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ABSTRACT

An investigation of pupil and teacher preferences concerning different ways of presenting subject matter in science and social studies in Swedish public schools is discussed. The curriculum used for these subjects was studied and an analysis made of a number of books used. Responses of a questionnaire gauging pupil and teacher preferences for types of classroom activities are presented and discussed. An additional study is described which evaluated pupil and teacher preferences concerning textbook illustrations. Results of this study indicate a preference for large, clear pictures, where the subject is presented realistically, both in color and form. The overall conclusion of the investigation was that to a large extent, teachers and pupils agree on their preferences for the presentation of subject matter. (MH)

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DIFFERENT WAYS OF PRESENTING AND HANDLING SUBJECT MATTER: SCIENCE AND SOCIAL STUDIES, GRADE 3

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SUMMARY

1. Objective

The primary objective of the present investigation is to give increased information on pupil and teacher preferences concerning the different ways of presenting and handling the subject matter in one of the junior school general subjects, Science and Social Studies. (The Swedish term for the subject is "Hembygdskunskap", corresponding to the German term: "Heimatkunde".) Only grade 3 (age 9-10) has been studied. Pupil preferences regarding choice of content have been treated in an earlier study (Lindsten, 1969) and thus are not taken up here again.

The second objective is to discover to what extent the recommendations in the Swedish comprehensive school's curriculum for the teaching of Science and Social Studies agree with the findings of the pupil and teacher preferences.

Finally by the analysis of a number of books in Science and Social Studies the investigation aims at discovering to what extent these satisfy the requirements of the pupils and teachers.

2. Preparatory study

In order to obtain information on the present teaching of Science and Social Studies the curriculum was studied and an analysis made of a number of books used in the subject. Both these preparatory studies were later used in gauging the pupil and teacher preferences. The preparatory work mentioned is described below, followed by a number of preparatory studies on which the illustration test included in the investigation is based.

2.1 Study of the curriculum

In the present report the 1969 curriculum for the comprehensive school has been studied regarding the presentation and treatment of material in the subject Science and Social Studies. This study gave the following result: The recommendations for the teaching of this subject largely agree with the general recommendations for teaching in the comprehensive school. Thus, for example, the general recommendations of the curriculum coincide with those of the present analysis with respect to coordination between subjects, pupil participation and individualized teaching.

Similarly we find recommendations on concreteness in teaching and the division of material into a basic course and a supplementary course.

However, in the teaching of general subjects, of which Science and Social Studies is one, certain principles of teaching have particular importance, even though they are also valid for most other teaching. Since, for example, human relations and ethics are included in the subject area, this accentuates the need for methods in the schools that encourage independent thought and candour concerning the problems of life. The analysis shows clearly that the curriculum draws attention to this point.

The position of Science and Social Studies as a general subject for the youngest children in school, with their great need for direct study and pupil orientation, has also been observed.

2.2 Analysis of a number of books used in Science and Social Studies

Five books, type textbook, have earlier been analysed with regard to the material they present to the pupils. From the number of editions sold it seems likely that about 80% of the pupils who in 1967 were in grade 3 used the books. In the present analysis they have been studied with regard to content, text, illustrations and tasks set for the pupils.

The books showed a wide variation in most of the analysed variables. In a later discussion on pupil and teacher preferences the question of how far the presentation in the books agrees with the findings on the pupil and teacher preferences is considered.

2.3 Preparatory studies on which the illustration test included in the investigation is based

An illustration test was to be included in the present investigation since it also sought to discover which of the illustrations in the books were most highly valued by the pupils and teachers. There was no suitable test available so one was constructed. In this context a number of preparatory studies were carried out.

Expert opinions were gathered on pictures suitable for books on Science and Social Studies, as it could be assumed that people who had been working with or were interested in children, pictures and the subject could give examples of features relevant to this investigation. A pre-study was therefore devoted to listing the views of experts and to analyzing the expert opinions. The views given express wishes on special features of the pictures, method of production, pictures for a given purpose plus special wide-range motifs. *A number of children* in the children's department of a library gave their views on the pictures in the books. The instructions read "If you

were to help me choose a picture of a broad-leaf tree for a Science and Social Studies book, what would be your opinion of this picture"? From the comments, about 50% referred to how realistic the picture was, about 20% referred to colour, about 14% to the distinctness of the picture, while only about 5% commented on the size. It was apparent that the pictures in the books should be clear and realistic in colour and form.

A number of motifs were to be included in the investigation, consequently each motif could not be represented by very many pictures. For this reason, one motif at least should be covered by a large number of pictures so that as many methods as possible of reproducing the motif could be represented. The motif "broad-leaf tree" was chosen and this sub-test covered 67 pictures. A pre-study was devoted to acquiring these pictures.

3. Method of gathering information

3.1 Questionnaire for rating preferences in pupil activities and pictures

In order to determine pupil and teacher preferences regarding different ways of learning, treating and reproducing knowledge in Science and Social Studies, two questionnaires were constructed, one for pupils and one for teachers.

3.1.1 The content and design of the questionnaire

Experience gained from the preparatory studies carried out, repeated discussions with experts on junior schools and my own personal experience from a long teaching career were utilized in constructing the questionnaires with the help of which the preferences would be rated.

In content the two questionnaires are very similar, although the teacher questionnaire is more detailed. This was because certain questions given to the teachers were considered less relevant to the pupils. One of the basic points in the construction of the questionnaire was a list of the pupil activities that, after the analysis of the curriculum, the books and the discussion with experts, could be considered in the main to cover all possible activities in the teaching of Science and Social Studies. These could be grouped to represent different methods of presentation, treatment or reproduction, even though certain activities, for example "reading", represent both the first and the last. Combinations of activities were also to be included.

Below is an account of the selected activities:

Pupil activities primarily in use when the pupils receive information:

"listening"
"reading"
"looking"
"investigating"

Pupil activities primarily representing ways of treating and reproducing information:

"speaking"
"writing"
"creating through manual work"

Although the above pupil activities may be considered to cover what the pupils did during the lessons, the work could be organized in different ways with, for example, the pupils working in groups or individually. In order to cover more fully the recommendation in the curriculum on teaching principles and method of working, as well as the recommendation for co-ordination of subjects, questions were added which, together with the pupil activities listed above, could cover the more far-reaching aspects of the curriculum. It should also be possible from the questionnaire to ascertain the attitude to various study materials used in the teaching of Science and Social Studies and this is why questions that could give information on these points were included. In this context particular interest was devoted to gathering information by means of the questionnaire on what the books (type text-book) should be like in order to gain the approval of pupil and teacher. Here, for instance, are included particulars on the range of the book, page size, size of print, balance between text and illustration surface plus different types of pupil assignments. Since the investigation desired also to ascertain preferences concerning various ways of illustrating the books, the illustration test was designed.

3.1.2 Formulation of the questionnaire

The formulation of the pupil and teacher questionnaires is on the whole the same, although there are some differences. Thus, for example, in both cases the questions are largely fixed i.e. alternative answers are given. Questions with freely formulated answers occur in both questionnaires, but are more numerous in the one for the teachers.

Given alternatives are marked by the pupils and teachers from 1 to 5, where 1 is the lowest mark, there being no 0.

Examples of the formulation in the verbal part (i.e. that part which does not consist of pictures) of the questionnaires are given below.

The pupils were asked to assess how interesting and enjoyable they considered the alternatives to be.
"One can *write about* what one knows. Here are some ways.
Give marks."

- ☐ Put, for example, figures in circles or squares to show that you have learnt what the pictures and words mean.
- ☐ Fill in the missing words.
- ☐ Write in a column about what you have learnt.
- ☐ Write short sentences on what you have learnt.
- ☐ Write a short account of what you have learnt

The corresponding questions for the teachers were formulated as follows:
"How *valuable* in school work do you consider the following activities to be?
Give marks."

- ☐ The pupils put, for example, figures in circles or squares to show that they have learnt what the pictures or words mean.
- ☐ The pupils fill in sentences where words are missing.
- ☐ The pupils write up in a column the things they have learnt.
- ☐ The pupils write short sentences about what they have learnt.
- ☐ The pupils write a short account of what they have learnt.

It is seen from the above that the questions are very similar in form and content. However the similarity between formulations can vary from question to question. On the other hand it is important to note that while the pupils assessed how enjoyable and interesting they considered the alternatives to be, the teachers assessed how valuable these were in the school work. Naturally it could have been of value to have the teachers assess the alternatives from the same aspect as the pupils, but teachers to a great extent plan and carry out their work from the viewpoint of how valuable different activities and materials are for schoolwork. Consequently it is this aspect that should primarily be investigated.

The pictures were assessed by the pupils from the viewpoint of the degree to which they would like to have the picture in their book. The picture was assessed by the teachers from the point of view of how suitable they considered it to be as an illustration for the book.

3.1.3 Reliability tests

Only the reliability of the pupils' questionnaire was tested. This was done as follows:

Two sections of the questionnaire "type-specimens" and "amount of text" were tested on the pupil material in the main investigation by means of the odd-even method. After correction using the Spearman-Brown formula the coefficient .71 was obtained for both questions.

Ten pictures, chosen at random, were assessed by 40 pupils in grade 3 of the Experimental and Demonstration School attached to the Malmö School of Education. This took place on two occasions during the spring term of 1973 and with an interval of 10 days. The product-moment correlation for the data from these two tests was calculated. The coefficient was .98. The result of the reliability test shows that, on the points on which the pupil's questionnaire were tested, there was acceptable reliability. Admittedly the 40 pupils used in the control of pupil reliability were not chosen in the same way as the pupils in the main survey, but the evaluation they made can give some idea of the agreement in picture assessment between two groups of assessors on two different occasions. Therefore a product-moment coefficient was calculated between the result of this group of pupils on the first occasion and that of the main survey group. The coefficient was .89 indicating that assessments were similar, at least regarding such a short period of time and such similar pupil groups as was the case here.

3.2 Picture assessment using semantic differentials

In the selection of pictures for the picture test the aim was to have represented within each sub-test a number of variables which, in accordance with the described preparatory study, could be considered relevant to the illustrating of Science and Social Studies books. These variables could not, however, always be offered isolated, as to a great extent book illustrations already printed were to be included. However, if a group of experts also assessed the pictures on a number of semantic differentials, the so-called Osgood scales, and the pictures that had been assessed according to a widely varying degree of appreciation by the group studied were compared with these, then there would be a greater possibility of giving the picture features which were received with more or less positive appreciation.

There was no ready prepared assessment form suitable for this purpose and so a new one was drafted. An expert group was called upon, consisting of twelve persons with varying occupations but all with experience of pictures or children. These experts were asked individually to give the feature on which a picture should be judged.

These were then restricted to the following variables:

strong colours ..... weak colours
distinct ..... indistinct
spacious ..... compact
small "refined" style ..... coarse style
realistic *colours* ..... unrealistic *colours*
realistic *shapes* ..... unrealistic *shapes*

Thus the final form covered only seven variables. "Size" is not included as this variable in 4 of the 5 sub-tests could be kept somewhat under control. In the fifth sub-test the surface area of the picture was calculated.

The work of the expert group and the test form and its reliability are treated in the next section and the processing of the data resulting from this work is treated in the section following that.

4. Individuals used in the study

4.1 Pupil and teacher preferences

The pupil group, all of whom were in grade 3, consisted of pupils from 10 classes in Malmö. On the basis of the various social structures of the schools these pupils were taken from 6 different schools so that the composition of the group as far as possible corresponded to the social structure of pupils in Malmö as a whole.

The pupil group providing data for the study consisted of 194 pupils of whom 98 were boys and 96 girls.

An analysis of the school achievements of these pupils based on their marks in mathematics and Swedish shows that the mean of the pupil group for this variable expressed in the 5 point scale is 3.20 and deviation 1.06. Using the mean as a boundary line the pupils were divided into two groups, high and low capacity respectively.

The teacher group consisted of 50 permanent junior school teachers, every sixth permanent junior school teacher being chosen from the Malmö Register of Teachers for the school year 1971-72. There was no non-response in the teacher group.

The fact that only people from Malmö are included in the study naturally limits the possibility of generalization of the results.

Pupil data were collected between June 1 and 12, 1972. The time period may seem to be too concentrated and too late in the term, but these circumstances have the advantages, among others, that the pupils could assess the presentation of the

teaching for a whole year and also that the result to a certain extent can be generalized to cover grade 4. Concentration to approximately two school weeks meant that instructions could be remembered more easily between test occasions. A total of five hours divided into two occasions was used in each class.

Since it could be assumed that a concrete picture material would be easier to judge, the first experiment began with the assessment of some picture series, after which the text and picture area were judged. There was subsequently a considerable break, 20–45 minutes, and then work assignments and working methods were treated. The first test concluded with 2–3 series of pictures. The second test dealt only with pictures. For the pupils the questionnaire consisted of 3 questions with open answers, 86 alternatives and 129 pictures to assess.

The teacher data were collected by the study group working with the questions for about 4 hours.

4.2 Expert opinion on the pictures

Earlier a description has been given of the drafting of a special assessment form for the analysis of pictures in the illustration test using semantic differentials. With the aid of this form consisting of seven variables, data were collected during the autumn term of 1973 as follows:

Five persons judged the 129 pictures that both the pupils and teachers had assessed. The group represented five categories of people interested in children of the age in question: a representative from a Parent-Teacher Association, a representative from a publisher's, a teacher in Picture and Design, a junior school teacher and a final term student teacher.

The work with the pictures took 6 hours, divided into 4 working periods.

The group worked independently and judged all pictures on one variable before a new one was treated. As is shown by the following example, the scale comprised 7 grades where each point of the scale was marked with a figure, only the neutral point and the outer points have been given a verbal description.

Example 1 Variable: distinct – indistinct

Picture no.	Distinct			Neither Nor	Indistinct		
	Very 3	2	1	0	1	2	Very 3
	☐	☐	☐	☐	☐	☐	☐
	☐	☐	☐	☐	☐	☐	☐

Estimation of reliability by analysis of variance (Winer, 1962, ch. 4) for the total marks of the 5 assessors, gives the following values for the different picture properties:

strong colours – weak colours	.91
distinct – indistinct	.81
light – dark	.90
spacious – compact	.84
small "refined" style – coarse style	.75
realistic colours – unrealistic colours	.91
realistic shapes – unrealistic shapes	.92

From these values the reliability of the assessment form can be considered satisfactory.

5. Processing methods

5.1 Pupil and teacher preferences

The calculations made are illustrated by means of the following examples from a larger table.

Example II

Pupil activity	PUPIL			TEACHER		
	Mean grade	Order within category	F ratio, omega squared and contrast analyses	Mean grade	Order within category	F ratio, omega squared and contrast analyses
Speaking:						
a) Answering the teacher's questions	4.07	1	F ratio 9.64*	3.78	2	F ratio 5.89*
b) Relating	3.73	2	ω^2:0.032	4.16	1	ω^2:0.059
c) Acting with a friend	3.55	3	a b c	3.65	3	b a c
a) Discussing with a few friends	3.66	2	F ratio 5.29*	3.39	2	F ratio 33.17*
b) Discussing with the teacher and the whole class	3.80	1	ω^2:0.047	4.10	1	ω^2:0.176
c) Discussion with people other than the teacher	3.18	3	b a c	3.16	3	b a c

The differences between alternative answers – which in the above example happen to be three – have been examined with the help of a simple analysis of variance based on the total result. Therefore after the mean value and the grade, the table gives the F ratio, ω^2 and contrasts, the latter in case the alternative answers should exceed two. The principle of marking contrasts is explained by means of the following example:

a b c all three alternatives differ significantly from each other

a b c a differs from b and c, the latter do not differ from one another

a b c a and b differ from c, but not from each other

a b c b does not differ from a or c, but a from c

a b c no significant contrasts

If the alternatives are numerous the notation becomes rather complicated. The contrast results are then expressed as matrices. The alternatives, as in example 2, are placed in ranking order and those that do not differ significantly are joined by a line as shown below

	d	e	f	c	a	b	g
d	f	———					
	c	———	———				
	a		———	———	———		
	b			———	———	———	

The criterion for the differences between alternatives to be included in the discussion is that the F ratio should be significant at the 5% level and ω^2 at least .05. It was considered that this percentage stands for an effect which should not be disregarded.

A two-way analysis of variance was used to investigate whether the division of the alternative answer into sub-divisions differed within the pupil and teacher groups. Since no important differences between the sample sub-divisions were indicated, the results of this test are not discussed.

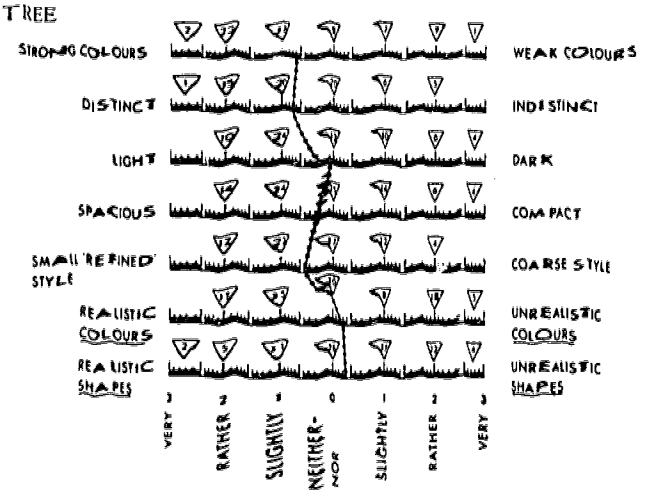
5.2 Semantic differentials

A mean of the values given by the expert opinions to the variables in the form was calculated. These values have been used to describe all the pictures in certain sub-tests and to describe those pictures that were received with particularly positive or negative reactions (diagrams I and II). The values for the most attractive pictures were compared with the values for the least attractive pictures in the sub-tests. The mean values for the 50% most attractive pictures were compared with those for the 50% given the least positive reception. The differences have been calculated for significance.

Product-moment correlations between the pupil ratings and the teacher ratings on the one hand and the seven picture features on the other have been calculated.

The verbal description included in the assessment table for the scale 3, 2, 1, 0, -1, -2, -3, was not given at the time of assessment but has been added later.

Diagram I. Description of the picture material by means of semantic differentials



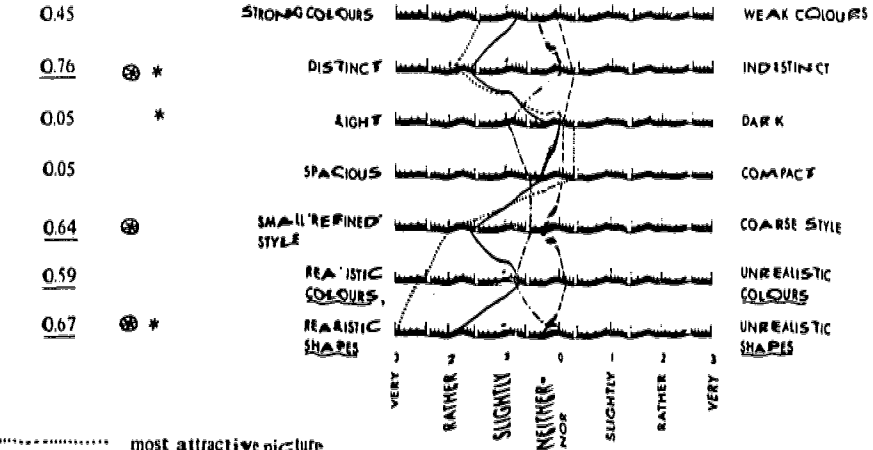
Mean for assessed variables calculated on pictures included in the test

▽ no. of pictures, as placed on each point of scale

Diagram II. Testing of chosen variables by means of semantic differentials

Corr-coeff.

Sub-test 2a "GREAT TIT" Teachers' results



most attractive picture

least " "

50% most attractive pictures

50% least " "

* Significant difference between ..... and —

⊛ " " " —— and – – –

The correlation coefficients are calculated between teacher points and features respectively, and the coefficients stated are related to the left-hand scale-exponent of the feature. Significant correlation coefficients are marked with a line.

6. Result

The account of the results is grouped into three areas: planning, work method and study material. When discussing pupil activity the reader is referred to Table 1.

6.1 Planning

6.1.1 Co-ordination of Science and Social Studies and Swedish

The pupils are clearly positive to "reading" during Science and Social Studies lessons and teachers consider this activity definitely suitable. Of the different types of writing activity tested it is only "write a short account" which meets with any particularly positive reaction from the pupils while the others are found among the 25% least attractive occupations. The teachers consider these activities more suitable than the pupils consider them enjoyable.

Co-ordination of the subjects includes the activities connected with "speaking". When in the test the pupils can freely formulate how they would best like to show what they know, more than one in two mark this category. Narrate and dramatize figure prominently in the answers.

The pupils also show interest in these activities when marking the alternative answers and the teachers show clearly that they think it appropriate for the pupils to give oral accounts in lessons. It is interesting in this context to see how the pupils experience listening to their classmates. The investigation showed that this is not a highly estimated activity. This is naturally puzzling as from the result one can assume that the pupils often present subjects orally to each other, since training in expressing and advancing one's opinions must play an important part in the schools of a democratic society. However, the pupils should also have a positive attitude to listening to others and here obviously measures are needed to increase motivation. Enabling the pupils to use material aids when narrating in order to give a better presentation may be one way of increasing the interest of the listeners. Another way is to activate listening by giving the listener simple tasks. Exchange of experience and information between pupils could also be made more interesting for the majority if the procedure was carried out in small groups where everyone would have a greater opportunity to speak.

The teachers place "listening to classmates" in a shared 36th position in the grading of the total 51 activities. Thus they also are reserved on this point, but the pupils far more so.

Table I. Alternatives regarding the teaching of Science and Social Studies listed in order of pupil preference

Alternative	MARKS		ORDER	
	Pupil	Teacher	Pupil	Teacher
Listen to the teacher	4.57	4.53	1	3
Draw and paint	4.43	4.04	2	18
Look at an object (in reality) and examine it oneself	4.39	4.65	3	1
Look at a model and examine it oneself	4.36	4.29	4	6
See a film at school	4.34	4.24	5	10
Look at colour slides or wall charts	4.16	4.25	6.5	8
Read in Science and Social Studies book	4.16	4.14	6.5	15
Children allowed to choose tasks they think are interesting	4.12	3.46	8	38
You know what group work is. The class then works in groups . . .	4.07	3.67	9.5	33
Answer the teacher's questions	4.07	3.78	9.5	24.5
Talk about and see a film on the subject	3.97	3.58	11	34
Make a model	3.93	3.63	12	32
When you are going to learn something new the teacher teaches the whole class at once	3.92	4.27	13	7
You experiment on your own	3.90	3.73	14	27
You and a couple of friends experiment together	3.86	4.02	15	19
Watch television in school	3.85	3.84	16	23
Discuss with the teacher and the whole class	3.80	4.10	17	16
Write a short account of what you have learnt	3.78	4.24	18	10
Relate about something	3.73	4.16	20	13.5
Look at pictures in books	3.73	3.75	20	26
Record own tape and play it back	3.73	3.56	20	35
Look at an object (in reality) whilst the teacher examines it	3.70	2.86	22	48
Look at slides or wall charts whilst the teacher, you and your classmates talk about them	3.67	4.31	23	4.5
Discuss with only a few classmates	3.66	3.39	24	40
Read from another book	3.65	4.06	25.5	17
Look at a model whilst the teacher examines it	3.65	2.80	25.5	49
One can teach oneself by . . . being told a little . . . and thinking the rest out for oneself	3.63	3.10	27	46
Talk about and play something interesting already recorded on a tape . . .	3.61	4.00	28	20
All children in the class do the same tasks and as much as they have time for	3.59	3.23	29.5	43
Watch while the teacher experiments	3.59	3.24	29.5	42
Talk about and show an object in reality	3.58	4.58	31	2
Act together with a friend	3.55	3.65	32	30.5
Look at colour slides and listen to someone talking on a tape-recorder	3.51	3.71	33	28
Paste	3.48	3.29	34	41
Talk about and show a model of an object	3.40	3.87	35	22
Only look at the object in reality	3.38	2.45	36	50
Look at pictures while the teacher, you yourself and classmates talk	3.36	3.78	37	24.5
Relate and show slides or wall charts	3.35	3.94	38	21
Put, e.g., figures in circles or squares to show you have learnt what the pictures mean	3.34	3.20	39	44
One can learn by . . . being told everything by someone else and not thinking out anything for oneself	3.31	4.31	40	4.5
Listening to the radio or tape-recorder	3.25	3.43	41	39
Reading in newspapers	3.22	3.65	42	30.5
Discussing with others than the teacher and classmates	3.18	3.16	43	45
Write short sentences on what you have learnt	3.15	4.16	44	13.5
Fill in words left out in sentences	3.04	3.02	45	47
Write down in a column the things you have learnt	3.01	3.53	46	36.5
Only look at a model of the object	2.97	2.22	47	51
Listen to something other than People, e.g., music or animal calls	2.90	4.24	48	10
Listen to other people	2.84	3.69	49	29
Listen to classmates	2.72	3.53	50	36.5
Some children do easy tasks and some more difficult ones	2.52	4.21	51	12

6.1.2 Combination Science and Social Studies and manual activities

In the grading of the various activities "drawing and painting" was placed second in competition with 50 other activities. At the same time the relatively modest representation given manual activities when the pupils freely formulate their wishes may indicate that the pupils do not consider these activities primarily as a means of receiving and reproducing knowledge, but more as a relaxation. It is true that the teachers state definitely that they consider "drawing and painting" to be suitable activities, but their evaluation is lower than the pupils'. This also applies to the other alternatives representing manual activities.

6.1.3 The division of material between basic course and supplementary course

The division of material into basic course and supplementary course has several advantages, but the aim is above all to satisfy the individual pupil's interest. It is of great importance in personality development that a pupil with more limited resources is not exposed to such difficulties or such frequent failure that this gives rise to a lack of self-confidence or low school motivation. Just as important is that the pupil with greater resources has the feeling that a real effort lies behind his results. The importance of dividing the task in a tactful way is made very clear in the results of the investigation. The alternative placed lowest of the 51 alternatives representing pupil activity was "Some children do easier questions and some harder ones". The teachers consider, presumably for the reasons given above, this method so suitable that it is placed in the top 25% and consequently the difference between what the pupils experience as positive and what the teachers consider suitable is very marked.

6.2 Work methods in Science and Social Studies

6.2.1 Motivation

By studying certain values for the assessed pupil activities, we can gauge how motivated the pupils are to participate in the teaching of Science and Social Studies. Of the 51 activities assessed, expressed in the 5 point scale used, 25% received almost 4 marks (3.92) or higher. Half had 3.65 or higher, only 25% had marks lower than 3.34. From this we can draw the conclusion that Science and Social Studies is a popular subject.

6.2.2 Activity

Different activity levels in the present investigation are assessed so that, for example, in the study of "reality" and "model" the pupil chooses between looking, the teacher examining, and the pupil examining the object.

It is of interest to note that of the more than 50 pupil activities assessed, the two activities which both assume high activity in the pupil and also stimulate his curiosity, namely "Look at an object (in reality) and examine it oneself" and "Look at a model and examine it oneself" came in 3rd and 4th place respectively. To induce curiosity in the pupils and to give them the opportunity under active forms of satisfying curiosity is in Science and Social Studies as in many other subjects "the royal road to a successful result". The teachers placed the above pupil activities in 1st and 6th place respectively.

6.2.3 Concreteness

The results of the investigation described here, make it clear that studies of the actual object and studies of a model, if combined with the pupil examining the object, are very popular activities. They were placed 3rd and 4th respectively when compared with the other activities. The alternatives "reality" and "model", used without the inclusion of "examine" in the wording, differ in that reality is more appreciated as demonstration material than models. These alternatives are placed 36th and 47th respectively of the 51 activities. When curiosity and activity factors are reduced to this level then the difference in concreteness is apparent.

If "Look at pictures" is compared with "Look at a model" and "Look at the object in reality" the following is evident: "Look at colour slides or wall charts" is an appreciated pupil activity. This alternative was placed 6th with marks 4.16. "Only look at the object in reality" and "Only look at a model of the object" came 36th and 47th with the marks 3.38 and 2.97 respectively, i.e. considerably lower. One must, however, reckon with the restricting adverb "only" having made these two alternatives less attractive, added to the fact that they were presented to the pupils together with the alternatives enabling them "to examine" the object in reality or in model. "Look at colour slides or wall charts" was presented together with "Look at pictures in books". Nevertheless it is rather remarkable that "Look at colour slides or wall charts" is placed so high. The use of a high degree of concreteness, such as reality in preference to pictures, has for a long time been considered a good pedagogic rule, and if the curiosity of the pupils is stimulated by letting them examine the real thing or a model then this rule is supported in the results reported here. On the other hand the investigation gives a less distinct picture regarding *only seeing* the real thing, a model or a picture. One should in addition to

the factor discussed above, which shows certain weaknesses in the presentation of the alternatives, also observe that picture study correctly carried out can awaken curiosity. Perhaps the pupils studied have been presented with pictures and wall charts in this way. A factor which may have acted in favour of slides is that the softer lighting in the classroom when slides are shown has had the effect of contrasting the picture effectively against the background. The size and colour of the slide pictures may also have acted in their favour. This "contrast" factor seldom occurs in demonstrations of "the real thing" or "a model".

"Concrete teaching in general subjects can be given to the pupils by means of a lively presentation in speech and writing". (Curriculum for comprehensive schools, 1969).

The pupil activity given the highest marks by the pupils was "Listen to the teacher", the marks were 4.57. However, one should probably not assume that this means that the pupils are assessing a teacher without aids, as such material often supplements the teacher's oral presentation. Here moreover another important pupil requirement besides that of concretion is satisfied: the necessity for contact. Another alternative assessed that also represented opportunities for contact with the teacher is "Answer the teacher's questions" which with its 4.07 marks had a shared 9th place and was clearly given a positive reception.

It is particularly important to note that establishing contact with the teacher is put so high in a stage of school development when aids of different kinds occupy such a prominent position.

Levie (1973) states in a general study of research on pictures that children have difficulty in transforming pictorial information into verbal terms. Is it the help that the teacher's oral presentation gives that is a contributory factor to the pupil's positive reaction to listening to their teachers? Teachers should be well-qualified for doing this in a satisfactory way, probably greater than ready prepared films etc. as these cannot be adapted in the same way to the different groups of pupils using them.

The attitude of teachers in the questions discussed here does not differ greatly from that of the pupils, with the exception of the last-mentioned alternative where teachers are less positive. A more detailed discussion on study material is given in a later section.

6.2.4 Individualization

As has already been stated in the section dealing with the division of material into basic and supplementary courses, the pupils placed the alternative "Some children are given easier tasks and some more difficult ones" lowest on the order scale by giving it 2.52 marks. However, teachers, by giving it 4.21 marks, show that they consider this to be a suitable method of dividing assignments. Another alternative

which aimed at giving information on attitudes to different individualizing forms was "Children are allowed to choose the tasks they consider interesting". Here the children give 4.12 marks and teachers 3.46. On a third alternative pupils and teachers were more in agreement: "All children are given the same tasks and are allowed to do as much as they have time for". Marks here were 3.59 for the pupils and 3.23 for the teachers.

It is clear that with such different and such pronounced preferences occurring in connection with the two first alternatives, there is a risk that pupils are offered the supplementary course tasks in such a way as to make them uninteresting. Probably, however, the desire of the pupils to choose tasks that interest them could be satisfied, and in the majority of cases the risk of failure kept relatively small, by the teacher's giving them assignments that were apparently very similar but which had different levels of difficulty. If the teacher is not able to interest the pupil in the task with the most suitable degree of difficulty, another very effective form of individualization remains: adjusting the amount of assistance given by the teacher. This method is probably a reality in many classes. There is still the risk that the pupil despite this feels that he has not achieved a satisfactory result on the task. But with all respect to the negative consequences a failure can in itself have for self-confidence, it is the reaction of the surroundings to the failure that largely determines how being unable to cope with a task is experienced. Knowing one's limitations can be an advantage as long as one also has the feeling that there are other areas one commands. The pupils should here be trained to accept that "everyone has the right to fail".

6.2.5 Co-operation

Listening to their classmates was something the pupils in this investigation did not find an attractive activity (2.72 marks). On the other hand, when the co-operation with classmates takes the form of group work, they are clearly positive in their attitude with marks 4.07 and 9th place. Considering that reproducing information often consists precisely of the pupils' listening to their classmates, there is reason to ask the following questions: Are the stimulation and group work periods so popular that the possible lower popularity of relating results is not apparent? When pupils report to each other after completing their group work do they have so many aids, such as pictures, that listening becomes more exciting? On the basis of this investigation the questions are impossible to answer.

Teachers are, with 3.62 marks awarded to "group work", rather more reserved toward this work form. One can perhaps trace in this reservation the knowledge that pupils do not always listen so attentively to one another and thus really learn what is most essential about the work of the other groups. There are perhaps at this stage grounds for differentiating between the function of group work as an instrument in teaching the pupils co-operation and its function as an imparter of knowledge. In the

junior stage, according to the results of the investigation, group work clearly more than adequately fulfills its function in affording the pupils an opportunity for stimulating work. If the teachers possibly feel that the imparting of knowledge is not satisfied equally well, this can be taken into consideration in the choice of material treated in group work. Thus, for example, basic knowledge, particularly before pupils are trained in this form, can be given in another way.

6.2.6 Structurization and evaluation

Approximately every 10th pupil in the freely formulated wishes expressed a desire in one form or another to consolidate their knowledge. The desire was usually expressed as to "swot", "have tests". In the present day school there is perhaps a tendency to underestimate the pupils' need to give their knowledge a more consolidated form.

Lindsten (1969) found that the pupils were eager to learn more about distant eras and places. Questions concerning the origins of life on this planet seemed also to be of great significance for the pupils interviewed (s 97-98). This could be more than curiosity, an expression of a need for order and logic in the milieu in which they live; and if this is true, can the interest for "swotting", and having "tests" in the present investigation be an expression of this same need?

6.3 Study material

6.3.1 Audiovisual aids

Of the teaching material already assessed in the investigation," reality","model", to a certain extent "picture" and "spoken word" have been discussed. "The printed word", which in this investigation is represented by the Science and Social Studies book, is discussed later, while "sound" and certain combinations of picture and sound are treated now.

Learning through "Listening to the radio or tape-recorder" was placed 41st by the pupils when compared with the other pupil activities. The corresponding position was 39th for the teachers. Thus this activity was placed lower than most other activities.

" Look at colour slides and listen to someone talking on the tape-recorder" was placed 33rd by the pupils and 28th by the teachers, i.e., the pupils are somewhat more positive to listening to the tape-recorder in combination with colour slides. However, they are more positive to "See a film in school" which the pupils placed 5th and the teachers a shared 10th, while "Watch television in school" was placed 16th and 23rd respectively.

Thus looking at a film was plainly more appreciated by the pupils. In the case of the teachers the difference between film and television was not significant. Conceivable reasons for this difference in appreciation can be that schools generally do not have colour television, whereas films often are in colour, that film pictures can easily be made larger than a television picture, and that the teacher can choose the time the film is shown and thus make more direct use of it in the teaching.

6.3.2 Science and Social Studies book

The area of application, content and text of the Science and Social Studies book

The teachers were asked to judge the range of application of the book. It was clearly evident that they considered the following ways of using the book were the most suitable: "The book as a basis for conversations about the illustrations" and "The book as a basis for the pupils' independent assignments".

The attitude as to whether the subject matter of the book should be divided into one or more books is that the pupils and teachers on the whole would just as soon have one book covering the whole year's subject matter as they would subject matter divided into two books, that is, a book for each term. On the other hand interest for material divided into a number of parts was cooler.

The teachers prefer the pages to be A4 format (210 mm x 297 mm), while the pupils prefer A5 format (148 mm x 210 mm).

Regarding the distribution between text and picture surface the result shows that a book consisting only of pictures was not approved nor one consisting only of text. The differences were small between " half pictures and half text" and " slightly more . . . " and " slightly less pictures than text".

A measurement of "picture density" of a book is the number of words per sq. cm. picture surface. From the evaluation by the teachers a figure can be calculated which, with slight deviations, is 1.2 words per sq. cm. picture surface.

If one is to satisfy the demands of pupils as well as teachers then the text should be produced with " letter size" and " line spacing" of at least 14/16 or 14/18. These alternatives were approved of by both groups investigated whereas this was not so with the smaller print. Larger print was not tested.

The attitude to the amount of text to be read in a Science and Social Studies lesson was investigated. Different sections of an A5 page with text covering 170 sq. cm. and printed in type size 14/16 were assessed. The pupils were positive to reading "a whole page" and up to " more than 2 whole pages" while they gave the textual quantities 3/4 page or less far lower marks. The teachers consider that 3/4 to 1 1/4 pages to be the most suitable amount of text.

The assignments given in the Science and Social Studies book

The type of tasks which the analysis of Science and Social Studies books showed to be most usual were reading and writing assignments characterized by a lack of creativity, namely, "marking", "enumerating", "one-word answers", "finish the sentence" and "reading aloud". The alternatives representing such assignments in the investigation are given a very cool reception by both pupils and teachers. The pupils gave them such low marks that they were all placed in the 25% least appreciated pupil activities.

"Dramatization, free oral and written description, freely formulated sentences" was received as follows: both pupils and teachers were quite positive to the alternatives representing these. The exception was the alternative representing "freely formulated sentence". The pupils received this very coldly whereas the teachers were more positive.

The assessment of the questions of type "information from other sources than Science and Social Studies book, for example, other literature and studies of real life outside school", gave the result that the pupils to a greater extent than the teachers are opposed to reading other literature and that both groups were rather guarded against listening to or discussing with people other than teachers. If studies in real life are associated with the pupils themselves being involved in examining the object then they, as well as the teachers, are very positive to this alternative.

"Drawing and painting" is assessed very highly by the pupils and even the teachers are quite positive to this. On the other hand "pasting" is not as popular.

Pictures in the Science and Social Studies book

Size

The attitude of the group studied to the size of the illustrations is made clear in the following:

When marks were set for the different sizes of pictures and these were shown on A5 pages, then the teachers definitely preferred 1/2 page pictures while the pupils did not differentiate between 1/2 page and 3/4 page pictures. Also when the teachers themselves later allotted picture surface on A4 format page, it was apparent that 1/2 page pictures were the most popular picture size. This is also the case when 1/4 and 1/8 pictures are compared with a picture corresponding to half the page surface. Further this sub-study shows that nearly all of the teachers used more than one size of picture and that they all illustrated the first page of an area of application, usually with a whole or 3/4 page picture.

The illustration test, which covered 129 pictures divided into 5 sub-tests, gives the following information on the size of the pictures: In the sub-test covering 67 pictures, "broad-leaf tree", the rank correlation was calculated between the surface

areas and the marks. It was found that the correlations coefficients were about .50 for the pupil and .62 for the teachers. A house 12 cm x 7,5 cm was also assessed in the scale 3:2 and 3:1. The picture in scale 3:2 did not receive significantly lower marks by pupils or teachers, as did the picture in scale 3:1. A subject with a number of right angles and straight lines in the above size seemed to bear a reduction by a third without obviously losing in attractiveness. On the other hand, when a cat of about the same size was reduced by a third it was given significantly lower marks by the teachers. The result from the picture series "the great tit" showed, however, that a small, realistic colour drawing is assessed almost as highly as, for example, a realistic drawing in black and white with 3 times as large a head measurement. However the teachers are also here reserved respecting the smaller picture.

All the teachers also state that size plays a certain or important part in pictures giving information as well as in pictures used for stimulation.

Colour

Regarding the pupils' and teachers' attitudes to the colour of the picture the investigation primarily found that a picture ought to have colour. This is evident, for example, from the fact that approx. 1/3 of the pupils who gave freely formulated wishes, stated precisely this demand. When a colour photograph of a house is compared with the same photograph in black and white, both the pupils and the teachers preferred the colour photograph. The same was true for two different versions of the drawn house executed in black and white with a corresponding picture in colour. A colour photograph of a great tit was more highly assessed than the corresponding black and white photograph. Only for the subject "cat with kitten" was it unimportant for both the investigation groups whether it was a photograph or drawing, in colour or not. Possibly this can be explained by the fact that cats very often have black-grey-white fur.

Of the pupils who gave freely formulated wishes, approx. 17% considered that the pictures should be "colourful", have "clear, bright colours" or something similar. A comparison of the significance of the main features of the pictures tested by means of semantic differentials admittedly show that colour strength to a certain extent meets with a positive reception, but this applies to a greater degree to another feature of the colours. It becomes evident that in half of the cases tested, those pictures most highly assessed had significantly more realistic colours than the less positively received ones and that in 60% of the tests carried out significant positive relations were found between this property and the pupil-teacher marks. Pupils and teachers were agreed upon this.

If one is to satisfy both the teachers' and the pupils' wishes regarding colour variable one should (1) present the picture in colour, (2) use realistic colours, and (3) see that objects which in reality have strong, bright colours also are given them in the picture.

The teachers consider that colour plays a more important part in pictures used for stimulation than in those used for information.

Distinctness

The investigation showed th: the pictures to which the pupils and teachers gave the higher marks were in 55% of the cases tested significantly more distinct than those given lower marks. Significant positive relations between distinctness and pupil-teacher marks were found in 40% of the tests carried out. About half of the significant cases belong to either one or the other half of the group of individuals studied and consequently the demand that the picture should be distinct is obviously a common one. All the teachers consider that the distinctness of the picture plays an important part for information pictures, while this feature is considered much less important for stimulation pictures.

Small "refined" style

Another variable which showed significant positive relations in connection with pupil-teacher marks is the small "refined" style. These occur in 40% of the tested cases of which 3/4 came from the teachers. When comparison was made between more or less attractive pictures, significances are found in 15% whereof 2/3 are found among the teachers. The result can be interpreted thus: this quality is given importance by both survey groups, but mostly by the teachers.

"Child inspired" technique

The idea that pictures done in children's special picture building technique are appreciated by pupils of this age gains no support in the present investigation. For of the 3 picture series where so-called "child-inspired" pictures are found, in no case was one placed first, but indeed in one case it was placed last. Of the other two cases the "child-inspired" picture was placed among the 50% least appreciated pictures and in one case as number 3 out of 7. The result for the teachers was on the whole the same, with slightly better placing of the pictures.

It is possible that younger children have another attitude to " child-inspired pictures", but for the age group concerned here, it is of great importance that the form is realistic and lifelike as emerges from the following.

Realism in form

Nothing differed so often in significance tests between appreciated and less appreciated pictures as realism. In no less than 85% of the cases tested the more highly assessed pictures have been considered by the assessors to be realistic to a significantly higher degree. Positive relations between this feature and pupil-teacher marks are found in 90% of the cases. Pupils and teachers were also agreed that this feature was of the greatest importance.

The pictures chosen to represent a simplified/stylized presentation technique were in every case placed by the pupils among the 50% least appreciated pictures. The teachers' estimate was nearly as low.

Practically all the teachers consider that realism plays an important part in information pictures while this feature is less important for stimulation pictures.

Photograph contra drawing/painting

The high assessment which the feature "realism" is given probably can partly account for why the investigation groups are also positive towards photographs.

To a direct question whether they would like photographs or drawings in the book 2 pupils out of 3 answer that they would like photographs. In the freely formulated demands, about 10% of the pupils who have given an answer mention that they want photographs, 7% want drawing/paintings and about 1% give both methods of presentation. In the freely formulated wishes close to 40% of the teachers say they want photographs.

The picture series designed specifically to compare photographs and drawings comprised four pictures, consisting of one colour and one black and white photograph plus a drawing in colour and one in black and white. The latter two had been done from the photograph. The colour photograph received from both pupils and teachers considerably higher marks than the colour drawing and the black and white photograph was preferred to the black and white drawing. On the other hand the difference between the black and white photograph and the colour drawing was not significant.

However, in the two picture series "the great tit" and "cat", the realistic colour drawing bears up well in comparison with the colour photograph. Neither the teachers nor the pupils give marks that significantly differentiate between these different types of pictures. These drawings are considered in both cases by the assessors to be very life-like in form, very distinct and executed in a rather small "refined" style. The great tit was assessed as very realistic while the cat was considered to have quite realistic colours. When choosing pictures for a specific area of application, both pupils and teachers chose almost without exception photographs despite the fact that the majority of these were black and white. However as these photographs were considerably larger than the corresponding drawing/painting no far-reaching conclusions should be drawn from this result.

Illustration of course of events

The results show that a course of events described in a series of pictures is highly assessed and this applies to drawings as well as colour photographs.

Conclusion

If one is to satisfy the wishes of both teachers and pupils when illustrating a Science and Social Studies book, then one should have large, clear pictures, where the subject is presented realistically, both in colour and form. The majority should be photographs, but distinct, realistic drawings/paintings in colour can to a certain extent be an alternative. Courses of events can advantageously be described in a series of pictures.

6.4 Final comments

The result of the present investigation gives the firm impression that teachers and pupils to a great extent are agreed on their assessments, in that what the pupils find attractive and interesting, the teachers also frequently find suitable for use in teaching. However, there are also examples where activities the teachers consider suitable are given a cool reception by the pupils. Teachers and pupils put the pictures in a somewhat similar order of preference, but the teachers most often give the pictures lower marks than the pupils do.