with narrow interdot spaces were difficult to read. Two of these subjects claimed that the stimuli with both narrower and broader interdot spaces than the standard were difficult to read, and one explained that the stimuli with narrow interdot spaces were difficult to read when combined with large dot diameters, as mentioned above. On the other hand, as for legibility conditions, one subject supported braille of the Japanese standard size, and another subject stated that large interdot spaces are preferred to the extent that one has to move his/her finger in the vertical direction to read.

Fig. 8 shows the correlation between the normalized reading times and the legibility ratings. It was observed that short reading times lead to high legibility ratings; the correlation between these two factors was almost linear (correlation coefficient  $r = 0.843$ ). When braille sentences have unligible parts, readers tend to move their finger on those parts repeatedly to read them correctly and the reading time increases as a result (Koyanagi, 1978). In this

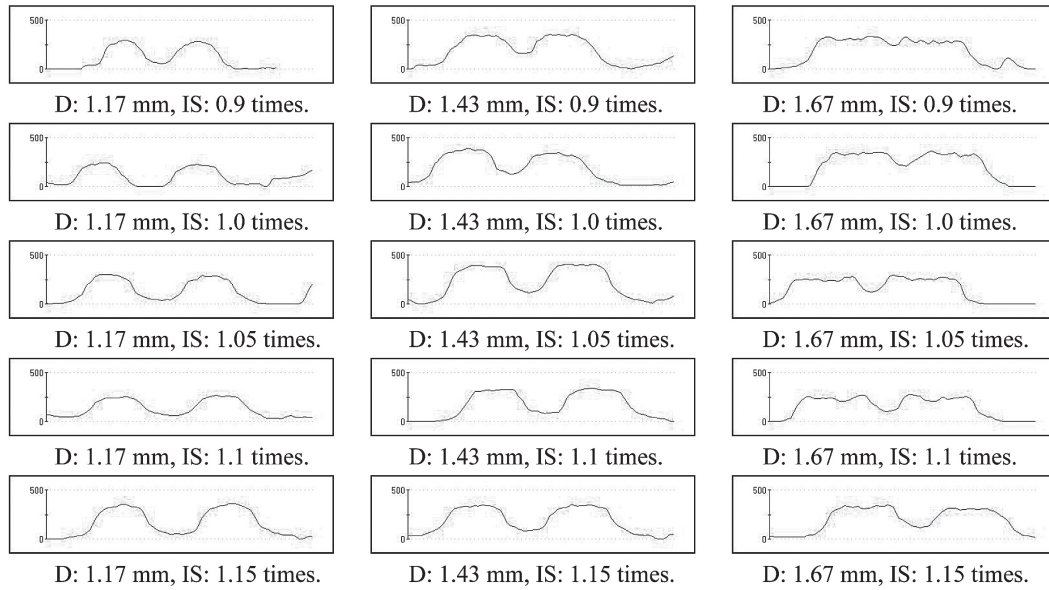
experiment, we did not only confirmed this phenomenon by videotaping but also demonstrated the linear correlation between the legibility rating and the reading time quantitatively.

The numbers of reading errors under each condition were added for all subjects (Fig. 9). As a whole, the number of reading errors increased as the interdot space decreased. In addition, at the interdot sapce of 0.9 and 1.0 times the standard, the number of reading errors increased as the dot diameter increased. These trends was the same as that of the reading time. No trade-off between speed and accuracy was observed; a long reading time did not lead to an increase in the number of reading errors.

#### IV. Three-Dimensional Measurement of Braille Dot Shapes

The shapes of capsule paper braille dots produced from the same original ink-printed paper used in the legibility experiment were measured using a laser 3D shape measurement system. The system consists of an XY stage-controlling system, EMS98AD-3D, COMS, and a CCD laser displacement measurement unit, LK-030, Keyence (Fig. 10). The system enables the measurement of the displacement in the Z-direction with a resolution of 1  $\mu\text{m}$  (according to the measuring conditions on the specifications) while moving the stage in the X- and Y-directions.

To focus on the fusion of braille dots caused by microcapsule foaming, the braille contraction of “for” was chosen as a sample since its six dots are raised. Braille



**Fig. 12** Cross sections of braille dots “for” measured along horizontal line crossing either of centers of dots 1 and 4, dots 2 and 5, or dots 3 and 6. The unit of the vertical line is  $\mu\text{m}$ , and the width of each cross section is 6 mm long. D denotes the dot diameter, and IS, the interdot space. Tilt compensation and level cut were applied to the obtained data. Since it is difficult to determine the zero level, a comparison of dot heights lacks decisive power.

samples were produced under the same conditions as those in the legibility experiment. The cross-sectional shape of each sample was measured along the horizontal line crossing the center of dots 1 and 4, dots 2 and 5, or dots 3 and 6. Horizontal cross sections were chosen because the spaces between the dots in a row are narrower than those between the dots in a column and these adjoining raised dots are more inclined to fuse together. The sample measurement of the entire character “for” is shown in Fig. 11 (at the interdot space of 1.15 times the standard and the dot diameter of 1.43 mm). The cross sections obtained under all the conditions are shown in Fig. 12, where we can observe the fusion of two dots at the dot diameter of 1.67 mm. Fusion occurred markedly at the interdot spaces of 0.9 and 1.0 times the standard. It is reasonable to consider that fusion leads to the unlegibility of braille.

Swelling parts on capsule paper became larger than the original ink-printed dots because of the foaming of microcapsules. On the basis of the technical information from Matsumoto Yushi-Seiyaku Co, Ltd., microcapsules of 10-30  $\mu\text{m}$  particle diameter expand a maximum of 70 times. The same principle applies to SwellPaper from Zychem, which was used in this experiment. Microcapsules expand not only in the normal direction to the paper surface but also in any lateral directions. Supposing that their extent of expansion is the same as that of vertical swelling, the particle diameter of these microcapsules increases to a maximum of 0.35 mm (Fig. 12) from the edge of the black ink-printed parts of the original image. This foaming of capsule paper should be explored in detail aside from

legibility experiments.

## V. Discussion

The results of this experiment clarified the unsuitable ranges of braille dot diameters and interdot spaces on the original image for stereocopying. Seven conditions of the dot diameter of 1.67 mm and the interdot space of 0.9 times the standard produced long reading times and legibility ratings lower than 3 (Fig. 8). On the other hand, the conditions of the dot diameter of 1.43 mm, which is the standard dot diameter, the dot diameter of 1.17 mm, which is smaller than the standard, and the interdot space range of 1.05 - 1.15 times the standard, which is broader than the standard, produced short reading times and high legibility ratings. Among these conditions, the interdot space of 1.15 times the standard and the dot diameter of 1.17 mm produced the shortest mean reading time and the highest legibility rating. Note that it does not necessarily indicate that these conditions are optimum for braille dots on the original image for stereocopying. Regarding the preferable braille size, subjects had different opinions; some preferred the standard braille size, but others, sizes larger than the standard. Moreover, variations in heating time, temperature, and type of capsule paper differentiated the degree of swelling. Accordingly, the suitable ranges of dot diameters and interdot spaces clarified in this experiment should be utilized as a reasonable guideline.

In addition to the above-mentioned heating conditions, the shape of the swelling parts of capsule paper changed in

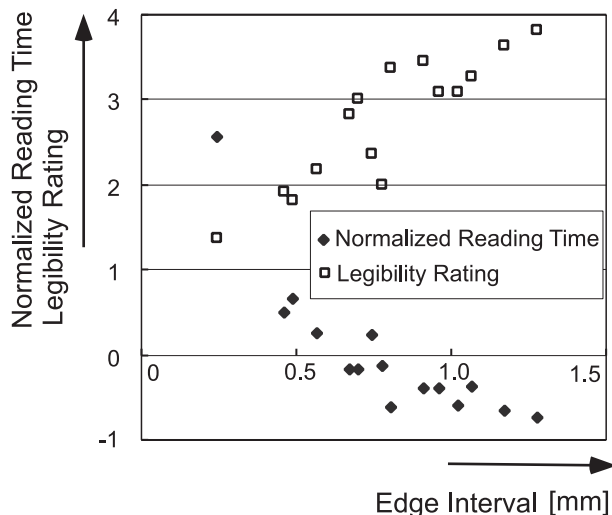


Fig. 13 Effects of edge interval on normalized reading time and legibility rating.

quality owing to finger pressure and abrasion. Regarding this issue, reading with a typical pressure does not rapidly wear the swelling parts away, as proven by our experience. Although we used the same stimulus capsule paper for all the subjects in the experiment, the trends in the changes in reading time and legibility rating under different conditions were in agreement for all the subjects. That is, within the limit of this legibility experiment, it can be considered that stimulus braille does not wear away so markedly that it affects the result. However, in future studies, it is necessary to measure the shapes of braille dots before and after reading to verify the finding.

In this study, the correlation between the braille size and its legibility on capsule paper was investigated. In addition, research studies on the legibility of braille embossed using braille printers were performed. For example, Kuroda et al. (1995) conducted an experiment using stimuli with different intercell and interline spaces, and concluded that either of large intercell or interline space improves legibility. Moreover, Nakano et al. (1997) showed that jumbo braille with increased vertical and horizontal intercell and interdot spaces can be read tactually even by visually impaired persons who suffered from diabetic retinopathy and had a low tactile sensitivity. If these experimental results are applied, an interdot space larger than 1.15 times the standard, which is the largest space used in this experiment, might also improve the legibility of braille on capsule paper. However, in this case, it is required to keep the dot diameter small, about 1.17 mm (Figs. 6 and 7).

The fusion of dots, which is considered to be the cause of unlegibility, can be expressed more directly by the edge interval of dots on the original image than by the dot diameter and interdot space. The edge interval was calculated by subtracting the dot diameter from the interdot

space. The horizontal axis of Fig. 13 denotes the edge interval. The normalized reading time and legibility rating were expressed in the vertical axis. The chart shows that as the edge interval decreases, the reading time increases and the legibility rating decreases. Large correlation coefficients were found between the edge interval and the legibility rating ( $r = 0.840$ ), and between the edge interval and the normalized reading time ( $r = 0.895$ ). To the best of our knowledge, this is the first time to clearly demonstrate the linear correlation between the edge interval and the reading time, and between the edge interval and the legibility rating. Although this finding was derived from the experiment using braille on capsule paper, it would be applied to braille embossed using braille printers. New knowledge on the speed and difficulty of tactile reading may be acquired if future studies are conducted with a new index, the edge interval, other than widely used diameters and interdot spaces.

In this study, we explored the relationship between the 3D shape of a braille dot and the reading time, and between the 3D shape of a braille dot and the legibility rating focusing solely on dot fusion. We observed that the legibility rating depends not only on the occurrence of dot fusion but also on the shape of an individual dot (Kamoda and Fujimoto, 2001). The opinions of the subjects who participated in this experiment varied from “higher dots are preferable,” to “sharp and lower dots are preferable.” Koyanagi (1978) reported that braille with 0.4 - 0.6 mm high dots is the most legible. On the other hand, the braille dots on capsule paper used in this experiment were approximately 0.35 mm high (Fig. 11). As for the shapes of braille dots, braille dots embossed using braille printers generally had a shape of an upside down bowl and their tops were round, whereas large dots (diameter: 1.67 mm) on capsule paper had flat tops and they resembled a plateaux (Fig. 12). It is possible that these shapes contribute to the difficulty of reading. In future studies, it is necessary to discuss the relationship between the shape of a braille dot and the legibility rating more precisely using physiological data.

## VI. Conclusion

The experimental results of reading capsule paper braille quantitatively demonstrated the suitable ranges of the dot diameters and interdot spaces of the original braille image for producing legible braille. One of the future tasks is to select appropriate braille fonts and sizes that keep original ink-printed braille dots in these suitable ranges. We hope that this research will provide useful information for persons who perform stereocopying in their daily job and life.



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# Special Education Program for Students with Physical Disabilities through a Community Support Network: Case Study of Social Resource Management at Special Schools

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**Abstract:** Nowadays special schools are increasingly called on to offer services to, not only students in special schools, but also to people with disabilities through the social resource network of a local community. In 2001, the ‘Cooperator’s Conference of the Ministry of Education, Culture, Science and Technology stressed in its Final Report that special schools should provide a more comprehensive service and adopt the role a special education center in a community. In this case study, examined the development of a special education program for a student with physical disabilities in a special school, utilizing not only the teacher, but also the wider community social support network, by analyzing the process of guidance, care plan, and ICF (International Classification of Functioning, Disability and Health) model Figure.

**Key Words :** Daily lives, Community, Social resource, Special education program, Social support network, ICF

## I. Introduction

This study is designed to examine the development of a special education program deeply rooted as a community social resource and as part of the daily lives of students, I would also like to discuss the details and the significance of this study.

Presently, special schools play the role of a special education center in a community. At a special school where I used to work, an educational counseling program including training courses for counseling was offered in keeping with the primary goal. As the person in charge, I assisted in the planning of training courses on the interaction of children with physical and motor disabilities, invited a physical therapist (PT) from an adjoining medical rehabilitation facility to serve as a lecturer, and made courtesy calls to two neighboring cities and six towns to guide training courses for their boards of education. Without question, the training needs were varied. However, I was often approached by local people asking where the special school is located, or if it was the adjoining facility. That is indicated that the local people know more the adjoining facility. That is a school that was trying so hard to take a lead in the community was having trouble being recognized by persons outside special school-related people not only as a “center” in the literal sense, but also as a system facility resource. Furthermore, every time I visited special or regular class teachers during activities such as study meetings, it was also quite apparent from the reports of these teachers that people did not regard special schools to be a social resource at all.

On the other hand, for students who are enrolled special

schools, how can we provide guidance on awareness of the community or everyday life? At least, the first function of special schools is to provide guidance to students in such schools. Consequently, it appears that there was not much need to be aware of the community. In addition to the role of special schools as a resource center for special education, these schools are supposed to collaborate with many other social resources, such as the “Model Project on Promoting Improvement in Specialties at Special Schools” and the “Model Project Promoting Systematic Educational Counseling for Children with Disabilities” by the Ministry of Education, Culture, Science and Technology, and the “Project for Community Support through Medical Treatment for Children (Persons) with Disabilities” by the Ministry of Health, Labor and Welfare. Under such circumstances, special schools are entrusted to take the role of a community social resource specifically for in special education. As for actual guidance, a greater specialization in independent guidance at special schools, such as special education programs, is required. Consequently, for special schools to perform its role as a social resource center in the community, for each student who is enrolled a special school, since this cannot be accomplished within a regular school, the development of guidance rooted in community life appears to be required.

Accordingly, in this study, (i) I will begin by detailing of the process of recognition of our role by becoming gradually aware of the many social resources around of community “A” during the direct guidance of a boy “A” who is enrolled a special school, based on the initial guidance expected to be provided within the school. Next, (ii) by networking with many social resources in the

community obtained through follow-up activities, a care management project, and effective use of the ICF model, I would like to examine our role in relation with other social resources in the community and the development of special education program rooted in the child's daily living.

## II. Interaction with “A” through Direct Guidance

### 1. Introduction of “A”

#### <General Features>

Mr. “A” is a grade 6 elementary school student, who loves comic book characters such as “Ultraman” and “Pocket Monsters” and their videos and cards. He has a little difficulty trying something for the first time or visiting an unfamiliar place; but once he becomes accustomed to the place, he is quite confident. His home is located in the same city as the special school he is enrolled. His parents take him to school in the morning and his mother takes him home by train.

#### <Basic Physical Features>

“A” has a movement disorder due to cerebral palsy. He is able to sit with his legs crossed for a few minutes (Photo 1), and if an antislip mat is placed on his armchair he can sit on his chair. He is able to shift from the supine position and crawl, and he can move forward slowly in a wheel chair using his right hand. Moreover, since grade 4, he has been practicing using a walker “gate trainer” (Photo 2).

He is able to eat almost all of his food by himself with modified spoon and fork by securing his posture and tableware. He loves to eat. He prefers western-style toilets, which he can use by himself, and if somebody supports his waist he also can use a urinal. He is able to change his own clothes if his posture is stabilized.

#### <Basic Educational Achievements>

Although a level of study equivalent to that for his grade in a regular school is difficult for him, whenever possible he tries taking the regular class curriculum. He has absolutely no trouble with daily conversation and listening to other people talk. Although he can read some Japanese characters, “hiragana”, it is difficult for him to read texts or write letters. He loves to browse through the pages of thick books such as dictionaries.

#### <Overview of the School He enrolls>

The prefectural special school “C” in prefecture “B” where “A” enrolls (hereinafter referred to as the said school) is a school for children with physical and motor disabilities located in city “D” in the center of the prefecture and adjacent to a prefectural medical treatment facility (hereinafter referred to as the “E” center). Approximately

50 elementary and junior high school children are enrolled there, and about 80% of the students go to school from the “E” center and 20% from their homes. Because the emphasis of the said school is special education program, apart from class teachers, two special education program teachers are assigned there (FY2001). The special education teachers not only take the initiative guiding students in the special education program at the said school, they are also responsible for implementing an educational counseling program in the community.

### 2. Details Guidance on and Role of Persons Responsible for Special Education Program

I was a special education program teacher responsible for guiding “A” in activities other than his regular classroom activities (2 hours weekly) during the four years that “A” was in elementary grades 2 to 5. When I look back at the details on guidance by paying attention to the method I used to set our annual goal, I can understand the process of focusing on our goals while becoming gradually aware of our role not only within the school, but also in “A’s” community as a social resource. Although the following changes in goals are based primarily on the growth of



Photo 1: Sitting with his legs crossed, which is gradually improving



Photo 2: Chasing his teacher with a “gate trainer”

“A” himself (e.g., physical, intellectual and personal relationship), it could be understood that goals was changing from general model to focusstd model, with my recognition.

Goals at the time “A” was in grade 2

- To deal with his study independently
- To lessen muscular tension
- To frequently utilize both hands (i.e., to utilize also the paralyzed side)
- To enhance understanding of his own body
- To promote stable posture
- To strengthen breathing

Goals at the time “A” was in grade 3

- To promote stable posture while standing
- To promote stability when sitting on a chair by training to hold up his own body and improving strength in his left hand for support
- To be able to walk unassisted whenever possible
- To promote clarity of speech through stronger breathing
- To deal with his studies by understanding their aims and through foresight

When “A” was in grade 2 and 3, there was a severe muscular tension when he stretch his body. He had difficulty maintaining his sitting position. Discussions were usually one-sided (i.e., the teacher talking about his favorite TV cartoons); this, it was difficult to have a conversation. Moreover, since his breathing was weak it was difficult to understand his words.

During that time, the goals were related to “A’s” growth over a two-year period. Undoubtedly, such goals were necessary for “A”. On the other hand, because of the wide scope of the goals we now realize that that there was little focus during those two hours each week. The people close to “A” evaluated that the school’s role as a social resource in the community and the roles of individuals responsible for the guidance of “A” were insufficient. Perhaps this special education program focused on “A”, and his environment with which he interacts was ignored.

Goals at the time “A” was in grade 4

- To improve his ability to maintain a sitting position and his left hand movements which will help him eat independently
- To become accustomed to and again mastery in using the “gate trainer”
- To promote a stable standing position

When he was in grade 4, the scope of the goals was narrowed significantly. During this period, he stopped using

a wheelchair and started using a special chair designed to assist him when he is eating. With this change, the goals set to improve his eating dexterity were streamlined even further during individual special education program. However, I introduced this special chair only after discussions with his class teacher, his parents and medical equipment manufacturers, and I evaluated the streamlined goals with regard to daily life activities in a concrete manner in relation to other social resources, though this was not my original plan. There was still a passive involvement of “A” in a self-examination such as this.

Goals at the time “A” was in grade 5

- To become accustomed to using a “gate trainer” and increase in usage for moving
- To be able to stand and transfer to the “gate trainer” with minimal assistance as possible
- To promote stability when sitting on a chair for ease in studying or eating meals

Gate trainer practice began during “A’s” individualized special education program, which was carried out jointly with a physical therapist (PT) and an occupational therapist (OT) at the “E” center (hereinafter referred to as TOPS (taken from the first letters of Teacher, OT, PT and Student) and after-school activities with the class teacher and parents. For “A” who had difficulty trying new things, it was not worthy that he gradually started taking the initiative to do new things. However, because the same activities were repeated many times, which was regarded to be inefficient.

After that, the actual gate trainer practice was carried out mainly by the class teacher and parents, which was limited to the time when leaving school. Occasionally, a special education program teacher joined in the practice. During TOPS (Photo 3) and individualized special education program, which emphasized on basic posture or movement, the action of transferring onto the trainer became part of individualized special education program (Photo 4).

In retrospect, with regards to the role of persons in charge of the special education program in relation with other social resources, I realized that our guidance focused on posture and basic movements. To realize his goals, I think it is important that we recognize our own roles after understanding not only “A” himself, but also his class teachers, his parents, and other people important to him.

### **3. Roles of Persons who is Responsible for special Education Program in the Social Resource Network**

During the same period, there was a strong tendency for specialists (e.g., special education staff, PT, OT, ST, nurses, medical equipment manufacturers and nursery





Photo 3: TOPS carried out by teacher and OT



Photo 4: Individualized special education program to enable transfer to gate trainer

staff) associated with students with disabilities in a local community to establish a network involving these students and their families through study meetings referred to as a “therapeutic education network”. During those meetings, in the case of “A”, we classified the people associated with “A”, we clarified our future directions (Figure 1).

Then, the surrounding social resources were classified into three groups, the school, “E” center, and private institutions; the underlined items indicate the types of involvement and items in parentheses indicate the frequency. From this figure, we can note in the care and guidance of that there were many people involved “A”. During individualized guidance during the special education program, which was two hours per week at the school, I again recognized that the role of the person in charge of guidance for such activities should place emphasis on basic body movements.

By the time he entered grade 5, except for the individualized special education program, there were no longer any morning meetings; instead, his mother, the class teacher and

other helpers shared information and provided stretching exercises (Photo 5). These exercises were preparatory for spending the day with a stable posture. Similarly, guidance in maintaining posture was further emphasized even during the individualized special education program. Through this guidance, “A’s” posture during sitting improved (Photo 6). When I told “A” he was able to sit well, he would ask repeatedly mr “Am I doing well?” Therefore, So he was also pleased that he was able to sit well.



Photo 5



Photo 6

In September, I visited his home to discuss with his mother, class teacher, and a staff member from a medical equipment manufacturer regarding the use of a new wheelchair, during which time we talked about the present and future conditions of his body and the use (in and out of school ) of various devices such as armchairs and right-hand operated wheelchairs. Afterwards, I was also present informed on the diagnosis of a doctor in the last stages of making the decision on what. After considering the daily life and anticipated future growth of “A”, I shared my opinion with the doctor as a person in charge of the special education program. In addition, we discussed his future potentials and ways of assisting him when using the toilet or bathing, helpful tools, new types of gate trainers and issues related to individualized special education program. From these discussions, I concluded that the role of the person in charge of special education program for “A” should be to provide guidance on the fundamentals of body movements during individual special education program and preparatory in the morning. Because changes in his body movements and muscular tension were expected with his rapid growth at his age, similar theories were confirmed to be increasingly important. Persons in charge of the special education program also began to realize the school’s role as a social resource in “A’s” community. However, since OT also assisted in similar guidance on body movements, it may not be necessary to rely so much on the school. Nonetheless, the role of the school should be examined in further detail.

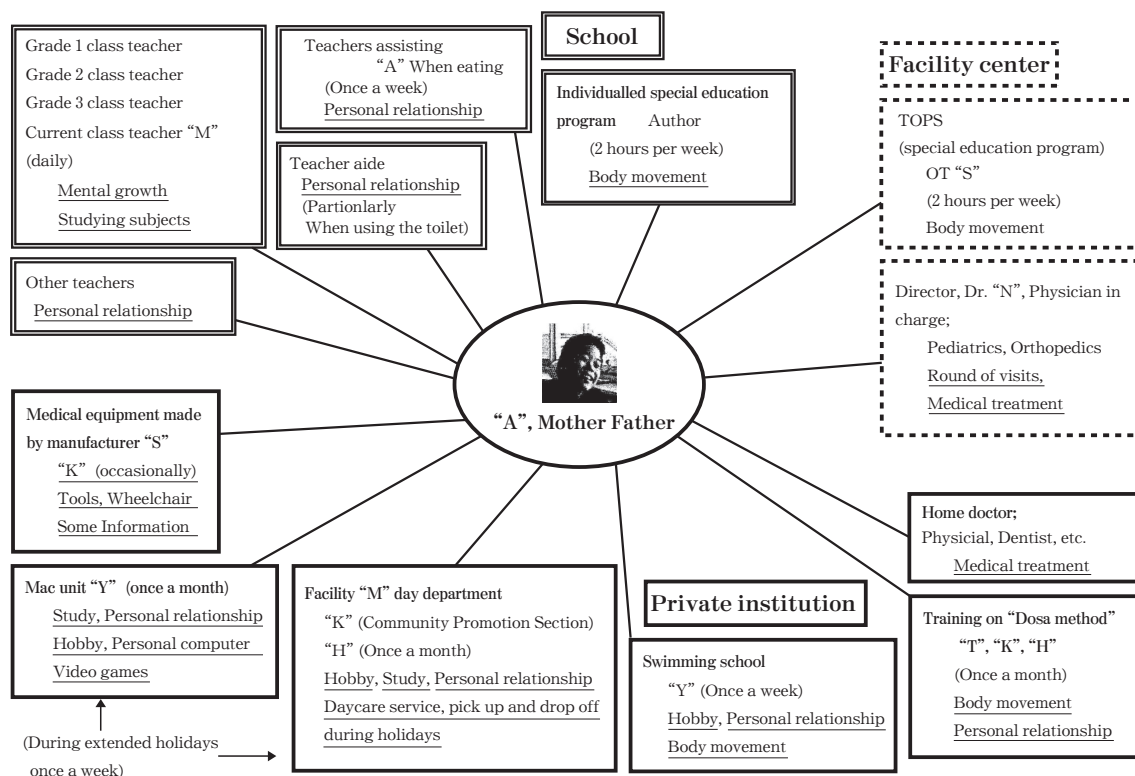


Figure 1: Chart of People Involved in the Case "A"

### III. Interaction with "A" Through Follow-up Interaction

I provided direct guidance until "A" was in grade 5. From then on, we talked on the telephone, or exchanged e-mails, or I visited him. So I continued to be involved with "A", his parents and class teachers.

Meanwhile, it was confirmed that guidance provided in the special education program was more deeply rooted in daily life with the involvement of other social resources. I would like to discuss the details below.

#### 1. Worksheet on Daily Living and Requirements

In the above-mentioned "therapeutic education network", a worksheet was prepared for his family and related persons on which items such as daily family life, school life, his condition prior to going out to school and future needs were recorded, to promote a common understanding of "A's" condition and needs. This worksheet was in a diagram form for ease of recording of activities during meals and bathing and other activities; this, we can see the actual activities of "A" in daily living.

Figure 2 shows a portion of the worksheet written by "A's" mother. From this worksheet, we were able to understand the living conditions of "A" more clearly than ever before,

and many things that the teachers could not see became clear. As a result of this, we were forced to self-examine ourselves on whether guidance in the special education program, which focused on basic body movements was of any real benefit to his future life. In particular, teachers who were only involved during the daytime could not really understand the difficulties he and his family face when bathing. When I think about this, I recall the words of one of the welfare personnel, "school teachers can never really understand the life of this person and his parents".

Furthermore, the other day, at the school training course, I asked classroom teachers to write the conditions of students with disabilities and their wishes on the same worksheet. Then, similarly to the case of "A", I read many comments such as, "I realize that I didn't know anything about these students other than their school life".

Figure 3 shows what the mother wrote under "Things I'd like to do". Her wish was "I want to go to a hot spring with my family."

It would be so nice to be able to relax bathing as a family with only one helper!" This is a good example of the social participation, which is the aim of the special education program. Moreover, on the basis of the worksheet, an analysis of movements necessary for going to a hot spring



[Figure 2: State of Family Life and Requirements]

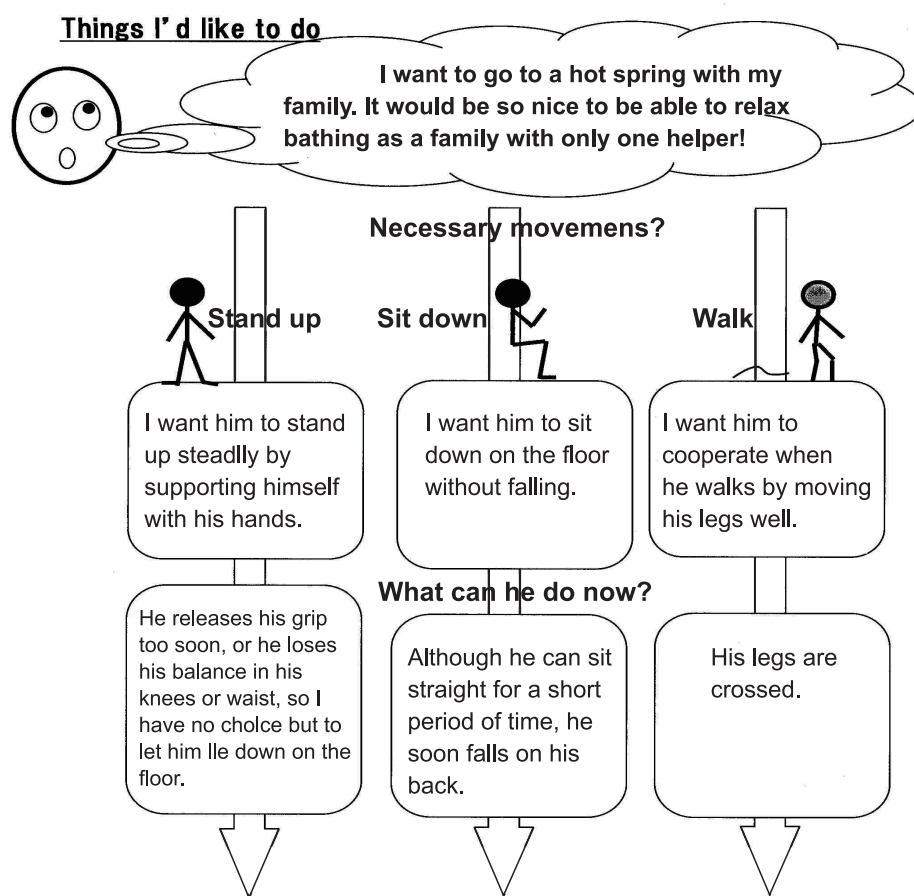
was made, and as a result, I was forced to respond to a very difficult question on my personal feelings on guidance in the special education program. Because these movements fall under the category of guidance for leisure as life-long learning, it is appropriate for these movements to be included in the existing guidance. His mother not only regarded these movements to be important, but also considered that going out to a hot spring may help "A" in overcoming his initial feelings of resistance to a new place. Guidance with due consideration of these feelings should be examined.

Normally, this does not mean that we should try to fulfill all the wishes of the parents or the subject. After we become aware of the conditions of the subject and consider meaningful guidance on the basis of these conditions, we should simply regard this as very valuable information. Then, in the case of the special education program, we should provide guidance to support meaningful activities.

## 2. Model Project to Improve the Care Management Scheme for people with disabilities

After talking with his mother, I realized that "A" had become the model case of a project for improving the care management scheme for people with disabilities in city "D". I immediately obtained his mother's permission and started to exchange information with the city "D" support center for people with disabilities. The project was designed in 2003 in consideration of the shift in support expenses. Therefore, "A's" case was a model for that school period. This plan was prepared through ten series of explanatory meetings, and through assessment and conferences.

A representative in charge of the planning explained that because care management is a job that connects social resources to individuals in need of care, in the case of "A" a network had already been formed through the above-mentioned "therapeutic education network", and it was extremely difficult intended meaning in this context unclear.



[Figure 3: Things I'd like to do]

Table 1: Needs of Parents in a Care Plan

Ranking	Needs	Parent's Comments
1	Would like a place where we could pick him up after school	A place where he can go and be taken care of after school.
2	Picking up from school and dropping off at home	When the family cannot pick him up, we would like someone to pick him up in place of us.
3	Would like a place for training in the city	At present, we use the day care project at "F" facility once a month; if it is closer, it would be better.
3	Would like him to have a comprehensive care	We want the "E" center to take care of him in a comprehensive manner, including medicine and rehabilitation (e.g., limbs, exercise, speech, therapy, eating).
4	Would like information on welfare and everyday life	We would like to be kept informed about daily life, welfare and other events through bulletin boards, facsimile, mail, etc.
5	Make friends	At the "C" special school, not many students come from home; and the few who are there are of different ages and they play with their brothers, so he cannot make friends.
5	Would like a place for him to play outside the home	A place where children with similar disabilities can gather together.
6	Restore of residence	Depending on the physical condition of each person, with regards to the bathroom. * If possible, I want him to be able to use our present bathroom with physical rehabilitation.

This shows that the social resources in the community where “A” resides were already established and evaluated favorably.

What I would like to point out here is that parents conveyed to the person in charge that some needs were rooted in daily life. Here, there was a wide range of needs that the school personnel had never heard of. Those needs were prioritized as shown in Table 1. In addition, with respect to the overlapping of priority, the opinions of parents who could not decide on the priority were left as is.

Both the class teachers and I were unaware that the needs extended over a wide range. As a matter of fact, because it was personal information, we did not know anything more than necessary. I was reminded of the opinion of the above-mentioned welfare-related personnel with that “from the beginning parents limited their consultations the school”.

When we examine those needs, the school could have become involved in meeting some of the needs. For example, <1 A place the where “A” can stay after school > which was an important wish of the parents of “A”, who are self-employed, should be provided by the school. Furthermore, as an opportunity for understanding the basic abilities of “A” and to satisfy his needs, guidance should be considered through the special education program, for example, movement during taking a bath or methods for effectively utilizing assistive devices in < 6 >.

Furthermore, the goals and plans of assistance and service providers were also established in these, meetings and there were some names that we did not know. I was surprised because I was confident that I have developed a program for guidance in collaboration with the network of many social resources. Accordingly, by referring to the real needs in daily life, the importance of planning and implementing guidance through the collaboration of many social resources by focusing on the future was again recognized.

### 3. Examining Individual Roles by Effectively Utilizing the ICF Model

With the many social resources and the wide range of needs mentioned earlier, in order to clarify individualized roles including guidance in the special education program at the school, one of our objectives was to introduce the International Classification of Functioning, Disability and Health (hereinafter abbreviated to ICF), which has the role of being a common language between other job classifications. In concrete terms, while referring to a detailed classification with respect to components feasible for evaluation that is utilized in ICF (Body functions, Body

structures, Activity and Participation, and Environmental factors), until the second levels, using the “ICF Checklist Version 2.1a Clinician Form”. Then, on the basis of this evaluation, and by referring to the diagram (Figure 4) of the disability conditions of “A” and previous works, which is a report describing the correlation between each component and the future direction was prepared, I had discussions with the parents, the class teacher, and PT in charge to confirm the conditions of “A” and the individual roles of all people involved in the care and guidance of “A”.

Figure 4 shows the items regarded as issues to be evaluated at each level of Health condition, Body function, Body structures, Activity, Participation and the Facilitators and Environmental factors. The meanings of these items are as follows:

Health condition: State of health

Body function: Physiological functions of body systems (including psychological functions)

Body structure: Anatomical parts of the body such as organs, limbs and their components

Activity: Execution of tasks or actions by the individual

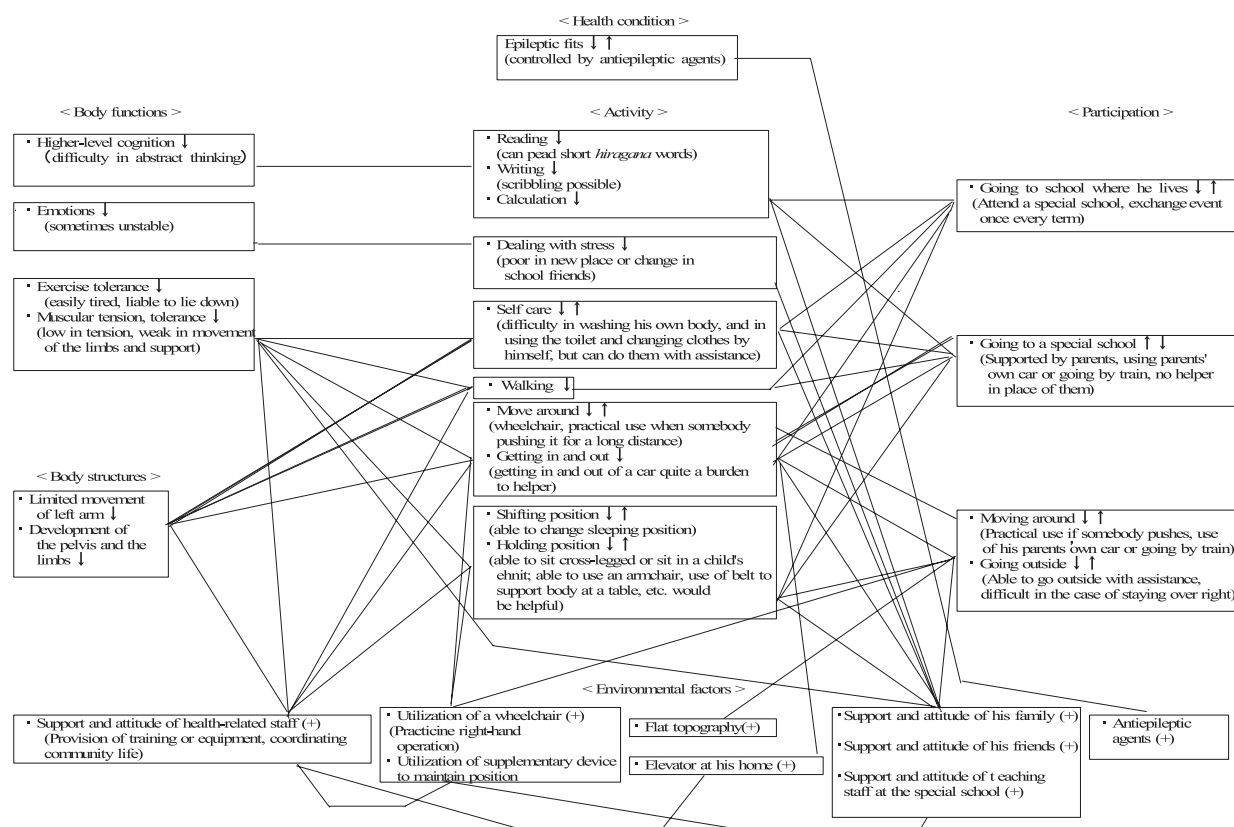
Participation: Involvement in a life situation

Environmental factors: Physical, social and attitudinal environment in which people live and conduct their lives. There are Facilitators and Barriers.

The symbols indicate the following. The arrow between each item indicates the direction of influence. Correspondingly, a bidirectional arrow indicates a mutual influence. In addition, “↑” within an item indicates something that “A” can do, and “↓” indicates something that he is poor in doing or has difficulty in doing. “↓↑” means that activity or participation is possible if the conditions in parentheses are prepared. Finally, (+) in the environmental factors means that it had an impact on each level.

As described earlier, because the basic aspects, such as movements or posture, were regarded to be important issues because “A” has movement difficulties, guidance in the special education program was mainly provided. In a reevaluation utilizing ICF, there were certain problems regarding movement-related functions in <Body function> and movement-related structures in <Body structure>; and as before, class teachers or PT and OT became involved. These major needs were also conveyed by parents to the school. However, it became clear that it was better to re-examine whether the guidance was regarded to be for the same movements, such as moving around or self-care in <Activity and Participation>. Furthermore, through discussions, we came to the conclusion that the class teachers should provide guidance in the special education





[Figure 4: Diagram of Actual Conditions of “A” based on the ICF Model]

program while paying attention to <Activity> level; whereas, the PT should take a partial role approach to Body functions while considering level of <Participation> or <Activity>. At that time, we also concluded that we should actively exchange information and the person in charge of the special education program should take the initiative in this area.

On the other hand, although it is confirmed that there were issues regarding to cognition of <Body function and to study of <Activity and Participation>, basic cognition or various movements, on the special education program that required as basis of these issues had been hardly taken. In addition, through discussions, it became obvious that parents had hoped for a better curriculum from his class teacher. From this, we concluded that the class teacher should examine the possibility of a greater emphasis on study and provide basic abilities through the special education program with the cooperation of OT. With regards to the importance of collaboration with PT and OT, not only by taking a partial role in the guidance of “A” within a specified timeframe but also by promoting the collaboration from the planning of guidance, it is expected that teachers can fulfill their roles from the education viewpoint.

In addition, in the evaluation of <Activity and

Participation>, there is a big difference between items in the evaluation of <Capacity> in the case of having some type of assistance and in the case of not having assistance, so improvement can be realized by manipulating <Environmental factors>. It is clear that PT and OT are not the only personnel that should be involved in the school; other welfare personnel and medical equipment manufacturers should either examine their role as one of many social resources or find new social resources.

#### IV. Consideration and Future Issues

As shown in Figure 1, “A’s” life is affected by many types of social resource. The school, teachers and persons in charge of the special education program are in the position to be one of the social resources in the community, so we should fulfill our individual roles by being aware of our duties. Moreover, the current network will change in the future. Therefore, we should consider our roles by anticipating not only the present, but also the future condition.

Since the support expense program began in FY2003, we should select and built feasible social resources. Although “A” was recognized as a model case for the care

management model scheme, for the time being there is no official plan to systemize the said scheme for all people with disabilities. Accordingly, municipal governments are expected to prepare a preliminary list of approved institutions; however, not only the persons with disabilities and their families, but also the school personnel need to be adequately informed of these resources scheme. Considering that students with disabilities, including “A”, frequently utilize many social resources in their daily lives, if they are able to actively utilize such resources while attending school, skills that they would learn will be useful in their life after graduation. Furthermore, the community will become more aware of the existence of children with disabilities or special schools, thus contributing to a more better society.

Although the subject and his family were able to establish connection with the surrounding social resources as indicated by the lines shown in Figure 1, this figure was designed to clarify social resources presently involved in and mutually creating horizontal connections. We should clarify our role in each of these connections. The person responsible for the special education program should provide guidance not only by paying attention to “A’s” basic movements, but also by concentrating completely on providing education for his overall growth. Moreover, this cannot be realized during the period of individual guidance, because it is guidance based on “A’s” daily life as shown in his worksheets or care management plan. “D” city stated that the said school was designated for the FY2001 and 2002 “Model Project to Promote the Systematization of Educational Counseling for Children with Disabilities”. However, the neighboring facility “E” center also received approval for “Support Program of Regional Medical Treatment, for Children (Persons) with Disabilities”. Consequently, special school “C” and persons responsible for the special education program should use their specialties mainly through guidance in the special education program as a social resource in specialized education.

The following two issues will be examined in the future. First, what was the effect of the guidance described here on “A” himself and on his daily life, and what further considerations should be taken in the future. Second, we should examine how guidance through social resources based on the daily lives of students with disabilities can be provided to these who must attend school from a boarding house, hospital or other facilities.

\* I obtained the consent of “A” and his family to use him as a model for this study and to publish his photographs. In addition, the parents have read this report and agreed to its contents.

**Acknowledgements:** I would like to express my sincerest gratitude to “A” and his family and other people who participated in the course of this study.

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# Lessons for Understanding Handicaps in Ordinary Classrooms

## “Period of Integrated Study” by Collaboration of Teachers in *Tsukyu* and Teachers in Ordinary Classrooms

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**Abstract:** In this case study, the author reports the progress of gaining greater understanding of the feelings of people with handicaps to improve collaboration among ordinary classroom and *Tsukyu* teachers. The study was conducted during the "periods of integrated study" in ordinary classrooms of elementary schools and highlights the importance of the collaboration of teachers in *Tsukyu* and teachers in ordinary as in title classrooms in the education of children attached to *Tsukyu*.

This is because these children spend most of their school lives in ordinary classrooms. Researchers and teachers collaborated in giving the lessons.

In the study lesson entitled, “How do you think about gentleness?” it was found that students from the first to the sixth grades experience continual inconvenience and this experience is reported here. The principal aim of the study lessons is that every child gains an awareness of the feelings of people with handicaps and to motivate children without handicap to provide supporting activities to people with handicaps.

**Key Words:** Understanding handicaps, Period of integrated study, *Tsukyu* (resource rooms), Experience study, Collaborate

### I. Preface

The *tsukyu* (“resource rooms”) educational system provides special guidance and education to children with mild handicaps. Children who attend *tsukyu* classes (hereinafter referred to as “*tsukyu* children”) are usually enrolled in ordinary classes, and thus, collaboration between *tsukyu* class teachers and teachers of relevant ordinary classes is important. In a survey concerning such collaboration conducted by the National Institute of Special Education (NISE) in fiscal 1996, many respondents favored<sup>1)</sup> “start-of-fiscal-year coordination meetings”, “telephone contacts”, “sending of guidance reports” and “school visits”. However, few studies have been conducted on specific, practical activities to improve the school life of *tsukyu* children in ordinary classes where they spend most of their time. The above survey (FY 1996) included an item “lessons for understanding handicaps” where *tsukyu* class teachers visit ordinary classes and provide lessons to promote the understanding of handicaps as one specific, practical activity. However, few respondents answered this item, and considered it only as a “special method” of collaboration. In recent years, WHO has been advocating a new classification scheme of disabilities<sup>5)</sup> (i.e., ICF, International Classification of Functioning, Disability and Health), and has been advocating social participation and investigation of environmental factors that predispose the development of

handicaps. Therefore it is important to gain understanding of the needs of people with handicaps to ensure their active social participation. In addition, the Nursery School Guidelines of Japan revised in FY 1999 added the following statement in Chapter 13: “provision of guidance to other children and their guardians to correctly understand handicaps”. Moreover, in the “period of integrated study” provided for in the new course of study, which has been implemented on a transitional basis since FY 2000, attempts are being made for children in ordinary classes to undergo simulated experiences of having handicaps.

In the field of education for children with hearing and speech handicaps, the teacher conference of special class for speech and hearing handicapped children (2001) pointed out that “collaboration with the school” is the key task of *tsukyu* classroom teachers, and expressly stated the need for them to “provide lessons for the understanding of handicaps by collaborating with the school”. (Note: In the aforementioned work, “collaboration” is defined in the conference as “to carry out activities for each person to attain independence, valuing each other, and developing cooperative relationships on a daily basis”. This means that each person must carry out activities related to children, while respecting each other’s viewpoint and clarifying each other’s responsibilities. This is a more wide-ranging concept than what is meant by “cooperation” or “joint work”. The

authors use this term when carrying out activities with persons working with children.)

Some examples of specific lessons for promoting the understanding of handicaps have been prepared by Tahara (2000a) who continually conducted lessons for understanding hearing handicaps in ordinary classes by aiding children who have difficulty in hearing, in which she prepared “A Supplementary Reading Material for Understanding Hearing Handicaps” (2000b). Hori (1999) has examined several practical materials such as videos presenting *tsukyu* classes and reports on learning experiences in such classes. He suggested that lessons presenting *tsukyu* classes or lessons on handicaps can be incorporated in the curricula of ordinary classes, and that there is an urgent need for such lessons in ordinary classrooms. Aside from this knowledge, there have been other reports on practical activities carried out as intramural research studies by local study groups.

Because the authors have considered collaboration with ordinary class teachers and children as indispensable to improve the school lives of *tsukyu* children, we have attempted to provide lessons on understanding handicaps in ordinary classes. From these lessons, progress in elementary school “A” is shown in Figure 1.

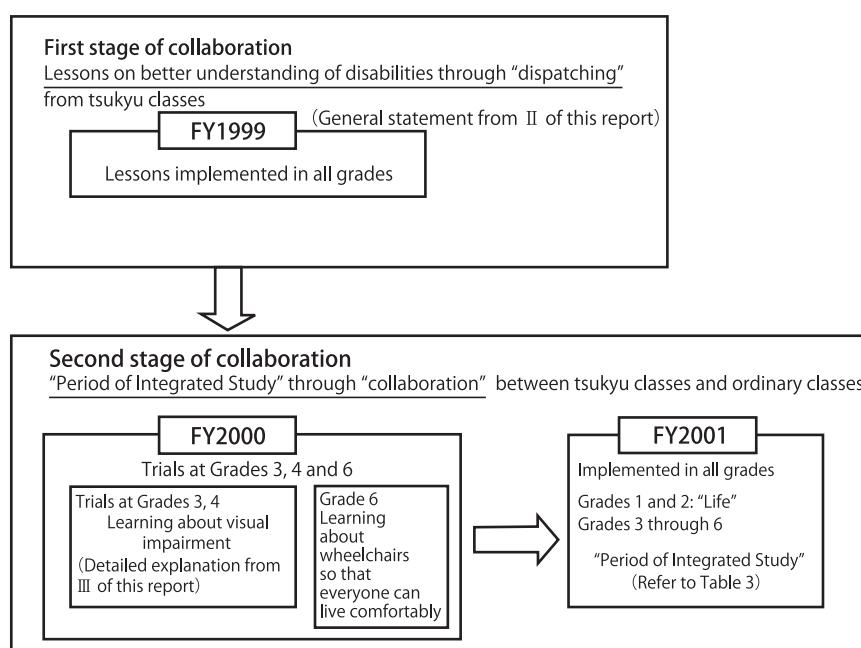
As shown in Figure 1, in the first stage of collaboration in FY 1999, the authors gave lessons on understanding handicaps in all grades at elementary school “A”. These lessons were “offered” to the whole school. *Tsukyu* classes were not only offered to the classes to which *tsukyu* children

attended, but also to the grades to which they belonged. Moreover, we consider that these lessons whole school would enormously help *tsukyu* children in their daily school life activities. Children and teachers in ordinary classrooms accepted this offer at this time, and collaboration then proceeded to the next stage.

In the second stage of collaboration in FY2000, by experiencing what it is like to have a handicap in three grades at elementary school “A”, lessons on understanding handicaps were given to children from ordinary classrooms so that they would feel the inconveniences of having a handicap and become more compassionate as part of their period of integrated study. This activity was not spearheaded by the authors alone, but was a collaboration with activity that involved the participation of ordinary classroom teachers.

In the second stage of development in FY2001, the trial lessons from the previous year were implemented to all grades at elementary school “A”.

In this report on the trial lessons made by the authors, we will first examine lessons on better understanding of handicaps, which is regarded as the first stage of collaboration. Next, we will discuss the “Period of integrated study: What is compassion?” and discuss lessons from the simulation of a visual handicap, and then examine the changes in children’s cognition of handicaps and the effect of collaboration with ordinary classroom teachers and children.



<Figure 1: Progress of practical activities conducted by authors at elementary for school “A”>

Table 1. Lessons on language

	Purpose	Simulated experiences
Lower grades	Word play (enjoy words)	Capping verses with conditions and silent videos
Middle grades	Speech conveyance (information processing)	Sound-transmission model and silent video using microphones or personal computers
Higher grades	Roles and functions of speech (manipulating thoughts)	Word replacing game and experiencing being old

Table 2. Lessons on Being Compassionate to Others

	Purpose	Discussion
Lower grades	To know that one cannot enjoy words if one cannot use words well	The feeling when one cannot say what he/she wants to say
Middle grades	To know how words affect various organs	The feeling when one wants to be heard to but is not
Higher grades	To know what it is like not to be able to do daily activities	What it is like to be elderly

## II. First Stage of Collaboration: Lessons from *Tsukyu* Classes

### 1. Details of start of trial lessons at Elementary School “A”

In FY 1998, before the trial lessons were started at elementary school “A”, the authors first conducted lessons in other ordinary classrooms attended by *tsukyu* children in an other school. These lessons were implemented to directly promote better awareness of *tsukyu* children. For example, in a class where a child who stutters attended, stutling became the theme of class discussion; and in a class where a child with an articulation disorder was present, articulation disorders became the theme of class discussion. These lessons were given so that children in schools were *tsukyu* children also attended would have a better understanding of handicaps and be aware of the existence of *tsukyu* classes, and, consequently, with the hope that *tsukyu* children would in turn be able to present themselves without inhibition in ordinary classrooms and to enable them to spend most of their school life productive.

While these lessons were being conducted, the principal of the school and classroom teachers asked if we would provide such lessons not only for *tsukyu* classes, but also for all classes in the same grade and other grades. Consequently, we started providing such lessons and reviewed their contents even in classes with no *tsukyu* children. As a result, we concluded that we should provide not only lessons on simple classroom introduction or hearing and speech handicaps, but also lessons on how to recognize feeling of discomfort or inconvenience of another individual and take action—in other words—to think about compassion for handicapped children at the same time.

Therefore, from the third term of FY 1998, the authors tried a new lesson called a “2-hour set”. After it was first tried in other schools, in FY 1999, we provided “2-hour set” lessons in all classes at elementary school “A”. Hereinafter, these activities will be described.

### 2. Overview of Lessons on Understanding Handicaps at Elementary School “A”

#### (1) Aim of Lessons

The lessons focused on the following two points.

- (i) To be more aware of persons with various circumstances and conditions around you and to correctly grasp the difference between oneself and others (to be aware of inconvenient situations through simulations or discussion with persons with handicap or the elderly, and to think about what can be done for a person in need).
- (ii) To identify with other persons with handicap and to express compassion (to think and act sensitively from the viewpoint or condition of other individuals with handicap, and to contemplate on social relationships such as a “give and take” relationship).

#### (2) Procedures

Two *tsukyu* classroom teachers (one of which took charge of recording) and one researcher in special education gave lessons on understanding handicaps in ordinary classes (two classes in each grade; a total of twelve classes) at elementary school “A”. The lessons were 90 minutes (45 minutes x 2) each. In Grades 1 and 2, the lessons were given for two days; for the other grades, the lessons were given successively on the same day. For the lessons, the interest



of the children was enhanced through slide presentations using a personal computer and a slide projector, videos and simulated experiences. Before and after each lesson, the children were asked to complete a questionnaire regarding their level of previous knowledge on handicaps or their impressions on the lessons. The opinions of the ordinary classroom teachers were also obtained after each lesson.

In addition, the trial lessons of FY 1999 were implemented as a research lesson of specialized teachers in elementary school "A", which became part of a joint research project among specialized teachers (teachers in charge of music, drawing and handicraft, and homemaking). Moreover, the lessons in the fifth grade were adopted as research lessons for the whole school.

### (3) Guidance

Three types of lessons were given to the lower, middle and higher grades on the basis of the level of guidance in each grade. Each lesson included guidance (Table 1) on "language" and guidance on thinking about compassion to others. (Table 2)

#### 1. Lessons for Lower Grades (1st and 2nd grades)

○First lesson: "Speech is fun, isn't it?"

- (i) Using words can be fun. Let us fully enjoy this a commonly used term in your field which is a play of speech.
- (ii) If we put limits on words, we cannot fully enjoy them. Let us try capping verses by limiting the use of words including specific sounds. Let us compare the results of activity (i) on capping of verses.
- (iii) Let us discuss why what? is not as much fun based on activity (ii).

○Second lesson: "Speech is wonderful, isn't it?"

- (iv) Do you know that some persons cannot speak using words? Let us listen to a recording of a child who has stammer and watch a drama about stammering.
- (v) How does the person who has stammer feel? How would you feel if that person is you?
- (vi) Let us discuss what we can do after thinking about other persons who have stammer based on (v).

#### 2. Lessons for Middle Grades (3rd and 4th grades)

○First lesson: "How are words conveyed?"

- (i) How do we learn words? Let us watch a video of the linguistic development of a baby.
- (ii) How are words conveyed and understood? Let us learn the process of sound information processing

through simulation utilizing a microphone, a personal computer and a speaker.

- (iii) Let us experience the inconvenience of having difficulty in hearing: Let us discuss about a video on a simulated experience of difficulty in hearing.

○Second lesson: "Let us think about the inconveniences of having handicaps"

- (iv) Let us discuss the inconveniences of going about daily life if you are a person who has difficulty in hearing on the basis of your experiences from the previous lesson.
- (v) Let us discuss the feelings of a person who has difficulty in hearing after listening to a recording of a composition read aloud by a child who has difficulty in hearing.
- (vi) There are many types of people in the world. Let us discuss barrier-free vending machines.

#### 3. Lessons for Higher Grades (5th and 6th grades)

○First lesson: "Let us discover the function of words"

- (i) How are we able to learn and use words? The same as middle grades.
- (ii) How do we learn words? The same as the detailed version of middle grades (ii).
- (iii) What role do words take in daily life? The symbolic function of language, communicative function, and language function as a thinking tool are summarized.
- (iv) If limitations are placed on the functions of words, it becomes inconvenient. Let us experience this through a word exchange game.

○Second lesson: "Let us take action while thinking about the position or feelings of another person"

- (v) Let us learn about stammering and the inconvenience of having it by listening to a recorded conversation or a composition of a child who has with stuttering.
- (vi) Let us learn about elderly persons and discuss the inconveniences they face by watching a video about them.
- (vii) Let us think about the feelings of persons with handicap and elderly persons and discuss their feelings based on (v) and (vi).
- (viii) There are many types of people in the world. Let us think about what you can do to help people with handicap.

#### 4. Impression after Lessons

For the impressions of children after the lessons, their impressions conform with (i) and (ii) of the aim of the lessons. Some of their responses "I really understand that

there are people who cannot hear or convey very well what they want to say”, “If I am one of them, I will be so stressed” (lower grade), “I realized that there are many types of people; however, I do not show them any special consideration”, and “I should change my attitude, so let us be kind to people” (higher grade).

Furthermore, after the lessons, ordinary classroom children visited the *tsukyu* classroom of their school more frequently. In addition, the children told the authors, “Please come again” or “When are we going to study again?”

#### (4) Discussion (Toward collaboration)

The practical trial lessons taken by the authors in FY 1999 placed an emphasis on the understanding of the handicaps of *tsukyu* children. With respect to the process of acquiring accurate knowledge on handicaps and becoming more compassionate, the lessons involved mainly the outlines of the authors.

As a result, ordinary classroom children became more familiar with *tsukyu* classes and specialized teachers, and expressed their willingness to continue the lessons. We have the impression that these responses indicate that the children wanted to become more compassionate. Furthermore, ordinary classroom teachers also expressed their opinions on the lessons given by showing the children’s compositions or diaries about their impressions or discussing their own views toward people with handicaps, so that their relationship with the authors also deepened.

The trial lessons adopted from FY 1999 were considered was a one-way lesson from the authors. As a result, the ground for collaboration between the authors and ordinary classroom teachers was established.

### III. Second Stage of Collaboration: “Period of Integrated Study” through Collaboration between Resource Rooms and Ordinary Classes

#### 1. Details of start of “Period of Integrated Study”

In accordance with the new course of study published in FY 1999, the authors gave lessons on understanding handicaps. Probably because of the impact of the author’s “2-hour set”, several ordinary here and elsewhere at elementary school “A” started to have a better understanding of different handicaps through their teaching materials for the “period of integrated study” in the new course of study.

On the other hand, through the “2-hour set,” which the authors developed for ordinary classroom children and in the pursuit of becoming more compassionate, the authors felt that not only should lessons on understanding of hearing and speech handicaps be given, but also lessons on understanding other types of handicap.

Accordingly, both the ordinary classroom teachers and the authors agreed, and a trial study has been conducted with the theme, “Period of Integrated Study – How about a little compassion?” for the perpole of understanding handicaps better in several grades at elementary school “A” since FY 2000. Lessons on the simulation of visual handicaps were given to Grades 3 and 4 and lessons on wheel chairs were given to Grade 6.

Moreover, in due consideration of the trial lessons, this activity has been implemented in all grades since FY 2001. By utilizing Life Environment Studies in Grades 1 and 2 and ensuring continuity in the “Period of Integrated Study” in Grade 3 and higher grades, the timing for giving the lesson on “How about a little compassion?” for all children is planned from Grades 1 to 6 (Table 3).

From these details, we will describe the lessons given on visual handicap implemented in FY 2000.

## 2. Lesson Overview

### (1) Aims of Lessons

The following two areas represent the aims of the “Period of Integrated Study – How about a little compassion?” over the six year elementary period:

- (i) To be aware of various consequences or conditions around oneself and to correctly grasp one’s difference from others (to understand feelings of inconvenience through simulated experiences or discussion about persons with handicaps and the elderly; in addition, to think about what one can do for a person with handicap);
- (ii) To recognize the needs of other persons and to be compassionate (to think about the feelings or behavior of another person from that person’s viewpoint position or state; in addition, to remember that the world is a “give and take” society).

From the above-mentioned points, for the of lessons under the theme understanding visual handicaps, the lessons are aimed to “enhance awareness of inconveniences resulting from having handicaps and to improve sensitivity to those inconveniences by acquiring knowledge and being

Table 3. General Plan: "How about a little compassion?"

	1 <sup>st</sup> grade 2 to 4 hours 3 <sup>rd</sup> term	2 <sup>nd</sup> grade 2 to 4 hours Latter half of 2 <sup>nd</sup> term	3 <sup>rd</sup> grade 1.5 hours First half of 1 <sup>st</sup> term	4 <sup>th</sup> grade 1.5 hours First half of 2 <sup>nd</sup> term	5 <sup>th</sup> grade 1.5 hours Latter half of 1 <sup>st</sup> term	6 <sup>th</sup> grade 1.5 hours 3 <sup>rd</sup> term
Number of hours Implementing period						
Theme	Word play	Word play	Experience of having visual handicap	Experience of having hearing and speech handicaps	Experience of using wheelchair	Experience of being elderly
Study aim	*To know the enjoyment of listening, talking and expressing feelings and to experience uneasiness during inconvenience that cannot be conveyed or understood (communication and information conveyance difficulties)		*To realize the existence of people with handicaps by learning about visual handicap through simulated experiences. To experience the inconveniences of visual impairment and to know how to handle such inconveniences	*To realize the existence of people with handicaps by learning about hearing handicap through simulated experiences. To understand that communication cannot be freely made if one has a hearing impairment	*Through observations of the uses of wheelchairs; the intramural simulated experience of using wheelchairs; when one uses a wheelchair; to think about the inconveniences and types of everyday necessities	*Based on simulations over three years, to create and implement a simulated experience of the elderly. *To make a presentation on "compassion" by organizing one's own thoughts
Major activities	1. Capping verses 2. Limited capping verses (to experience speech difficulties) 3. Inconvenient life due to difficulty in speaking	1. Experience having a hearing handicap by listening to a silent video 2. Experience uneasiness or frustration due to difficulty in hearing 3. What to do when in trouble 4. To search for and think about inconveniences in a town through pictures 5. Preliminary announcement of lessons on being compassionate to be conducted for 4 years between Grades 3 and 6	1. To discuss about visual handicap 2. Simulated experiences such as folding a paper, catching a ball, walking, putting on and removing clothing and doing research (everyday inconveniences) 3. Conclusion: To ask blind persons about questionable points simulated experiences and research 4. To know more about blind persons and to think about what be done to help them can	1. To listen to the voice of a person with simulation of difficulty in hearing on video. To notice the difference in pronunciation. To learn why the pronunciation is so. 2. To know the mechanism of hearing or talking 3. Video presentation: "Do you know what a hearing aid is?" 4. To conduct simulations through the use of silent videos 5. Let us think about people with difficulty in hearing, their inconveniences and their feelings. What I can do to help them? 6. Ask a person with difficulty in hearing some questions	1. What types of people use wheelchairs? 2. Let us imagine a wheelchair 3. To observe a wheelchair and to actually use it 4. To do an intramural search using a wheelchair. 5. To think about helping a person using a wheelchair 6. What are the inconveniences of using wheelchair? 7. What conveniences are there in the school or town? 8. What we can do? 9. To listen to a person who actually uses a wheelchair	1. To learn basic knowledge on the elderly 2. To compose and implement a simulation experience of being an elderly based on previous experiences. (By utilizing a simulated experience set) 3. To conduct research study on issues about the elderly through experience 4. Based on learning and the present state, to discuss what can be done in the future to help the elderly 5. To convey our own views about compassion to everybody during the elementary grade
Remarks	*To obtain the basic skills of communication (basic attitudes of listening, talking and discussing) through lessons *To learn (emphasis on the process of obtaining knowledge) → to experience → to think → to conclude → to convey → to discuss through lessons					

in contact with people who are visually handicapped”.

We felt that simulated experiences should be conducted fully to accomplish this aim, and we thought that it was important for each child to record and present his or her own ideas after the simulated experience, and discuss his/her experience with a person with handicap.

## (2) Procedures

Altogether, the lessons were carried out in four classes, two in the 3rd grade and two in the 4th grade at elementary school “A”. Of those classes, we will examine class “B” in the 4th grade as a model case for this report where the authors were frequently involved. In addition, children in the 4th grade, including those in class “B”, have already received a middle grade version of the “2-hour set” when they were in the 3rd grade (FY 1999).

## (3) Collaboration in Lessons

### (i) Collaboration in Preparing a Guidance Draft

Initially, the authors prepared a guidance draft and discussed it with four ordinary classroom teachers. In the first discussion, ordinary classroom teachers asked us “to clarify the aims of the lessons”, “to explain the content of a simulated experience and the presentation methods to be used by the children”, “to describe in detail the wording of questions” and “to demonstrate the methods of evaluation”. These requests were made because the teachers were well aware of the specific characteristics of their ordinary classes and daily lessons. Therefore, their requests were an indication of their need of a guidance draft to enable them to carry out their collaboration responsibilities.

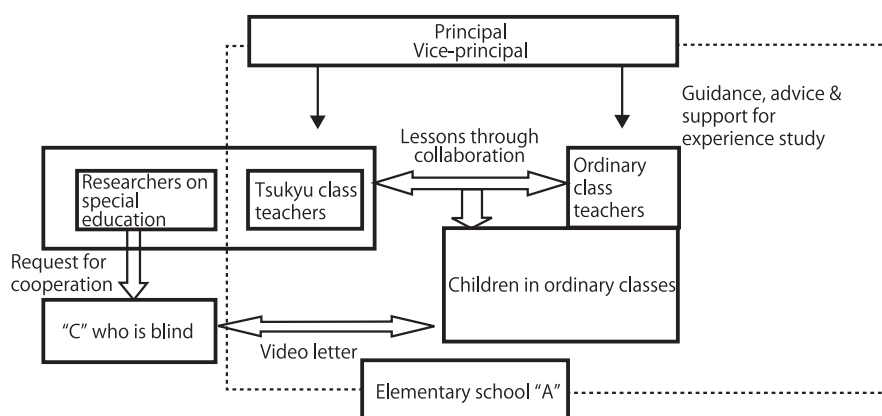
Upon the teacher's request, the authors tried to explain the content of a simulated experience by examining

anticipatory practice. Discussions with ordinary class teachers were conducted six times, over approximately one month and a half to repeatedly evaluate the guidance draft. In each discussion, the teachers examined the content of a simulated experience presented by the authors and compared the content features of the simulated experience with the specific features of their school children under their responsibility. With respect to the evaluation of lessons, which was a problem until the last stage of planning, the authors suggested that the evaluation should be extended throughout the entire lessons instead of evaluating each unit lesson at a time, and the authors were able to obtain the teacher's consent.

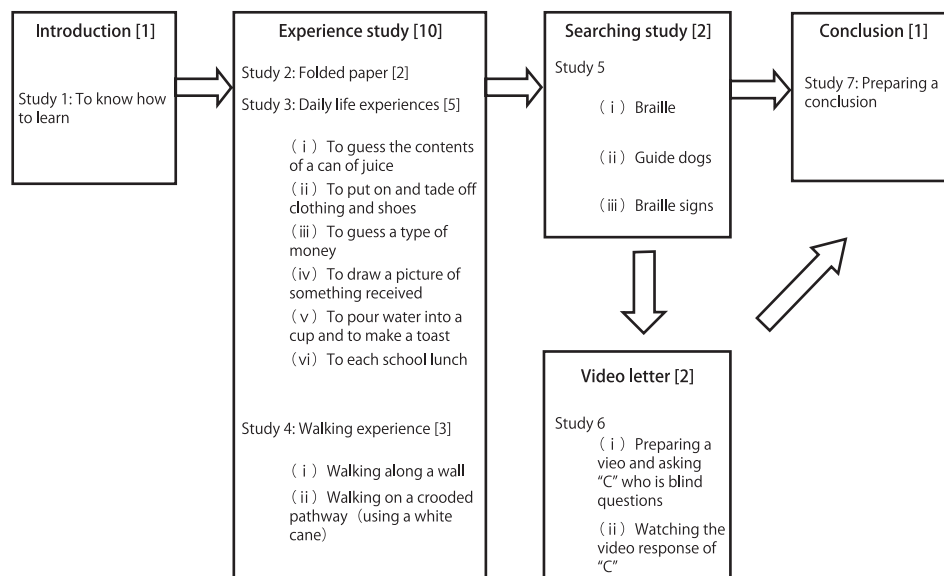
During the one month and a half-long evaluation process, despite the initiatives of the authors, in the second half of the evaluation process, the teachers started expressing their opinions openly. For example, some teachers commented that there may be better methods of accomplishing a goal, or other methods to enable the ordinary classroom children to perform better, and they started taking the initiative in our discussions. Eventually, the teachers started saying, “They can probably do this” or “Let's try this” and the expressed enthusiasm toward the lessons to be given in collaboration with the authors.

### (ii) Collaboration in Giving Lessons

The participants in the lessons are shown in Figure 2. The lecturers were composed of one ordinary class teacher and the authors or one *tsukyu* class teacher and one researcher on special education. During the lessons, the lecturers performed their corresponding roles and cooperated by effectively utilizing the special features of each class. For example, ordinary classroom teachers who were very familiar with the characteristics of each child, became the main lecturers of a simulated experience during discussions and research studies. Furthermore, the authors who had



<Figure 2: Participants in for consistency lessons>



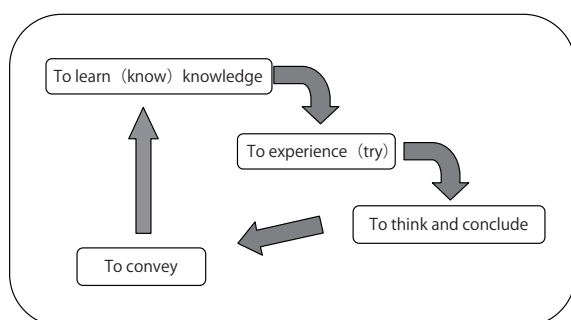
<Figure 3: Lesson structure (The figures in [ ] are the number of unit lessons.)>

knowledge of and experience with handicaps became the main lecturers of the introductory lessons or the explanation of a simulated experience. Other ordinary classroom teachers, the principal and the vice principal also provided learning support through their experiences and ensured safety of the children.

#### (4) Lesson Structure

Since FY 2000, the new course of study has entered a transitional period, and 35 unit lessons for the “period of integrated study” for selected grades at Elementary school “A” were planned. In the planned lessons, approximately 15 unit lessons (more or less depending on the class) were utilized. The outline of each unit lesson and the lesson structure are shown in Figure 3.

The lessons placed emphasis on the simulated experiences shown in Figure 3. To avoid repeating the simulated experiences from the beginning to end of each activity, a child’s way of learning was established, as shown



<Figure 4: Way of learning>

in Figure 4.

For each simulated experience, the lessons were given for the purpose of (i) learning from experience, (ii) experiencing the actual lesson, (iii) thinking and formulating a conclusion from the experience, and (iv) sharing presenting one’s experience and thought. Through these lessons, the children acquired new knowledge, asked questions [return to (i) again] and moved on to the next simulated experience, and then the whole process was repeated. This process of learning emphasized not only learning from experience, but also the development of communication skills such as listening to an explanation or the opinion of another person, or the ability to understand and participate in discussions by being able to organize one’s own thoughts.

Furthermore, we had each of the children prepare worksheets (refer to Figure 5) regarding all their simulated experiences. These worksheets were kept until graduation (in class “B” worksheets from the 4th grade to the 6th grade were saved as a single file) and these worksheet data were used as reference data of the development of this program or the process of learning.

### 3. Contents of Lessons

(1) Study 1 (Introduction, one unit lesson) [The authors served as lecturers]

Aim: to increase awareness of problems faced by people who are visually handicapped, and to explain ways of learning and making future plans

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Today Date: yy/mm/dd

## **Daily Life Experience Worksheet 6 (Eating)**

Class      Name

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### **Please eat as much as you can!**

1. What was inconvenient when you wore blind-mask?

2. How did you feel? Please discuss it!

3. What was inconvenient? And why were you inconvenienced?

Inconveniences:

Reasons for the inconvenience:

4. What did you have to do prevent spilling food?

5. Eat lunch with a mask! How was it?

6. Try it at dinner time! (If possible, please write about it on the back of this page.)

7. If you have visually handicap, what innovation do you think would make it easier to eat? Also, is there something you hope will never be done?

Innovation:

Something that you hope will never be done:

8. How do you feel about this “eating experience”

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**Figure 5: Worksheet Example (Lesson 3: Part of daily life experiences. Original size is, A4)**





**Photo 1 : Searching for one's own shoes wearing a blind mask**



**Photo 2-1 : School lunch (A child extending his hand to receive milk from another child)**



**Photo 2-2 : School lunch (A child did not notice that the child next to him has not opened his bottle of milk; he took the bottle and tried to drink from it. His milk is in the bottom center of the photo.)**

**(2) Study 2** (Experience study 1: Folded paper, two unit lessons) [Ordinary class teachers mainly took charge]

Aim: to experience folding a paper as if one is blind, the students were asked to fold a paper and make a “purse” with and without a blind mask. The time it took for each student to make a purse was measured and compared. Difficulties and opinions while wearing a blind mask were recorded on a worksheet, which were discussed after the activity.

**(3) Study 3** (Experience study 2: Daily life experience, 5 unit lessons) [The authors and ordinary class teachers served as coordinators of the simulated experiences and presentations, respectively]

To experience various daily activities without using their eyes, the children were divided into six groups, with each group selecting one of the following daily activities:

- (i) Guessing the contents of a can of juice
- (ii) Putting on and taking off clothing or shoes (Photo 1)
- (iii) Guessing a particular type of money
- (iv) Drawing a picture of something received
- (v) Pouring water into a cup and making a toast
- (vi) Eating school lunch (Photos 2-1 and 2-2)

Each group was divided into children doing a selected daily activity using a blind mask and children attempting to assist; all the children took turns in doing the activities. The opinions of the children regarding their experiences and the results of the observations were recorded on a worksheet. Each group discussed the inconvenience that they actually felt, their means of adjusting to it, and then made a conclusion. Each group gave a presentation of their experience and then presented the results of their discussions.

Note: The time of group presentation in classroom “B” was used as a parameter for intramural research, and teachers from the whole school evaluated the lessons by incorporating outside lecturers.

**(4) Study 4** (Experience study 3: Walking experience, 3 unit lessons) [The authors coordinated the activity]

To experience walking in a wide space as if blind and with no assistance, the children were asked to walk along a wall once in a big study room (approximately double the size of an ordinary classroom) with and without a blind mask. Next, they walked on a crooked course of approximately 1.5 m wide and approximately 20 m long with a blindfold and with and without a white cane (Photo 3). In either case, the children were divided into three groups, those who walked on the crooked course, those who tried to assist, and those who just observed, all of whom took



**Photo 3 : Walking experience (left boy : without a cane, right boy : with a cane)**

turns in doing the walking activity. The opinions and results of the observations were recorded on a work here and elsewhere sheet and presented afterwards.

**(5) Study 5** (Research study, 2 unit lessons) [Ordinary class teachers coordinated the activity]

By dividing into groups, the children searched for documents or videos about Braille and guide dogs, or searched for Braille signs while actually walking in a town.

**(6) Study 6** (Video letter, 2 unit lessons) [The authors coordinated the activity]

On the basis of the above-mentioned lessons, the children listed questions they wanted to ask from blind persons, and a letter-type video was prepared. The authors asked some blind persons for their cooperation, and after listening to the questions of the children from the video, they responded to the questions, which was videotaped. The children then watched the video of the blind persons who responded to their questions.

**(7) Conclusion** (Preparing composition, 1 unit lesson) [Ordinary class teachers coordinated the activity]

By reviewing all the activities, the opinions and questions of the children were written as one composition.

#### **4. Results and Discussion (Based on Learning State of Children and Their Opinions)**

##### **(1) Inconveniences due to visual handicap**

Here, we will quote the opinions of children in study 2 regarding their first visual handicap experience.

“When I wore a blind mask, I felt as if I was in a dark

place, and so I was very frightened. When I tried to fold a paper wearing a mask, it took a long time to complete the folding because I could not see any lines in the paper for folding. This made me wonder how blind persons could “see” lines or corners of a paper.”

When the children wore a blind mask for the first time, we received comments such as “I was frightened” or “I was nervous”. In addition to the above-mentioned lines and corners for folding a paper, there were comments such as “I could not see the center of the paper” and “I could not see where the paper is”.

From this experience, the children started to realize the importance of vision, which they have always taken for granted, and the inconvenience of being blind.

Next, the opinions from carrying out daily activities while wearing a blind mask in study 3 are as follows:

“I feel sorry for blind persons who try to pour juice into a cup or water flowers without actually seeing them.”

“People who are visually handicapped need to be aware of the differences between various types of canned juice when they go shopping, so I thought this situation was very hard for them.”

From their experiences that are directly associated with daily life activities, more and more children began to realize the difficulty in carrying out normal activities once a person becomes blind. In addition, we noticed that many opinions focused only on the inconvenience of having a handicap, such as “I feel sorry for them” or “It looks hard”.

##### **(2) Importance of our senses and substitutes for sense of sight**

In the course of repeating the simulated experiences in studies 3 and 4, the children started feeling the inconvenience of having a handicap. They noticed that the inconvenience resulting from a handicap could be relieved by utilizing other senses such as the sense of touch in place of the sense of sight or tools such as a white stick. The opinions of these children are as follows:

“At first, I was able to pour water into a plastic cup easily. I could feel the coldness of the cup, so I did very well. However, when I used a glass cup, I could not feel the temperature change. So I tried pouring water very carefully, but it was very low. (Omission of interior parts) When I checked it with my finger, it went well. [(v) from Study 3]

This student was able to confirm the water level by

Table 4 Questions for Ms. “C”

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Question 1: Regarding “walking”

- How do you walk without bumping into things or people?
- What do you watch for when going up and down steps?
- What do you do when you turn in a hallway or a corner in a town?
- How do you walk when there are no walls or Braille signs?
- What do you do when your cane cannot reach the end of a wide street or when it is crowded or when you cannot use your cane because there are so many people?
- What do you do if you drop your cane?
- Do you walk with a cane even in your house?
- What do you do when crossing a pedestrian lane?
- How do you know when it says “stop” in a pedestrian lane and when there is no sound?
- What do you do when you lose your way?

Question 2: Regarding shopping

- How do you check your change when you buy something?
- How do you decide what you want to buy when you go shopping?
- How do you know products from their wrappers?
- How do you discriminate between colored pencils?
- How do you buy a ticket at a station?

Question 3: Regarding meals and living

- What problems do you have when making meals?
- How do you eat?
- How do you use chopsticks?
- Do you have difficulty drinking?
- How do you select your clothing from the closet when dressing?
- Do you make your own bed?
- How do you hang your laundry?
- How do you read the newspaper?
- Do you often watch TV? How about radio? Which do you prefer?
- How do you write letters? Can you also write hiragana or Chinese characters?
- How do you draw pictures?

Question 4: Others

- When do you use your cane?
- What trouble do encounter when using your cane?
- How difficult is it to memorize Braille?
- How do you know what time it is?
- How do you play ball?
- Have you ever folded a paper?
- How do you play cards?
- You were dealing with a “carrier service” person. But what would you do if it was somebody else?
- How do you know when there is danger?
- If you are used to life without sight, have you lost any feeling of uneasiness?
- What is the most convenient thing for you to do?

inserting her finger inside the cup. However, when she was preparing for her presentation, she commented that she will not like it if other people put their finger in her cup. During her presentation, she was asked “What if it is hot water?” So she realized that her method of checking the water level was not such a good idea. When pouring water into a cup, there is really only one method, that is, to pour water carefully, so she thought this activity was very difficult. However, when a blind person answered that she could tell the amount of water in a cup from the weight of the cup or from the sound of the pouring of water, the children were surprised, but were soon convinced.

Next, here are some opinions on the walking experience while blindfolded.

“When I did not have a white cane, I could not follow the course correctly. Many students tried to give me directions by saying “go right” or “go left”, but I became more confused. When I used a white cane, I did better and I did not stray of the course.” (study 4)

By experiencing not being able to walk in the right course when walking without a white cane, some children started realizing the usefulness of such tools. In addition, the children began to realize important considerations when assisting people who are visually handicapped. For example, one child realized that people who are visually handicapped may become more confused if many people give them directions simultaneously.

### **(3) Assisting people who are visually handicapped**

The children were divided into groups and they carried out research studies on Braille, guide dogs and Braille signs (they studied the use of paving blocks to aid people who are visually handicapped) and presented their results to each other. This is the opinion of one child who did a research study on Braille.

“I went to the library and borrowed a book on Braille so that I could try to learn it; nobody could memorize any of the Braille signs. However, when we watched a video of a blind person using Braille, we were amazed at how smoothly the blind person could read the Braille signs.”

From this, the children carried out their own research on Braille signs unfamiliar to them but which exists around them. Afterwards, they openly expressed their feelings about their findings.

The children simulated their experience of being visually handicapped from studies 2 to 4, which perhaps explains why they carried out their investigations with so much enthusiasm. At the same time, they began to realize the

importance of Braille, guide dogs and Braille signs.

### **(4) Video message from a blind person (Ms. C)**

Table 4 shows that questions listed by the children in all 4 classes, which were arranged and organized into a manuscript. When watching the video of blind person “C” responding to the questions, the children wrote the following impressions:

“I was amazed when I watched the video. She was blind and yet she could fold a paper so easily”.

“When Ms. “C” was going about her daily chores, it was marvelous to see that she could walk without using her white cane.”

“She has a Braille newspaper and she was reading it for us. She was reading the Braille newspaper as fast as we would normally read an ordinary newspaper.”

When we analyzed the children’s opinions and reactions when they were watching the video, most of them appeared to be interested in the following three points; the fact that she could walk without a cane, that she could fold a paper and that she could read Braille or printed letters as fast as, or even faster than the children could. All the children agreed that she was amazing. The children realized that she could do many activities even though she is blind.

### **(5) General impression**

Twenty-nine children among 31 in classroom “B”, excluding those who were absent, prepared a composition. From all the compositions, we could observe that each child had become more aware of the inconveniences and conveniences of daily life, and had learned more about visual impairment and experienced being visually handicapped, which are the aims of the lessons.

Furthermore, considering the aims for the whole six years of elementary education, we were able to observe two things from the children: their enhanced expression of compassion toward people who are visually handicapped and their expression of their willingness to help handicapped.

Eighteen children said that they would like to express their feelings openly. Of those children, 16 said “it was marvelous to see that “MS. C” could accomplish so much”. One child said that “he felt sorry” for people who are visually handicapped, and one child said that he enjoyed the simulation experience, but was concerned about “how people who are visually handicapped felt about it”.

The opinion that “it was amazing that people with visual handicap could do ○○ even though they could not



see” came forth because children actually realized through their simulation experience that inconvenience is enhanced if they cannot see. The things that people who are visually handicapped do are not very different from the things that normal people do. However, during the simulation experience, the children also appeared to be thinking about the effort exerted by people who are visually handicapped in the performance of their daily activities.

Moreover, four children told us what they would do if they met a person with handicap. Of those four children, the last part of the composition of one child was written as follows:

“Ms. C could fold a paper very well but I could not. I thought that she was so fantastic. She could also play table tennis even though she could not see. I was surprised that she could do things even though she could not see. I thought that she would be able to do things do you mean “with some handicap”. If I am brave enough, I think I would like to help someone who is visually handicapped.”

Although this student said she wanted to help people with handicap, she realized that they could also do things that she can do, so she expressed her desire to help people who are visually handicapped. Thus, even though there were only a few children in this study, some of these children could already fulfill the general aims of this program throughout their six year elementary education.

### IV. Summary

This report represents a trial study of the authors mainly for the “Period of integrated study – How about a little compassion?” through the collaboration of the authors and ordinary classroom teachers. Hereinafter is the summary of this trial study.

First, if we look back on the collaboration between the authors and the ordinary classroom teachers, the FY 1999 trial study was a one-sided lesson from the authors. However, through this lessons, children began to show an interest in *tsukyu* classes and teachers, and the relationship between children from ordinary classes and children from a *tsukyu* class was deepened. Thus, we were able to establish the grounds for collaboration in the following fiscal year. It seems that the lessons a necessary process promote collaboration.

Furthermore, in the FY 2000 collaboration, note that it took “one and a half months” here and elsewhere of discussions before the lessons could be started. Ordinary classroom teachers meticulously planned each lesson and

carefully observed the presentation of teaching materials or the methods of presentation of the lessons to the children; this process took much time. Despite the long period of discussions, when the contents of the lessons were finally established, the ordinary classroom teachers became more and more enthusiastic and even took the initiative in discussions. From then on, we were able to collaborate with the teachers in presenting the lessons enthusiastically.

Through this experience, the authors once again recognized the importance of carefully planning lessons in detail, particularly for large groups such as ordinary classes. Such careful and meticulous preparations were finally accomplished and ordinary classroom teachers and the authors carried out their roles in accordance with the special features of each class. As a result, the lessons were developed smoothly. If the authors took the initiative to plan and give the lessons one-sidedly without fully discussing them with the ordinary classroom teachers, such lesson development might not have been possible.

Next, we observed the reactions of children during the “period of integrated study”. The children initially had negative ideas about people who are visually handicapped. For example, some children said “they cannot do anything”. However, when the children exchanged video letters with a blind person, and received answers to their questions, their negative opinions changed. Accordingly, we felt that the children learned a lot about handicaps and people with handicaps.

The framework for evaluating the lessons is being further examined. A child’s understanding of handicaps and people with handicaps cannot be accomplished in just one lesson. Each child will think more about handicaps and become more aware of them through various experiences. We are confident that the lessons learned at this time have enhanced the children’s awareness of people who are visually handicapped and provided an opportunity for them to think of ways on how to help them. With respect to the question “What can I do if meet a person with handicap?”, because the lessons were a good opportunity for the children to realize the needs of a person with handicap, we look forward to and support the ideas of each child through his/her accumulated experience until graduation.

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# Educational Activities Using of Picture Books for Blind Children: A Case Study

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**Abstract:** Picture books for blind children include pictures made with tactile materials to enhance understanding, but occasionally these books have pictures that can not be understood tactually by blind children. The purpose of this study is to make relevant and interesting picture books for blind children using pictures that can be understood tactually and, using these books, to enhance the development of blind children and their learning. Examples of this include improvements in tactile perception, tactile imagery and the use of imagination when presented with pictures and stories, and the learning of Braille. These aspects were investigated in a case study using picture books with a blind girl between the ages of 3 and 6. It was found that, 1) tactile perception generally improved and “searching” and “tracing” tactile perception improved, 2) the child expressed the stories using gestures and by manipulating 3-D models of the characters in the picture books. Consequently, her tactile images and imagination were enhanced, and 3) she developed an interest in the Braille used in picture books and this became a basis for her learning of Braille.

**Key Words:** Picture books for blind children, Tactile perception, Imagery, Imagination, Braille

## I. Introduction

Picture books for blind children are designed for visually impaired children. They are made from tactile materials or pictures manufactured through stereo copying or embossing. Using these books, it is possible for visually impaired children to understand the picture by touching it. However, visually impaired children are sometimes unable to enjoy tactile picture books because the pictures in them are difficult to understand through touching. Consequently, we tried to produce enjoyable picture books with pictures that blind children can easily understand through touch, and we examined their appropriateness by introducing them to visually impaired preschoolers. As a result, if such books are manufactured in accordance with some of the guidelines developed in this research, we feel that enjoyable picture books containing pictures that are easy to comprehend through touch can be produced.<sup>3)</sup>

Furthermore, although the picture books themselves are regarded as being enjoyable materials for children, which is considered most important, the utilization of picture books may contribute to some areas of development and learning in children. In general, these areas include the ongoing exchange between children and persons reading the picture books (such as mothers or nursing individuals), enhancing children's images and cultivating their imagination, and stimulating an interest in letters and their learning.<sup>1) 4) 5)</sup> Such contributions are also relevant for visually impaired preschoolers. Furthermore, when visually impaired preschoolers touch pictures in picture books, it is a good

opportunity to improve their methods of tactile perception. With regards to improvements in tactile perception, we have already developed two guidelines that are regarded as being effective for such improvement.<sup>3)</sup>

In this study, we will discuss the case of one visually impaired preschooler for whom progress was observed in some areas through activities utilizing picture books for blind children developed by us. This study covers three areas: improvement in tactile perception, enhancing images and cultivating imagination, and stimulating an interest in letters (Braille) and their learning.

## II. Prerequisites for the Activities

As described above, in this study, we examine three areas in which we observed the progress of one visually impaired preschooler through activities utilizing picture books for blind children. As a prerequisite for these activities, the special features and types of picture books used in this study and the order of their introduction will be mentioned.

### 1. Characteristics of Picture Books for Blind Children in this study

As stated earlier, the most important aspect of a picture book is that it is enjoyable. Therefore, the pictures should be easily understood by children, which is only natural for a picture book. In the case of picture books for blind children, the pictures should be easily understood by visually impaired children through touching. In other

words, objects represented by pictures should be adequately understood. What does the picture describe? (Is it a human being, monkey, turtle, balloon, soap, kitchen sink or slide?) This should be understood easily. The events represented by the picture (the monkey is climbing a tree, the balloon is gradually becoming bigger, the turtle has been overturned, the soap is falling from a kitchen sink) should also be easily recognizable.

On this precondition, the picture book should be enjoyable for children through its pictures and its story.

In this study, picture books for blind children that were regarded as satisfying the above-mentioned points was considered a prerequisite. As for the picture books themselves, at the beginning of the treatment, as mentioned earlier, they were based on guidelines developed by us, and then new picture books based on new policies were utilized. In addition, we used some picture books based on guidelines for improving tactile perception.

Further details of these guidelines and picture books produced will be covered later in the explanation of the progress of the treatment.

### **2. Types of Picture Books for Blind Children and Order of Introduction in this Study**

The types of picture books for blind children include those composed of pictures by pasting tactile materials on the pages, and those composed of raised pictures through stereo copying or embossing. In the case of stereo copying, original images are copied on special stereo copying paper and then processed using a stereo copier, so the black areas of the images are raised. The original images can be drawn on a computer. Embossed pictures are composed of dotted lines and dotted patterns, and formed on Braille paper. When utilizing computer software such as EDEL (created by Mr. Norihiro Fujino) \*(Note), a drawing can be made on a computer and printed out on Braille paper using a Braille printer.

For picture books with tactile materials, depending on the type of tactile materials pasted, information on their feel (smooth, rough, wooden or furry, etc.) can be transmitted to the children, which is not true for other forms. Even younger visually impaired children (preschoolers) are able to extract information from the feel. Therefore, pasted tactile materials are regarded to be most effective in the initial stage of activities using picture books.

On the other hand, in the case of making an original image for stereo copying or a embossed picture by computer drawings, a picture can be drawn more accurately and easily. In other words, the structural elements of a picture can be arranged more accurately. Furthermore,

more complicated features such as an outline or lines can be more accurately and easily drawn. In addition, after entering school, when studying a curriculum, figures, graphs, diagrams, and maps produced by stereo copying or embossing may be utilized.

In due consideration of the above, for the introduction of picture books to blind children, the sequential order is considered to be first picture books utilizing pasted tactile materials. After this, picture books for blind children made by stereo copying or embossing can be introduced.

In the case of the visually impaired child (preschooler) examined in this study, at the age of 3 years and 0 months, a picture book for blind children utilizing pasted tactile materials was introduced for the first time. Subsequently, a picture book utilizing stereo copying was introduced at the age of 4 years and 5 months.

By dividing this study into two periods based on the above, we describe the results of each period.

### **III. a Case Study: Introduction**

The child, M, is a girl born in May 1995. She was a 23-week-old fetus and 696g at birth, and her vision was only at the level of light sensation due to premature retinopathy. From age 2, she started to attend support classes for visually impaired preschoolers in an institute for the visually handicapped, once a week. Since the resource room is visited by researchers, M was involved in research from the time that she started to attend the institute.

She was involved in treatment through picture books for blind children produced from this study between the ages of 3 years and 0 months and 6 years and 2 months (as of July 2001). When picture books were introduced, she had no problems in vocalizing her comprehension through spoken language. In addition, she was able to turn the pages of the books herself.

### **IV. Progress of Treatment**

#### **1. Introducing Picture Books for Blind Children Utilizing Tactile Materials**

The picture books that were introduced to M for the first time utilized tactile materials pasted onto the pages, as mentioned above.

These picture books were based on guidelines developed by researchers to satisfy the prerequisites of being enjoyable and easy to comprehend by blind children (Kaneko, et al. 1999)<sup>3)</sup>. Furthermore, to stimulate improvements in tactile perception, picture books were based on the two guidelines (from the same study).

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Note\*: For further details on EDEL, please refer to the author's homepage (<http://homepage2.nifty.com/EDEL-plus/>).

Hereinafter, the guidelines on the production of picture books for blind children and their contents will first be discussed. Next, the results of the introduction of picture books to M by describing her improvement in tactile perception and the stimulation of her interest in letters (Braille) and their learning will be covered.

## **(1) Guidelines on Production**

### **(i) Basic Guidelines on Production**

In the case of producing picture books for blind children, to produce tactually appropriate pictures without relying on intuition or experience and tracing ordinary visual pictures, the following basic guidelines were considered (Kaneko et al. 1999)<sup>3)</sup>.

Picture books for blind children should be produced by utilizing various attributes (such as tactile materials, size, number, shape, present position, direction and inclination) in a self-conscious and appropriate manner. (For instance, in the case of the picture of a balloon, the tactical material are rubber; 7cm in diameter; there is one balloon; it is round; it is located in the lower central part of the page.)

In addition, these basic guidelines were also adopted for picture books for blind children utilizing stereo copying.

### **(ii) Guidelines on Producing Easy-to-Comprehend and Fun-to-Touch Picture Books**

Guidelines on producing easy-to-comprehend and fun-to-touch picture books for blind children (Kaneko, et al. 1999) are described briefly as follows.

- (i) Each picture in a picture book should be manufactured by different tactile materials. Moreover, tactile materials similar to the feel of the actual object should be selected as much as possible. This enables a child to easily and clearly understand the picture by simply placing her hand (or fingers) on it. (For example, rubber materials for a balloon picture, fur materials for a cat, and paper that feels like stainless steel for a kitchen sink.)
- (ii) The shape, regarded to be one of the attributes of a picture, should be simple. It should be a simple shape such as a straight line, circle or square whenever possible, or it should be composed of these elements. (For example, a circle for a balloon and a square for a kitchen sink.)
- (iii) As a method for producing enjoyable picture books, even if the shape is simple, attributes other than the shape such as the size, number, position, direction and

inclination should be inventive. In particular, to make picture books simpler and more enjoyable, only one attribute in the same picture (for instance, only size or only position) should be changed on each page. (For example, only the size of a balloon picture is changed or the position of a cat is changed in consecutive pages.)

- (iv) To put the above-mentioned guidelines (I).-(III) into practice, we create original stories and pictures to produce tactile picture books. Then, applying the lessons learned through this process, other tactile picture books are produced on the basis of existing picture books for sighted children.

### **(iii) Guidelines on Improving Tactile Perception**

The guidelines on improving tactile perception are as follows.

- (i) To encourage “searching” with hands or fingers, the position of specific pictures or structural elements in picture books should be changed on each page.
- (ii) To create movement by “tracing” with hands or fingers, pictures using straight lines, rectangles or circles (or structural elements), which are considered to stimulate a child to trace should be included in picture books.

## **(2) Contents of Picture Books Created for Blind Children**

On the basis of the above-mentioned “basic guidelines” and “guidelines for easy-to-comprehend and fun-to-touch picture books”, 8 picture books were created by pasting tactile materials on pages.

The pictures were created by pasting tactile materials on the left page of double pages with the story written beneath or on the right page. The text was initially not in Braille but comprised normal letters, and an intervener read the text out loud. The right side of the picture book was bound so that a child turned pages from left to right.

For further details on these picture books, please refer to Table 1 and Kaneko, et al. (1999)<sup>3)</sup>. In Table 1, among the 8 picture books, four picture books made in an earlier study and mentioned in this study and one after the earlier study are listed.

Figure 1 shows the examples of pages from picture books.

Furthermore, of the 8 picture books, the above-mentioned guideline (i) in “guidelines on improving tactile perception” was incorporated into 3 picture books “Balloon”, “Soap” and “Cat”. In the picture books “Soap” and “Nuts”, guideline (ii) was incorporated.

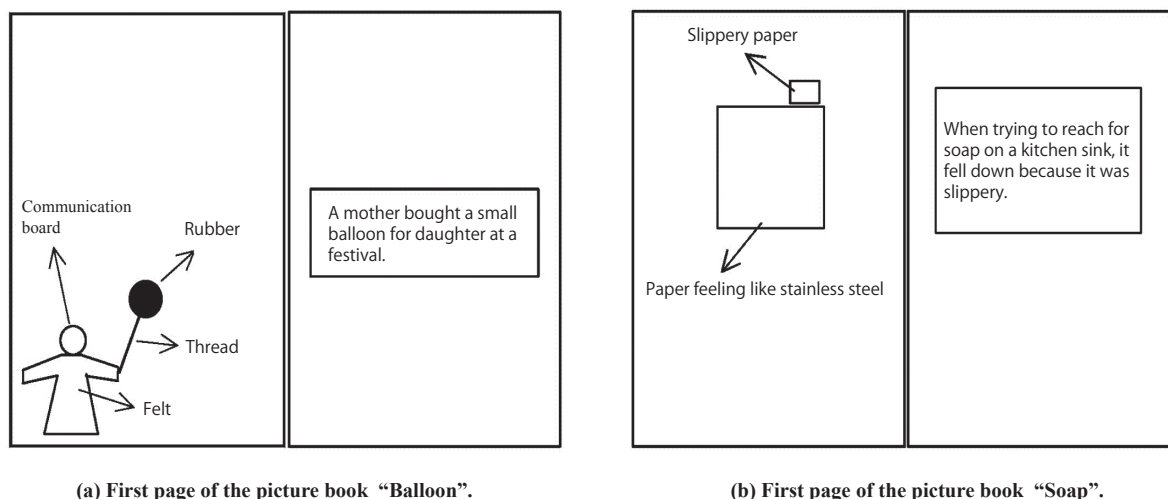


Figure 1: Examples of picture books for blind children utilizing pasted tactile materials (the picture materials are also indicated).

Table 1: Picture books for blind children utilizing tactile materials (Roman numerals figures in the table correspond to each page).

1. Picture book “Balloon” [Pasteboard is B5 and lengthwise]
<p>&lt;Story&gt; A balloon held in a girl’s hand gradually became bigger and lifted her up into the air. It was then pecked by a crow and burst and scattered, which turned out to be a dream.</p>
<p>&lt;Pictures&gt;</p> <ul style="list-style-type: none"> <li>(i) In this picture, the girl [6.5cm high, felt clothing, her face is a circle made of communication board (Note 1)] (Note 2) is holding a balloon (circle of rubber material) (2cm in diameter). (The balloon is in the center of the pasteboard and the girl is to its lower left side.) (The balloon and the girl’s hand are joined by a thread.)</li> <li>(ii) In this picture, the balloon is a little larger (4cm in diameter). (The girl is not in the picture.)</li> <li>(iii) In this picture, the balloon is even larger (6 cm in diameter). (Same as above.)</li> <li>(iv) In this picture, the balloon is bigger still (8 cm in diameter). (Same as above.)</li> <li>(v) In this picture, the balloon is in a higher position.</li> <li>(vi) In this picture, a crow (furry material, its bill is made of hard paper) pecks at the balloon.</li> <li>(vii) In this picture, the balloon bursts and scatters (it is divided into an 8 in a fan shape, 5mm between each piece). (Same as above.)</li> <li>(viii) In this picture, the balloon returns to its original shape and size and the girl is holding it again [as in picture (i)].</li> </ul>
<p>&lt;Text&gt;</p> <ul style="list-style-type: none"> <li>(i) A mother bought a balloon for her daughter at a festival.</li> <li>(ii) She hoped that the balloon would become larger. Suddenly, like magic, it got bigger and bigger.</li> <li>(iii) It got bigger and bigger.</li> <li>(iv) It got even bigger still.</li> <li>(v) To her surprise, the girl started to float up into the air, so she held on tight.</li> <li>(vi) Suddenly, a crow appeared, and wondering what it was, he started to peck at the balloon.</li> <li>(vii) The balloon burst and the girl began to fall.</li> <li>(viii) The girl woke up startled. It was just a dream. She was still holding the balloon tightly in her hand.</li> </ul>
2. Picture book “Soap” [Pasteboard is B5 and lengthwise]
<p>&lt;Story&gt; Soap on a kitchen sink falls down and a cat, carrying it in its mouth, goes to a park to put it on a slide. Then, the soap falls down the slide, into a pond and dissolves.</p>



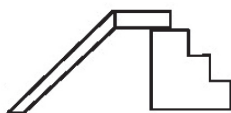
## &lt;Pictures&gt;

- (i) In this picture, soap (small rectangle, 1.5cm x 2cm, slippery paper pasted on a base of thick paper) is on the top-right corner of a kitchen sink (large square 7cm long, paper feeling like stainless steel is pasted on a base of thick paper).
- (ii) In this picture, the soap is on the bottom right-corner of the kitchen sink.
- (iii) In this picture, a cat (facing left with its mouth open, 5.5cm x 12cm, made of furry material) takes the soap in its mouth.
- (iv) In this picture, there is a slide and the soap is on the top of it. (see Picture below). (Steps are made using three rectangles, the slope is drawn with oblique lines of 7mm in width and 7.5cm in length, wood board material).
- (v) In this picture, the soap is at the bottom of the slope (oblique line).
- (vi) In this picture, there is a pond (circle, 7cm in diameter and 7mm wide, plastic material) and the soap is in it.
- (vii) In this picture, we see only the pond without the soap.

## &lt;Text&gt;

- (i) When a girl tried to grab some soap off a kitchen sink, the soap slipped and fell down.
- (ii) The soap fell onto the floor with a bang.
- (iii) The cat took the soap in her mouth and ran away.
- (iv) The cat took it to the top of a slide.
- (v) When she reached for the soap, it started to slip down the slide.
- (vi) The soap slipped down the slope faster and faster then fell into a pond.
- (vii) The soap started to bubble and then it disappeared.

## &lt;Picture&gt;

**3. Picture book “Nut” [Pasteboard is B5 and lengthwise]**

<Story> A girl tried to take nuts from a high tree, but she couldn't reach them. She couldn't reach them even using a stand. An elephant came to try and take the nuts but couldn't reach them. Then a giraffe came to try to take them, but without success. Finally, a monkey came, climbed up the tree and then took the nuts. The monkey shared the nuts with the girl.

## &lt;Pictures&gt;

- (i) In this picture, there is a tree full of nuts on the right side of the pasteboard (wooden board 7mm in width and 15cm in length represents the tree trunk; plastic circle-shaped board 1.5cm in diameter represents round nuts attached to the top of the tree; four artificial leaves are arranged around it) and the girl is reaching out toward the nuts on a tree from the left side (5.5cm in height, distance between girl's hand and nuts is quite far).
  - (ii) In this picture, the tree does not change its position and the girl on the left side is on a stand (3cm in length, made with wood).
  - (iii) In a similar manner, in this picture the tree does not change position and an elephant is facing toward the right (his nose is reaching for the nuts, 12cm in height).
  - (iv) In a similar manner, in this picture a giraffe is facing toward the right (her neck is reaching for nuts, 13.5cm in height).
  - (v) In this picture, a monkey (4.5cm in height) facing toward the right is on the bottom-left reaching out to touch the tree.
  - (vi) In this picture, the monkey is on the center-left side of the tree reaching out to touch it.
  - (vii) In this picture, the monkey is on the top-left and reaching for the nuts.
  - (viii) In this picture, the girl and the monkey face each other on the left side of the tree and reach out to touch the nuts in the center (there are no nuts on the tree).
- (The elephant, giraffe and monkey are made with different types of furry as elsewhere materials).

<Text>

- (i) A girl went to a forest to search for nuts. There were some nuts on the top of a tree, but they were so high that she couldn't reach them.
- (ii) The girl tried using a stand, but she still couldn't reach them.
- (iii) Then, an elephant came. The elephant also wanted to get the nuts and tried extending his long nose, but he couldn't reach the nuts because they were too high.
- (iv) Next, a giraffe came. The giraffe also wanted to get the nuts and tried to extend her long neck. She could reach the leaves, but she couldn't reach the nuts.
- (v) Finally, a monkey appeared. The monkey also tried to get the nuts. "I will climb up this tree!" he said.
- (vi) The monkey easily climbed up the tree.
- (vii) When he reached the top of the tree, he could get the nuts easily.
- (viii) The monkey shared the nuts with the girl. "They were so delicious!" she said.

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#### **4. Picture book "Cat" [Pasteboard is B5 paper lengthwise]**

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<Story> A cat who loves to go for walks went for a walk along a wall, took a nap on the roof of a house, woke up and then came down. She then encountered a disgusting dog. She ran home in confusion to find her favorite fish had been prepared for supper.

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<Picture>

- (i) In this picture, the cat is on the bottom of the page (made with furry material, 6cm high) facing toward the left side.
  - (ii) The cat is in the center of the page and there is a wall (rectangle) underneath. (The lower end of the wall is where the cat was before in (i).)
  - (iii) The cat is at the top of the page and the roof of a house is below (other parts of the house are below). (Same as above.)
  - (iv) The cat is at the bottom-right of the page and a dog is on the left side (different fur materials for the dog and cat, 7cm large). Both animals face each other.
  - (v) The cat is in the same position as above and the fish is on the left (rough plastic material, 5cm in length).
- 

<Text>

- (i) There was a cat. She loved to go for walks. "It's such a nice day, so I think I'll go for a walk!" she said. She went out.
  - (ii) She walked along a wall.
  - (iii) She climbed up onto the roof of her neighbor's house and took a nap.
  - (iv) After she woke, she climbed down only to encounter a disgusting dog. She ran home in confusion.
  - (v) When she returned home, her supper was ready. To her surprise, it was her favorite fish. She ate a lot of fish until she was full.
- 

#### **5. Picture book "The Wind and the Tree" [Pasteboard is A4 and horizontal]**

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<Story> A tree was blown by the north wind and about to fall down, but it recovered thanks to the south wind. However, since the south wind continued to blow, this time it leaned toward the opposite side and was about to fall down. Luckily, the north wind blew again and returned the tree to its original position.

---

<Pictures>

- (i) In this picture, the tree is in the center of the page. (Wooden board 7mm in width and 15cm in length represents the tree trunk, 4 sheets for artificial leaves are arranged around the top.) For the tree, the trunk is drawn vertically from the bottom of the page.
  - (ii) In this picture, the tree is inclined 45 degrees toward the right side of the page.
  - (iii) Same as (i), picture of the vertical tree.
  - (iv) In this picture, the tree is inclined 45 degrees toward the left side.
  - (v) Same as (i) and (iii), picture of the vertical tree.
- 

<Text>

- (i) A tall tree stood in the center of a field.

- (ii) One day, a big wind blew from the north, the tree bent and was about to fall down. The tree was worried, and it thought, “Oh no! What can I do?”
- (iii) Then, from the opposite side, a wind blew from the south and helped the tree to recover. The tree felt relieved, and thought, “That’s better.”
- (iv) But, the south wind didn’t stop blowing, so the tree bent toward the opposite side this time. The tree was worried, and thought, “This is not good.”
- (v) To his surprise, the north wind blew again and helped the tree recover. “Thank Heaven, I’m safe!” he said.

(Note 1) Kent paper is pasted on both sides of styrene foam. Because of the sandwiching of the styrene foam, the feel is different from pasteboard, even though the same Kent paper is used.

(Note 2) Hereinafter, the modeling of people in other picture books is based on this description. In addition, some legs or hands are made with the same communication board as used for the faces.

### **(3) Results of Using the Picture Books**

#### **(i) Improvement in Tactile Perception**

##### **(a) Change in Touching and Picture Comprehension**

Before the introduction of these picture books when M was 2 years and 0 months old, she was often observed scratching with her pointing finger and its nail as a way of touching and manipulating objects that researchers had introduced.

This behavior had almost completely disappeared by the age of 2 years and 11 months (April 1998).

One month later, at the age of 3 years and 0 months (May 1998), the above-mentioned picture books were introduced for the first time. At that time, she would use the bulb of the pointing finger of either hand to touch any place on the picture. The tip of her finger did not move when she left her finger on the picture. From the scratching movement mentioned earlier, although she did not scratch the pictures, we feel that her way of touching with the tips of her finger remained.

Even by touching with the tips of her fingers, she could understand the contents of a picture because the tactile materials were different in each picture.

For example, in the picture book “Balloon”, she could comprehend the balloon through the rubber tactile material and the crow from the fur. However, by touching in this way, she could not understand the size or shape of a picture. For example, in “Balloon”, the size of the circular balloon grows in diameter from 2cm to 8cm as the pages progress. Perceiving the changes in size was an important part of this picture book; however, M did not notice the change in balloon size through her touching style.

Consequently, a member in the institute would guide the tips of her fingers from the left end of the balloon’s surface (or the right end) to the right end (left end).

After repeating this, M spontaneously began doing

this for the balloon pictures. However, her direction of movement was from top to bottom instead of left (right) to right (left). By touching in this way, she could grasp the size of the balloon.

Two months later (two months after the introduction of the picture books), after tracing the picture of a balloon from top to bottom, she would tap the picture with the palm of her hand.

Six months after the introduction of the picture books, at the age of 3 years and 6 months (November 1998), instead of just pointing she began to feel the pictures with her fingers other than pointing finger or the palm of her hand. For the balloon pictures, we discovered that she used 5 fingers and the palm of her hand. Through this way of touching, she was able to easily grasp the change in size of the balloon.

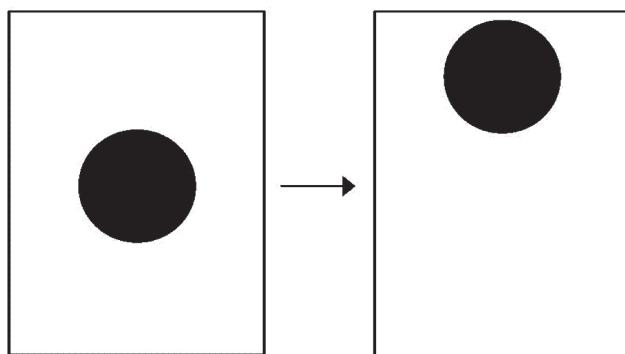
##### **(b) The “Searching” Motion**

Picture books for blind children based on guideline (i) in “guidelines on improving tactile perception” were introduced to M. As a result, with respect to the change in the position of the balloon in the picture book “Balloon”, the soap in the picture book “Soap” and the cat in the picture book “Cat”, in the early stages of introduction when she was between 3 years and 0 months and 3 years 1 month old, we observed the searching motion of her hand or fingers for these pictures. When she turned the pages, the searching motion of her hand or fingers occurred when pictures were positioned differently from the previous page. (see Figure 2)

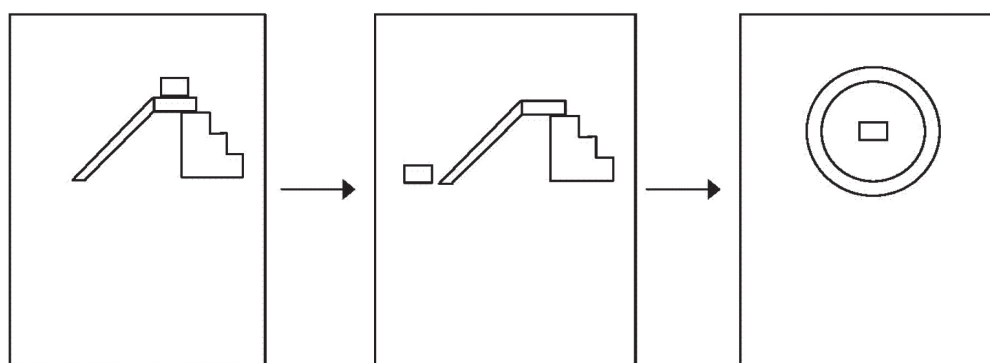
We sometimes mentioned that they (the balloon, the soap, and the cat) reached the top or the bottom of the page and then asked “Where did it go?”, but would rarely guide her hand.

##### **(c) The “Tracing” Motion**

The picture books “Soap” and “Nuts” based on guideline



(a) Change in position of the balloon in the picture book “Balloon” (pages 4 to 5).



(b) Examples of change in position of the soap in the picture book “Soap” (pages 4 to 6).

Figure 2: Change in position of pictures that stimulated the “searching” motion.

(ii) in “guidelines on improving tactile perception” were introduced to M. As a result, a “tracing” motion for the picture of the slope of the slide (oblique line of 7.5cm) in the picture book “Soap” and the tree trunk (straight line of 15cm in length) in the picture book “Nuts” arose 6 months after the introduction (at 3 years and 6 months). (see Figure 3.)

After their introduction, we did not provide any hand assistance.

As mentioned in Kaneko, et al. (1999), for another child with visual impairments, the tracing motion appeared 4 months (at 3 years and 2 months) after the introduction of “Soap” to a child at age 2 years and 10 months.

On the other hand, as mentioned earlier, M’s searching motion was observed when the picture books were first introduced. The other visually impaired child was also observed to search in a similar manner. However, this visually impaired child was different from M, because we sometimes guided her hand through the tracing motions. But, she did not move her hand spontaneously following such assistance.

As mentioned above, the tracing motion appears to be more difficult than the searching motion. However on the basis of these two cases, if blind children can regularly touch picture books that include straight or oblique lines,

we think the tracing motion before long arises. On the other hand, even if we guide their hands, one could say that it is difficult to initiate a spontaneous tracing motion.

The reason for this, as mentioned in Kaneko, et al. (1999), may be that the searching motion arises regularly in daily life, whereas the tracing movement may arise less frequently. In addition, in our daily lives objects can be distinguished or identified in a tactile manner by simply holding or gripping them, which makes tracing their outlines unnecessary.

## (ii) Stimulating an Interest in Letters (Braille) and Their Learning

For the words of the story and the title of the cover page in the picture books produced in the study, when M was age 3 years and 8 months (January 1999), in addition to ordinary letters, Braille in transparent tag paper was attached, because we expected that M might touch them.

As a result, M touched Braille letters when reading (feeling) a picture book at age 4 years and 0 months (May 1999), which developed into an interest in Braille. When M touched Braille, she sometimes asked the assistant what the part she touched said. Furthermore, during the same period M even began to show an interest in Braille in places

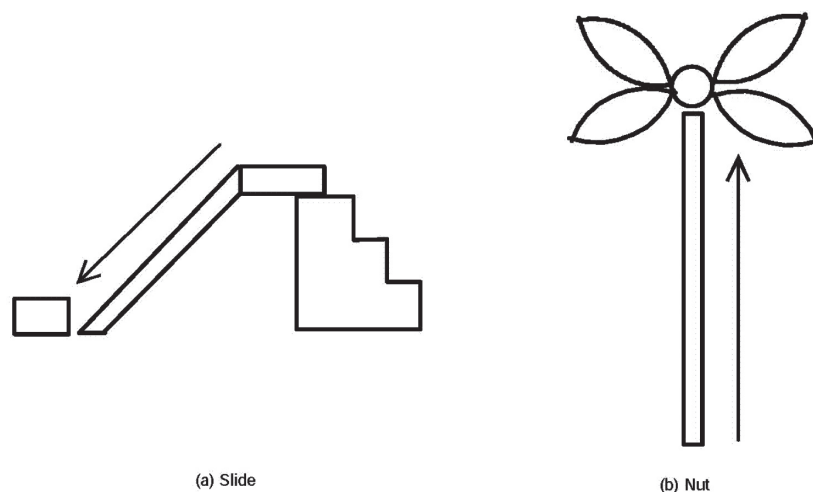


Figure 3: Tracing motion in the picture books “Soap” and “Nuts” (the arrows show the direction of motion).

other than picture books (such as Braille room names on handrails within the facilities).

## 2. After Introducing Picture Books for Blind Children in the Form of Stereo Copying

At age 4 years and 5 months (October 1999), in addition to picture books for blind children using the above-mentioned tactile materials, picture books for blind children that utilized stereo copying were produced and introduced to M. In these books, original drawings for stereo copying were created on a computer.

Hereinafter, the guidelines for producing picture books for blind children utilizing stereo copying and the contents of picture books based on this will first be described. After these picture books were introduced to M, there was an improvement in her tactile perception, enhancement in her imagery and imagination, and a greater interest in learning letters (Braille). This will then be discussed.

### (1) Guidelines on Production

#### (i) Guidelines on Easy-to-Comprehend and Fun-to-Touch Picture Books

When producing picture books through stereo copying, it is impossible to discriminate between pictures through differences in tactile materials in the same manner as those with pasted tactile materials. Guideline (i) in the “easy-to-comprehend and fun-to-touch picture books guidelines” for picture books for blind children using pasted tactile materials cannot be utilized.

However, if attributes other than tactile materials such as size, number, shape, position, direction or inclination were used inventively, we thought that each book would become easy to understand and fun. Furthermore, for the structural

elements of a picture, to distinguish the major elements from other elements, we decided to incorporate differences in paintings and drawings (outlines). The guidelines are summarized below.

- (i) Attributes other than tactile materials such as size, number, shape, position, direction or inclination should be used inventively.
- (ii) The major structural elements on each page should be expressed through painting, while other elements should be expressed through drawings (outlines) for easy identification.

#### (ii) Guidelines on Improving Tactile Perception

Compared with pasting tactile materials, the advantage in the case of creating original drawings on a computer for stereocopying is that a picture (and its structural elements) can be arranged accurately and easily. It is also possible to draw more complicated lines such as bending lines, curved lines and spiral lines. Of these, the former is superior when producing pictures to stimulate the more advanced searching motion to improve tactile perception. The latter is advantageous in the case of stimulating the more advanced tracing motion by producing more complex lines in picture books.

With due consideration of the above, the following guidelines on stimulating improvement in tactile perception were followed.

- (i) To establish more advanced searching motion, placing the one hand on base points and searching with the other hand, two related pictures (on two related structural elements) should be arranged relative to vertical, horizontal or oblique positions.



- (ii) For the development of more advanced tracing movement, more complicated lines such as oblique lines, bending lines, curved lines and spiral or longer lines should be arranged in picture books as a picture (or its structural element).

### (2) Contents of Picture Books for Blind Children

The form of production is the same as for the above-mentioned pasting of tactile materials, other than raised pictures, which are made by stereo copying.

All the pictures and stories were produced by us.

Furthermore, all of the original drawings were drawn on a computer for greater accuracy and easy modification.

Five picture books for blind children were produced on the basis of the above-mentioned guidelines. For further details, please refer to Table 2. In addition, examples of pictures are shown in Figure 4.

Of the five above-mentioned picture books, one picture book “Butterfly” was produced by incorporating guideline (i) in “guidelines on improving tactile perception”. Two picture books “Norimaki: Vinegar Rice Rolled in Laver” and “Adventure of the Grass Bead” were produced by incorporating guideline (ii) of the same guidelines.

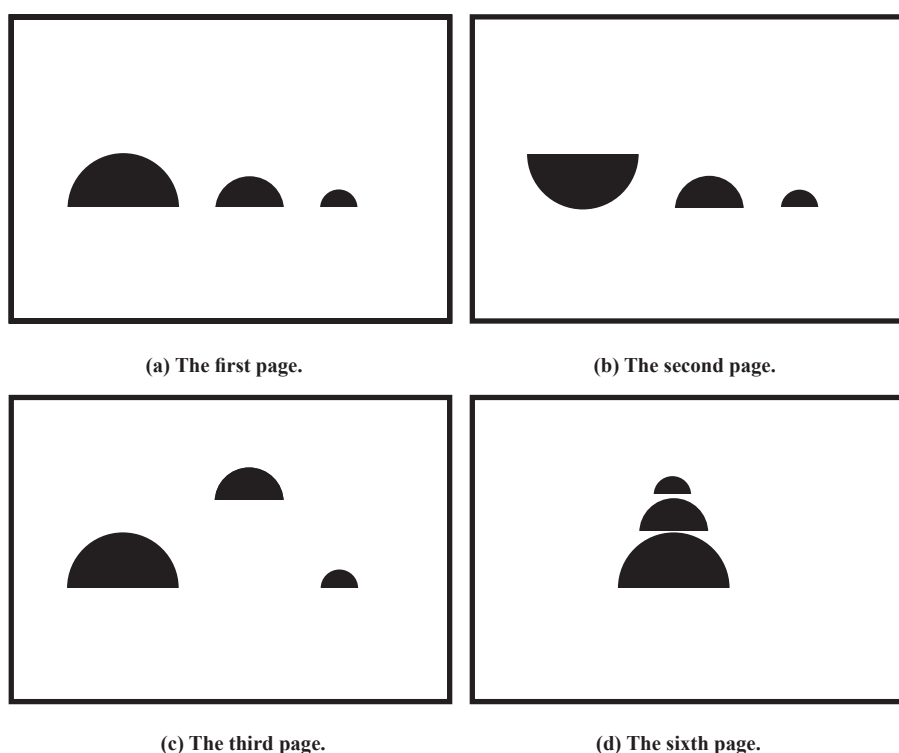


Figure 4: Examples of a picture book for blind children utilizing stereo copying (based on the picture book “The Turtle Picnic”, only pictures are shown).

Table 2: Picture books for blind children utilizing stereo copying (the roman numerals in the table correspond to each page)

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**1. Picture book “The Turtle Picnic” [Paper is A4 and horizontal] < stereo copying>**


---

<Story> A family of turtles, father, mother and baby go on a picnic in the forest. The family travels in the order of father, mother and baby. On the way, father turtle is overturned, mother turtle becomes frightened and jumps, and baby turtle loses his way. They eventually arrive safely in the forest, play happily and eat lunch. On the way home, mother turtle rides on father, and baby turtle rides on mother. They return home.

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<Pictures>

- (i) A picture of father, mother and baby turtle in a row from left to right. In the center of the page, semicircles of 7cm, 4cm and 2cm in diameter are shown with the diameter sides down. (The inside of each semicircle is painted). The space between each turtle is 3cm.
  - (ii) A picture of father turtle overturned. Father turtle is represented by placing the diameter-side up.
  - (iii) A picture of mother turtle frightened and jumping. Mother turtle is represented by placing the semicircle 6cm higher.
  - (iv) A picture of baby turtle losing his way. This is represented by the disappearance of the baby turtle.
  - (v) A picture of the family eating lunch together. The turtles are in the center of the page in the order of father, baby and mother from left to right, with a spacing of 1.5cm.
  - (vi) A picture of mother turtle riding on the back of father turtle, and baby turtle riding on her back. This is represented by arranging the turtles in the order of father, mother and baby turtle from the bottom in the center of the page. Each space is 5mm.
- 

<Text>

- (i) A turtle family went on a picnic in the forest. Mother turtle walked behind father turtle, and baby turtle walked behind mother turtle.
  - (ii) On their way, father turtle stumbled over a stone and was overturned.
  - (iii) Mother turtle was very frightened by a snake and jumped.
  - (iv) Baby turtle lost his way.
  - (v) However all of them played happily and ate lunch together in the forest.
  - (vi) On the way back, mother turtle rode on father turtle’s back, and baby turtle rode on mother’s back. They quietly went home.
- 

**2. Picture Book “Norimaki” Vinegar Rice Rolled in Laver [Paper is A4 horizontal] <stereo copying>**


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<Story> A girl makes *Norimaki* (vinegar rice rolled in laver) together with her mother. At first, she makes a round *Norimaki* by rolling once, twice and three times. Next, a square *Norimaki* is made in a similar manner by rolling once, twice and three times.

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<Pictures>

- (i) A picture of a round *Norimaki* being rolled once. This is represented by spiral lines with an inside diameter of 4cm, the diameter of the outside circle is 6cm (line thickness is 1mm).
  - (ii) A picture of a round *Norimaki* being rolled twice. This is a double spiral line. By drawing a circle once through the end of the outside line of (i), the picture is connected (diameter of outside circle is 10cm).
  - (iii) A picture of a round *Norimaki* being rolled three times. In a similar manner as (ii), this is a triple spiral line created by adding one more line (diameter of outside circle is 14cm).
  - (iv) A picture of a square *Norimaki* being rolled once. This is a square spiral line of 4cm on the inside and 6cm on the outside (line thickness is 1mm).
  - (v) A picture of a square *Norimaki* being rolled twice. In a similar manner as the round *Norimaki*, this is a double square line created by connecting the lines (length of outside square is 10cm).
  - (vi) A picture of a square *Norimaki* being rolled three times. In a similar manner as the round *Norimaki*, this is triple square line created by connecting the lines (length of outside square is 14cm).
-

<Text>

- (i) A girl made *Norimaki* together with her mother. She rolled out a round *Norimaki* once.
- (ii) She rolled it twice.
- (iii) She rolled it three times and it was ready to serve.
- (iv) Then, she rolled a square *Norimaki* once.
- (v) She rolled it twice.
- (vi) She rolled it three times and it was ready to serve.

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### 3. Picture Book “Adventure of Marble Boy” [Paper is A4 horizontal] <stereo copying>

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<Story> A marble boy went out to play outside his house on a hill. On the way, he passed various types of hills, a beetle pushed him up a hill and he fell down into a hole. A mole then helped him to get out from the hole.

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<Pictures>

- (i) The road is represented by a line 1mm in width. A horizontal line of 4cm is at the top left of the page. An oblique line runs 40 degrees downward for 11cm from the right end of this line, and a horizontal line runs 4cm from the right end of the line. The marble boy is represented by painting a circle 1.5cm in diameter. The marble boy is located on the horizontal line in the top left of the road (distance between the horizontal line and the marble boy is 3mm).
- (ii) The road is the same as (i). The marble boy is on the horizontal line at the bottom right.
- (iii) The road is a horizontal line running 24.5cm along the bottom of the page. The marble boy is in the center on the horizontal line.
- (iv) For the road, horizontal lines of 4cm are drawn on the top left and top right of the page. Two lines of length 10.5cm are in the center, bending downwards (angle of slope is approximately 40°) and connected. The marble boy is on the horizontal line at the top left.
- (v) The road is the same as (iv). The marble boy is on the horizontal line at the top right.
- (vi) For the road, through each horizontal line of 3cm on the bottom left and bottom right of the page, an oblique line of 10cm at 40 degrees from bottom left to top right, a horizontal line of 3cm and an oblique line of 10cm at 40 degrees toward the bottom right are connected. The marble boy is on the horizontal line at the bottom left of the page.
- (vii) The road is the same as (vi). The marble boy is on the horizontal line in the center of the top part. On the left side, a beetle is on the oblique line. The beetle is made by drawing lines, as shown in picture (a), and has a 3cm body length and a 1.5cm for the long horn.
- (viii) The road is the same as (vi). The marble boy is on the horizontal line at the bottom right of the page.
- (ix) The road (under the ground) is expressed by lines as shown in picture (b). The position of the marble boy is shown in picture.
- (x) The road (under the ground) is the same as (ix). The marble boy is on the horizontal line at the top right.
- (xi) The hole is represented by connecting two 10.5cm horizontal lines from top left and top right, two vertical 7cm lines downward from the center, and the 4cm horizontal line. The marble boy is on the horizontal line at the top left of the page.
- (xii) The road (including the hole) is the same as (xi). The marble boy is on the horizontal line in the hole.
- (xiii) The road (including the hole) is the same as (xi) except that there are no horizontal lines under the hole. In the hole, a mole is 1.5cm from the top line. The mole is made by a line drawing, as shown in Picture (c). Its size is 7cm x 3.5cm. The marble boy is on the horizontal line at the top right of the page.

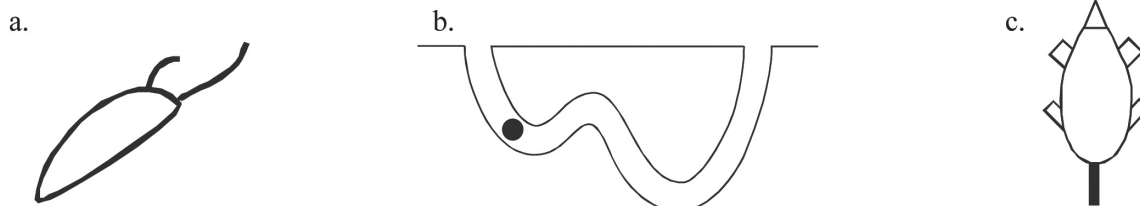
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<Text>

- (i) A marble boy went out to play outside his house on a hill.
- (ii) He went rolling down the hill.
- (iii) He kept going.
- (iv) He was fine going on such a hill.
- (v) He could go to the top of the hill.
- (vi) But, he could not go up such a hill.
- (vii) When he was considering what to do, his friend the beetle came. “I can push you up to the top of the hill” he said. The beetle pushed him up to the top. “Thank you. I am alright now,” the marble boy said. The marble boy thanked the beetle.

- (viii) Then he rolled down the hill.
- (ix) “Ah!” It looks like he fell into a hole.
- (x) But, the hole spiraled up. “Ah!” He came out of another hole.
- (xi) He went rolling again, but there was another hole. “Ah! There’s another hole. The previous time I was OK, so this time I will be OK, too.” he said, Just as he thought that, he fell down into the hole.
- (xii) But, this time the hole was a dead end.
- (xiii) “What shall I do?” he asked himself. As he was thinking about it, a mole, surprised that something had fallen into the hole, poked his head out of the hole. So, the mole pushed the marble boy so he could escape the hole. He then became friends with the mole.

<Pictures>



#### 4. Picture Book “Butterfly” [Paper is A4 horizontal] <stereo copying>

<Story> There was once a family of butterflies. The baby practiced flying by following his father. He flew vertically, horizontally and diagonally around some flowers. On the way, they took a rest on some flowers. Finally, they sat on a flower and ate some honey.

<Pictures>

- (i) The butterfly is shown in Picture (a); father butterfly is 6cm x 7cm and baby butterfly is 2.5cm x 3cm. In this picture, father butterfly is on the left side of the page and baby butterfly is on the right side. They are 5cm apart.
- (ii) Father butterfly is in the top center of the page and baby butterfly is 6cm below.
- (iii) By turning the picture of the butterfly shown in Picture (a) 90 degrees, father butterfly moves to the left of the page and baby butterfly is 6cm to the right.
- (iv) Father butterfly is at the top left of the page at 45 degrees to picture (a) and baby butterfly is 10cm away and at 45 degrees, toward the bottom right.
- (v) The flower shown in Picture (b) is situated on the left side of the page, and the length of the stem is 9cm. Next, another flower, with a 5cm stem is drawn, 6cm to the right. Father butterfly is on the left flower and baby butterfly is on the right flower. The direction of the butterflies is shown in Picture (a). The space between the flowers and the butterflies is 5mm.
- (vi) A flower shown in Picture (c) [made by removing the stem and leaves from Picture (b)] is located in the center of the page. The size of the flower is 4cm x 4cm. Father butterfly is facing in the direction shown in Picture (a) and is 2cm left of the flower. Baby butterfly is 2cm right of the flower and by turning 180 degrees in direction to father, is on the right.
- (vii) The flower and its position are the same as (vi). Father butterfly, by turning 45 degrees clockwise, is in the top left to the flower, and baby butterfly, in the same way, is in the bottom right to the flower. The distance between the flower and the butterflies is the same as in (vi).
- (viii) The flower is the same as (vi). By turning 45 degrees clockwise (90 degrees clockwise from the picture shown in Picture (a)), father butterfly is on the upper side of the flower, and by turning 45 degrees clockwise, baby butterfly is on the bottom of the flower.
- (ix) Flowers with stems are arranged in a similar manner as (v). Baby butterfly is on the left flower and father butterfly is on the right flower. The distance between the butterflies and the flowers is 5mm.

<Text>

- (i) There was a family of butterflies. The baby butterfly could not fly well yet, so he practiced flying by watching his father.

- (ii) They flew vertically in a straight line.
- (iii) They flew horizontally in a straight line.
- (iv) They flew diagonally.
- (v) When they were tired, they stopped to rest on some flowers. Father butterfly rested on a tall flower. Baby butterfly rested on a short flower.
- (vi) They flew around the flowers. At first, father butterfly faced upwards and baby butterfly faced downwards.
- (vii) After a while, they flew around; father butterfly faced diagonally upwards. Baby butterfly faced diagonally downwards.
- (viii) Then, they flew around some more. Father butterfly faced right and baby butterfly faced left.
- (ix) When they got tired of flying, they stopped again to rest on some flowers. But this time, baby butterfly took a rest on a tall flower, and father butterfly took a rest on a short flower. Then they had a delicious snack of honey.

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<Pictures>

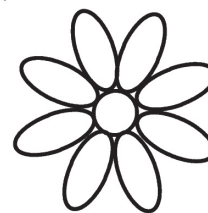
a.



b.



c.



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### 5. Picture book “The Sea Bathing Turtles” [Paper is A4 horizontal] <stereo copying>

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<Story> A family of turtles went sea bathing. The family marched in the order of father, mother and baby. On the way, father turtle sank into the ground, mother turtle fell into a hole, and baby turtle had difficulty climbing up a hill. However, they arrived at the sea safely and began sea bathing. The family swam on top of the waves and under the waves.

---

<Pictures>

- (i) A Father, mother and baby turtle are lined up from the left. In the center of the page, the turtles are represented by semicircles 7cm, 4cm and 2cm in diameter, respectively (inside of semicircle is painted). 3mm beneath them, a road is represented by a horizontal line of 23cm (1mm in width). The distance between each turtle is 3cm.
  - (ii) A picture showing the position of father turtle who has moved 1.2cm down. The others are in the same position as in (i).
  - (iii) As (i), but there is a hole under father turtle. The hole is 5cm wide (for this, the horizontal line of the road is deleted) and 4.6cm deep.
  - (iv) As (i), a hole similar to that in (iii) is made under mother turtle. Then, mother turtle is placed in the hole below the horizontal line.
  - (v) From the center left of the page, a road is represented by an oblique line 23cm at 20 degrees to the horizontal and a 3cm horizontal line is drawn towards the right. In the order of father, mother and baby, they are lined up on the center of the slope 2.5cm apart. The bottoms of the semicircles are parallel to the road.
  - (vi) The angle of a road in (v) is changed to 36 degrees. The bottom of the turtle family is parallel to the road; only the distance of baby turtle from mother turtle is changed to 6cm.
  - (vii) By transposing the left and right of the road in (vi), it changes to a downward slope toward the right with a 3cm horizontal line on the left. The bottom of the turtle family is parallel to the slope, father turtle is located near the horizontal line, mother and baby turtles are situated 5mm apart on the slope in order.
  - (viii) The line shown in the Picture is used to represent waves. Three waves are arranged vertically on the left side of the page. The size of a wave is 3.5cm x 13cm. On the right side of each wave, father, mother and baby turtles are arranged. The distance between the waves is 2.5cm. The distance between each wave and the center of the turtle on the right is 5cm.
  - (ix) The wave shown in the Picture is drawn 6cm x 22cm in size; only one wave appears in the center of the page. Father turtle is on the left peak, mother turtle is at the bottom of the wave, and baby turtle is on the right peak.
  - (x) On the road in (i), father turtle is in the center, mother and baby turtle are arranged on him. The turtles are 3mm above each other.
-

<Text>

- (i) A family of turtles went sea bathing. Mother turtle walked behind father turtle, and baby turtle walked behind mother turtle.
- (ii) On the way, father turtle sank into the soft ground.
- (iii) When father turtle finally got out, there was a hole in the ground. Father turtle could not fall down into the hole.
- (iv) However, mother turtle fell into the hole. Father and baby turtle helped to pull mother out of the hole.
- (v) They went on for a little while and they came across a hill. The hill didn't pose much of a problem.
- (vi) But, baby turtle had difficulty climbing the next hill. Baby turtle got left behind. But he kept on trying to climb the hill.
- (vii) Soon, they were going downhill, so mother turtle almost bumped into father turtle, and baby turtle almost bumped into mother turtle.
- (viii) Eventually they made it down the hill and came to the sea.
- (ix) All of them swam together. The waves were so high that father and baby were on top of the waves and mother turtle was under the waves.
- (x) They really enjoyed that. As they were going home, mother turtle rode on father's back and baby turtle rode on mother's back. Finally they arrived home happily.

<Picture>



### (3) Results of Using the Picture Books

#### (i) Improvement in Tactile Perception

##### (a) Change in Touching and Picture Comprehension

Of the five picture books for blind children that utilize the above-mentioned stereo copying, the picture book "The Turtle Picnic" was introduced to M for the first time at age 4 years and 5 months (October 1999).

In this picture book, the three turtles, the father, mother and baby, were represented by large, medium and small semicircles (painted). When father turtle was overturned after stumbling over a stone, he is turned 180 degree, when mother was frightened and jumped, her position is moved upwards, and when baby turtle lost his way, this is represented by his removal from the picture. In the story, the family of turtles went on a picnic in the forest incorporating the above-mentioned episodes.

When we introduced this picture book to M, although she could not discriminate and identify pictures based on the difference in tactile materials, by introducing the various attributes of the above-mentioned pictures, she could fully discriminate between and identify each picture and understand what each picture represented.

As mentioned earlier, M had touched the pictures with

not only with her pointing finger but with all five fingers and the palm of her hand. In doing this, she was able to grasp such attributes as the size and direction of a picture and understand the picture. If she had only touched the pictures with the bulb of her finger, it would have been difficult to understand the pictures in such picture books utilizing stereo copying, where information from tactile materials can not have been obtained.

On the other hand, at age 5 years and 1 month (June 2000), by touching with the bulb of her pointing finger, she began to show that she could obtain information on more detailed parts of the picture. For example, in the picture book "Nuts" (utilizing pasted tactile materials), by touching in this way, it was observed that she touched part of a leaf on a tree, and in the monkey picture, she touched the hand and tail of the monkey. (For a picture of the tree, please refer to Figure 3 (b).). When she was first introduced to the book, instead of not moving her finger on the picture, she moved her finger on the picture (traced it) while pressing the picture. She traced the leaf from the center to the end, and whereas in the case of the monkey picture, she traced the thin hands and the tail of the monkey (5mm wide, 2cm long). Furthermore, it was also observed that she traced the profile of the picture, for example, the radius of a piece (fan shape 4cm in radius with an angle of 45 degrees) of the broken balloon. Even in the picture books that utilized stereo copying, for example, the picture book "Butterfly", introduced at age 5 years and 8 months (January 2000),



it was observed that she could discriminate between and identify the antenna and other parts of a butterfly by touching them with her fingers in this way. Moreover, in

this picture book, by touching the antenna of a butterfly, she could understand the butterfly's direction. (For the picture of a butterfly, please refer to Figure 5.)

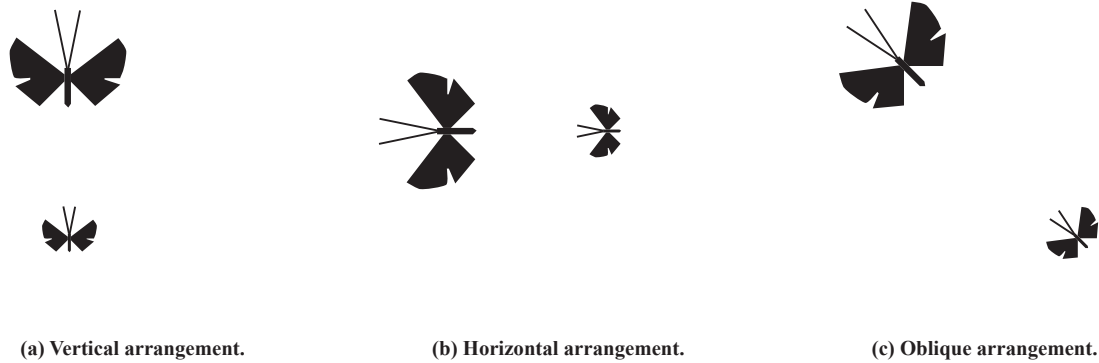


Figure 5: Searching motion with one element as a base in the picture book “Butterfly”  
(after touching one butterfly, she touched the other)

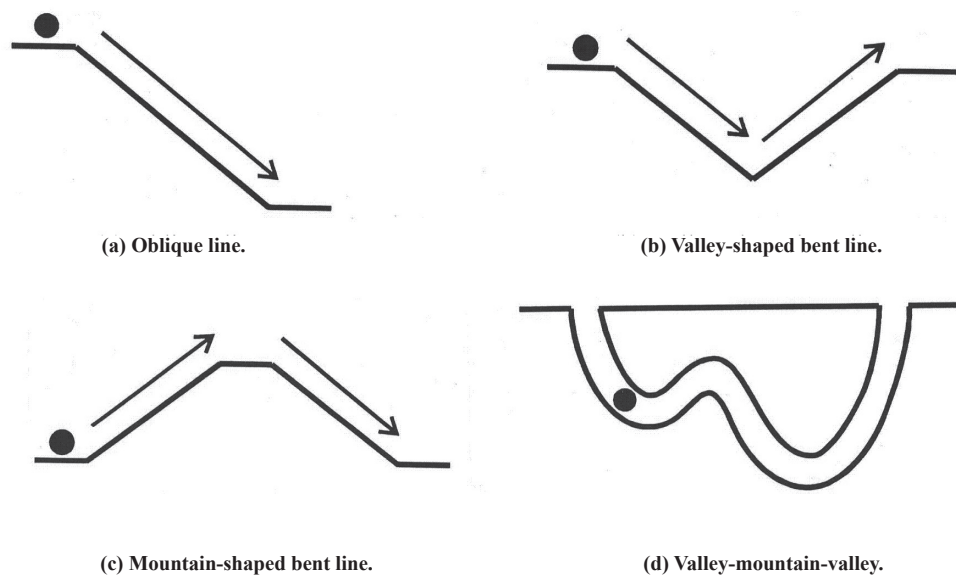


Figure 6: Tracing a road in the picture book “Adventure of Marble Boy”  
(the directions of motion are expressed by arrows).

Therefore, to obtain information on the detailed parts of the pictures, her way of touching—by placing the bulb of her finger on a picture and tracing—was effective.

### (b) Searching Motion

When she was introduced to the picture book “Butterfly” based on guideline (i) in “guidelines on improving tactile perception”, at age 5 years and 8 months (January 2001), by using one hand as a base, she began to search with her other hand.

In this picture book, the parent and child butterflies are arranged on a page in vertical, horizontal, oblique and symmetrical positions. She was able to touch one butterfly with one hand and search for and touch the other butterfly with the other. (Please refer to Figure 5.)

With respect to this movement, when M touched the parent or child butterfly, even though an assistant would sometimes ask her where the other butterfly was, the assistant did not guide her hand to it.

In such a manner, if the number of elements was limited to two, one hand was able to touch one of the elements while the other hand could search and touch the other element.

However, for this to arise, a child can relate two elements and has intention to touch both elements at the same time. If not, other means such as wording to encourage this could be taken.

### (c) Tracing Motion

The picture book “*Norimaki*” based on guideline (ii) in “guidelines on improving tactile perception” was introduced to M at age 4 years and 5 months (October 1999). This picture book contains one-fold, two-fold and three-fold spirals and square shapes (lines 1mm in width) to represent *Norimaki*. A single fold spiral shape is represented by a circle with an inside diameter of 4cm and an outside diameter of 6cm. The double shape is represented by adding a 10cm circle, and the triple shape is represented by adding a circle 14cm in diameter.

In this picture book, when we encouraged her to trace, although she could trace part of a shape, we did not observe her trace from the beginning to the end, even in the case of the single shape.

After that, the picture book “Adventure of Marble Boy” based on guideline (ii) was introduced to her at age 5 years and 4 months (September 2000). In this picture book, the structural elements of each picture are arranged through continuous oblique lines expressing a road, valley-shaped bent lines, mountain-shaped bent lines and valley-mountain-valley-shaped curved lines. The width of each line is 1mm and the length is 11cm (oblique line), there are 2 oblique

lines 10.5cm in length (mountain-shaped bent line), 2 oblique lines 10cm in length and a horizontal line 3cm in the center (mountain-shape bent line); the distance of the straight line is 16.5cm (valley-mountain-valley-shaped curved line). (Please refer to Figure 6.)

The circle-shaped “marble boy” went along on a road in the story.

Four months after being introduced to this picture book, at the age of 5 years and 8 months (January 2001) M could trace the three above-mentioned oblique lines, the valley-shaped line and the mountain-shaped lines well.

To trace all the valley-mountain-valley-shaped curved line, someone had to intervene and provide partial guidance by taking M’s hand. At that time, the intervener read the movement of M’s hand in a tactile manner. If the motion stopped, the intervener guided her hand, encouraging her to move her hand. If she moved her hand forward, the intervener trusted her to continue moving her hand and used no force, which was effective. Through this method, although partial guidance of the intervener was necessary, spontaneous movement was possible.

## (ii) Enhancing Child’s Use of Images and Cultivating Imagination

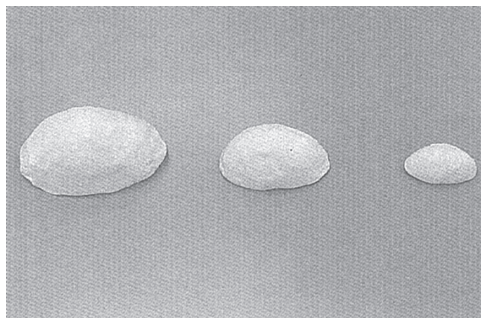
### (a) Tactile Perception of Pictures, Body Actions, and Using Models

At age 4 years and 5 months, in the picture book “Turtle Picnic”, M’s actions began to correspond with the pictures and story.

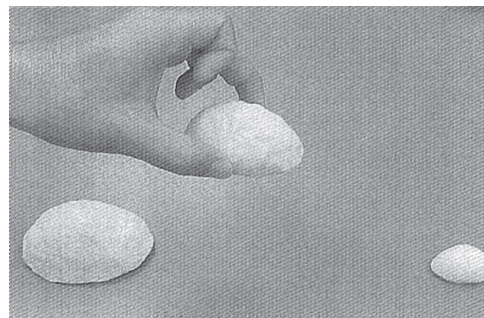
As mentioned earlier, this picture book is about a family of turtles—a father, mother and baby who go on a picnic in the forest—represented by large, medium and small semicircles.

After reading this picture book, she displayed actions such as lying on her back, jumping up and searching for the baby turtle who had lost his way, then pretending to pick the turtle up from the floor when she found out from the picture book that “father turtle had been overturned”, “mother turtle was frightened and jumped” and “baby turtle lost his way and disappeared”, respectively. After that, with other picture books, we observed her rolling over on the slope when the marble boy rolled over on a hill in the picture book “Adventure of Marble Boy”, and she bumped her head on the body of the observer when the baby turtle was about to bump into mother turtle in the picture book “The Sea Bathing Turtles”.

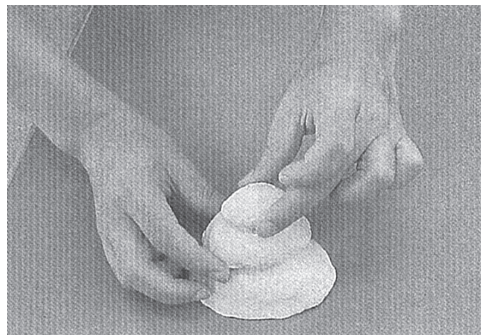
Next, in the case of the picture book “Turtle Picnic”, 2 months after the above-mentioned actions (at age 4 years and 7 months) we created three-dimensional models of the turtles (large-sized father, medium-sized mother and small-sized baby turtles, the lengths of the bases were 10cm, 6 cm



(a) Models of turtles.



(b) Causing mother turtle to jump.



(c) Making mother turtle ride on father's back, and baby turtle ride on mother's back.

Figure 7: Models of turtles and manipulation of models.

and 3cm, respectively) similar to the pictures in the picture book. By manipulating these, we tried to get M to act out the story. (Please refer to Figure 7.)

As a result, it was quite simple for M to assign the large, medium and small models as father, mother and baby turtles. In addition, when the mother turtle was frightened and jumped, she held the mother turtle up with her hands. Moreover, when mother turtle rode on the back of father turtle, and when baby turtle rode on mother turtle, M manipulated the models in such a manner. She continued to manipulate the models as she was recounting each scene of the story.

As observed above, the body actions or the manipulation of models appeared to be effective for creating a deeper understanding of the picture books for blind children. This behavior made it possible for her to understand the story as being associated with the images through specific actions.

Next, when reviewing the pictures in the picture books for blind children, it seemed that touching the pictures made it possible for children to understand the story associated with the images through specific tactile actions. For example, in the picture book "Turtle Picnic", when mother turtle was frightened and jumped, the picture of mother turtle, which was previously the same height as father and baby turtles, moved to the top of the page. When M turned the page and touched the same place as father and baby

turtles, there was nothing there. In the story when mother turtle was frightened and jumped, if M moved her hand up, she could find mother turtle.

In other picture books, she traced the slope of the slide or the trunk of the tree, or she confirmed by touching the pictures that the balloon had become bigger every time she turned the page. Consequently, in the various scenes, specific tactile movements arose. In this manner, one might say that touching the pictures also made it possible for her to understand the story associated with each image through specific tactile actions. In addition, in the case of picture books for blind children utilizing pasted tactile materials, information obtained through feeling various materials may also instill specific images.

Even totally blind children are able to understand stories associated with specific images through nonvisual pathways such as the tactile perception of pictures, bodily action and the manipulation of models.

Picture books are believed to cultivate children's imagination by inviting them into a story world different from daily life. This is the same for stories provided through picture books for blind children.

To further cultivate this imagination, we feel that it is very important to awaken and enhance images through the tactile perception of pictures, body actions and the manipulation of models that can also be used by visually

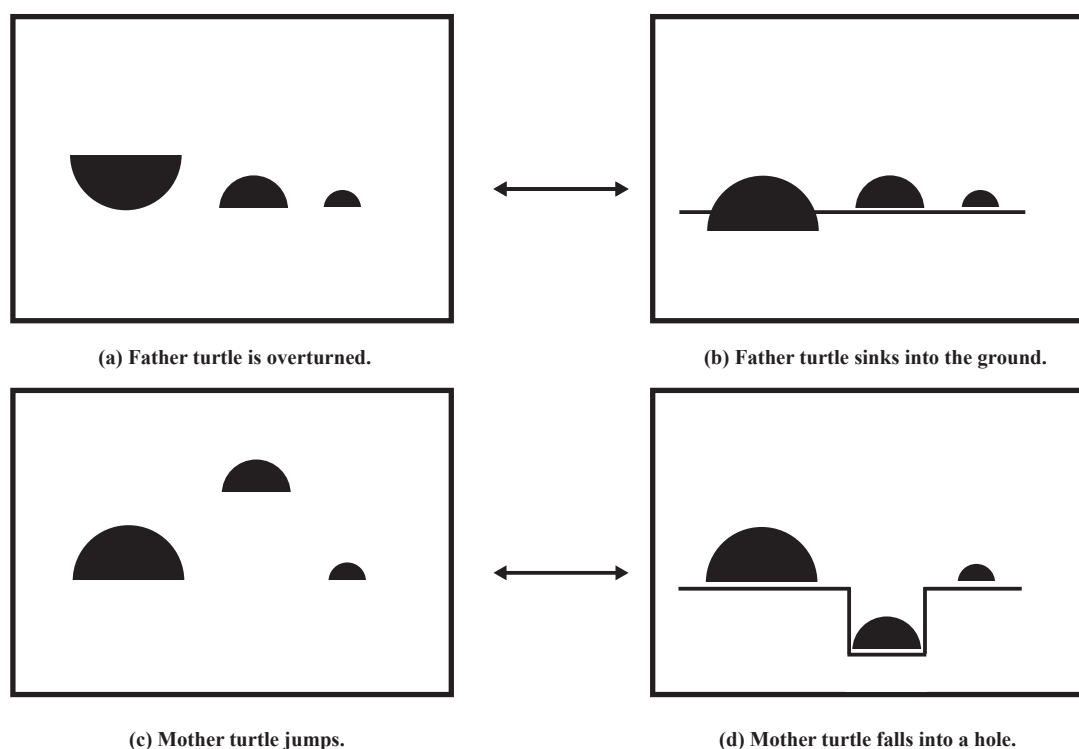


Figure 8: Comparison of two types of picture books for blind children  
[comparison made by touching (a) and (b), and (c) and (d)].

impaired children.

#### (b) Comparison of Two Picture Books for Blind Children

After introducing the picture book “Turtle Picnic” at the age of 4 years and 5 months (October 1999), the picture book “Sea Bathing Turtles” was introduced at the age of 6 years and 2 months (July 2001). In these two picture books, the father, mother and baby turtles appeared in the same manner. Furthermore, although the stories were different, father turtle being overturned, mother turtle being frightened and jumping, and baby turtle losing his way corresponded with father turtle sinking into the ground, mother turtle falling into a hole, and baby turtle having difficulty climbing a hill, respectively. They were designed so that M could make a comparison of the two sets of pictures and stories.

As a result, When the picture book “Sea Bathing Turtles” was introduced, after reading (touching) the book, M wanted to reread the picture book “Turtle Picnic”. From this, we observed her touching the pictures alternately to compare the two stories.

Therefore, if the characters appearing in both books are the same and there are corresponding parts in both stories, one could presume that a comparison between two stories and pictures will be made.

On the basis of this comparison, it is possible that the two picture books deepened her understanding of these stories

and enhanced the images.

Although this process might occur in ordinary picture books, if the books belong to a series, this may be effective in promoting the enhancement of images in picture books for the blind, too. This could be carried out by producing picture books oneself or by adapting a series of ordinary picture books.

#### (iii) Stimulating an Interest in Letters (Braille) and their Learning

As described earlier, at age 4 years and 0 months (May 1999), M began to develop an interest in Braille sentences and the Braille title on the cover pages on the picture books for blind children. After 9 months had elapsed, at age 4 years and 9 months (February 2000), while tracing Braille letters, she could recite part of the story by memory. After that, at age 4 years and 11 months, she could type some Braille letters (*a*, *wa*, *tsu*, *i* and *o* in Japanese characters) using a Braille typewriter (Perkins Brailler) and then touch what she had typed.

Later, at age 5 years and 0 months (May 2000), she began to study Braille seriously and learned each Braille letter through Braille models at the school for the blind where she attended. At the same time, in the picture books for blind children she was able to distinguish each Braille letter and started to show an interest in what each letter represents.

After that, at age 6 years and 1 month (June 2000), without depending on the context of a passage, she began to understand the Braille letters of “a”, “ka” and “me”. Then, she started to read these Braille letters, in the picture books for blind children.

While reading ordinary picture books, sighted children begin to show an interest and learn the letters in the books. In a similar manner, in the case of visually impaired children, under natural circumstances such as reading (touching) picture books, they also appear to develop an interest in letters (Braille), which becomes the basis for Braille learning.

Furthermore, in the case of M, before the start of involvement through picture books for blind children, her mother would read books to M. In other words, there was a period when M just listened to stories with only her ears.

According to this case study, one way visually impaired children can smoothly acquire letters (Braille) is to first be read stories, in other words, listening to stories only with the ears. The next step is to listen to stories while touching the pictures in picture books for blind children. The final phase is to read the Braille included in the picture book.

### V. Conclusion and Considerations

#### 1. Improvement in Tactile Perception

In this study, through treatment using picture books for blind children, M’s method of touching changed from touching pictures only with the bulb of her pointing finger to touching with five fingers and the palm of her hand. In addition, we later observed her touch more effectively. She used tactile motions to obtain general information, such as the size or direction of a picture, using five fingers and the palm of her hand, and to obtain more detailed information about a picture, she used the bulb of her pointing finger.

Furthermore, by incorporating settings through picture books for blind children to stimulate improvement in tactile perception, we could see progress in the searching and tracing motions of her hands and fingers. When carrying out the searching motion, she searched for the same picture in a different position as each new page was revealed. Next, when there were two related elements in the same page, one element became the base point and she then searched for the other element. When tracing, she could initially trace a short diagonal line and a vertical line for approximately 10cm, after which we could observe progress, for example, her tracing of a valley shape or a mountain shape 20cm in total length.

However, she was unable to trace a spiral or all of a valley-mountain-valley-shaped curved line on her own. In addition, a picture containing a spiral was introduced after she was observed tracing the above-mentioned short lines.

This turned out to be difficult for M, and therefore appeared to be a too big step for her.

From this case, it seems that pictures should be presented at an appropriate time for each child to stimulate the tracing motion. For example, pictures should progress from short to long lines, straight to curved lines, curved lines to circles, and then circles to spirals.

#### 2. Enhancing Children’s Use of Images and Cultivating the Imagination

Through the treatment using picture books for blind children, M was able to express part of the story by bodily actions, such as lying on her back on the floor, and rolling over on the slope.

In the picture book “Turtle Picnic”, after we had observed her expressing part of the story with her body, we presented models of the turtle family that appeared in the book, after which she began to express part of the story by manipulating these models.

Body action, manipulation of models and tactile perception based on picture books for blind children may make it possible to understand a story associated with the images of each specific tactile action. Even if visual images cannot be utilized, tactile images may be utilized. In the case of visually impaired children, it is important to stimulate and enhance such use of tactile images. Moreover, this may lead to the enhancement of the imagination.

Furthermore, to build on the success of the manipulation of models based on the picture books, an assistant intervened with the intention of developing pretend play. For example, immediately after the period of manipulation of models in the picture books, when a miniature piano and a doll were introduced, M took the doll and manipulated the doll to hit the keyboard of the piano (pretend action). Later, during a more recent period (May 2001 at age 6 years and 0 months), when we introduced *Anpan-man* (Bean-Jam Bun Boy) dolls, characters that M often watched on TV or videos, we started to observe her acting out (pretend action) the defeat of the doll *Baikin-man* (Germ Boy) using *Anpan-man*, or acting out (pretend action) *Jam-ojisan* (Uncle Jam) healing the broken face of *Anpan-man*.

Such characters may also stimulate pretend play and enhance the imagination through images of tactile actions.

Furthermore, in the case of sighted children, it appears easy to search for an appropriate object for them to manipulate on their own and effectively utilize this in pretend play. However, visually impaired children seem to have difficulty searching for appropriate objects on their own during an activity.

In addition to the above-mentioned tactile perception of pictures through picture books for blind children or the manipulation of models, even in the case of pretend play, an



object feasible for touching and manipulation by visually impaired children is effective. Consequently, appropriate introduction of tactile objects to blind children and its timing appears to be important.

### 3. Stimulating an Interest in Letters (Braille) and their Learning

At the present time in Japan, most sighted children are able to read *hiragana* (simple phonetic characters) before they enter school<sup>2)</sup>. Depending on the child, it is possible to encourage blind children, even before entering school, to learn Braille, which is regarded as being necessary for smooth progress after entering school.

However, most sighted children are blessed with an environment of abundant letters and can obtain such information visually. Such an environment means that picture books or fairy tales can be read by a parent, newspapers can be read by the whole family, and books and textbooks by their brothers and sisters. Letters are projected on TV, printed on bags of snacks, store signboards and on advertisements. This environment becomes the basis for learning letters. On the other hand, in the case of blind children, none of this information can be utilized.

Therefore, for the purpose of providing an appropriate environment for blind children as a basis for learning letters (Braille), a course for learning Braille, as observed for M, may be a good reference. This course begins with being read stories or listening to stories with only the ears, followed by listening to stories while touching tactile pictures, then developing an interest in and touching the Braille in the story or title. This becomes a basis for learning Braille and leads naturally to its learning. Therefore, this course is considered to be effective.

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# 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

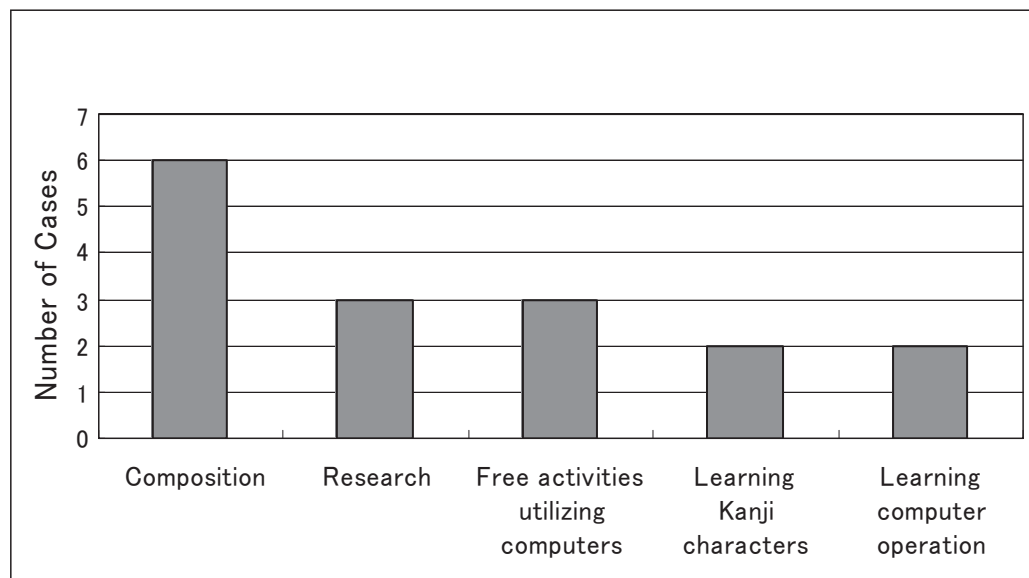


Figure 1: Contents of Approaches in Practical Models at Schools for the Visually Impaired

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”.

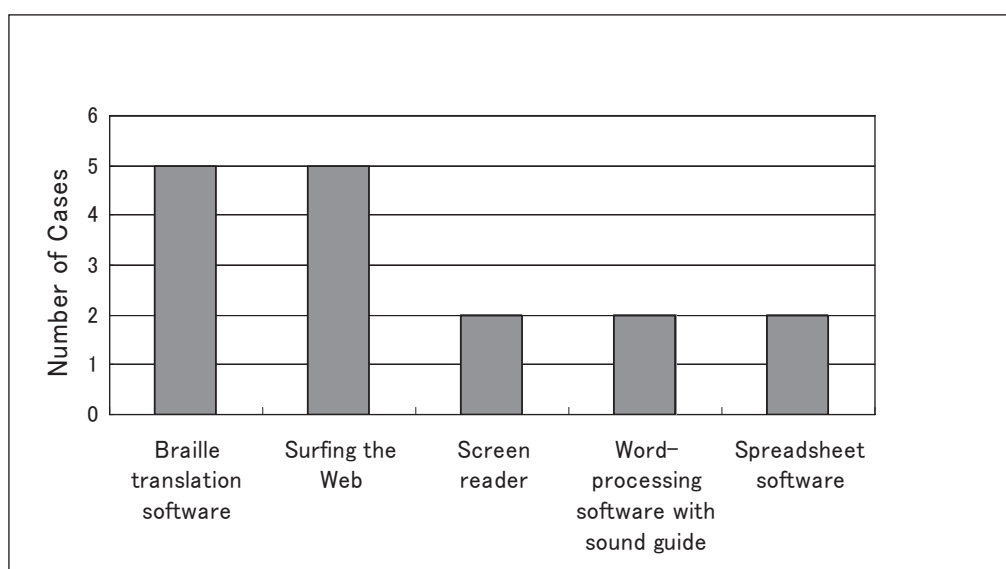


Figure 2: Software and Information Devices Utilized Practical Models at Schools for the Visually Impaired

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.

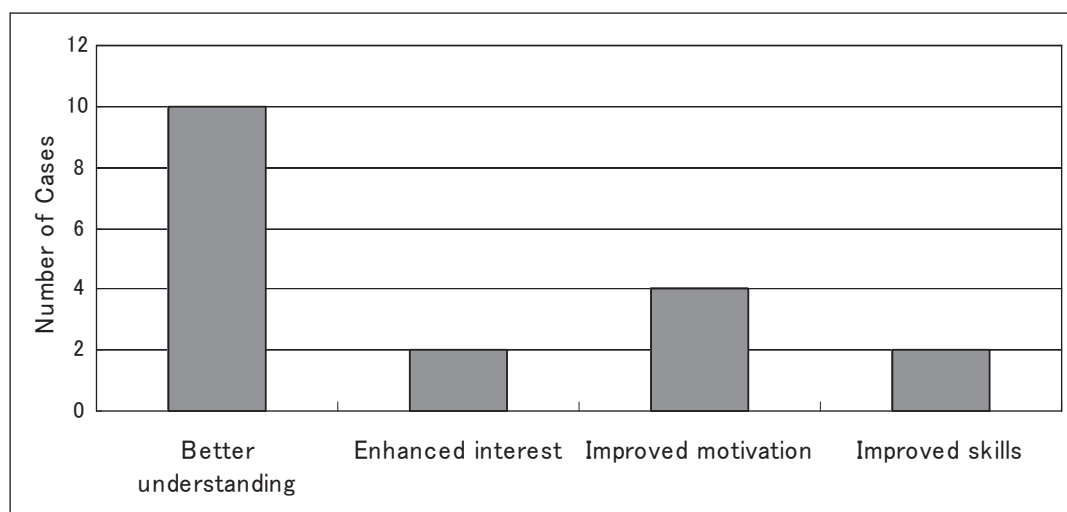


Figure 3: Types of Effects of Practical Models at Schools for the Visually Impaired

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.

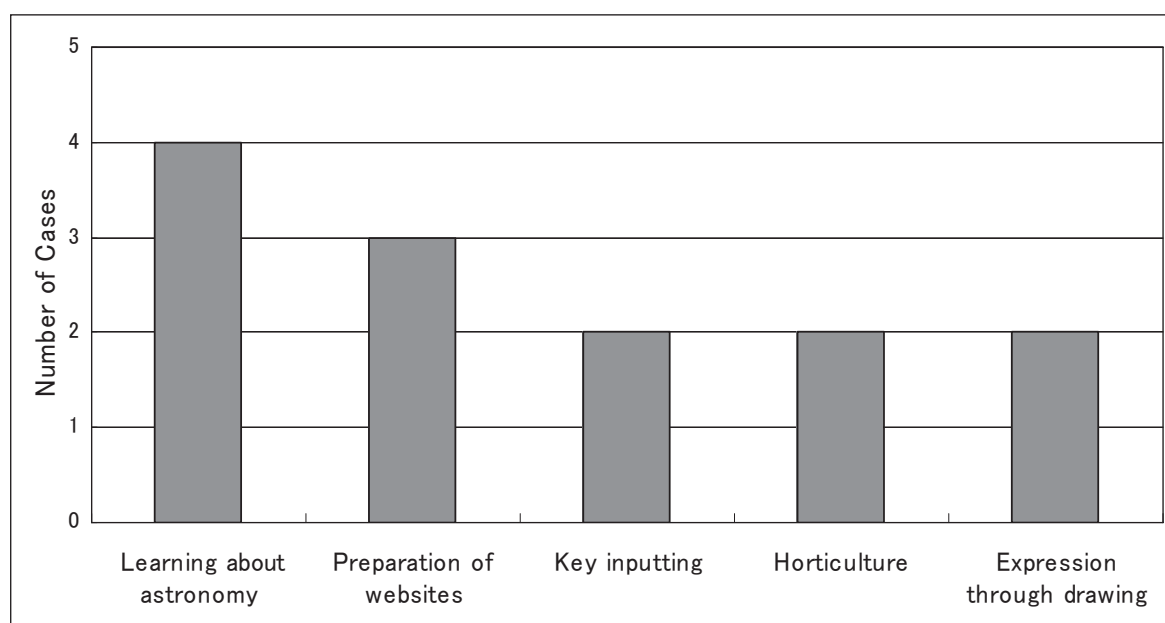
### 4) Instructional Methods

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**

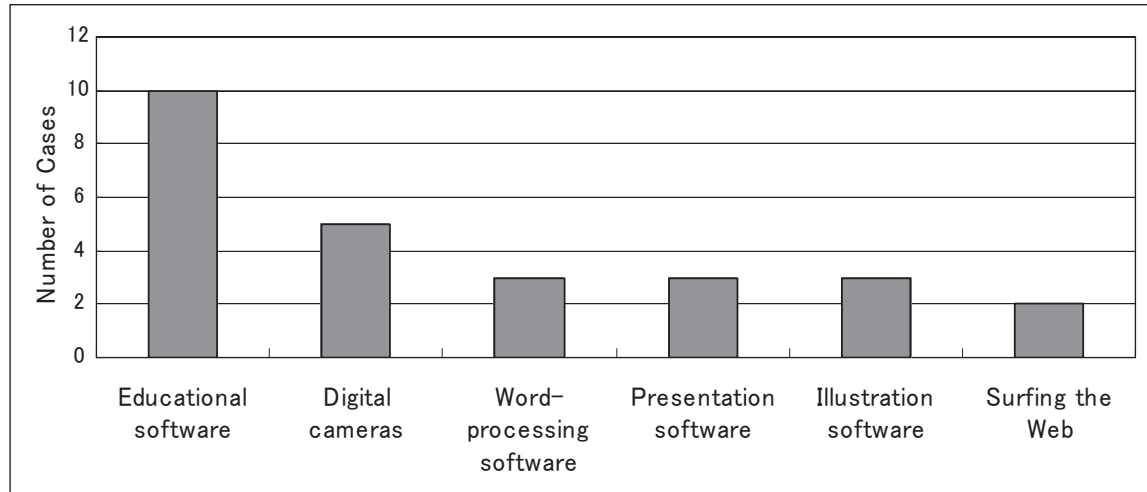


Figure 5: Software and Information Devices Utilized in Practical Models at Schools for the Hearing Impaired

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

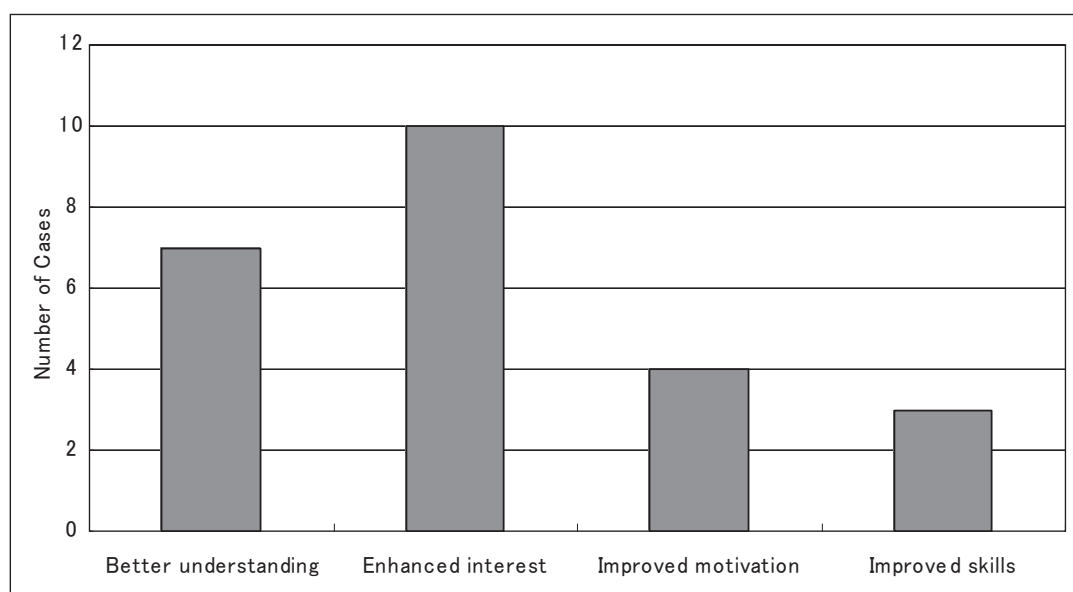


Figure 6: Types of Effects of Practical Models at Schools for the Hearing Impaired

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>Yougo-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

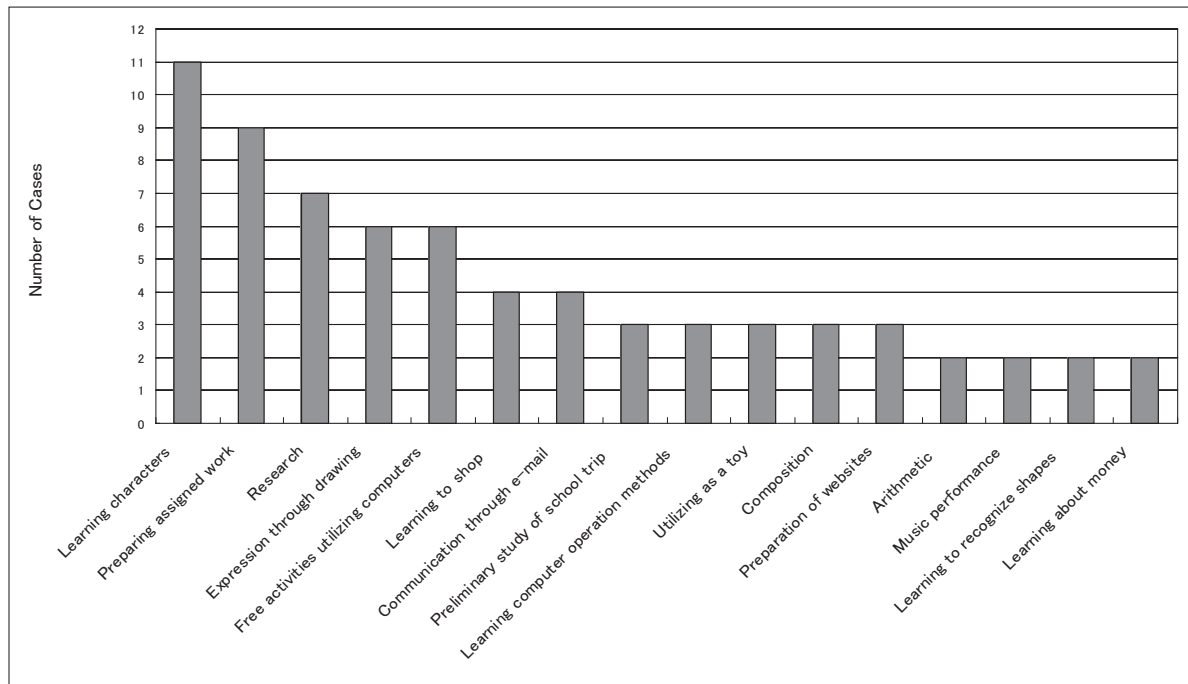


Figure 7: Contents of Approaches in Practical Models at Schools for Children with Intellectual Disabilities

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

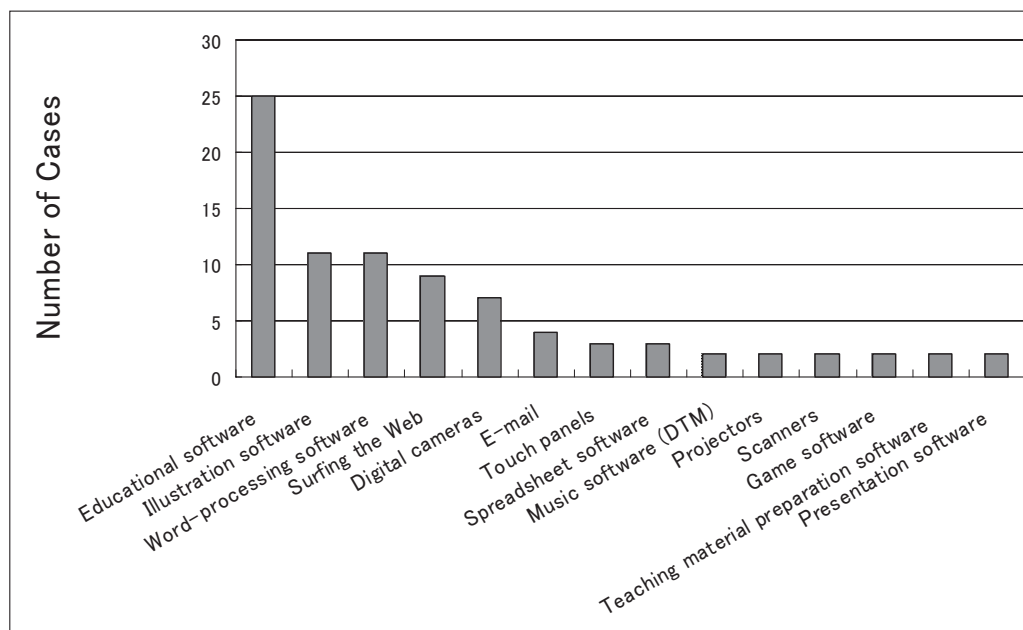


Figure 8: Software and Information Devices Utilized in Practical Models at Schools for Children with Intellectual Disabilities

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.

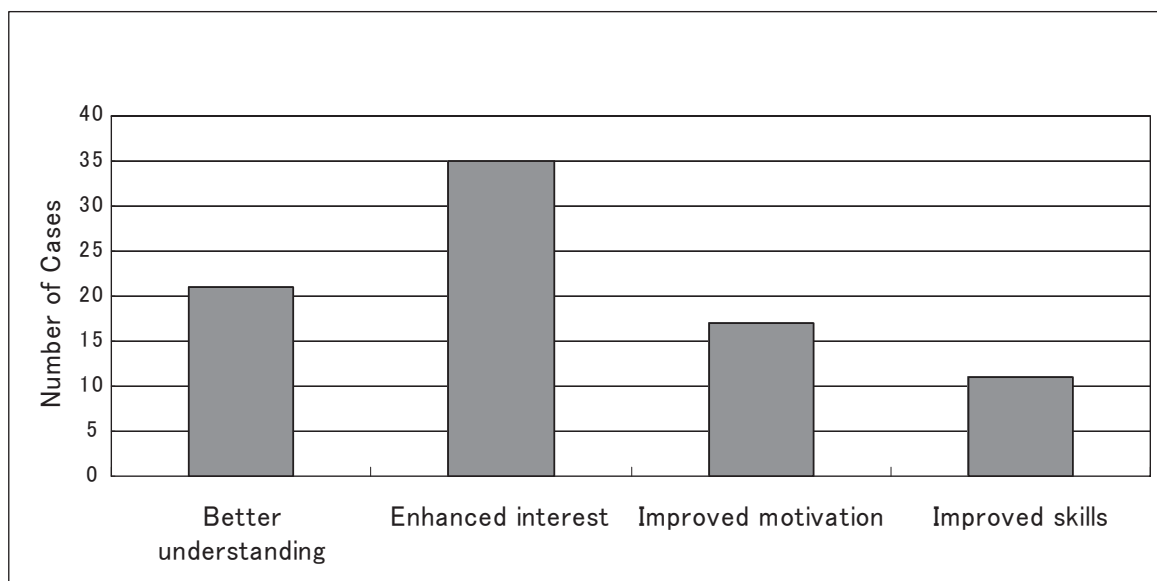


Figure 9: Types of Effects of Practical Models at Schools for Children with Intellectual Disabilities

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



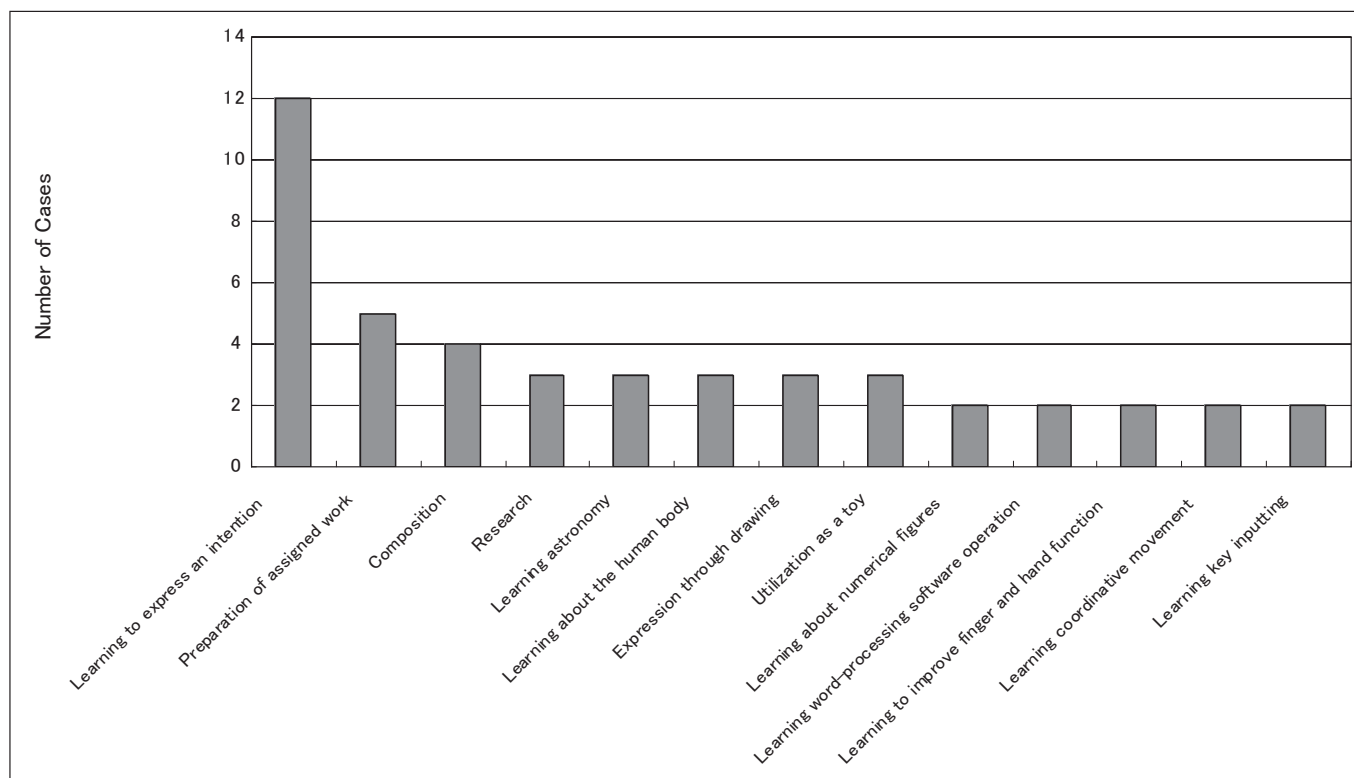


Figure 10: Contents of Approaches in Practical Models at Schools for Children with Physical and Motor Disabilities

### 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).

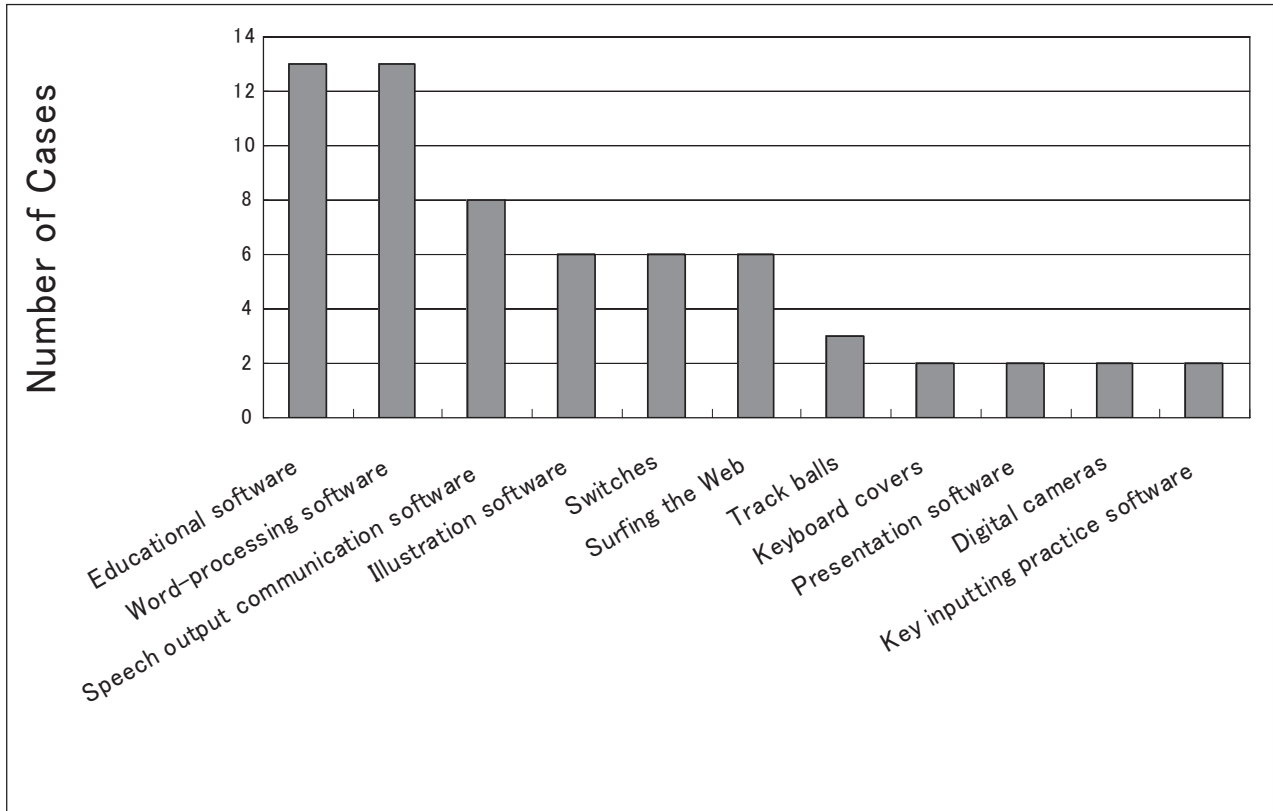


Figure 11: Software and Information Devices Utilized for Practical Models at Schools for Children with Physical and Motor Disabilities

#### 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).

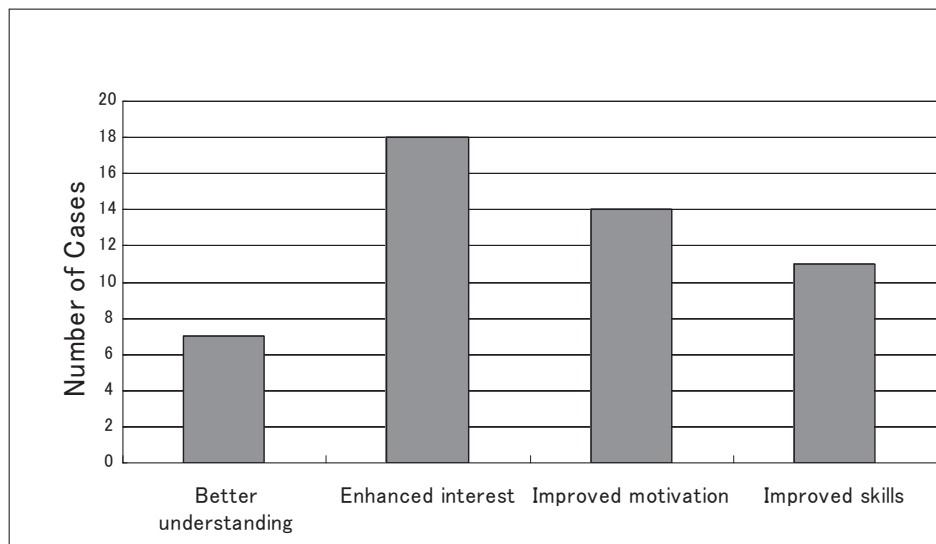


Figure 12: Types of Effects of Practical Models at Schools for Children with Physical and Motor Disabilities

### 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

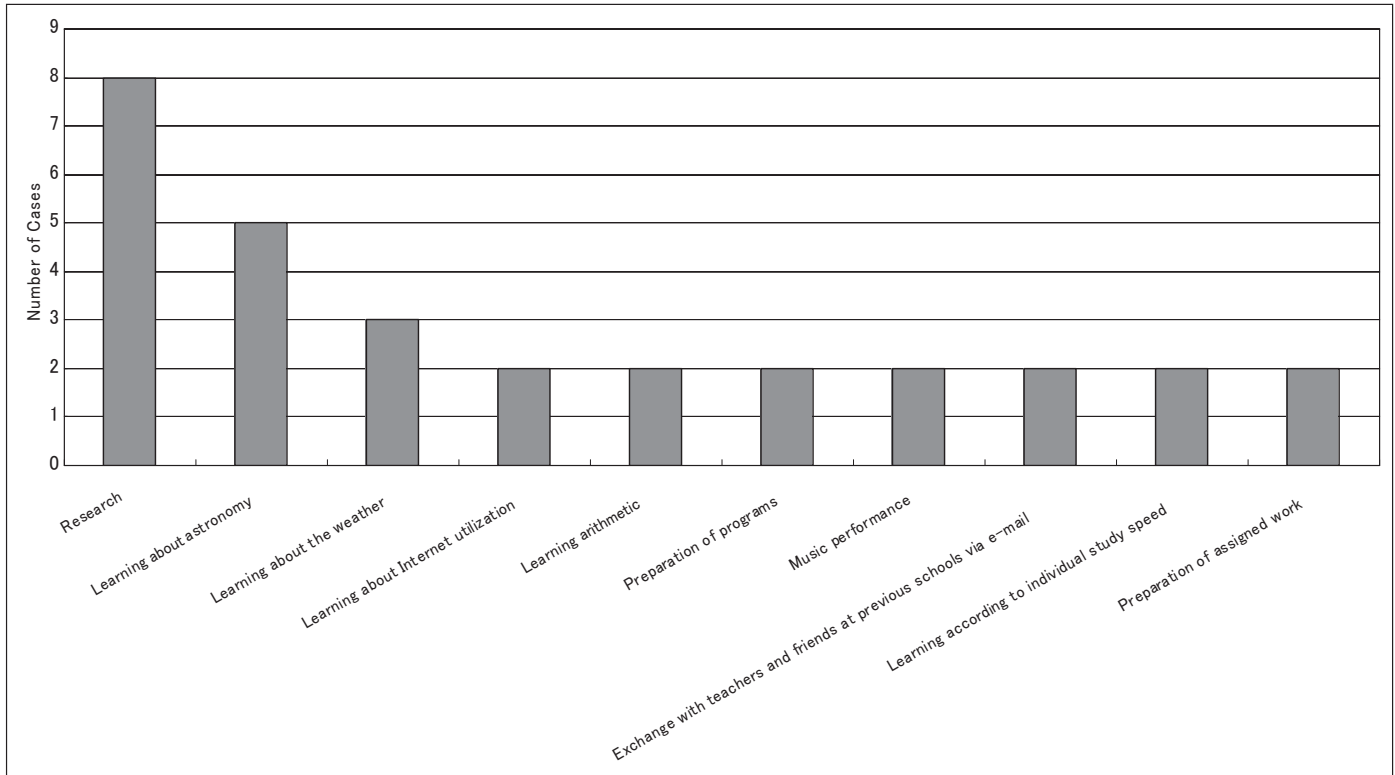


Figure 13: Types of Approaches Taken in Practical Models at Schools for the Health Impaired

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

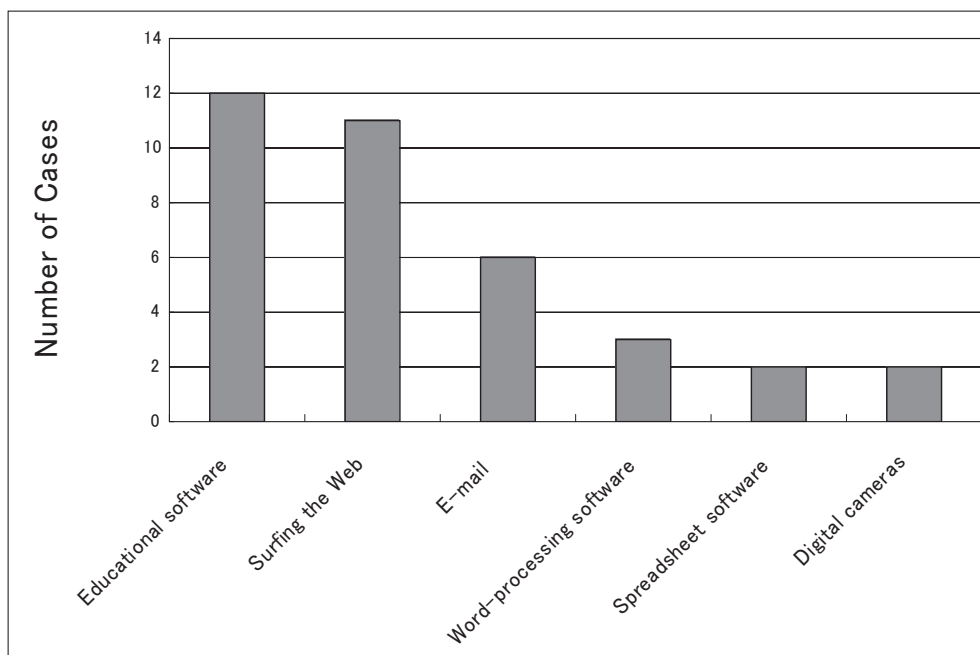


Figure 14: Software and Information Devices Utilized in Practical Models at Schools for the Health Impaired

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,

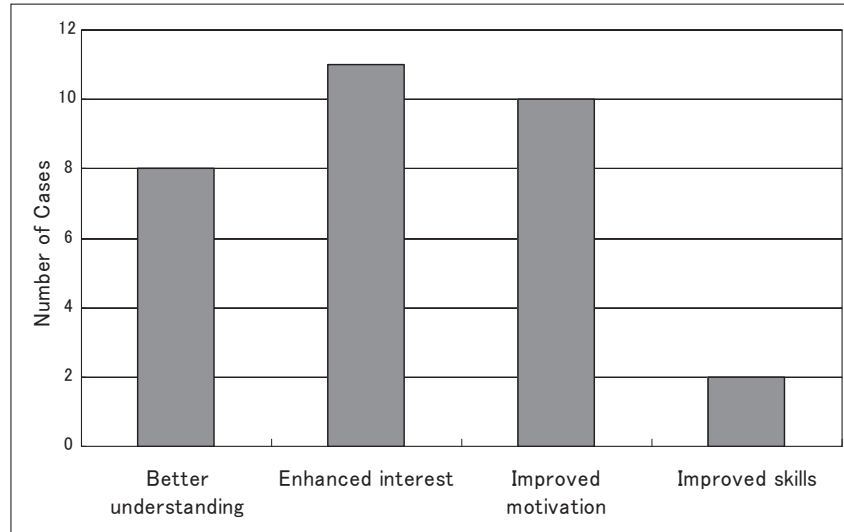


Figure 15: Types of Effects of Practical Models at Schools for the Health Impaired

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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# Current Conditions and Issues on Education for Children with Health Impairments in Japan

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**Abstract:** In recent years, Japan has seen a shift away from “special education”, in which instruction that matches the degree of disabilities is provided at specific sites, to “special support education”, through which appropriate educational support is provided in accordance with the special educational needs of individual schoolchildren. This shift is taking place at special schools and special classes that provide education for children with health impairments and physically weak children. However, beyond simply providing education for schoolchildren with chronic diseases who are undergoing treatment in hospitals, special schools for children with health impairments are now taking on new roles; they are now accepting children with a long absence from school because of psychosomatic illnesses or family problems. Psychosomatic illnesses and school refusal are common and frequent among schoolchildren who are under considerable mental and physical stress. These problems are also associated with school health. While reviewing the history of education for children with health impairments in Japan, in this article problems that confront education for children with health impairments are addressed and special schools for children with health impairments under special support education are discussed.

**Key Words:** Education for children with health impairments, Special education, Special support education, Special educational needs

## I. Introduction

Education for children with health impairments was established to provide learning opportunities to children who must undergo continued treatment as in- or outpatients. Under the current special education system, such education is provided through special schools for children with health impairments, classes in hospitals as special education courses of elementary and lower secondary schools, special classes for children with health impairments and physically weak children in elementary and lower secondary schools, “resource rooms”, and home visits from special schools (i.e., schools for children with health impairments, motor disabilities, thuraghot. and intellectual disabilities).

However, Japan is currently undergoing a systematic shift from “special education”, in which instruction is provided at specific sites in accordance with the degree of a person’s disability, to “special support education”, through which appropriate learning support is provided in accordance with the special educational needs of each child.

Special schools for children with health impairments as well as classes for children with health impairments and who are physically weak are part of this shift. Schools for children who are blind or deaf or have intellectual or motor disabilities lead the way in providing education that meets

special educational needs of these children. However, because of changes and diversification of diseases with the changing times, special schools for children with health impairments have become places that can encourage nonattendant children, who require hospitalization or medical treatment due to psychosomatic illnesses, to return to society. These facilities have also become places for providing protection to abused schoolchildren with chronic diseases. The operation of various schools and classes is required because special educational support is needed to meet these different medical and welfare-related needs.

While reviewing the history of education for children with health impairments in Japan, in this article we will examine into current conditions of this type of education, analyze its characteristics, and consider the role it should play in special support education.

## II. Prototypes of schools for children with health impairments

If we examine the history of education for children with health impairments in Japan, we find that it has characteristics different from those who are blind or deaf, or those with intellectual disabilities or motor disabilities. Let us clarify these characteristics as we review the social conditions in the early days of education for children with

health impairments.

### 1. Establishment of public health and school systems as state-run operations

Japan began to establish itself as a modernized country on a par with those in Europe and North America during the Meiji Restoration Period. As part of this effort, it took systematic steps to establish a health and medical system as well as a school system.

In the late 1870s and early 1880s, the containment of cholera and other infectious diseases became one of the nation's highest priorities, and this led to the establishment of a public health administration at the central and regional levels. At the same time, the Meiji government promoted efforts to develop awareness and knowledge of sanitation among the nation's citizens to raise their understanding of sanitation. The Japan Sanitation Association, which was established as a private-sector organization in 1883, also played a major role in enlightening the public; indeed, the expression "school hygiene" can be found in the Association's bylaws. With this background, Japan began pursuing a strict education program to build up the nation's strength after its school system was established in 1872, and continuing health problems among students (called "school diseases" at the time) led to efforts to immediately provide relief and prevention.

### 2. Birth of special schools for children with health impairments in Japan

The first education for children with health impairments in Japan was provided to pupils suffering from beriberi at Mie Prefectural Normal School for the Primary Level. At the time, beriberi had a major impact on national health as it had a high mortality rate and depleted the country's labor force.

This led the Ministry of Education to focus on school sanitation, and in 1897 it took steps to assign a physician in all of the country's public schools. That was a landmark move never before seen even in other countries. Furthermore, because it was believed that those with a weak physical condition were susceptible to tuberculosis and other diseases, the Ministry of Education provided special instruction at "vacation colonies" where children with poor health were gathered on nonschool days with the purpose of promoting health and improving physical strength. From the good results of the activities carried out at the vacation colonies, it was realized that providing long-term and systematic education for physically weak children in forest or coastal areas was effective. It was thus decided that such

schools would be set up in all parts of the country.

The time from the end of the Meiji Period (1868 - 1912) to the Taisho Period (1912 - 1926) was a period of industrial expansion in Japan. This led, however, to a social problem whereby the conditions of laborers deteriorated in opposition to the nation's dramatic industrial and economic growth. Japan's citizens experienced additional hardship because of the Great Depression of 1920 and as a result of the Great Kanto Earthquake of 1923. The infant mortality rate (number of infant deaths per 1,000 live births over the course of a year), which is a measure of regional health, stood at 189 in 1918. This was the highest rate ever recorded in mother-and-child health statistics in Japan. The nation thus experienced a high infant mortality rate as well as a high rate of mortality due to chronic and infectious diseases such as tuberculosis and sexually transmitted diseases.

According to the Ministry of Education statistics on physical examinations for 1924, on average, 5% of the nation's children (approximately 500,000 children) suffered from poor physical health in forms such as malnutrition, eye diseases (e.g. trachoma), and tuberculosis, and social inequality was noted in the health of the weakest children. In line with changes in the country's prevailing diseases, Japan's education for children with health impairments, which had started as a countermeasure against "school diseases" during the Meiji Period, shifted roles to one that provided countermeasures for tuberculosis, the incidence of which increased rapidly during the Taisho Period. Through this shift, education for children with health impairments was making slow but steady progress.

As Japan entered the Showa Period (1926 - 1989), it began taking steps to foster healthy soldiers as part of its policy to increase the nation's wealth and military power amid the Manchurian Incident and other events. The National School Order in 1941 clearly mentioned this as an objective of primary education. The Regulations for the Enforcement of the National School Order thus banned children with infectious diseases from attending classes, called for the organization of special schools and classes for these children, and made the education for physically weak children as a measure against tuberculosis as a national policy. As a result, the number of schools and classes of this type increased markedly.

According to the Ministry of Education documents in 1942, the total number of special classes in national schools was 1,682, with the number of attending children reaching 65,930. Of these, the number of classes for physically weak children was 1,616 (96%) and the number of children



attending these classes was 64,891 (98%). Thus, it is notable that nearly all of the children attending these classes had poor physical weakness. If the scarcity of medical resources at the time is considered, the significant role that these special classes played from the aspect of prevention and treatment of tuberculosis, leprosy, and other chronic and contagious diseases is intriguing.

### III. Genealogy of education for children with health impairments following World War II

Article 25 of the Constitution of Japan ensures the right to live and stipulates the government's social security obligations by stating that "All people shall have the right to maintain the minimum standards of wholesome and cultured living. In all spheres of life, the State shall use its endeavors for the promotion and extension of social welfare and security, and of public health." Furthermore, Article 26 ensures the right for the nation's citizens to receive an education and details the government's obligation in terms of education by stating, "All people shall have the right to receive an equal education correspondent to their ability, as provided for by law. All people shall be obligated to have all boys and girls under their protection receive ordinary education as provided for by law. Such compulsory education shall be free."

The above-mentioned items are guaranteed as social rights that are included among citizens' basic human rights, and the guaranteeing of these rights is a responsibility of the government. The two articles mentioned above also form the philosophical basis for Child Welfare Law, Basic Education Law and School Education Law among others that were enacted after the war. While the previous Constitution considered education as one of "three major responsibilities" that must be fulfilled by the nation's citizens (with military service and payment of tax as the other two responsibilities), the new Constitution represented a 180-degree change in this philosophy by establishing education as a right of the nation's citizens, and by making it the national government's responsibility to ensure this right. Consequently, the foundation ensuring opportunities for schoolchildren with disabilities to receive compulsory education was laid.

#### 1. Issue of securing the right of education for children with health impairments: toward the establishment of compulsory education at special schools

Japan's School Education Law was enacted in 1947. Article 71 of the law stipulates the following as an objective for establishing special education schools: "Schools for blind children, schools for deaf children and special schools

will provide education based on kindergarten, elementary school, lower secondary school, and upper secondary school curricula for all schoolchildren suffering from blindness, deafness, intellectual disability, motor disability, or other physical disabilities. At the same time, these schools shall teach their schoolchildren knowledge and skills necessary to help them overcome their disabilities." Thus, efforts from the prewar era to realize compulsory education for the blind and deaf were finally bearing fruit.

In the past, there was a persistent belief that education for children with health impairments would worsen their condition because the main treatments of tuberculosis and other infectious diseases were rest and eating nutritious food. Thus, such children were exempted from attending schools under Article 23 of the School Education Law. Article 75 of the law, however, stipulated the establishment of special classes for these children. Paragraph 1 of Article 75 states that children with physical weakness should be educated at special classes, and Paragraph 2 states that schoolchildren currently undergoing treatment can be educated at special classes or by dispatching teachers to them. The two paragraphs followed in the wake of the special classes that were established in prewar elementary schools, national schools, secondary schools, and girls' secondary schools. There was an increasing need to continue special classes for schoolchildren with physical weakness because of food shortages, worsening sanitation, tuberculosis epidemics, and other problems that occurred in the days following World War II.

After the war, many special classes were set up. However, to realise the continual establishment of special schools for children with health impairments, which were not covered in legal stipulations, a government notification on disability classification standards in 1953 was revised in 1957 to clearly state that schoolchildren suffering from tuberculosis, heart diseases, renal diseases, or those with physical weakness should receive education in special schools. Furthermore, the Special Measures Law for Establishment of Public Special Schools in 1956 added momentum to the establishment of schools for children with health impairments, as did a revision of Article 71 of the School Education Law in 1961, which clearly laid the groundwork for the establishment of such schools (including those for persons with physical weakness). A newly revised Item 2 of Article 71 entrusted the regulation of the degree of disability of schoolchildren attending special education schools to government ordinance. Item 2 of Article 22 of the enforcement regulations of the School Education Law in 1962 established that the term "health-impaired schoolchildren" should refer to those who experienced medical or living restrictions lasting for six months or more.



It was at this point that health-impaired schoolchildren were finally included in the School Education Law and began to receive the same educational services as schoolchildren with other disabilities.

A preliminary government ordinance on a compulsory program for special school education was issued in 1971. In working toward implementation of this program, one of the major barriers in education for children with health impairments was that their parents had to shoulder an extremely high portion of their medical expenses because they require long-term hospitalization or medical care. However, through the efforts of concerned individuals with common interests, a path was opened for making public support, which covered many diseases, available for many of the children with health impairments. The compulsory program was thus implemented in 1979.

### 2. Transitions in school curricula

The first course of study at special schools for children with health impairments was established in 1963 through a notification issued by the Administrative Vice Minister of for Education. Prior to this, the courses at these schools were implemented in accordance with the condition of the schoolchildren, and various methods were tried in efforts to return the schoolchildren to their former schools. While engaging in health management in a suitable natural environment and based on a well-regulated daily routine, their school courses put emphasis on care from the standpoint of education that is based on elementary and secondary school courses.

Apart from physical education, the educational content of the initial school curriculum was based on that in elementary and secondary schools. The subject “physical education” was replaced by “care and physical education”, with “care” being composed of “rest, exercise, and recreation”. Even schoolchildren with diseases or health impairments were able to participate in the lessons and to easily move up to the next grade.

The course of study was revised in 1971 and implemented through a ministerial notification. Moving away from the traditional assumptions for tuberculosis or physical weakness, this revision allowed for a flexible response to diversified types of illness and disability as well as to interruptions in the studies of schoolchildren. Major changes included those based on the compulsory program for special school education to “include all children, no matter how severe their disabilities” and, in terms of education, the establishment of a sphere of instruction in “care and training”, as it was deemed necessary to cultivate

a base for harmonized development of both the mind and body by alleviating children’s disabilities and by providing these children the knowledge, skills, and attitude, they will require to overcome their disabilities.

The course of study for upper secondary schools was established in 1973, and the first course of study for kindergarten was implemented in 1989.

### 3. Conditions since establishment of compulsory program for special school education

Through the implementation of the compulsory program for special school education, all children with health impairments and who had been excluded from schooling due to their illnesses were now guaranteed the opportunity to receive an education. The number of health-impaired schoolchildren who received this special education reached a high point of 8,313 in 1979. However, for several years after, this number vacillated up and down before beginning a declining trend in 1984. As of 2002, the number stands at 3,921, which is less than half the 1979 figure.

There are three reasons for this decline. One is improved medical management, which has resulted in a decline in the number of schoolchildren requiring long-term hospitalization due to asthma or kidney disease, which made up a large proportion of health-impaired children receiving special school education. Furthermore, regarding the quality of life (QOL) continuous medical treatment through repeated short-term hospitalizations (even for patients with malignant neoplasms), has led to fewer schoolchildren needing to go to special schools for children with health impairments. Moreover, a revision of medical insurance coverage of medical fees has resulted in shorter hospitalization, and the withdrawal of highly non-profitable pediatric treatment in particular, due to limitations on long-term hospitalization. Even for patients requiring continuous treatment, there is a trend toward repeated hospitalizations and discharges.

The second reason is that education-related personnel, medical personnel, and caretakers have insufficient understanding of education for children with health impairments. It is also true that these children and their families are not receptive to the idea of transferring to a special school. Conversely, the more understanding of these schools grows, the more schoolchildren (and their families) not attending school because of psychosomatic disorder elect these schools.

The third reason involves administrative problems; expertise in education to support children with health

impairments at the regional level is in decline. This is evident in an insufficient placement of personnel specializing in children with health impairments in boards of education of local government, the manner in which school enrollment and guidance committees are set up, and the short terms that school principals serve, among other items. It can thus be inferred that many health-impaired school children do not receive the special education they require.

#### 4. Working to “provide education to all children undergoing medical treatment”

In compulsory education, schoolchildren who do not attend classes due to illness make up a large proportion of all students who are absent from school for a long period of time. Because only a portion of these schoolchildren have received education for children with health impairments, in 1993 the Ministry of Education established a “Conference of Persons Involved in Survey and Research on Education for Children Receiving Medical Treatment”. An official notice entitled, *Byoki Ryoyo-ji no Kyoiku ni Tsuite* (On Education for Children Receiving Medical Treatment), was released in December 1994 based on the Conference’s report.

The notice basically called for the following: a.) understanding of the actual conditions of children who are hospitalized, b.) work to ensure appropriate educational measures (e.g. simplification of transfer procedures) for schoolchildren who want to change their schools, c.) promotion of educational institutions for children receiving medical treatment (e.g. establishment of classes in hospitals) by boards of education of local government, and d.) improvement in the expertise of educational personnel. Since then, there has been a gradual increase in the number of classes held in hospitals.

However, a basic survey of schools conducted in 2002 revealed that 54,336 schoolchildren had long-term absences of 30 days or more due to illness in compulsory education. Of these, 2,761 went to schools for children with health impairments, 1,693 attended special classes, 8 attended “resource rooms”, and 64 were exempted from education. Of the children that possibly require special education to health impairments, the percentage of those actually receiving this education was 8.3% . This is only a slight improvement over the 6.8% recorded in 1994.

Schoolchildren who require special education due to health impairments but who do not receive it are registered in regular schools. An issue for future research will be to investigate the actual conditions in these schools.

#### 5. Education for children with health impairments and “On Special Support Education in the Future”

In March 2003, a report entitled *Kongo no Tokubetsu Shien Kyouiku no Arikata ni Tsuite* (Saishu Houkoku) (On Special Support Education in the Future [Final Report]) clearly showed a shift away from special education conducted in particular places to “special support education” that meets individual needs. For the framework for special support education, the report pointed out the need to “actively respond to the needs of schoolchildren who require special educational support in regular classes” as well as the need to provide integrated counseling on medical care, welfare and labor for children and their caretakers that spans from infancy to graduation from upper secondary schools. Although these perspectives are considered important for the future education of children with health impairments, “special educational support” currently focuses only on mild developmental disorders; the issue of children undergoing medical treatment and attending regular classes was not clearly addressed.

#### 6. New school enrollment measures and education for children with health impairments

Article 22, Item 3 of the Enforcement Order of the School Education Law was revised in April 2002. This revision allow for the flexible management of disability levels (school enrollment measures) for enrollment in schools for children who are blind or deaf or with other disabilities. The revision also made it possible for children to enroll in an elementary and secondary school as a “certified enrollee”, if the board of education of local government certifies that they have conditions requiring them to receive an appropriate education in the said school, even if the schoolchild do not meet the school enrollment measures. This was the first time in 40 years that a revision was made to the Enforcement Order of the School Education Law, which is the foundation of the school enrollment system for children with disabilities, and it brought Japan closer in line with international education trends.

### **IV. Transitions in basic concept regarding human rights as noted in education and welfare-related policies: advancement of normalization in Japan**

The constitution of Japan establishes that all of the nation’s citizens shall “possess basic human rights”, “be guaranteed freedoms and rights”, and “be respected as individuals” among other items. The Basic Education Law places emphasis on the “dignity of the individual” and “equal educational opportunities”. The concept behind

child welfare is described in the Child Welfare Law as “All citizens must work to ensure that children are born healthy in both mind and body and that they are given an education” and “All children must be ensured fairness in daily living and protection.” The Children’s Charter, which was enacted in 1951, integrated both mental and physical disabilities into its philosophy on child welfare as follows: “All children shall be guaranteed a healthy birth (both mentally and physically), upbringing, and living environment”, “All children shall be given appropriate medical care, education, and protection, if they would be born with physical or mental disabilities.”

However, analyzing these policies in more detail, it was clear that the concepts of social defense and social effectiveness were the cornerstone. For example, implementing educational and welfare policies for people with intellectual disabilities entails only minimal burden and hardship on the society, and these policies were considered necessary to turn negative aspects of the society into positive aspects.

Japan’s Fundamental Law on Measures for People with Physical and Mental Disabilities was enacted in 1970. This law stated, “The dignity of all persons with disabilities shall be respected and they shall have the right to be treated in such a manner” (Article 3) and “nation and regional municipalities shall prevent the occurrence of physical and mental disabilities.”(Article 4) Article 9 of the Fundamental Law defined the basic policy for prevention of physical and mental disabilities.

Two contrary statements in The Fundamental Law were as follows: measures to prevent disabilities and strategies to provide welfare support to persons with disabilities. These became a source of problem later.

In connection with the “International Year of Disabled Persons” (1981) and “The United Nations Decade of Disabled Persons” (1983 to 1992), Japan domestically enacted its “Long-Term Plan for Measures for Disabled Persons”.

Then, in 1993, Japan made large-scale revisions to the Fundamental Law on Measures for People with Physical and Mental Disabilities, which was enacted as the Disabled Persons Fundamental Law. With the end of The United Nations Decade of Disabled Persons, this revision was carried out to reflect the concept of “normalization”. The words “measures for people with disabilities” were excluded from the law’s name. In Article 1 (“Purpose”) of the new law, the expression “measures for disabled persons” was clearly mentioned, whereas, the expression “prevent

the occurrence of physical and mental disabilities” was eliminated. In Article 3 (“Fundamental Principles”), the phrase, “All disabled persons shall, as members of society, be provided with opportunities to fully participate in social, economic, cultural and other area of activity” was added to the phrase, “The dignity of all disabled persons shall be respected and they shall have the right to be treated in such a manner” that appeared in the law’s previous version. The new law states that the “prevention of disabilities” is a responsibility of the nation and its municipalities.

In 1995, Japan enacted “The Government Action Plan for Persons with Disabilities: A Seven-year Normalization Strategy” in connection with the Disabled Persons Fundamental Law. The Action Plan was established as a specific means for implementing the high-priority policies of the “New Long-Term Program of Government Measures for Disabled Persons: Towards a Society for participation of all established in 1993”. The government is currently working to implement these policies based on the Action Plan’s idea of rehabilitation, which aims at improving disabilities at all stages of the life cycle and that of normalization, which aims to create a society in which persons with disabilities are equal to those without disabilities in daily life and activities by minimizing their handicaps.

A new “Master Plan for Persons with Disabilities” and “Action Plan for Persons with Disabilities” were commenced in 2003. The Master Plan fine-tunes the government’s response on the basis of the special needs of an individual in line with its basic policy in the education and care field: “In order to provide fine-tuned support that meets the needs of each child with disability, the government shall provide integrated and systematic education and medical care from infancy to postschool graduation, while at the same time responding appropriately to children with special educational and care needs by, among other activities, providing educational support for disorders such as learning disabilities (LD), attention deficit/hyperactivity disorder (ADHD), and autism.”

Furthermore, as a cross-sectional approach within the basic policy of the entire Master Plan, the government will study strategies toward the application of International Classification of Functioning, Disability, and Health (ICF), which was adopted by the World Health Organization, from the standpoint of promoting understanding of disabilities and appropriate policies.

“Disability” is understood as the relationship between an individual and his or her environment. When considering disability from this new perspective, it is important to

take an integrated approach that involves working for the individual by alleviating disability and developing capacity, while also creating an environment in which people with disabilities can be fully active and utilize their own particular skills. Rather than helping people with disabilities live and work independently by building their personal capacity, it is better to create an environment in which they can live and work independently. It is considered that this method is more effective in helping people with disabilities develop the capacity for independent living.

Macover, in looking at the relationship between the two above-mentioned ideas, if we realize “normalization that aims to create a society in which persons with disabilities are equal to those without disabilities in daily life and activities by reducing their handicaps”, then it is only natural that the “rehabilitation that aims at improving disabilities at all stages of the life cycle” will also realized.

## **V. Current issues surrounding education for children with health impairments**

If we look at efforts that promote measures for people with disabilities and current conditions in education for children with health impairments in Japan, we find that education for children with disabilities is undergoing a significant shift and that relevant issues cover a wide spectrum. This section will concentrate on issues about schools for children with health impairments.

### **1. Establishment of integrated counseling and support system**

Currently, schools for children who are blind or deaf or with other disabilities are utilizing their expertise in their particular fields to become regional centers for special education-related counseling and support for elementary and secondary school teachers and their caretakers. Only one school for children with health impairments in Japan sets up kindergarten. This is primarily thought to be because infants are generally hospitalized for short periods of time and because there is a tendency toward placing emphasis on the treatment of their illness. However, the types of illness of hospitalized infants are diversifying, and the disabilities appear to be more severe and complicated. Some of them must be hospitalized for long periods of time. People have become increasingly aware of the importance of early education in recent years, and it is becoming particularly necessary to provide childcare and kindergarten education, including play, for hospitalized infants. Thus, in the field of medical care studies are underway on the introduction of a system for nursery teachers in hospital wards as well as volunteers who assist hospitalized infants to play

in pediatric wards. Tests on guidance and counseling of infants are also being started in the field of school education. It is desirable that “kindergarten should be set up in schools for children with health impairments that are attached (linked) to hospitals having a certain number of hospitalized infants in order to provide appropriate education for them.

Furthermore, there will be an increase in the number of schoolchildren who need long-term medical care and regimen in daily living following the end of their compulsory education and who are judged suitable for education at upper secondary department of special schools for children with health impairments. Consequently, it will be important to promote the establishment of these departments to enhance educational opportunities for them so that they can receive an upper secondary education. In addition, current procedures for leaving school or entering school in midterm in upper secondary education, schools make it difficult for students to return to their original schools. Even in cases in which students move on to senior high school, there are many instances when these students suffer disadvantages because their studies have been delayed by their medical treatment or because it is difficult for them to participate in physical education. Thus, there are issues that must be resolved with regard to credit acquisition and college preparation at senior high schools. It will be necessary to respond to the diversifying educational needs of children with health impairments by strengthening frameworks related to credit systems and their admission to credit-system or part-time senior high schools.

### **2. Securing education for hospitalized children**

Classes in hospitals serve an important role by providing hospitalized schoolchildren with opportunities to learn and by making up for delays in learning, while at the same time stabilizing their conditions and making the most of their time in hospitals. In actual fact, however, there are prefectures in Japan that have not established these classes in hospitals, while others are abolishing these classes due to the scaling back of pediatric services in hospitals. On top of this, hospitalized schoolchildren must transfer from regular schools to schools for children with health impairments to receive education, and this takes time as the procedure is both difficult and burdensome. Furthermore, children and their families sometimes have an aversion to transferring to such a special school.

A flexible education management that will allow schoolchildren to receive the education they need without transferring schools is required. Furthermore, under the

current system, through which classes are certified based on the number of registered students as of May 1 of each year, teacher allocation cannot be immediately implemented in response to increases in students that occur during the fiscal year. Thus, there are many instances in which a gap occurs in a schoolchild's learning during the period of home treatment that occurs between the student's discharge from the hospital and his or her return to the original school. It is therefore important to ensure that education is provided not only during a student's hospitalization but during home treatment as well.

### 3. Expanding the range of schoolchildren with health impairments eligible for special education

In recent years, the number of schoolchildren with health impairments attending special schools has been declining. This trend has become a problem in the management of these special schools that are attached (linked) to hospitals and other medical care institutions. However, there are schoolchildren who need to go to hospitals over a long period of time and to undergo medical care in their daily life without hospitalizing. It is important to promote the acceptance of such children with health impairments in resolving the above problem. Such schoolchildren are showing a gradual increase nationwide.

According to a basic survey on reasons for long-term absence from school that was conducted in 2002, of 204,069 schoolchildren who did not attend school for 30 days or more, 54,336 were absent due to illness and 131,211 refused to attend school. Thus, the educational needs of children who refused to attend school and those who are undergoing medical treatment are significant. Pediatricians often point out the various problems that affect the school life of children suffering from chronic diseases (e.g. asthma, atopic dermatitis, epilepsy, diabetes, heart diseases, renal diseases, and psychosomatic disorders) when they attend regular schools. However, despite the fact that over 90% of schoolchildren who were absent from school for long periods of time due to illness are registered in regular schools and are eligible for school health services, the special needs of these schoolchildren are rarely recognized as in the case of the needs of those who refuse attending school. In the future, it will be necessary to include persons connected with school health (e.g. school physicians, health managers, and school nurses) as targets for training in education for children with health impairments.

At the same time, it will be important to conduct enlightenment activities to deepen understanding and awareness of education for children with health impairments among elementary, secondary school students who are

absent for long periods of time due to illness as well as among their caretakers and teachers in charge. Similarly, it will be necessary to expand the range of children who are eligible for this kind of education by working to transfer children to schools for children with health impairments.

### 4. Enhancing educational content and methods

The upper secondary departments of schools for children with health impairments currently have general courses for full-time studies. In recent years, vocational education in a variety of forms (including such courses as domestic science and commerce) have been implemented, with consideration for admission and transfer of students from commercial and industrial high schools among others. Considering changes in society brought about by computerization and other factors as well as the conditions of students enrolled in such upper secondary department of school, it will be important to study the establishment of data processing, commerce and other courses, and means of making school curricula flexible so as to promote future employment and academic advancement.

In addition to children with severe and complicated disabilities, it is anticipated that there will be a further increase in the number of schoolchildren who refuse to attend school and who are diagnosed as having psychosomatic disorders and nervous disorders, among others. It will be important to develop and devise an appropriate educational content and methods that match the conditions of these children. Among children with health impairments, there are some that are hospitalized while facing the prospect of dying. For example, schoolchildren with severe heart or renal diseases or pediatric cancer require terminal care. For these children, it will be necessary to improve the quality of teacher training in universities and other institutions as well as on-the-job training to respond appropriately to the diversifying conditions of schoolchildren and to implement effective education.

## VI. Conclusion

In looking back at the history of education for children with health impairments, we see that such education has progressed while being influenced by attitudes toward school hygiene and physical education. This has occurred against a background in which each era has had its own school health issues, beginning with simultaneous medical care and education for schoolchildren needing treatment for a disease (beriberi) that was becoming problematic in the early days of Japan's schools system. As part of this trend, differences in the historical development of education for



children with health impairments and education for children with other disabilities, such as blindness and deafness, began to emerge. Following World War II, special schools for children with health impairments were developed and enhanced to ensure an education for schoolchildren who were forced to undergo long-term treatment (e.g. tuberculosis, muscular dystrophy, asthma, renal and heart diseases.), without first establishing the legal basis for ensuring education for children with health impairments. With the establishment of a compulsory program for special school education, education for children with health impairments was set within the framework of special education.

However, today, as efforts are underway for a systematic shift toward “special support education”, the basic foundation of education for children with health impairments, which has been built within the “special education” framework, has become endangered. We are now facing a situation in which the methodologies that have been developed until now cannot, by themselves, handle issues such as the decrease in the number of schoolchildren enrolled in special schools for children with health impairments and the diversification of illnesses eligible for special education. The number of school children with health impairments who actually need special education is not decreasing. Rather, the issues here are to respond to the diversification of eligible illness and to expand a sphere within which the services of schools for children with health impairments can reach.

On the other hand, education administration is not exempt from reforms of local administration and finance. Thus, there are some prefectures in Japan that are merging or abolishing schools for children with health impairments because of low enrollment or to increase financial efficiency. All areas in Japan are now facing merging or abolishment of national and public hospitals, and this is leading to the closure of educational institutions established within these hospitals.

At the foundation of the shift toward “special support education” is the international trend toward “education that is based on special needs”. Here, it is important to view this foundation not only within the traditional special education framework, but also within the current school system, including regular classes. In this article, the points that should be borne in mind in this endeavor has been summarized by examining the changes that have occurred in the history of Japan’s education for children with health impairments.

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# **Abstract of Bulletin of The National Institute of Special Education Vol. 30**

## **A Study of Legible Braille Patterns on Capsule Paper: Diameters of Braille Dots and their Interspaces on the Original Ink-printed Paper**

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**Abstract:** An experiment was conducted using braille readers to search for the suitable range of diameters of braille dots and their interspaces on the original images of capsule paper braille. The result showed that capsule paper braille under the condition of 1.17/1.43 mm diameter and interdot spaces of 1.05 to 1.15 times used in standard Japanese braille was read in a shorter time and with fewer mistakes and rated more highly by the subjects. In contrast, braille with larger diameters and narrower interdot spaces was read in a longer time and with more mistakes and rated lower. Three-dimensional measurement of braille shapes suggests that difficulties in reading braille under latter conditions may arise from the fusion of dots due to the expansion characteristic of microcapsules.

**Key Words:** Stereo copying, Braille pattern, Reading time, Tactile legibility, Three-dimensional shape

## **Development of Assistive Technology Devices for Children with Difficulties in Manipulating Objects and Locomotion Due to Myopathy: Development of Special Hand-bells Player and a Low-floored Scooter**

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**Abstract:** This paper describes the development and evaluation of two types of Assistive Technology Devices or technology-based teaching aids for children with disabilities. Firstly, three instruments for playing hand-bells were devised. These aids were designed to help people with difficulties in manipulating objects. Secondly, a low-floored scooter for an infant with difficulty in locomotion due to myopathy was devised and evaluated. In particular, the two devices consist of a micro-controller and stepping motors. The paper illustrates the process involved in the development of these technologies, details of the devices, such as blueprints, flowcharts, pictures, the procedures involved in evaluating these technologies, and the results. Original evaluation forms based on the International Classification of Functioning, Disability and Health(ICF) were used. The results suggest that these technology-based teaching aids are effective. Finally, the future issues involved in the development of these helping technologies, or Assistive Technologies in education are discussed.

**Key Words:** Assistive technology, Educational materials, Myopathy, Micro-controller, Special Education

## **The Practice of Consultation for Teachers of Regular Classes who Teach Children with Autism: A Case Study of Two Children Two Cases Using "Order Made Manual"**

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**Abstract:** Based on the findings of a survey of teachers of regular classes who teach children with autism demonstrating the need for more inservice training and a teaching manual for the education of children with autism, a prescriptive teaching manual for two children was devised. This study reports on the effectiveness and problems of this manual in its practical application by teachers.

An outline of the evaluation of the manual is presented as follows. The positive findings were that: 1) teachers could better understand the features and behavior patterns of the children, 2) teachers were able to obtain more concrete information specific to the needs of the children, 3) the anxiety-level of a teacher who taught children with autism for the first time decreased, and 4) manual additions, such as including teaching records in the manual itself were found to enhance teaching performance.

The negative findings were as follows; 1) the manual could not provide all the information that teachers needed, 2) the manual could not cope with the children's rapid development and changes in the pattern of their behavior, 3) in certain situations, the manual might make it hard to enhance the teacher's expertise, and 4) external personnel not directly involved with the child in the school settings, such as an expert of special education, might have difficulty using the manual if they did not have enough information about the child in school, and 5) the issue of privacy of information arises in the use of these records.

**Key Words:** Children with autism, Order made manual, Regular classroom's teacher, Consultation

## **Early Intervention for an Infant with a Hearing Impairment: Support in the First Sixteen Months**

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**Abstract:** This paper reports on an individual case of early intervention for an infant with a hearing impairment. The subject is a baby girl who was diagnosed as hearing impaired by Universal Neonatal Hearing Screening (UNHS). We provided the early intervention program for the subject and her parents on educational guidance and counseling. Three areas of support were discussed: First, audiological support, which included the observation of various audiological behaviors, the appropriate fitting and usage of hearing aids and guidance for auditory learning in daily life. Second, developmental support, which included the observation of various physical activities and emotional conditions. Finally, on the support for her parents, it was suggested that the provision of guidance on understanding hearing impairment, interaction and communication between infant and parents, and health care were the major considerations.

**Key Words:** Universal Neonatal Hearing Screening, Infant, Hearing impairment

## **An Examination of the Validity of the Kanji Component Learning Method for Children with Blindness**

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**Abstract:** Japanese language can be written using solely the phonetic syllables “kana” or using a combination of “kana” and ideographic characters “kanji.” The latter style is predominantly used in Japan, but Japanese Braille letters correspond basically to kana. However, the knowledge of kanji is necessary for Braille users as there are many homonyms in Japanese language represented by different kanjis.

This paper proposes a new method to acquire knowledge of kanji characters based on the following hypothesis; that is, if a child is instructed to extract the components that constitute a kanji character, then further knowledge of kanji can be systematically constructed using this base.

Two children with blindness and who were already familiar with the use of Braille but who had not learned any kanji were the subjects of the study. Shape discrimination and the ability to learn the meaning of some basic kanji was analyzed. In addition, whether or not the shape of new kanji, which are composed of basic kanji, could be imagined by the subjects with the support of verbal explanation from the instructor was investigated.

Firstly, basic kanji were selected from the list of kanji allotted to first grade children to learn in Japanese schools. The standard to select basic kanji was determined by the researchers considering the kanji formation rules. Secondly, the composed kanji, which consisted of the basic kanji, were selected from the list of kanji allocated to first and second grade children. These 'composed kanji' were shown in raised dotted lines, and the children were taught to extract basic kanji and their position in the 'composed kanji'. Following this procedure, whether or not the subjects could imagine new 'composed kanji' using verbal explanation from the instructor was evaluated.

The results showed that if children could understand basic kanji they could imagine a new 'composed kanji' with the support of verbal explanation. This finding suggests a new possibility in expanding the knowledge of kanji in children with blindness.

**Key Words:** Braille users, Basic kanji, The composed kanji, The support of verbal explanation

## **An Overview of the Provision of Educational Support for Children with Attention-Deficit/Hyperactivity Disorder (ADHD) in Ordinary Classes**

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**Abstract:** The provision of educational support for children with ADHD in ordinary classes, and the role of educational counselling were illustrated by the example of one child with ADHD. The educational intervention involved the parents, an ordinary registered class and school, and a resource room, and direct instruction of the child on a monthly basis. Although the child had violent speech and behaviour, including avoidance behaviour initially, improvement was noted in a comparatively brief period. This result suggests that the improvement was due to the integrated nature of the support services provided for the child.

**Key Words:** ADHD, Regular, classroom, educational Counselling

## **The Development of a Teaching Method for the Reading of Braille: A Case Study Promoting the Efficient Use of Both Hands from the Introductory Stage**

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**Abstract:** When reading braille, it is desirable to coordinate the use of both hands to achieve greater efficiency in the reading process. Furthermore, to read well with both hands, the ability to read braille using either hand is necessary. In this study, focus was on the importance of the ability to use either hand from the introductory stage of teaching braille. Based on the ability to use either hand, and a new teaching method with the aim of developing cooperative use of both hands in braille reading was attempted. This involved the following strategy. First, the subject was instructed to read with the right hand and then with the left hand. Next, the child was instructed to start reading the line with left hand and then relay to the right hand at about midline. From this stage, the teaching strategy was to complete braille reading utilizing both hands in coordination. A trial of this teaching method revealed the following results. An increase in the reading speed using either hand was observed and the speed of relay reading also improved. In addition, it was easier to monitor how the subject was using his/her hands since hand preference was obvious using this method.

**Key Words:** Braille, Braille teaching at the introductory stage, Tactile reading, Reading with both hands, School for the Blind

## **Developing a Special Education Program for a Child with Physical Disability using the Community Social Support Network: A Case Study of the Social Resource Management of a Special School**

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**Abstract:** Nowadays special schools are increasingly called on to offer services to, not only children in special schools, but also to people with disabilities in the social resource network of the local community. In 2001 the 'Cooperator's Conference of the Ministry of Education, Culture, Science and Technology' stressed in its Final Report that the role of the special schools should provide a more comprehensive service and adopt the role of a Special Education Center in community.

This case study reports on the development of a Special Education Program for a child with physical disability in a special school utilizing, not only the teacher, but also the wider community social support network.

**Key Words:** Daily lives, Community, Social resource, Special education program, Social support network

## **A Study of Computer Use in Schools for the Deaf**

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**Abstract:** The purpose of this paper is to clarify the present condition of computer usage and the future of computers in schools for the deaf in Japan. This analysis presupposes that educational change in the future will be a result of the spread of information technology in schools at present, and therefore, it is important to provide an overview of current practice in deaf schools. Initially, a literature survey of past practice in schools for the deaf using reports of meetings on deaf education (Zen Nihon Rou Kyouiku Kenkyu Taiki/ ZEN NIHON ROU KYOUIKU KENKYU TAIKAI) was conducted. Four items concerned with the study of current practice were investigated: (1) The purpose of current practice, (2) a device point in current practice, (3) The outcomes of current practice, and (4) the problems of current practice.

**Key Words:** Computer, The use for education, A deaf school, Communication

## **Special Educational Support for Students with Mild Developmental Disabilities in Upper Secondary Education**

**SATO Katsutoshi, TOKUNAGA Yutaka**

**(Department of Education for Children with Intellectual Disabilities)**

**Abstract:** This paper reports on a survey of educational administration and education centers designated by government ordinance in all prefectures and major cities in Japan. The survey was designed based on an analysis of some practice about special educational support for students with mild developmental disabilities in upper secondary education. We found that educational administrators were largely unaware of the number of students with mild developmental disabilities in ordinary high schools and the support services these students are offered.

Furthermore, we found (some?) teachers in ordinary high schools had participated in inservice teacher training about methods of assessment and special support education for students with mild developmental disabilities, and that there was a demand for that inservice training. Some education centers indicated that there were many from teachers about how to cater for the needs of students with mild developmental disabilities in ordinary high schools.

Taking into account these results and current trends in education policy, we propose that special educational support is necessary for students with mild developmental disabilities in upper secondary education.

**Key Words:** Mild developmental disabilities, Upper secondary education, Questionnaire investigation, Special educational supports



## **Problems and Prospects of In-Service training for Teachers Offered by Special Education Centers in Writing kobetsuno- shido-keikaku (individual teaching plans)**

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**Abstract:** The purpose of this study was to clarify the problems facing educational planners in providing in—service training in the preparation of kobetsuno-shido-keikaku(individual teaching plans). Responses to three open-ended questions were analyzed using the KJ method developed by Kawakita (1967). The three questions were as follows:(1) What problems do teachers have in making individual teaching plans in schools? (2)What problems do in-service training planners have in developing programs for the writing of individual teaching plans? And, (3) What problems do Special Education Center staff have in helping teachers in schools develop individual teaching plans?

The findings clarified that that partnerships between teachers and teachers, teachers and parents, among institutions, approach to school organizations, and protection of personal information were very important as well as knowledge and techniques for making individual teaching plans. In addition, by comparing the results of a previous study with the present research, it is suggested that the knowledge and techniques which teachers expected to have would be adapted to specific contexts and current trends in thinking in special education. It is also suggested that theoretical applied knowledge is very important in the development of new in-service training programs.

**Key Words:** Kobetsuno-shido-keikaku (individual teaching plans), In-Service training, Special education center, KJ method

## **'The Network for Blind Schools to Utilize Braille Documents Data' : The Current Situation and Prospects for the Future**

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**Abstract:** 'The Network for Blind Schools to Utilize Braille Documents Data' is a system in which electronic data, including Braille documents made by schools for the blind are up-loaded to a host computer and used by all schools by down-loading these data. The system began in April 1992, and was revised in May 2001 to enable it to be accessed through the Internet (URL: <http://www.tenji.ne.jp>).

This study reports on the current situation, the tasks yet to be solved, and the prospects for the future of the new system. Data were gathered from a questionnaire survey of the teachers -in -charge of the system in schools for the blind.

The results are as follows: 1) The number of computers used to access the Internet is greater than 5 in about 90% of blind schools, but the number used to access the latest system is less than 4 in about 50%. We propose that the current restriction on access to the system by ID needs to be relaxed, 2) The frequency of down-loaded data from the system has increased very much compared with the old system, but the number of up-loaded data from schools for the blind is very low. To increase the rate of up-loaded data, asking for volunteer help in translating of Braille documents, with coordination of schools for the blind is needed, 3) The kind of Braille documents already in the system is not always compatible with that needed in schools for the blind because workbooks and reference books for each subject are especially needed. To increase the volume of Braille documents volunteer help is required.

**Key Words:** Braille, Visual impairments, Network, Internet, Schools for the blind

**The Development of Web-based Educational Materials Equipped  
with Accessibility Features: Revision of Recognized Special  
Education Software Programs for Use of the Web with the  
Addition of Accessibility Features**

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**Abstract:** The authors report the development of Web-based educational materials equipped with accessibility features for enhancing special education as a part of the ministerial project named "Development of Web based Education Contents in 2001-2002." They describe the Web-based materials mainly focused on their accessibility features such as keyboard navigation, key scan, voice guidance as well as equipment for their practical use.

Finally, a summary of results is presented and a discussion of added accessibility features as integral to the materials is presented.

**Key Words:** Educational software, WWW, Accessibility, The digital classroom, Special education

# **Abstract of Bulletin of The National Institute of Special Education Vol. 31**

## **Cooperation between Guardians and Resource Room Teachers: A Comparison of Guardian and Teacher Feelings**

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**Abstract:** Due to the increasing importance of cooperation between guardians and resource room teachers, this paper aims to clearly define the details of that relationship. Two surveys were conducted. The subjects of the first questionnaire were resource room teachers and the subjects of the second survey were guardians associated with those resource rooms. In the first survey teachers were asked, "What words and actions do you believe discouraged the guardian?" and "What words and actions encouraged the guardian?" In the second questionnaire guardians were asked, "What words and actions of teachers discouraged you?" and "What words and actions of the teacher encouraged you?" The results of two surveys were as follows. The words and actions the teacher thought had discouraged the guardian, and the words and actions of the teacher the guardian thought discouraging, and the words and actions the teacher thought had encouraged the guardian, and the words and actions the guardian regarded as having been encouraged by the teacher, were produced in the same situations. They are, "how to tell a child's developmental and actual condition" and "correspondence with a guardian." Although it is the same situation, guardian and teacher feelings differ. We believe that it is important to prevent these differences arising in the relationship. We propose that resource room teachers consider accepting the style of parenting of the guardian, the establishment of a common understanding of guidance between guardian and teacher, developing an awareness of the family context of the child, and providing guardians with greater access to relevant information.

**Key Words:** Resource room, Guardian, Teacher, Feelings, Family support

## **The Applied Use of ICF in Collaboration between Multi-professions: A Perspective on its Applicability to "Individual Education Support Plan"**

**TOKUNAGA Akio**

**(Department of Education for Children with Physical/Motor Disabilities)**

**Abstract:** Nowadays, professionals in the field of special education are increasingly required to collaborate with professionals in other fields. This paper reports on an attempt to develop ICF as a practical tool in the collaboration between multi-professions. The subjects of the study were five pupils attending a special school. It was found that (1) ICF was a useful tool of collaboration between multi-professions, (2) the ICF checklist and the model chart was effective in the efficient execution of the discussion, (3) further research on the relationship between ICF and the Individual Teaching Plan is required, and (4) a manual system on how to use ICF should be produced.

**Key Words:** ICF, Multi profession, Collaboration, Individual education support plan, Checklist

## **Support Systems in Remote Communities: A Case Study of the Establishment of a Support Network in Amamioshima**

**TOUSHIMA Shigeto**

**(Department of Education for Children with Physical/Motor Disabilities)**

**Abstract:** Children with disabilities and their families need a variety of support services. This case study examines the nature of support available for children with disabilities and their families in a community with limited resources. Based on previous research in this community over the past 10 years it has been found that a system and network of community support has been established. This has been achieved through the cooperation of members and a coordinator with abundant knowledge and experience. In particular, it has been found that the community support system now in place has helped children with disabilities living in remote areas. Finally, it is suggested that this case study will contribute to the construction of support systems for children with disabilities living in remote areas of Japan.

**Key Words:** Community support system, Network, Coordinator

## **Issues in Educational Support for Individuals with High-Functioning Autism Using Information from Five Case Studies**

**OSHIBA Fumie, ATSUMI Yoshikata**

**(Department of Education for Children with Emotional Disturbance)**

**Abstract:** This paper reports on individuals with high-functioning autism who have been utilizing the services of the guidance and counseling section of the National Institute of Special Education (NISE). The subjects were three adults aged in their late twenties, and two were pupils attending upper secondary schools. Four individuals had FIQ's of 85 or higher and one had an FIQ of 82 measured by Wechsler Intelligence Scale for Children. Information was collected on each case using reports of the developmental process in infancy, the use of medical and welfare services, educational placement, the practice and process of guidance and counseling at NISE, and the present status of the individual such as degree of social participation. Based on these five case reports, empirical issues in educational support for the people with high-functioning autism were discussed.

**Key Words:** High-functioning autism, Guidance and counseling, Educational issues

## **A Review of Working with Deaf Children under Three Years Old and Their Families**

**SATO D. S. Masayuki, KOBAYASHI Michiyo**

**(Department of Education for Children with Speech and Hearing Handicaps)**

**Abstract:** In this review, issues of working with deaf children under three years old and their families are discussed. These include the first session after hearing impairment diagnosis through universal neonatal hearing screening (UNHS), educational support and the process of working in a multi-disciplinary team with deaf children.

The results suggest that in the first session after hearing diagnosis through UNHS, that we initially interpret the UNHS results, then, obtain more information on deafness and review the comprehensive development of the child for families, or parents. This is because they are usually distressed about deafness due to the lack of available information given of the UNHS results.

Concerning educational support, it is suggested that how we support children, parents, or families in their communicative relationships is more important than auditory learning, language instruction, and so on. This is because children's parents often disregard attachment to their children and their dependence on children as human beings, which is the basis of communication and the means whereby they can overcome the impairment. It is then suggested we advise parents to accept their child's handicap and participate in activities and opportunities to play with them, regardless of auditory-oral communication through hearing aids.

Finally, on multi-disciplinary working for deaf children, it is suggested that a true multi-disciplinary team supporting deaf children must include parents and named individuals from all services, and there is a need for an individual to coordinate the work from a variety of disciplines.

**Key Words:** Universal Neonatal Hearing Screening, Infant, Deafness, Support for families

## **Teaching Adventitiously Blinded Persons with Difficulty in Reading Braille Letters by Touch: A Comparison of the Degree of Ease in Reading by Touch between Two Sizes of Braille Letters**

**SAWADA Mayumi**

**(Department of Education for Children with Visual Impairments)**

**Abstract:** Many of those who have visual impairments after acquiring normal letters can write Braille letters with comparative ease, but have difficulty in reading Braille by touch. The purpose of this study is to clarify the effect of size of Braille on learning in the first training of reading by touch for adventitiously blinded persons. In the first study the effect on reading of the interval between letters was examined by comparing sighted persons not used to reading by touch with Braille users used to reading by touch. Speed of reading, number of error and feeling of ease in reading was measured. In the second study the effect of the size of letters on reading by touch in sighted persons was examined. The results showed that using large size letters was effective in the first training for adventitiously blinded persons who have difficulty in reading by touch.

**Key Words:** Adventitiously blinded persons, In the first training of braille reading, Size of braille, Braille reading by touch

## **A Survey on Making and Using Tactile Educational Materials in Schools for the Blind**

**OOUCHI Susumu, SAWADA Mayumi, KANEKO Takeshi and CHIDA Koki**

**(Department of Education for Children with Visual Impairments)**

**Abstract:** It is required for future special school having the function as center of education of persons with disabled of community area. In the school for the Blind is have done on the basis of unique teaching methods. Because of that, service of the teaching materials for community area will be more important than ever. Even among those, development of the teaching materials which utilize the tactile perception for children who cannot utilize visual function is important.

In this research, in order to obtain the fundamental data for service to community area, focusing especially of braille and the tactile graphics, actually condition of availability and development of that materials for in school for the visual impairments were researched.

As a result, the school for the visual impairment recognized necessity of organizational correspondence. But, in regard to the compilation and management of the tactual teaching materials, schools where it corresponds organizationally as a school were in a minority. The school for the blind of 40 percents or less did not service the braille textbook as the school library. The school which have teaching material room were few.

Personal computer application has become active, common use of personal computer quality was above the half. Teaching aid compilation was requested to the volunteer in approximately half school. The school which offers the Braille teaching materials outside was 1/3. We inspected the situation concerning production and utilization of teaching materials for tactile graphics with main subjects. In the elementary section in school for the blind it had utilized positively above the half. In the junior and senior high section the utilization of that marerials for mathematics and science was higher relatively in comparison with national language and social studies. The teaching materials mainly were produced by the teachers.

Microcapsule paper was utilized preponderantly as a format of tactile graphics. In addition, it became clear that the embossed tactile graphics has produced on a braille printer with personal computer and support from volunteers for production of the tactile graphicis is low as compared to production of braille materials,a great number of schools didn't set up tactile graphics materials for outside .

**Key Words:** Tactile educational materials, Braille, Tactile graphics, Role of resource center

## **A Trial of the Construction of an In-Service Training Course on Computer Literacy in Special Education**

**ONO Tatsunori, OOSUGI Nariki and NAKAMURA Hitoshi**

**(Department of Educational and Information technology)**

**Abstract:** The IT Strategic Headquarters of the Government of Japan has set a goal in its e-Japan Strategy that all school teachers should have the capability to teach using information and communication technologies by 2005. According to the latest statistics, 52.8% of all schoolteachers use computers to teach their children. It is crucial, therefore, to increase the number of opportunities and enrich the contents of in-service training courses in this field. The Department of Educational and Information Technology, the National Institute of Special Education, in collaboration with the Special Education Center, Faculty of Special Education, Fukuoka University of Education, conducted a three-day in-service training course entitled 'In-service training course on Information and Assistive Technologies for Children with Disabilities 2003'. At the conclusion of the course, the opinions of participants were collected using a survey questionnaire followed by an information gathering session dealing with better ways to organize such training courses as well as enriching the essential content of such courses. Future issues regarding in-service training courses in the use of ICT in education were also discussed.

**Key Words:** Computer literacy, In-Service training course, Assistive Technologies



## **A History and Perspective on Education for Children with Speech and Language Disorder**

**MATSUMURA Kanyu, MAKINO Yasumi**

**(Department of Education for Children with Speech and Hearing Handicaps)**

**Abstract:** Education for children with speech and language disorder in Japan started as remedial education for children with learning difficulties in reading and the correction of dialect. The influence of the introduction of speech pathology in the U.S.A improved this type of education and it has since become specialized to cater to the educational needs of children with speech and language disorder. This kind of teaching originally began 'after-hours', that is, after the school day had finished. In a short time, it came to be integrated into the system of "special classes," a teaching method that lasted for 40 years, or so. At present, it is based on the system of "Tukyu-sidou" which is one of the systems of the resource room. The education of children with speech and language disorder in Japan has expanded to develop its method, knowledge base and system. In recent years, the licensing of speech therapists has been implemented and this raises the issue of the status of this education and the role of the teacher. This paper expands the debate about the education of children with speech and language disorder.

**Key Words:** Education for children with speech and language disorder, Special support classes and the resource rooms for the children with speech and language disorder, Speech clinic

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