

Chapter 4

The Educational Environment on a Remote Island in Kagoshima

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1. Educational system in Japan

The educational system in Japan is elementary school (six years), junior high school (three years), high school (three years), and university (four years). Elementary school and junior high school are compulsory. Parallel to high school are technical colleges (five years), high vocational schools, specialization schools, and vocational schools. After graduation from high school, there are also junior colleges (two years) and specialty schools (one to four years). Graduate schools offer masters and doctoral programs and the management of a school is public, private, or national.

When looking for information about a Japanese university, the URL for the site “For Prospective Students Study in Japan” provides details and is available to apply for admission to study in Japan. This is the URL:

<http://www.studyjapan.go.jp/en/toj/toj0201e.html>

2. The law to promote education in remote districts and promote science education

2.1. The law to promote education in remote districts

The population in Japan lives on approximately 420 islands. Japan has few lowland areas, and many people live in remote districts between mountains. Children grow up on these islands and in remote districts, and schools are established, in principle, in areas where children live. The law to promote education in remote districts must advance education in consideration of the educational conditions on those remote districts, based on the meaning of equal educational opportunity. A country and a municipal corporation develop the measures in a remote district public, and aim at improvement in the level of education through these measures.

When we consider education in Kagoshima Prefecture, we have to consider the many remote islands in the prefecture. The public school teacher in Kagoshima Prefecture also works at a remote island school. Teachers in a remote school earn a remote allowance to ease the teacher’s conditions in a remote district and on a remote island. The remote allowance is based on the education in remote areas law.

2.2. The law for promoting science education

The law to promote science education was enacted in 1953. This law has an important mission as the basis for creating conditions in which science education is cultural. The law is to facilitate the mastery of scientific knowledge, skills, and attitudes through science education. It supports the capability of device creation and rational daily life in order to educate and nurture students who, as adults, can contribute to the development of our country. The law is to promote science education. In our resource-starved country, even if Japan participates in intense international competition, in order to maintain the full life of the citizenry, the promotion and understanding of technology are crucial measures.

Since personnel training in technology has been planned, legislation that promotes the understanding of science education in primary, middle and high schools and other programs has been implemented. Thanks to this law, for students in Japan, no matter where they go to school, the teaching and the use of scientific equipment are standardized.

The science educational promoting law August 8, Showa 28 Act No. 186: <http://law.e-gov.go.jp/htmldata/S28/S28HO186.html>

Japanese science educational promotion association: <http://www.japse.or.jp/rishin-hou>

2.3. Education on the remote island in Kagoshima Prefecture

Elementary and junior high schools are situated on the remote island where the children and students of Kagoshima Prefecture live. Elementary schools in the center of Amami city and in each town are large schools that hundreds of children attend. The elementary schools in a small area are small-scale schools. That there are many elementary schools with few children means that an elementary school is located so that a child can walk to school. When the number of children is 16 or less in two grades, combined classes are established in these small-scale schools.

Although a junior high school also has many small-scale schools, it is unified and the number of schools to which a student is bused has recently increased. A high school is established on the main remote islands. Although there is no university, an Amami nursing welfare vocational school is located in Amami-Oshima Is. The vocational school has a medical secretary program (two years), a cooking program (one year), a welfare program (three years), and a nursing program (three years).

2.4. Combined classes in elementary school

2.4.1. The standards for class composition in the combined class

On the standards for class composition in Japan, it is supposed that the formation of a combined class can be carried out when the number of children in two grades is 16 or fewer children. However, for first and second grade classes, the formation of a combined class can be carried out for eight or fewer children. This reduced number makes a first grader's environment smaller so that the classroom is warmer and more intimate. The method of instruction in the combined class has been studied and devised in accordance with educational goals. Publications, such as the *Kagoshima Prefectural Education Board* (2006), *Hokkaido Prefectural Teaching Laboratory* (2001), and *Hokkaido University of Education* (2003), are indispensable literature for the novice teacher in a combined class.

One teacher in the combined class provides direct guidance, indirect guidance, and timing of movement between first and second grade students. The teacher shifts the guidance from direct to indirect and back again. The results of using this teaching method are that children in a combined class receive higher evaluations than children in a single grade class in the same area. This method of instruction in the combined class is important to establish a pattern of active, independent learning for the child. The student eventually gains academic ability by developing active study. In a combined class, children master the habit of active study.

2.4.2. The combined class in Kagoshima Prefecture

According to the *School Basic Survey Report for Kagoshima Prefecture*, the number of combined schools in remote districts is 263 among 589 elementary schools. In the whole of Kagoshima Prefecture, the number of single classes is 3,695, and the number of combined classes is 560. Teachers in Kagoshima Prefecture may teach in a combined class in that one of seven classrooms in the prefecture is a combined class.

2.5. Many combined classes in an elementary school, the necessity for a science lesson, and difficult conquest

2.5.1. New hire at a big school

The teacher in Kagoshima Prefecture experiences work in schools on a remote island, a remote district, and an urban area. Therefore, many teachers may have a combined class. In science class, in the single grade class in elementary education in urban areas, many schools have science specialized subject teachers.

Newly hired teachers receive training for beginning teachers at a relatively large school. At an elementary school, many teachers do not have a science class. When changing schools, the new assignment for a teacher may be a small-scale school with a combined class. This presents the teacher with a new opportunity to take charge of a science lesson.

2.5.2. To take charge of a science lesson at a small-scale school

In the school with a combined class, as there are not enough teachers, none of the teachers are science educators. The generalist teacher takes charge of science lessons. In a combined class, the students have two curriculums in that there are children in two grades in one class. As science is a subject studied through experimental observation, the teacher has the responsibility of double preparation of materials in the combined class. A device unique to science is required. In the science lesson, the systemicity of the lesson must be appreciated. In the education board for each area, training for a science class is carried out with teachers who have no actual science teaching experience and who started a new teaching assignment in a large-scale school.

2.6. Science instruction classified by grade in a combined class

2.6.1. Device for direct instruction, indirect instruction, and *zurashi*

In the science lesson for a combined class, the teacher provides direct instruction in one grade while the other grade has indirect instruction. An experiment dangerous for a child cannot be conducted with indirect instruction. The teacher must directly guide the introduction of the science lesson, but the introductory part of each science lesson for one grade with indirect instruction may leave some students behind in their learning.

Zurashi (shifting) facilitates learning for those students who may be behind in the flow of the lesson. *Zurashi* is used several minutes after the introduction of the lesson. At the beginning of the science lesson, the teacher uses the shifting technique. Using the technique, instruction can be carried out directly at the time of experimental observation. Without direct instruction, an experiment may present a possible danger to the students. Hence the requirement is to safely set up the introductory part. An indispensable technique in the teaching plan classified by grade in a combined class is to shift from one grade to the other. In a combined class, the child actively studies during indirect instruction.

The opportunities for mastering active study increase in a combined class lesson. Therefore, the teacher has to teach so that every child may learn the behavior and attitude for active study. When a child is able to master the method of study under indirect instruction, the combined class lesson in which direct and indirect instruction becomes a reality. When carrying out instruction in accordance with skill level, a single grade class can also benefit from the method of instruction used in a combined class.

2.6.2. The rotated guide role

A teacher provides direct instruction in a short time to the child in charge, the guide-san, who will be discussed in detail below, just before the lesson starts. The teacher conveys the subject of the lesson using indirect instruction immediately after the lesson starts. After receiving these instructions, the guide-san tells everybody in class the study subject of the class. This is indirect instruction methodology. In indirect instruction, children consider answers to a question the teacher has asked, respond to the question in writing, review the conclusions of their previous learning, and actively study. In the combined class, since children can grow through the role of the guide, each child should have the rotating guide-san role, which avoids a fixed role for one student. The goal is to avoid creating a mini-teacher.

2.6.3. Use of a small blackboard or whiteboard

The teacher understands how the children understood the lesson by their using a small blackboard or whiteboard at the time of indirect instruction. When the teacher returns to direct instruction, s/he will understand the learning that has taken place from seeing the responses that the children wrote on the board. The children's study continues. The goal is instruction in which a child's active study progresses, and the teacher helps the children problem-solve.

When discussing the science lesson in a combined class, one of the important items to understand is the learning of the children during indirect instruction. When understanding a child's conclusion, a small blackboard, whiteboard, or a card on

which each of the children can write is important. They write their ideas on the small board during indirect instruction. The teacher who shifts back from the other grade reviews their writing, and knows immediately the kinds of ideas the children have.

2.6.4. Timing the teacher's shift

In a science lesson, the flow of lesson and the timing of the teacher's shift are important. At the time of indirect instruction, the guide-san stands in front of the blackboard in the classroom, and each child tackles active study through the guide-san's indirect instruction. The teacher then returns to direct instruction and guides the lesson.

Since the time of experimental observation may be long during the science lesson in a combined class, both grades may overlap in the time zone of problem-solving study. At this time, the teacher frequently shifts from one grade to the other.

When the teacher is in a state of indirect instruction, if the teacher directs the children to consider some aspect of the lesson, the children will think hard intellectually. If a teacher directs the children to write their response on a small blackboard after having considered the teacher's question, the children will write on a small blackboard. The outcome is that writing on a small board or other surface becomes a habit for the children. Writing responses on a small board and writing notes saves time in order to increase the time for direct instruction. The teacher formulates the lesson so that indirect instruction does not serve as neglect. The goal is to develop the habit of independent, active study practiced in combined class instruction.

If a teacher changes indirect instruction to direct instruction and tells students to write an idea on a note, card or a board, the children will write a note themselves. This writing generates active study.

2.6.5. Preparation of directions and lesson improvement

Printed instructions prepared in advance clarify directions for the children and save the teacher's

time giving directions. The point the teacher needs to remember when preparing the teaching plan for a combined class is distinguishing the two teaching methods: indirect instruction and direct instruction. When preparing direct instruction, the teacher should write on Japanese vellum, which is a thick paper, or write on a small blackboard. Doing so will save time for the teacher.

The time between direct and indirect instruction emerges, and the child in an indirect instruction lesson can also actively study. The teacher has to carry out instructions so that children do not have to ask questions during indirect instruction.

Although it is paradoxical, when the child has an important question, the teacher should teach so that a child may ask for a teacher's help during indirect instruction. The teacher learns from the questions asked by a child during indirect instruction. The teacher can then prepare written directions so that a child does not need to ask how to proceed.

2.6.6. The teaching plan for indirect instructions in science

The arrangement of the course content in a combined class needs consideration unique to a combined class lesson. When preparing the science educational guidance proposal classified by grade in a combined class, it is necessary to demonstrate imaginative power in the flow of the lesson and to consider syllabus planning. If one grade is observing the flowerbed in the schoolyard while the other grade is experimenting indoors, the teacher cannot monitor the safety of the class. Orchestrating the syllabus to avoid such conflicts is mandatory.

In a combined class, the success or failure of a lesson is determined by the teacher's question provided in indirect instruction and the teaching method of shifting between the two grades. The quality of a child's active study will significantly change in accordance with the kind of question the teacher asks at the end of direct instruction.

2.6.7. Quantity of directions before teacher shifting

There is no device for how to introduce the subject at the time for indirect instruction. If the directions

before the teacher shifts are unclear, if a subject is too easy, or if there is too much information about the subject, the children will ask the teacher questions. In a combined class lesson, the success or failure of the lesson will be decided by what occurs before the teacher shifts. Children will be confused if the teacher presents too much information in indirect instruction. The teacher should point out as many things as possible before shifting.

As the number of items held in short-term memory is between two and seven items (7 ± 2), there are directions and a need to skillfully present the contents of the lesson. If a teacher's shift is skillful, the children will be relaxed about the shift and progress in their learning.

2.6.8. Too few children in class

Indirect and direct instruction and shifting in a combined class have been described. In addition, in a combined class, one other problem is the small number of children in the combined class. Sharing an idea but lacking a fellow student at the same level is a poverty of opportunity for children. Moreover, there are problems, such as a lack of motivation in children. To resolve this situation, students are introduced to other students at school events in a rotational system. The learning outcome of a different grade is posted on the wall, and this outcome is used for preparation and review for the students. When there are only a few children, the teacher must add originality and creativity so the group understands different ideas as well as the teacher's.

The teacher needs to save good outcomes of work that a previous grade accomplished, past experimental results, and past work. The teacher is important also for expressing the ideas of some children with different ideas and opinions. For the problem of few students that result in too few diverse interactions, the creativity of instruction is made in a school unit. Other options are joint study in the whole school, group study with a school on the same scale, and exchange study with a large-scale school. In science instruction, joint study, group study, and exchange study are needed experiences for a child's growth.

2.7. Educational foundations and active study

2.7.1. Developing active study

Although active study is required in a single grade classroom, active study is particularly important in a combined class lesson. In a combined class lesson, half of the time on average serves as a time zone for indirect instruction. The quality of study changes in accordance with whether the child has mastered active study. With minimal support, teachers have to nurture each child to develop active study.

When children understand how to experiment, the time is appropriate for clarifying their active study. If a child needs clarification, many children can help. The teacher should also help. For the child who still cannot understand, further direct instruction is required. For the success or failure of a lesson, the result is decided to some extent by the stage at which the teaching plan shifts the teacher between the two grades. A child can advance active study through productive shifting instruction, skilled teacher shifting, and the guide-san's help.

2.7.2. Active study at the time of guide study

The required teaching plan includes teacher participation in the child's talks. Guide study is also a method for developing and increasing the active study habit. At the time of indirect instruction, one child often has the guide role and advances the lesson as directed by the teacher. If a child fully understands how to advance using guide study, the rotation of the guide role is decided, a manual explaining how to advance guide study is prepared, and the child in the guide role utilizes the manual for how to talk about the material in the lesson. Thus, the child can play a role.

If the students finish the indirect instruction lesson early, the teacher has an exercise that can be a problem for the children as an activity. The requirement is to show using a worksheet the flow of the lesson so that the guide-san can refer to the worksheet. The child as the guide has the lead role in active study for all members in the grade of the combined class. This child for this particular lesson is the guide-san. The guide-san is friendly and an important part of class learning.

The teacher has a short discussion with the

guide-san and asks the guide-san to distribute the printed material. The guide-san distributes the printed material. After learning with the guide-san, the children work together on the answer to the teacher's question. At the end of the lesson when the teacher shifts back to the grade, the guide-san introduces the answer. One advantage of guide study is that the role of guide-san positively impacts the growth of each child when s/he has the role.

The child in the guiding role reads the printed material from the teacher to explain the lesson to the other children in the grade. The guide-san has an active role so that the other students may progress in the learning. If this guide role is a regular part of the lesson, the role is expected to generate a positive effect. One important part of guide study is that all children experience the guide-san role.

Although this guiding role is not suitable for everyone, any deviation from the role must be avoided. The teacher has to avoid fixation of the role. The guide-san role should not be given only to some children because those children more quickly understand the teacher's directions. Those children who do not quickly understand their task must also be included in the guide-san role. Since the role of a guide may be easy for some children, the expectation is that the role develops and increases children's ambitions because all members in the grade are assigned the rotating task.

2.7.3. Guide study for preventing a zero-sum phenomenon

One of the important matters of guide study is to prevent generating a zero-sum phenomenon. A zero-sum phenomenon is an event that occurs in the educational activity of science. When a teacher educates using one teaching method, the method may benefit some of the students but not all of them. A zero-sum phenomenon would occur when if the teacher assigns the guide-san role to a receptive child but does not assign the role to those children who are less receptive. The outcome would be that some children lose an opportunity for growth, which would result in zero-sum phenomena.

Although asking children to be the guide-san for those children who have already developed

leadership skill is easy, limiting the role to those children must be avoided. A child as the guide-san is a golden educational opportunity that all children should experience.

2.7.4. The guiding role that all children take

Even if the children are at different academic levels, if the assignment for the guide-san is explained only to the guide-san, at the time of an ordinary problem and at the time of a complicated and difficult theme, all the children can share in the role. Through such experiences, the child who has a slower understanding and the child who is behind in study can grow. A complicated guiding role can develop from an easy guiding role. This is an educational foundation. A part of science study in a combined class is the importance of getting used to guide study. The aim is for children to accept and feel comfortable in the guide-san role and for the others in the group to actively study in collaboration with the guide-san.

Guide study is realized only after putting into practice the instructions that teach a fundamental routine and a study attitude. The question is when there is no time to talk before the science lesson with the guide-san, what the other options are.

When such a problem arises, the teacher prepares notes on the plan for the child in the guiding role. In the notes, the teacher explains the lesson to the guide-san. The requirement is guidance for the guide-san in the science lesson. In the science lesson, experimental observation may be impossible for one child. During an observation children cannot look elsewhere while time progresses. They need to record the changes in a phenomenon. If fixation of a role is avoided in this situation, and the rotation system is implemented, a child will come to automatically take the responsibility of the role. In the environment that the teacher develops in which the teacher and the child can study in mutual collaboration, self-centered children will become less self-concerned and more group-centered.

2.7.5. Active study at the time of pair study

When a child cannot easily follow actively study alone, if a pair is constructed and one child learns

with another child who easily actively study, the learning effect can be increased. The child who understands and uses skilled active study learns through teaching the less skilled child. People with the ability to organize their own ideas by explaining them to others learn in the process of explaining. For the child who can actively study, what s/he learned will strengthen learning through explaining to a classmate. Teaching others reaffirms learning. In a very small-sized classroom, in the case of two children in one grade, one child as the guide-san is difficult to establish. Learning in pairs is an opportunity to implement a similar approach that increases learning for children.

In order to realize the merits of guide study, we want to have the guide study experience even if there are only two children. The teacher needs to devise a plan that uses each child's individuality.

2.8. Safety in the science lesson in a combined class

2.8.1. Ensuring a safe environment

Safety must be primary in a science lesson in a combined class. Even if a class teacher uses the shifting technique, an experiment that has potential danger can be directly presented through instruction, but the time zone for experimental observation becomes shorter. In order to make as much time for experimental observation as possible, a teacher may have to ask other teachers to participate.

2.8.2. Example of a safe science experiment

The author introduced a science lesson in an elementary school in Kagoshima Prefecture in which another person participated in the lesson (HATTA 2007). The lesson proceeded as follows:

A vice principal provided support in a teacher's class, which means that two teachers were in one class for a science lesson. The teacher set up the experiment and provided instructions to the third graders about conducting electricity. After the water had started heating, the responsibility for the lesson was given to the vice principal. The vice principal presented the experimental observation to the fourth graders at about the time the water began to boil.

The instruction considered accident prevention for the fourth grade experiment including danger such as a child spilling hot water. Safety is always a primary concern. The vice principal as teacher was able to return to his other responsibilities in approximately 15 minutes.

2.8.3. The meaning of collaboration between teachers

There may be a teacher who thinks that an experimental observation is dangerous and hesitates to carry out experiments in science lessons for a combined class. Asking another teacher for help does not require an hour of time from the helping teacher, but the requesting teacher should request only a specific amount of time for experimental observation.

The children understood that the vice principal as teacher helped the science lesson. The vice principal as teacher also presented himself as a member of society that implemented education, which supports mutual help in adult society. This collaboration positively influenced character building in the children in addition to the actual science lesson.

2.9. Application to a single grade class: composition as the opportunity for active study

The instruction form in the combined class is helpful in a single grade class when guiding the child whose skill level is not the same as the other children in the class. That is, when a child does not yet understand in a single grade class, if almost all the other children do understand, the child left behind requires extra help to progress.

If the teacher thinks in terms of a combined class lesson, the child left behind could have the opportunity to catch up without delaying the whole lesson. The active learning ability and the strength of self-teaching in a combined class are also required in a single grade class. Since active study is indispensable in a combined class, the child always tries hard, but there is an equivalent situation in a single grade class. Even if a school is not a research designated school that includes active study, all schools should research active study. The school that is not a designated school also needs

to aim at improvement in independent study and learning skill.

Although the class in a single grade is not the same as a combined class with a guide-san, group study in a single grade provides experiences for leadership, and those experiences seem to facilitate the growth and development of both leadership and autonomy. In a school with a combined class, a higher grade student studies with lower grade students to connect them through joint study, and a lower grade student has the opportunity to understand the complexity of an idea when in contact with a higher grade student's larger view.

Although it is easy to experience relationships in the same grade of children, it is rare to experience a long relationship inside a single grade class and a large-scale school. Studying activity of the committee made in the school, is regarded as the place to understand the relationship of different grade of children.

Since a child must actively learn in a combined class during indirect instruction, the child is mastering active study. Such mastery of active study is required also in the instruction of a single grade

class. The single grade class with the child left behind presents the same dilemma as in the combined classroom. A combined class method of instruction is useful for instruction in accordance with different skill level children in a single grade class.

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