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THE EFFECT OF TV SCHOOL BROADCAST ON CHILDREN IN ISOLATED VILLAGES.

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FROM 1962 TO 1963, THE JAPAN BROADCASTING CORP. CONDUCTED A STUDY TO MEASURE THE EFFECTS OF INSTRUCTIONAL TELEVISION ON PRIMARY SCHOOL CHILDREN IN ISOLATED AREAS OF JAPAN, WHO HAD SCORED BELOW THE NATIONAL AVERAGE ON NATIONWIDE ACHIEVEMENT TESTS. 4 PRIMARY SCHOOLS WERE CHOSEN FOR THE EXPERIMENT. THE STUDENTS WERE PRETESTED FOR INTELLIGENCE, ACHIEVEMENT, AND INTEREST IN LEARNING. TESTS USED AT THE START AND FINISH OF THE STUDY WERE THE TANAKA-B-TYPE INTELLIGENCE TEST AND THE STANDARD ACHIEVEMENT TEST. THE STUDENTS WERE SORTED FOR UNIFORM INTELLIGENCE AND ACHIEVEMENT LEVELS, RESULTING IN 130 CHILDREN IN THE TV GROUP AND 84 IN THE CONTROL GROUP. 2 SCHOOLS WERE THEN FURNISHED WITH 2 TV SETS EACH. THE OTHER 2 SCHOOLS WERE THE CONTROL GROUP. FIFTH GRADERS FROM THE TV GROUP REGULARLY VIEWED A SCIENCE AND A SOCIAL STUDIES PROGRAM. THE SAME TEXTS AND TEACHING METHODS WERE USED IN ALL 4 SCHOOLS. IN EACH GROUP, SUBGROUPS OF HIGHER AND LOWER INTELLIGENCE WERE SET UP. IT WAS SHOWN THAT, ON INTELLIGENCE AND SCIENCE ACHIEVEMENT TESTS, BOTH SUBGROUPS OF THE TV GROUP SCORED HIGHER THAN THE CONTROL GROUP AFTER ONE YEAR OF INSTRUCTIONAL TV. THE LOWER INTELLIGENCE TV SUBGROUP DID PARTICULARLY WELL ON THE SOCIAL STUDIES TEST, BUT BOTH SUBGROUPS DID BETTER THAN THE CONTROL GROUPS. IT IS NOTED THAT TELEVISED INSTRUCTION WAS PARTICULARLY EFFECTIVE IN SUBJECTS FOREIGN TO CHILDREN IN REMOTE AREAS. MEMORY AND ALERTNESS IMPROVED. (MS)

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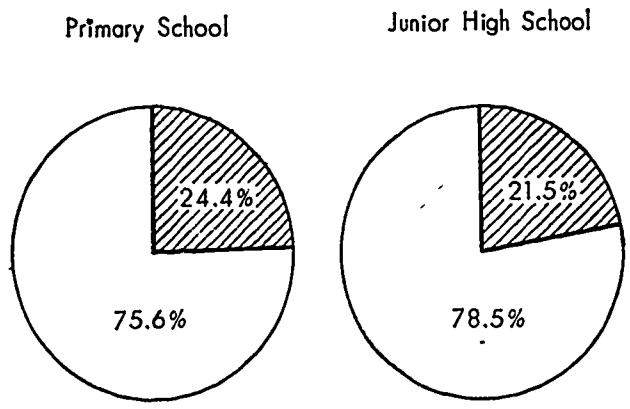
1. Introduction

Japan is a mountainous country; 70 per cent of the country is mountainous. It has also a large number of isolated islands in its territory. Such districts are usually called *"hekichi"* in Japanese, which means remote or out-of-the-way places, unfavored economically and culturally as well as geographically.

Public schools—primary and junior high schools—in those remote districts are specially designated by the State as 'isolated schools'. According to the statistics compiled by the Ministry of Education, the primary schools officially designated as "isolated schools" number about 6,500, the junior high schools so designated some 2,600, the former, as indicated in Figure 1, occupying about 24 per cent of the total and the latter 22 per cent. In other words, the figure indicates in this country one out of every four public primary or junior high school is situated in an out-of-the-way district, which means that education for children in such isolated parts of the country is one of the most important problems to be solved in Japan.

Fig. 1 Percentages of Primary and Junior High Schools in Remote Area in Japan



Statistics by Education Ministry (1962)

The following table shows the analyzed results of the nationwide achievement tests conducted by the Education Ministry in 1959 and 1960, classified by regions and subjects. As the table clearly indicates, the average marks that children attending such isolated schools obtained in the Japanese language, arithmetic, social studies, and science were all lower than the national average by 5 to 10 marks. Of the ten districts selected, school children in isolated villages got the lowest marks in all the subjects except science.

Table 1. Results of Education Ministry's Achievement Tests Classified by District and Subject.

	Primary School			
	Japanese	Arithmetic	Social Studies	Science
National average	49.2	43.6	44.5	51.7
Residental District	58.4	52.1	52.2	55.8
Business District	57.2	50.0	53.6	56.5
Mining & Industrial District	53.5	47.2	44.7	50.5
Business-Industrial District	52.6	45.2	48.6	52.0
Urban District	50.6	45.4	46.8	52.4
Mining Industry District	44.9	37.3	38.6	48.7
Agricultural District	43.3	38.6	39.7	50.2
Mountain Villages	41.0	36.0	32.9	46.6
Fishing-Industrial District	43.3	38.8	35.1	45.8
Out-of-the-way District	40.0	35.8	34.0	46.3

Education Ministry's Survey: 1959~1960

According to the researches made by a number of psychologists and educators using intelligence tests and personality tests, the intellectual level of children in these remote areas is rather low, and they are lacking in creativity and emotional control, leading a poor emotional life. Needless to say, their mental world is either restricted or hardly socialized.

In 1954, the Government became aware of the seriousness of the situation in such areas, and established the "Law for the Educational Advancement in Isolated Areas", taking positive actions to promote education for children in such places. For instance, the National Treasury provided the special allowances for teachers working at those isolated schools or extended financial help to the construction of their dwellings. The Government also offered a subsidy of 50 per cent to install television sets in primary and junior high schools of those areas. To be specific, the Government has been subsidizing some 30,000 yen per school as expences, for "television would be extremely helpful in widening the experience of the children and supplementing the shortage of teaching material in such remote districts." Within the budgetary limitations, some 300 to 500 remote schools that have no television sets yet are selected annually to be so subsidized, and this has resulted in equipping about 1,100 isolated schools with television sets.

Meanwhile, the Japan Broadcasting Corporation (NHK) also started TV-set donation in 1962, planning as its goal to provide those schools with 1,600 sets by 1966.

It must also be pointed out that 54 per cent of the schools in mountainous or isolated areas where TV vewing is possible have been furnished with television sets for educational purposes by the end of 1963, thanks to the contribution of sets by various organization interested in the project and also by their own community, as the result of which the NHK TV school broadcast has become available in those areas.

To what extent are these television sets contributing to the education of school children in those isolated areas, to meet such high expectations from the Government and the public at large as well as local communities themselves?

Table 2 shows the results of TV utilization investigations conducted by the Audio-Visual Education Center of the International Christian University, which studied replies by mail from those isolated schools where television sets have been installed with the government subsidy. According to the results obtained, about 60 to 66 per cent of the primary schools investigated and 38 to 43 per cent of the junior high schools are utilizing school broadcast programs in their classes.

Table 2. TV Utilization at Schools in Remote Areas

		Primary	Junior-High
Regulary viewing School		64%	40%
Depending on courses, Regulary or Occasionally viewing School		11	16
Non viewing Schools, Unknown & Others		25	44
Total	%	100	100
	N	160	75

ICU's Survey—1962

Table 3. TV Viewing Classified by Course of Study

Course of study	Subject	No of Schools	Percentage
Science	Primary • Junior-High	161	61.5
Social Studies	〃 〃	143	54.6
English	Junior-high	44	43.1
Music • Drawing	Primary • Junior-High	45	24.1
Morals • Social Guidance	〃 〃	22	11.8
Technique • Housekeeping	Junior-High	12	11.8
Children's Programs	Primary	24	12.8
Puppet Plays	〃	15	8.0
Arithmetic	〃	10	5.3
Gymnastics	Junior-High	3	1.0

ICU's Survey—1962

As shown in Table 3, the degree of utilization of TV school broadcast programs in terms of subject-hours is science, social studies, English, music, and drawing in that order.

Most of the teachers who have taught their classes with the help of television filed favorable answers on televiewing classes, saying:

"The pupils' interest in and desire for study have increased",

"The areas of learning experience have increased",

"The pupils are readier to ask questions",

"Their interest in learning English at junior high school has become greater", and so on.

Besides the above investigations conducted by ICU, there have been of late many other researches into the effects of television teaching on school children in out-of-the-way districts.

The results of these researches are much the same with those carried out by ICU researchers.

These researches inform us of the nature and significance of the role television plays in education in those remote places. Strictly speaking, however, the above results cannot be perfectly reliable as research results of television effects, inasmuch as the investigations have been carried out by mail survey method; so that the teachers might have replied to their questionaire on their own judgement, probably based on their purely subjective impression.

The NHK Radio & Television Culture Research Institute designed a unique study of television education in remote places of the country, consulting researches and investigations previously conducted in Japan. The projected study was conducted for one year from April, 1962 through March, 1963, selecting children of four primary schools in out-of-the-way places as study samples, by considerably strict method, which might be paraphrased roughly as follows:

1. We investigators made on-the-spot study at the sampled schools to measure the effects of television viewing in class.

2. We measured cumulative effects of regular viewing of TV school broadcast during the year.

3. We analysed the genuine effects of TV viewing, applying the "Before-after design", and "Control-group method".

2. The Area Selected and Sampled Schools

The areas selected for research were mountainous villages in Gumma Prefecture, lying on the borders of three prefectures—Gumma, Saitama, and Nagano—some 130 kilometers northwest of Tokyo in a straight line. They are not very far form Tokyo, but it takes more than half a day to go there by train or bus, because of traffic difficulties. The mountains surrounding the areas are comparatively high. Most of the inhabitants are petty farmers raising "*kon-nyaku*" (devil's tongue plant), whose average acreage under cultivation is about 40 acres, their arable land being terraced fields rising very high. Lumbering is also active to some extent, and a considerable amount of charcoal is shipped from the areas.

Four primary schools—Ueno Village Ueno-Higashi, Nakazato Village Nakazato, Bamba Town Aihara, and Oniishi Town Mihara Primary Schools—were sampled for our research. They had been selected as our subjects on the grounds that they met the following conditions favorable to our plan.

The conditions are that:

(1) They are all schools situated in remote, isolated parts of the country,

(2) They had no televiewing experiences of school broadcast programs as TV sets were not furnished until 1962 when our study was carried out.

(3) They were located in the area where it would be possible to receive television programs, if TV sets were furnished,

(4) They could provide us with a considerable number of children as samples of our study to enable us to treat the data statistically.

In April, 1962, we first made investigation into the actural condition of those school children's intelligence, school achievement and interest in learning, before we started our experimental study.

Immediately after, we furnished two of the four schools—Ueno-Higashi and Nakazato Primary Schools—with two TV sets each, and fifth graders of each school were enabled to view regularly a TV-Schoolbroadcast Social Studies program, "TV Tour" and a Science program, "Science Classroom for Fifth Graders".

Meanwhile, the other two schools—Mihara and Aihara Primary Schools—continued their ordinary classroom learning without the help of TV sets, as in the past. (Hereafter the fifth graders of the former two schools will be called "TV-group" or an "Experimental-group", while those of the latter two schools will be called a "Non-TV-group" or a "Control-group.)

Later, in June, October, December, 1962, and in March, 1963, we carried out four investigations in order to study the differences between the two groups, at each time, and after a period of one year we tried to study the over-all differences between the two.

In these investigations, we endeavored to equalize the two groups except for the variable factor that one group viewed TV school broadcast programs while the other did not.

The most controversiable was perhaps the quality of teachers in charges of the classes, but as for the attributes of the class-teachers there were no significant differences between the two groups as shown in Table 4.

Table 4. The Attributes of Class-Teacher

		Name	Sex	Age	School carreer	Term of Service	Term of Service at Present School
TV-group	Ueno Higashi Primary School	Ig	Male	34	High School	16	1
		A	Male	27	Univ.	7	1
	Nakazato Primary School	Y	Male	28	Univ.	4	1
		I	Male	25	Univ.	3	3
Control-group	Aihara Primary School	M	Male	30	Univ.	7	3
	Mihara Primary School	Ma	Male	28	Univ.	4	4

Needless to say, each teacher has his own personality, and has his own way of teaching children in class. But, in field surveys such factors cannot but be neglected. If allowed to add a few more lines, we had so arranged that the teachers in charge of the TV-group should be new men in television education, and they were cautioned against any efforts to enhance the effects of television teaching by putting particular stress on science and social studies neglecting other subjects.

It must also be added that in the four sampled schools they used textbooks for science and

social studies published by the same publisher, allowing no differences either in the construction of their annual curriculums or in the progress of their classwork.

3. TV Programs Selected and Viewing Procedures

Let us give some of the characteristics and features of "TV Tours" and "Science Classroom for Fifth Graders", selected for the investigation material.

"TV Tours" was a program based on the course of study authorized by the Education Ministry, introducing, by means of films, the industries of various parts of Japan, appropriate for throwing light on the industrial problem of this country and aiming to make the young viewers understand the relations between the areas selected and the whole country, while watching regional industries and people working there. The introduction of the industrics was arranged in the following order: agriculture, forestry, and fisheries for the first term; manufacturing and power resources for the second; commerce, trade and transportation for the third. They were telecast regularly every Tuesday morning for 20 minutes—11:35~11:55, and retelecast from 13:20 every Thursday.

The other program, "Science Classroom for Fifth Graders" was also based on the course of study authorized by the Education Ministry, and programmed chiefly with observations and experiments, so that the children could achieve the attitude and aptness for scientific observation of natural phenomena and problem solving on their own. They were telecast 20 minutes—11:35 ~11:55—every Friday morning, and retelecast from 9:20, Saturday morning.

Television viewing for the TV group was directed through the following stages; those stages had been established only for the control of experimental conditions, so that they were not considered to be the "most advisable guidance".

We used various forms of tests throughout our study, but in this report we will restrict our explanation of them to two types of such tests.

For intelligence test, the TANAKA-B-type Intelligence Test forms were used.

This is the most popular type of intelligence test for group study in Japan, and has been standardized on a nationwide scale. Intelligence test of this type was employed twice—in April, 1962 (before the study began), and in March, 1963 (a year later).

For the achievement test, the Standard Achievement Test forms were used. The test forms of this type, prepared by a group with Arata Yoda, professor of Educationai Psychology at Tokyo University as leader, had also been standardized on a nationwide scale.

The tests of this type were used twice in checking up the childrens' capacity for science and social science—April, 1962 (the tests used were those for furth graders because the pupils examined had just moved up to the fifth grade) and March, 1963 (the tests for the fifth graders).

Table 5. Guidance Stages for Television Viewing

Objective	Guidance Before Viewing	Guidance After Viewing	Period
First Stage 1. Accustom both the sampled children and teachers to television viewing. This is the first requisite. 2. Make them enjoy the televised classes in a relaxed mood. 3. Make their ears and eyes used to television viewing.	1. Notify the TV-programs to be telecast the following day on the blackboard, by noon of the previous day. 2. Confirm the notice to the group children orally.	1. After viewing, let children question about the scenes, narration and so forth they could not understand. 2. Time required....about 5 minutes.	Up To May
Second Stage 1. Guide the pupils to concentrate their attention to television programs, and keep up with the scene-changes and speedy narration of the television 2. Let them understand the focus and points of the program.	The same as above	1. The same as No. 1 above 2. Let the Children discuss "What they got interested in" "What surprised them," and "What attracted them." 3. Time required....5 to 8 minutes.	Up To July
Third Stage 1. Guide the pupils to catch the general trend and important points of the program easily. 2. Make them find out what aim of the program is.	1. The same as the first stage. 2. Brief the content of the teacher's text with some explanations. 3. Time required....about 3 minutes.	1. The same as 1 and 2 above. 2. Have the children discuss themselves to confirm the important points of the program. 3. Time....10 minutes.	Up To Dec.
Fourth Stage 1. Guide them to understand the relations of the aim of the program to its content. 2. Exert more advanced guidance so that they may state what they have in mind about the viewed program.	1. The same as the third stage. 2. Give the children the aim of the teachers' text, relating it to the content and emphasizing the part they should view attentively. 3. Time....less than 5 minutes.	1. The same as the third stage. 2. Have the children discuss the relations between the aim and content of the program.	Up To March
Fifth Stage 1. Promote the generalization of what was recognized by children. 2. Have them obtain a generalized knowledge and theoretical recognition upon what they viewed.	1. The same as the fourth stage. 2. Give the children the relations of what they would view into what they had studied in their previous class room teaching.	1. The same as fourth stage. 2. Relate what children had viewed to the content of textbooks and the curriculum in their own school. 3. Time....less than 15 minutes.	

4. The Matching of TV-Group with Control-Group

As we previously stated, we went ahead with our study and compared the two groups, naming the children of the two schools that employed television in cless the TV-group and those of the other two that continued ordinary classes without television the Control-group.

Of the children of the two groups, 150 were TV-group samples and 84 were sampled into the Control-group. Practically, however, some of the sampled children failed to sit for the tests, and extremely retarded children (whose intelligence was so low that they could scarcely write their own names) were included in the sample, making it necessary to excluded them in the process of analysing this kind of study.

Moreover, in order to investigate the genuine effects of television it is desirable to put the two groups to be compared in as equal conditions as possible. Accordingly, we excluded such children as shown below from our proper subjects of analysis, equalizing the two groups as much as possible before our study began.

1. Pupils whose intellectual standard scores* were below 15, and those whose achievement standard scores below 20, in 1962-April investigation.

2. Those who failed to sit for both or either of the investigations in April, 1962 and March, 1963.

3. Those who achieved such deviating scores that would break the balance of the mark distinctins of the two groups when we gathered the data of 1962 investigations, exclusive of the samples pointed out in the preceding two items.

Having thus sorted out the samples, we had 130 children for the TV-group and 84 for the Control-group. (As a matter of course, the sorting-out of item 3 was done, with the results of March-1963 investigation uncounted.)

Table 6 shows the results of the intelligence test and the achievement tests in social studies and science carried out on TV-and Control-group in March, 1962.

Table 6. Matched TV and Control Groups Before Experimental Study

		TV-group	Control-group
Intelligence	Mean Score	45.4	46.2
	Standard Deviation	9.52	11.28
	Result of t-Test	No significant difference.	
Social Studies	Mean Score	44.9	43.2
	Standard Deviation	8.13	9.92
	Result of t-Test	No significant difference.	
Science	Mean Score	42.9	41.9
	Standard Deviation	8.05	10.17
	Result of t-Test	No significant difference.	
Samples		130	72

The Control-group achieved a better mean score in the intelligence test, while the TV-group achieved better mean scores in social studies and science, but there was no significant difference between the two groups even at the 10% level in testing of statistical hypothesis.

* The Standard Score in this respect requires some division and addition upon the so-called T score.

$$\text{Standard Score} = \frac{X - \bar{X}}{\frac{1}{10}\text{S.D.}} + 50$$

For the purpose of reference, if we compare these mean scores with those achieved by the same graders all over the country (which is 50 for any of the three tests), they were all inferior to the national level, their inferiority in science being particularly remarkable.

5. Summary of the Results

(1) Changes Indicated in Mean Scores or Score Distributions.

What kind of changes were found in test results one year later? It must be added just for precaution's sake, that the natural change following the increase of chronological age was weighted off in the calculation process of the standard score. As an example, if a pupil born in April, 1951 achieved the 55 "raw" scores in both tests before and after the experiment, his or her standard score before the experiment is increased to 53, and that of one year later will be reduced to 48.

Table 7 shows the results of the tests a year after the television class experiment started. The table indicates that the TV-group was superior in the mean standard scores of intelligence tests and achievement tests of social studies and science.

Table 7. Mean Scores and Standard Deviations of TV and Control Groups One Year After the Experimental Study Started.

		TV-group		Control-group
Intelligence				
	Mean Score	52.6		48.9
	Standard Deviation	9.64		13.0
	Result of t-Test		d=2.07*	
Social Studies				
	Mean Score	45.9		43.1
	Standard Deviation	7.71		9.67
	Result of t-Test		d=2.09*	
Science				
	Mean Score	47.9		42.3
	Standard Deviation	7.16		8.64
	Result of t-Test		d=4.64**	
Samples		130		72

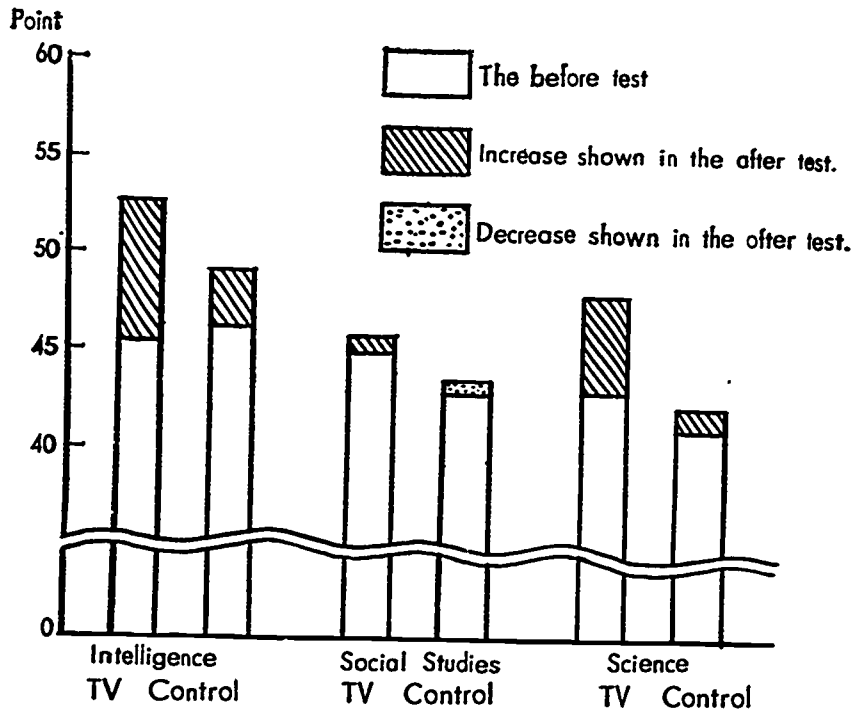
(Note) ** 1%-level significant * 5%-level significant

The differences between the two groups in intelligence and social studies tests were found significant at 5% level, and the difference in science also significant at 1% level.

It is worth notice that the mean standard score of the intelligence test of the TV-group was over 50, although the fact that the pupils who scored under 15 in the test in April, 1962 had been excluded as our proper subjects of analysis must be taken into consideration.

It is also of great interest that the mean score of the achievement test in science, which had apparently indicated the disadvantages of the remote area schools showing remarkable inferiorty to the national level, was found to be 47.9 in the case of the TV-group, drawing much closer to the national level. Meanwhile, the mean score of the Control-group was 42, showing little improvement.

Fig. II Change Shown by Two Groups after a year.



When compared with the results obtained a year before, the TV-group scored +5.72 in the intelligence test, while the Control group scored +2.96. The differences each group had registred in a year were significant at 1% level. What had raised the mean standard scores of intelligence test notably in all the four sampled schools?

A rapid increase of late of television sets in homes of the area might be a cause. It might also be attributed to the pupils', so to speak, familiarization with the tests, in consequence of our repeated enforcement of them.

The greater difference was registered by the TV-group showing the difference of differences of 4.5*, and this difference was also significant at 1% level. No other factor than the viewing of television school broadcast could be considered to have brought about the above improvement.

The "practice-effect" might be considered to be the same for the two groups since the frequency of the tests was same. We left the effect the home television sets out of consideration, for chances for furnishing them were fewer among the homes of the TV-group pupils, as they were located in more mountainous areas.

*	Before	After	Difference	Difference of Difference
TV-group	45.4	52.6	+7.2	+4.5
Control-group	46.2	48.9	+2.7	
(cf. Table 6 and 7)				

Television teaching in itself could be considered to have an aspect that calls for prompt intellectual activity within limited time—following speedy unfoldings of subjects or shifts of scenes. On the other hand, the intelligence test of this type was found to have heavy loadings of mental alertness factor, as psychologists put factor analysis on it. This factor of mental alertness played an important role in the test process and in the stages of mental set for the following subtest.

When taking these factors into consideration, adjusting oneself to television might have had some connection with achieving high scores in the intelligence test, particularly in remote environment. We will discuss this subject later on.

Neither group made significant difference in a year of the scores of social studies test. The difference of differences (1.1) was not significant at all, either.*

As for science test, the situation differs between the two groups. Both groups had raised scores in a year, but the difference of the TV-group was significant at 1% level, while that of the Control-group was not significant. The difference of differences (3.7) was also significant at 1% level.** Such being the case, the TV-group can be said to have further improved in achievement in science.

Figure III shows the score distributions of each test for the two groups. In the intelligence test, the Control-group showed a wider variance a year later, while the TV-group showed approximately the idential variance, but the whole distribution of the TV-group had risen by about 5 points.

In the social studies test, what differs most between the distribution chanbes of the two groups is, that the percentages of extremely low scores had decreased in the TV-group, while they had not been affected in the Control-group.

In the science test, the difference between the distribution changes of the two groups was very remarkable. While in the Control-group no particular changes occurred except that the peak had come to be divided in two, in the TV-group the peak moved upward from 41~45 to 51~55. It is also worth notice that the lowest of this group had moved upward from 20 to 31~35.

The distribution changes a year later of the two groups in intelligence, social studies and science tests could be summed up as follows:

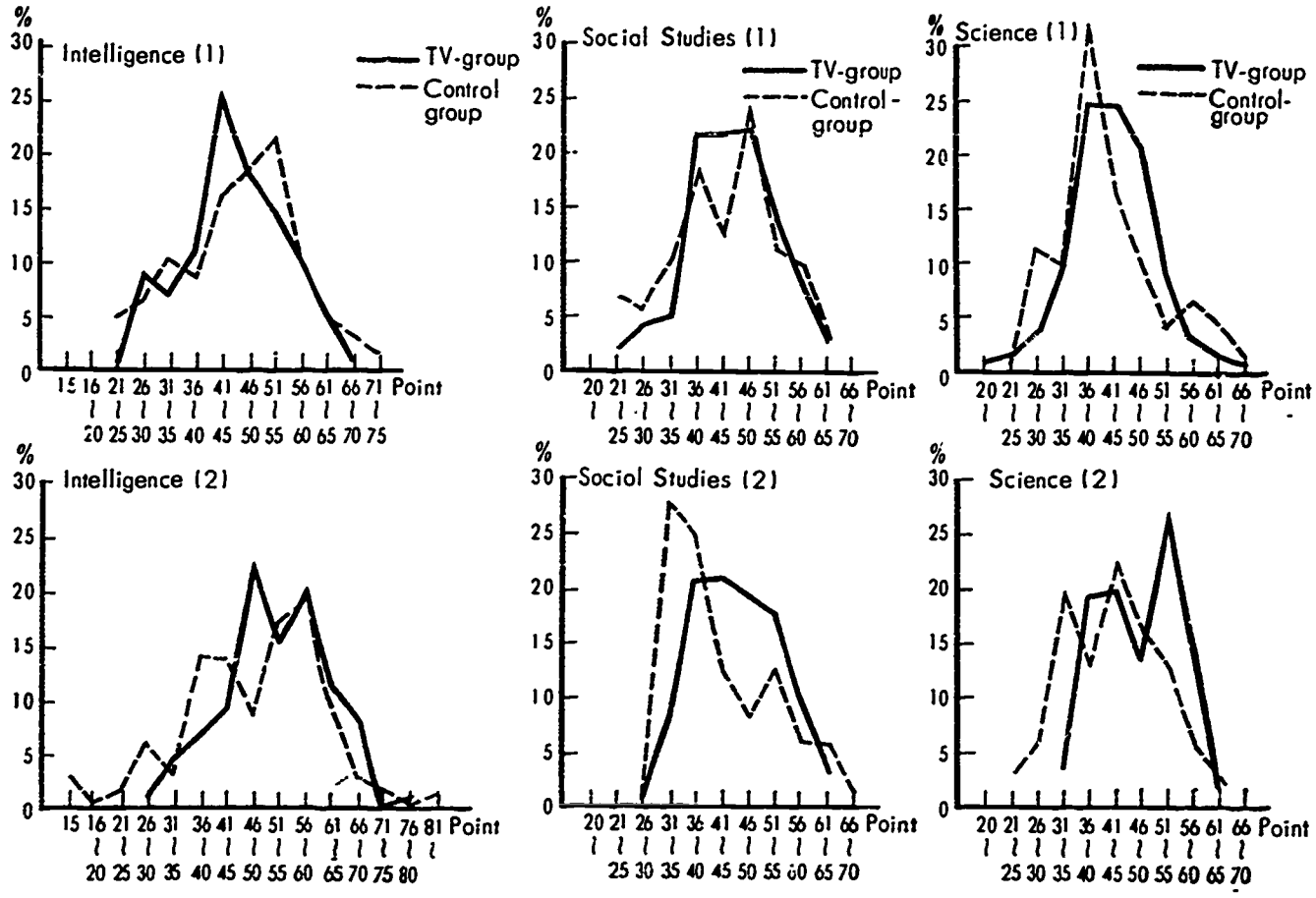
While the Control-group showed wider variances or falling "Modes," the TV-group showed educationally advisable trends registering rising "Modes" (except in social studies), narrowing variances (except in intelligence) or rising lowest levels.

Particularly worthy of note is the decrease of the extremely low-scoring children consistently observed in three kinds of tests, resulting in the confirmation of views of teachers that television teaching might give rise to the interest in and desire for learning in low-scoring children.

*	Before	After	Difference	Difference of Difference
TV-group	44.9	45.9	+1.0	+1.1
Control-group	43.2	43.1	—0.1	

**	Before	After	Difference	Difference of Difference
TV-group	42.9	47.9	+5.0	+3.7
Control-group	41.0	42.3	+1.3	

Fig. Ⅲ Score Distributions of Each Test for Two Groups Before and After the Experiment



Note: (1) indicate the before test; (2) the after test.

(2) Aspects of Television Teaching Indicated in the Scores of Each Sub-test.

As mentioned above, we found that the TV-group had better results in the mean scores or in score distributions, manifesting effects of the utilization of television school broadcast.

Going a step further, we will try to see in learning what kinds of school subjects or in what sort of test items the effects of television viewing were manifested.

The TANAKA B-Type Intelligence Test consists of seven sub-tests: "Maze" (an ordinary maze problem on finding a way out from the entrance to the exit), "Counting Cubes" (counting the number of cubes given in each column), "Construction of Geometrical Figures" (drawing cutting lines in given figures to construct some figure constellations), "Substitution" (replacing certain symbols with corresponding symbols), "Similarity Discrimination" (checking the differences between the rows of numbers on the right and those on the left), "Completion of Numerical Progression" (filling the blanks in the progression in search of detectable rules therein), and "Figure Erasure" (crossing out figures identical with designated ones).

The psychologists who studied the intelligence of remote area children in Japan have coincidentally come to the following conclusion:

"Generally speaking, children in remote areas are inferior to those who live in urban areas in all the seven sub-test results, but in the results of such sub-tests as "Maze," "Substitution," "Figure Erasure," and "Cube Counting," no significant difference was observed between the two.

In short, children in remote areas are not much inferior in works that do not require high-level thinking."

Then, how are the results of our study related with the above conclusion?

In our study of April, 1962, the Control-group achieved higher scores on the whole, but in that of March, 1963, the TV-group achieved higher scores in all the sub-tests except in the fifth one (cf. Fig. IV and Table 8). It is of interest that great differences of scores were found in the three sub-tests—"Maze," "Substitution," and "Figure Erasure"—in which psychologists had found remote-area-children not so inferior.

We have speculated about some relation between television teaching and improvement of the scores of the intelligence test before, and this effect manifested itself in the scores of tests, which are rather easy to work out for remote area children. The three sub-tests in which the TV-group showed further improvement—"Maze," "Substitution," and "Figure Erasure"—had been found to have heavy loading of mental alertness or memory factors. So we may say that television teaching might first stimulate the children's mental alertness or memory.

As shown in Fig. IV, the TV-group achieved higher scores in other sub-tests on the whole, though without registering significant difference.

It is an interesting question to be left for further investigation what kind of changes the two groups would show in the remaining four sub-tests when they continue viewing television school broadcast for two or three more years.

To add a few more lines for precaution's sake, there are various arguments on whether intelligence can be improved by learning. In this report we have no space to spare for the discussion of this subject, but before attributing our results to television teaching, we may interpret them as follows: the children who had been endowed with sufficient intelligence but could not display them because of remote environment, came to display them more fully as a result of television teaching.

Fig. IV Changes Shown of Scores in Intelligence Sub Tests

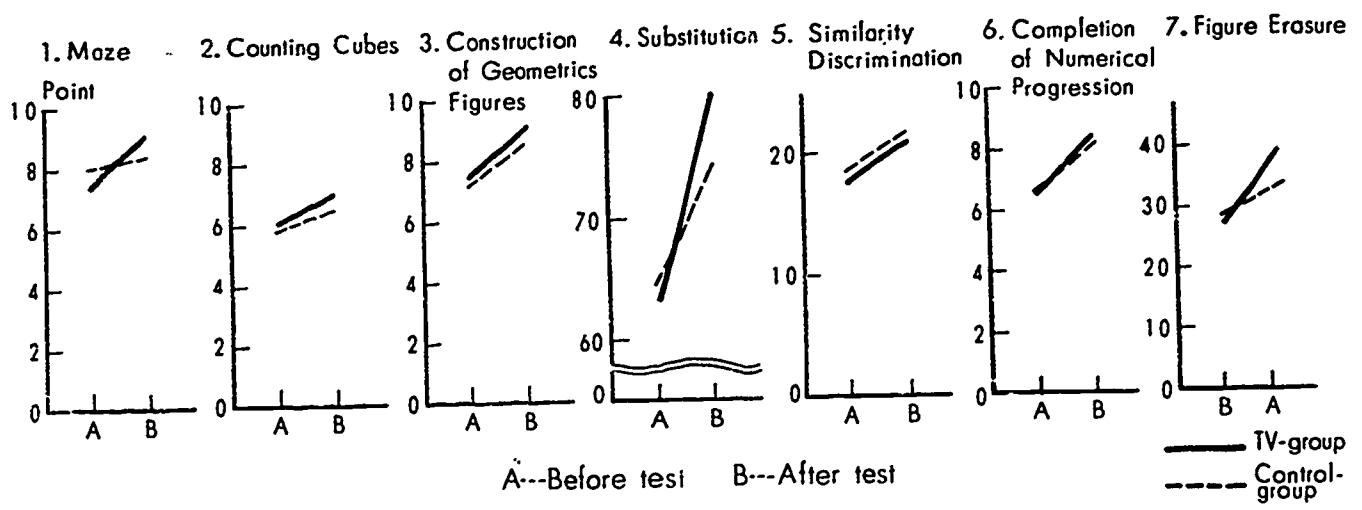


Table 8. Changes Shown in Sub Test Results One Year After TV and Control group

	TV-group	Control-group
Maze		
Mean Score of Difference (the score of after test substracted from the score of before test)	+ 1.71	+0.49
Standard Deviation	1.44	1.36
Result of t-Test on Difference	t=13.48**	t=3.01**
Result of t-Test on Difference of Difference	t=6.07**	
Counting Cubes		
Mean Score of Difference	+ 0.99	+0.92
Standard Deviation	2.43	2.18
Result of t-Test on Difference	t= 4.61**	t=3.55**
Result of t-Test on Difference	No significant Differences	
Construction of Geometric Figures		
Mean Score of Difference	+ 1.65	+1.43
Standard Deviation	1.85	1.73
Result of t-Test on Difference	t=10.19**	t=6.97**
Result of t-Test on Difference of Difference	No significant Difference	
Substitution		
Mean Score of Difference	+15.90	+9.60
Standard Deviation	11.93	9.06
Result of t-Test on Difference	t=15.07**	t=8.91**
Result of t-Test on Difference of Difference	t=3.91**	
Similarity Discrimination		
Mean Score of Difference	+ 3.82	+3.94
Standard Deviation	3.43	3.21
Result of t-Test on Difference	+10.97**	+10.34**
Result of t-Test on Difference of Difference	No significant Difference	
Completion of Numerical Progression		
Mean Score of Difference	÷ 2.00	+ 1.60
Standard Deviation	2.51	2.25
Result of t-Test on Difference	t= 9.06**	t=5.99**
Result of t-Test oe Difference of Difference	No Significant Difference	
Figure Erasure		
Mean Score of Difference	+12.98	+5.31
Standard Deviation	8.04	7.18
Result of t-Test on Difference	t=18.32**	t=6.23**
Result of t-Test on Difference of Difference	t=6.72**	
Samples	130	72

The Standard Achievement Test of Social Studies for fifth grades consists of four sub-tests —"Nature of Japan," "Forestry and Fisheries," "Industries of Japan," and "Commerce, Trade and Transportation." We found no difference between the scores of the two groups in "Nature of Japan," and "Forestry and Fisheries," but in the other two sub-tests the TV-group scored higher and the differences were significant. It is of much interest that the effects of television teaching were found in "Industries" and "Commerce, Trade and Transportation," for these subjects were the ones that children in remote areas could seldom experience for themselves, and the ones that the effects of television teaching had been expected to be greatest. We are not so

hasty as to generalize from these results, because of the difference of the degree of test difficulties or the difference of intervals between the periods of learning and the period of research. We may say from our results, however, that, in a sense, the effects of television teaching in aspects of knowledges and apprehension were manifested more definitely on subjects children could not get direct experience of.

Teachers have always demanded the telecast of what children in remote areas seldom experience, and their demand can be said to be quite reasonable in some respects.

Table 9. Sub Test Scores of Standard Achievement Test of Social Studies (After test)

	TV-group	Control-group
Nature of Japan (full score=20 points)		
Mean Score	7.5	7.6
Standard Deviation	3.51	3.78
t-Test	No significant difference	
Forestry-Fisheries (full score=30 points)		
Mean Score	13.5	11.9
Standard Deviation	5.58	6.35
t-Test	No significant difierence	
Industries of Japan (full score=30 points)		
Mean Score	13.8	11.5
Standard Deviation	5.59	6.23
t-Test	t=2.69**	
Commerce-Trade-Transportation		
Mean Score	7.2	5.6
Standard Deviation	4.20	5.13
t-Test	t=2.34*	
Samples	130	72

The Standard Achievement Test of Science for fifth graders consists of three sub-tests—"Biology," Meteorology, Astronomy, Physical Geography," and "Physics, Chemistry." The TV-group scored higher in all the sub-tests, and the differences were all significant. Accordingly, we can assume that the effects of television teaching were great in every subject. It is particularly worthy of note that the TV-group got 26 out of the full score of 45 even in the subject of "Physics, Chemistry," which is the most difficult subject for remote-area-schools to conduct with their poor experimental equipment.

Needless to say, our study of effect of television teaching is not a sufficient one, for we just compared within two groups and measured only a year later.

For instance, in the social studies test, the mean score was about 4 points lower than the national level, and even in the science test about 2 points still lower than the national level.

This is true about sub-test scores. For example, children should be encouraged to improve in "Meterology, Astronomy, Physical Geography." We are looking forward to improvement in these respects by continuing the utilization of television for the years to come.

Table 10. Sub Test Scores of Standard Achievement Test of Science (After test)

	TV-group	Control-group
Biology (full score=35 points)		
Mean Score	23.6	19.3
Standard Deviation	5.87	5.48
t-Test	t=5.14**	
Meteorology-Astronomy-Geography (full score=20 points)		
Mean Score	8.7	7.6
Standard Deviation	3.66	3.79
t-Test	t=2.17*	
Physics-Chemistry (full score=45 points)		
Mean Score	25.9	21.8
Standard Deviation	6.72	8.59
t-Test	t=3.59**	
Samples :	130	72

(3) Aspects of Television Teaching Indicated in Scores of groups of Higher and Lower Intelligence

Previously, when we examined the whole test from the viewpoint of the score distributions, we pointed out that the effects of television were more manifest on children whose intelligence and achievement scores were low. In order to make this point clearer, we analysed test scores by dividing the sampled children of each group into another two subgroups—higher intelligence group and lower intelligence group.

We classified the children who obtained in the 1962-April intelligence test the standard score from 46 upward into the higher intelligence group, and those who scored below 45 into the lower intelligence group. Table 11 shows the analysed results of the scores of the two groups, each divided into two subgroups.

Table 11. After Test Score of Intelligence, Social Studies and Science by Two Groups—Higher Intelligence and Lower Intelligence

		Higher Intelligence		Lower Intelligence	
		TV-group	Control-group	TV-group	Control-group
Intelligence					
	Mean Score	59.4	57.1	50.1	38.7
	Standard Deviation	5.88	8.24	8.00	8.86
	t-Test	No significant difference		t=6.12**	
Social Studies					
	Mean Score	47.4	47.0	44.5	37.9
	Standard Deviation	6.97	10.24	8.08	5.59
	t-Test	No significant difference		t=5.07**	
Science					
	Mean Score	50.2	45.5	45.7	38.7
	Standard Deviation	6.23	8.22	7.29	7.78
	t-Test	t=3.11**		t=4.63**	
Samples		62	41	68	31

According to this table, the two subgroups of the TV-group scored higher in the three tests. It is noticeable that significant differences were observed between the two lower intelligence groups in all the three tests, while between the two higher intelligence groups a significant difference was observed in science test alone, which means that the effects of television were more manifest on the lower intelligence groups.

Again, we are not so hasty as to conclude from these results only, and we examined by means of various other analyses (for example, "before-after design") on which of the two intelligence groups—higher and lower—the effects of television were more manifest. Below are our conclusions:

1. In the intelligence test, both intelligence groups of the TV-group scored higher one year later, and no difference was observed between the two.

2. In the achievement test of science, too, both intelligence groups of the TV-group scored higher, and no difference was observed between the two.

3. In the achievement test of social studies, however, the effects of television teaching were manifest on the lower intelligence group.

6. Conclusions

We may now summarize, into the following five points, the results obtained by means of the intelligence test and achievement tests, regarding the effects of television school broadcast on the sampled children of four remote area primary schools in the mountain villages in Gumma Prefecture.

1. Compared with the children who continued to receive ordinary classroom instruction (the Control-group), the children who continued viewing television school broadcast for one year (the TV-group) improved in the mean scores of the intelligence test and achievement tests in science and social studies. When we examine them from the viewpoint of score distributions, we found a decrease of the extremely low scoring children one year after in the case of the TV-group in the intelligence test and the achievement tests in science and social studies.

2. In the intelligence test, the TV-group scored higher in the sub-tests in which the factors of mental alertness and of memory were considered to count considerably. Television teaching might be supposed so work as to improve those factors in children.

3. In the achievement test of social studies, the TV-group scored rather well in subjects such as "Industries" or "Commerce, Trade, Transportation." This fact seemed to prove that the effects of television teaching were manifest on the subjects which the children in remote areas seldom experienced in their everyday life.

4. In the science test, the effects of television were manifest in all the subjects.

5. When we examine the results dividing children into another two groups—higher intelligence and lower intelligence groups, no difference was observed between the two as to the effects of television teaching as far as the intelligence test and achievement tests of science were concerned (that is, effects were remarkable for both groups), but in the achievement test of social studies, the effects of television teaching were more manifest on the lower intelligence group.