

## Excerpt from: Intelligent and Effective Learning based on the Model for Systematic Concept Teaching

*Practitioner's Manual for the Systematic Concept Teaching (SCT) Approach to the Prevention and Remediation of Learning Difficulties*

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### From Chapter 11:

#### Case Study 3: Presentation of a repetition and extension of a three-year field experiment.

By Ragnhild Hope Nyborg

The results of the students' performance during the three first years

I have chosen to present the work I carried out by putting the results from the three first years (1976–1979) into a table, cf. Table 1. This table gives an overview of the proportions one can find between the average scores of **four** of my seven students and average scores of the **control group** from the original three-year field experiment undertaken by Lyngstad and Nyborg.

The original field experiment lasted three years (1973–1976) and had a control (12 students) and an experimental group (12 students). It was measuring the possible effects of Systematic Concept Teaching (SCT) for students with general learning disorders in special education schools in Norway and was led by Magne Nyborg and Turid Lyngstad, who published their report of the study a year later (Lyngstad & Nyborg, 1977).

The individual scores for the four students in my study: Lisa, Olav, Nils, and Andreas, deviated only slightly from the average scores for this experimental replication study; i.e., the standard deviations would have been minimal if they had been calculated. The reason why I did not include all my students in the comparison with the students in the control group in Lyngstad and Nyborg's field experiment is commented later in this Case study right before the description of those who were not included.

Previous experience with the teaching program – based on the application of the Concept Teaching Model (the CTM)

Part of the references and comments to be found in this brief resume are associated with my previous work based on the Concept Teaching Model. It is undoubtedly necessary for the reader to know that I had previously implemented a similar work over four years in order to determine how I could allow myself to focus on what I have managed to promote of flexibility, the conscious verbal form of expression, the ability to comprehend and see causal relationships – in brief the students' concept usage – as the basis for the teaching concerned. The reader can find this work described

in part C of Lyngstad and Nyborg (1977) report on a three-year special educational field experiment.

### Assumptions regarding more usual types of special education programs and Table 1

It was very important for me, in repeating my previous work, to build on my past experiences and the certainty of positive results from the field experiment.

**Table 1.** The results from RHN’s three-year replication study compared to the result of the Control group in Lyngstad and Nyborg’s three-year field study, cf. below

This table shows the results from my repetition or replication of the three-year field experiment undertaken by T. Lyngstad & M. Nyborg (1977). As mentioned above, four of my seven students in this replication study (SR = Students in RHN's study) were observed and tested at the end of the first three school years. The average scores in the SR-group were compared with the average scores of the Control Group in Lyngstad & M. Nyborg’s mentioned three-year field experiment.

*P = 8 (cf. 1.1 Concept test, verbal R) means that the average scores for the SR-group were 8 times higher than the average score of Control Group 1.*

LEARNING AND TEST AREAS	Test after 1st year (P1)	Test after 2nd year (P1)	Test after 3rd year (P1)
1.1. Concept test, verbal R	8.00	6.07	
1.2. Concept test, non-verbal R	1.85	2.14	
1.3. Concept test, selective identifications	3.80	3.80	
1.4. Concept test, selective discriminations	2.37	1.46	
1.5. Concept test, selective generalizations	5.02	4.88	
1.6. Concept test, total scores	3.26	3.53	
2. Concept usage in more complex tasks <sup>1</sup>		6.00	4.06
3. Flexibility test	12.27	10.10	
4. Letter identification		1.38	1.27
5.1. Reading, self-made test battery		2.26	2.17
5.2. Reading, standardized test			
6. Dictation, letters, words, sentences, own test battery		2.86	1.65

<sup>1</sup>. (ad.2): The tests for the 2nd and 3rd years are not comparable.

7. Number identification, number dictation, handling of numbers, etc.		2.28	1.68
8.1. Quantity concepts		2.91	3.30
8.2. Relations between quantities		5.53	5.41
8.3. Operations with quantities		3.94	4.29
8.4. Measurement units + ones/ tens <sup>2</sup>		5.41	4.87
8.5. Total scores, 8.1 – 8.4		3.75	4.28
9. Total scores, mathematical language		3.28	3.08
10.1. Standardized mathematical test for the middle of the first grade			
10.2. Standardized mathematical test for the end of the first grade			

This helped me to hold onto the individual student's possibilities for development, regardless of the specific difficulties each student may have had. As can be read from the table above, the results have come forth through three years' exact and concept-directed teaching (SCT) in which all the students – regardless of individual variables such as age, gender, and measured IQ – achieve top results on all types of tests.

The common element for this group of children was that they had learning difficulties. The reasons for this varied, but the effects of having learning difficulties was quite similar. We are talking about children who couldn't manage to acquire learning the syllabus in the usual manner. Based on my previous experience as a teacher for similar kinds of children, most of the effort in education goes into "normalizing" the child – something I myself attempted for many years by offering children the multitude of various experiences I presumed they had not received during the first seven years of their lives. The set-ups/ the arrangements all varied in regard to ingenuity and creativity. But what they all had in common, was that they each provided far too little in positive outcomes, seen in the light of the students and the teacher's "all-around" ideas and efforts.

After the mighty efforts resulting from these creative set-ups using all kinds of plausible, and surely also impossible combinations, the unfortunate result was that I had to turn to the simplified form of teaching still designated as "special education." This simplified form of instruction was best characterized by requirements for extremely slow progression; i.e., all presumed difficulties (e.g., consonant combinations in the early teaching of reading) are removed.

Teaching based on such simplification easily loses perspective. Such an approach presumes that the students concerned "lack the ability for transfer of learning," with the learning inevitably becoming characterized by the lack of opportunities for just such transfer.

My experience was that traditional special education teaching for children with general learning difficulties built on the belief that, since the student was assumed to possess little intellect, one could not count on it being probable that he or she would be

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<sup>2</sup>. (ad 8.4): Ones/tens are only for the 3<sup>rd</sup> year.

able to understand very much. The teaching was therefore characterized by an endless series of exercises and training based on separate individual tasks.

I would suggest that teachers have often imported these mindsets of the students' general expectations to fail. The teaching then takes on the character of "a self-fulfilling prophesy" (Rosenthal & Jacobsen, 1968) – the students do not possess much intellectual capacity and so they cannot, therefore, understand what "we" (representing the normal) say to them – the one who does not understand, does not get his/her intellect developed either.

One of my students expressed it like this:

You know what? Before, when I went to the other school, I thought I was so stupid that I could not do anything. And that is how it became; in the end, I could not do anything.

### Dealing with myths regarding students with learning difficulties

As a result of many years' of own experience with SCT, in particular an earlier "pilot program" using the Concept Teaching Model, and my knowledge of the excellent opportunities students' could have to develop their learning capacity by receiving Systematic Concept Teaching (cf. the three-year field experiment undertaken by Lyngstad and Nyborg, 1977), I was able to put aside preconceptions of rigidity, limited learning capacity, cementation of aptitude structures and "a ceiling" on development possibilities as a useless way of thinking.

I have unfortunately often met individuals who believed that students were "vessels" capable of holding only a certain amount of learning. The following conversation a few years back serves to illustrate this attitude:

NN: "I cannot understand why you work so hard to teach the small ones. They are going to go to school for at least nine years."

Myself: "Do you think that students' possibilities to learn are so limited that the little they can learn should be portioned out in nine parts in order for the children to have something to do each year?"

NN: "Yes, of course, this is how it is!"

I would like to ask the reader to look at the table shown above one more time. Then think about what it means to have "flexibility" 10 to 12 times greater (to be able to flexibly direct one's attention by means of BCSs from one BCS to another, and so on) than another child with the corresponding age, measured IQ, and school progress measured in years. It is certainly fair to infer that the possibility which this greater flexibility creates, could be traced in behavior, learning capacity, and personal growth and development.

I hope through the description of this case study to be able to show how important the improvement of learning concepts, flexibility, and practical skills that this experiment resulted in are to all students.

I also hope that I will be able to get the reader to understand that when a teacher meets a student with a learning difficulty, the student's developmental possibilities depend in no small degree on the teacher's expectations of that student, and on the teacher's insight into basic learning processes.

The great differences between the four target students in my Case study and the students taught according to traditional special education teaching methods, were, in my opinion, dependent on the teacher variable to a greater degree than is usually recognized.

Since teachers through training/ courses/ studies, etc., are given opportunities to change themselves, it can really mean a lot for children with general learning difficulties that the teacher is willing to change his/her way of teaching.

We certainly know that children with such learning difficulties can to a significant degree get help from well-adapted Systematic Concept Teaching. Neither is there any reason to doubt that flexibility and linguistically conscious use of concepts are important factors in students' opportunities to make use of their schooling.

Rigidity, lacking the ability to concentrate and direct one's attention, and the lacking opportunities for transfer of learning are each an inhibiting reality for children with learning difficulties. Many of these functional disabilities can, however, be overcome, and the previously functionally disabled child can behaviorally and in his/her learning opportunities become amazingly like any other child who can develop under the right learning conditions. A teachers' training student in practice in my class said that many of her fellow students got angry with her when she talked about the students in the class: - You must not do this! Do you think you can change the Gauss (Bell) curve?

When I began teaching in special education schools 20 years ago, there was a lot of talk about something called "pseudo- debility." This was supposed to mean that a student who really utilized the teaching within this type of school was not "mentally handicapped after all."

One of my students expressed it like this:

When you say that we have a learning difficulty, then this is not right anymore. A difficulty can be overcome, well then? Then we can say that we have had a learning difficulty.

I hope that the reader bears this in mind during the further reading. Otherwise, I am afraid that it may be difficult to comprehend that it is the teaching that changes the students' learning prerequisites. I have unfortunately often heard teachers say about students benefiting from an excellent teaching program: "They were not so backward after all" – as if this was about some trick on the part of the students or the teacher.

#### A description of the students taking part in the teaching program

Basic data: The students' ages varied at the start of school from 6.10 to 8.11 (with an average age of = 7.10). During the first fall, they were tested with WISC (a General Intellectual ability test) and Terman Merrill (a General Intellectual ability test), among other measures. The results varied most on the WISC scale, ranging from 51 to 79 IQ points. On Terman Merrill the results varied from 64 to 76 (with an average of = 70). In order for the reader to be able to remember each student more easily, they are given a fictitious name.

**Lisa**

"Lisa" was 6 years and 10 months old when she started school. She had Down's syndrome. She was small and chubby, with typical Down's facial features, poor muscle control with strongly over-elastic joints. She had particularly poor fine-motor skills. She talked well, clearly and distinctly, without pronunciation mistakes. She understood what others said, even if they did not address themselves directly to her. She could not draw, but she scribbled down something resembling handwriting.

When she was followed into the classroom, Lisa was told that she was here to enjoy herself, play, draw and paint. "I have started school to learn to write", said Lisa. She knew the names of four to five colors. She could not count, not even one to one counting. Lisa had gone to a good pre-school, where she had been well accepted.

## **OLAV**

"Olav" was 8 years, 2 months old when he started school. He had lived for two years at an institution for children with cerebral palsy. During the last year, he had received individual lessons in, among other things, "preparatory reading and mathematics training." He had been so "difficult" that it was considered impossible to teach him together with the other children. When on the first day I asked his mother if there was something she wanted to tell me, she smiled and said that he was challenging and restless. He was noisy at home, too. Since Olav was one year older than the others, he was, on his mother's wish, taken into what was called "the reading group." (This was a group of students that the school's speech therapist had asked me to teach to write alongside the beginners' group for which I otherwise had responsibility. There were in the end 6 students in the "reading group" – which by the way turned out to be very successful.)

Olav was thoroughly loud and dominating. He had some small articulation problems and a slight tendency to stammer. He wrote his name with squarely formed letters. He could count to 119 but did not have any conceptual basis to do mathematical sums. His parents very quickly expressed great satisfaction with the Systematic Concept Teaching program. His mother herself pointed to the fact that the ability to count got in the way of doing sums. Olav could tell the time, and he could count to ten in English. He did not know any of the lower-case letters of the alphabet.

## **NILS**

Nils was 7 years, 7 months old. He started in the class about three weeks after the others. He had been a student in a regular first-grade class at his neighborhood school. Nils seemed "normal" when first meeting him. He talked openly in an adequate manner, and he seemed immediately so quick that I wanted to look into whether he could benefit from the work in the "reading group." (This work included analytic coding of letters by means of Basic Conceptual Systems and related Basic Concepts directed primarily at the teaching of reading").

During the first lesson, Nils showed a total lack of calm, which he continued to show for several years in all situations in which new learning was to take place. Hyperactivity is usually the professional term used. He decided the case himself by very determinedly declaring that he was not going to learn to read until he was 8 years old. "That's a deal then," I answered.

Nils is a boy with severe deprivation damage – recently diagnosed as a "borderline child." After a couple of years at a children's home and two years at a foster

home where he was treated as mentally disabled, he arrived at his present foster home. Then he could say two words: yes and no. He walked with difficulty on flat floors; a door threshold was a hindrance and stairs were insurmountable.

During the first three weeks, Nils was very "meek" (the children's home syndrome). After he had a conversation with the foster parents and the school found out that he was going to continue at our school, he became as restless.

He has given a touching description of how it felt for him to participate in a structured Systematic Concept Teaching program. "It is so good to be here with you because you give the right homework." Some days later he elaborated on this saying: "The other miss did so many other things on the blackboard at once. I did not understand it. It was just a mess. You teach us things one at a time, you do, and then it all becomes so easy." (He referred to Shape such as straight lines, and various positions).

What Nils described as "just a mess" had led to a complete breakdown of his behavior as well as his drawing ability which he had otherwise mastered very well. This breakdown led to the transfer to a school for students with special needs. Nils could count to twelve, without relating the numbers to objects. He possibly knew the letters in his own name, but this he did not *want* to demonstrate.

## ANDREAS

Andreas started school 1 ½ years before the others. He was 8 years, 11 months old when he first joined me as a student in the "reading group." Here he distinguished himself in two ways – he talked very slowly, and he was a very sharp observer of small details like changes in tone of voice, facial expressions, etc. Except for the first three lessons which I had with him in the "reading group," he roamed around quite a lot from group to group. In his own group, there was a student who dominated him completely, both physically and verbally. After a few weeks, he declared very strongly that he wanted to be in our class, as it was a quieter group in which to work. After trying this out for a few weeks, the set-up was formally approved by the parents.

Andreas was spastic, but this did not arise from birth damage. When he was one year old, he had a brain hemorrhage, and at the age of two years (because of this weakness), a significant case of bronchitis and a dangerous case of pneumonia that nearly proved fatal. His mother says he had to learn to walk three times over. He appeared to experience a setback as a result of these illnesses and consequently learned to talk very late in life. He had received speech therapy treatment with excellent results. He had no pronunciation errors, but he did speak with a slower rate of speech than was typical. As a result of this, Andreas was often interrupted by people finishing sentences for him. When he became very angry, stressed or anxious, his speech could become blocked. Andreas had received ordinary reading and mathematics teaching. He did not know the letters of the alphabet, but he could count confidently to the number 6.

These four students fulfilled the criteria set up for the experimental students and control students in the three-year field experiment mentioned earlier. They were on average a little younger, and their average IQ was approximately similar. Their behavior and general capacity were comparable to students usually found at the beginning of school at the special education schools (In Norway at that time). They had one unique advantage, even though two of them did have rather significant behavioral issues, and one of them was full of anxiety – they wanted to and could speak when they experienced something meaningful.

## **A brief description of the other students**

During the first months, I had another girl with Down syndrome in the class. She appeared to be selectively mute. She was very good at carrying out all the tasks she was given, but she utterly refused to speak at all. (At home she did speak, and after a few weeks, her mother noticed a significant improvement in her articulation and pronunciation.) After about three months she was transferred to another group of students where she, together with two other children, received a corresponding Systematic Concept Teaching program appropriate for their linguistic level.

### **ELISABETH**

When the girl mentioned in the previous paragraph was moved to another group, "Elisabeth" took her place in the class. Elisabeth had continuous small epileptic seizures, sometimes interrupted by major seizures. She took part in the study during the first spring, but due to long-term stays at The State Centre for Epilepsy, she was eventually taken out of the study itself. She, of course, continued to receive teaching in line with the others in the class and greatly benefited from the structure, concreteness, and continuity. When the attacks lessened in frequency, she functioned well with the rest of the class. She was 8 years, 4 months old when she began the class.

### **JØRGEN**

The sixth student, "Jørgen," arrived in March. He was incredibly disillusioned about his own learning possibilities. This especially impacted his ability to learn to read. It had been tried, but it did not work. He was regularly very distant. Once during the first week, after I had read aloud a page from a book, he exclaimed: "Why are you reading in English?" When I denied doing this, he said desperately: "Yes, but I could not understand anything!" Jørgen was 7 years, 5 months old when he was transferred to our school.

### **MARI**

Mar started in my class a year after the other students. She had attended the school's pre-school group for several years. She first started as a student in Norwegian lessons together with my youngest readers. At her parents' request, she was transferred as a regular student in the group at Christmastime. She had received teaching based on Systematic Concept Teaching in her original class. Mari had an unusually uneven ability profile. Her language, both for articulation and grammar, functioned at a high level, but her motor development was significantly impacted by a lack of muscular control – both fine and gross motor skills were lacking. She was 7 years, 11 months old on becoming a full-time student in the class.

Both Jørgen and Mari had specific difficulties tackling parts of the learning process. Both of them managed to learn concepts in such a way that they have managed to compensate for their special learning difficulties.

## **The group composition, size, and staffing**

I had a long experience as a special education teacher, and my impression of this group of students was that it did not differ much from other randomly composed student groups that you would find in individual special education schools. It took about 1 ½ years before the class composition was stabilized in the final form it took for this project. This is also a regular phenomenon in this type of school; the only thing that could be called unusual is the size of the group, which was somewhat larger than usual at these types of schools. Through the course of the years of the project, the class had an assistant teacher, a trainee, an authorized social educator and a conscientious objector (teacher) as extra staff resources in addition to my full-time teaching post.

The group received a lot of visiting students and teachers who were in the process of educational training. The students started asking early on why people came to visit the class so often. They were told that the people came to learn how to teach in the same way that I did. The students were proud that the way in which they learned could mean something for other children with learning difficulties.

Jørgen was especially keen to say to all those visiting that this was an important form of training.

"It is so easy to think that we are stupid, but actually it is a learning difficulty that we have," he says.

During the last years at the school, the class had its own art teachers and, part of the time, also in gymnastics and swimming.

### Overview of the Basic Conceptual Systems (BCSs) and related Basic Concepts used in teaching during the first three school years

It would take too long to account for how the various Basic Conceptual Systems had been integrated into one another as they were learned. But it speaks for itself that, if the students really did have a use for the concepts they learned, then they would be able to use them in various different forms to learn skills inherent in the school's curriculum and goals. For some readers, it would perhaps be useful to give a brief overview of the concepts taught during the first three years. I have divided the overview into "semesters." Readers who, related to their own teaching situation, are already familiar with the general content of BCSs and are looking to find out how to build a concept series and sequences, can skip over the following pages.

**Table 2.** Basic Conceptual Systems and Basic Concepts taught during each semester throughout the 3-year Project.

#### The First semester

Basic Conceptual Systems	Related Basic Concepts
COLOR	: blue, red, yellow, green, brown, black, white.
SHAPE	: as a straight line (alternatively straight-lined), curve, round, straight-lined (the students' spontaneous transfer to describe triangles and squares), heart, star. (A bit later in the year) triangular, square-shaped.

SIZE	: big / large, small, bigger / larger than, less than, biggest / largest, smallest.
POSITION	: vertical, horizontal, sloping / diagonal.
FUNCTION	: used to write with, draw with, drink from, eat with, sit on, sit beside.
TASTE	: sweet, sour, salty, various fruit tastes, good, bad.
LENGTH	: as for size.
HEIGHT	: as for size.
PLACE	: up, down.
DIRECTION	: upwards, downwards.
QUANTITY / NUMBER	: After the first week in which learning the work form and terminology proved enough for the students, all the number concepts were learnt in parallel and in combination with other conceptual systems. Big / large-small numbers, making a number bigger / larger-smaller, making a number bigger / larger one by one, making a number smaller one by one until an empty group, group, see a number in relation to other groups, in relation to size. Exact number concepts, 1, 2, 3, 4, 5.

### The Second semester

SIZE	: next biggest / largest, next smallest (in size, length, height)
PLACE	: first (in a series), last (in a series), between, up in, inside, in, on, beside, on the left-hand side of..., on the right-hand side of..., over, under, highest, lowest.
SHAPE	: angle shape
DIRECTION	: to the right of something, to the left ...
PATTERN	: striped, checkered, dotted, flower.
QUANTITY / NUMBER	: Exact concepts: 6, 7, 8, 9. The concept of " ten" (ten staves, ten groups, ten currency notes, liters as tens in relation to deciliters, deciliters as

	<p>tens in relation to centiliters, meters as tens in relation to decimeters, decimeters as tens in relation to centimeters.)  The "hundred" concept is done in the same way.  The "thousand" concept.  Symbol: a is a symbol for all groups that are similar in that they have the number a.  The writing of numbers (use of the shape concepts)  Symbol for operations + and -, alike in numbers =, not alike in numbers / =.  Size relationships, use of symbols for larger than and smaller than.</p>
CONCEPT USE	: During the first school year all the students received their own reading book. This included names, word pictures, tasks for analysis, and gradually small texts for combined full word reading and sound synthesis.

### The Third semester

SHAPE	: circle, oval, square, rectangle (defined by measuring as a basis for definitions), ball, cube, cylinder, prism.
COLOR	: orange, pink, purple
THICKNESS	: big/large, bigger/larger, biggest/larger. Small, smaller, smallest.
BREADTH	: as in thickness.
QUANTITY/NUMBER	<p>: length, height, breadth measurements.  Use of length units, centimeters (cm), decimeters (dm.), meters (m). Cubic measures, use of centiliters (cl), deciliters (dl), and liters (l).  Use of money (Norwegian), 1 crown (kr.), 10 crowns (10 kr.), 100 crowns (100 kr.).  Transfer of occurrences to mathematical tasks, (addition, subtraction, deciding which type of mathematics should be used).  Evaluating size relationships.</p>
WEIGHT	: as in thickness.
CONCEPT USAGE	: the order (succession), place, height, direction, position, shape/form were all concept systems which were constantly used in all parts of the teaching, so also of course in the case of reading.

### The Fourth semester

MATERIAL/SUBSTANCE	: cloth, wood, cardboard, paper, plastic, metal (iron, copper, steel, gold, silver), fur, glass, ceramic.
SURFACE ATTRIBUTES	: rough, smooth, bumpy.
ATTRIBUTES OF A SUBSTANCE	soft, smooth, hard.
SPEED	: great/little, slow
TIME	: long, brief (experienced time), long, brief (exact time, measured by the clock). Whole hour, part of an hour. Use of fractions.
QUANTITY/NUMBER	: partial groups, part of a whole, fractions $1/2, 1/4, 1/8$ . PLACE SYMBOLICS (previously partially learnt in concept usage and through my pointing it out) Ones, the placement of ones, tens, the placement of tens, hundreds, the placement of hundreds, thousands, the placement of thousands. Figure, one figure, two-figured, three-figured, four-figured numbers. Occurrences/Events (claps, strikes, knocks, the tones of a flute, etc.) Further work on mathematical written language (quick way of writing). Assessments of quantity: too much, too little, left over. Pair, counting in order with 10, 2, 5, 100, 1000.
CONCEPT USAGE	: As previously mentioned. Learning about places, orienteering subjects.

### The Fifth semester

DEPTH	: great/large-little/small, greater/larger-lesser/smaller, etc.
TEMPERATURE	: warm, cold (high, low), lukewarm, boiling point, freezing point
SMELL	: good, bad, perfume, flowers, herbs (various types), types of fruit and food, types of fruit and food with a characteristic smell
ATTRIBUTES OF A SUBSTANCE	: elastic, not elastic, very/not very elastic
WEIGHT	: great/large, little/small, heavy/light. Kilograms (kg), hectograms (hg) and grams (g). Own weight, weight assessed in relation to volume.

QUANTITY/NUMBER	: Reading a thermometer and a weight scale. Use of time and place concepts in order to learn how to tell the time (the clock) completely. Fractions used in learning tones (reading music). Serial counting. Multiplication, the two-times table.
CONCEPT USE	in problem-solving, ordinary orienteering, value assessment, and as an interpretative and comprehension base for reading and writing processes gradually filled the students' timetable.

### The Sixth semester

CONCEPT APPLICATION	: as a basis for building up class concepts in the natural sciences. Various animals, plants, trees, the nearest environment. Use of various senses. What do we perceive through the different senses? (A fine combination of making the students aware and a quick run-through of all the previously learnt conceptual systems.) Use of concepts by learning the rules for writing and the pronunciation rules for reading.
QUANTITY/NUMBER	: Ordinal numbers. The co-ordinate system, series, columns, lines, rows. Multiplication, 10, 5, 1 and 0 times-tables. Partial groups – alike in quantity / number, the conceptual base for division. Measuring units, the conceptual base for understanding decimal numbers.

### A short description of parts of the teaching of reading

I would like to start this section by stating what should be obvious. The reason that I emphasized Systematic Concept Teaching (leading to concept learning) during the first years at school in my work with children with learning difficulties is that they needed these concepts to grasp and comprehend what they were experiencing. Without the chance to comprehend, teaching reading becomes a slow and time-sapping process without real opportunities for intellectual stimulation. When the students had acquired the appropriate concepts with which to grasp (comprehend), they had the opportunities and tools to make use of reading training similar to that which the other students received.

When the students had acquired the appropriate conceptual basis for learning, it was entirely possible for them to participate actively in all the analysis and synthesis processes necessary to learn to read with comprehension. From the first day at school, they learned "to read" their own and the other students' names in their class. All school possessions had been labeled with the students' names. Every time worksheets or books were handed out, the class would read all the names. After a few weeks, they recognized all the names of their classmates and several of them began to write the names. I formed the basis for this idea from Psychology and Teaching of Reading (Schonell, 1964).

The students in the "reading group" received self-made reading books in October; the youngest got theirs at the end of January in the first year of school. I drew a picture of each student and had these drawings copied, some of them in miniaturized form. These drawings were used as a basis for texts such as: Here I am – My name is Lisa – Here is Nils – Here are Andreas and Olav – Do you see Elisabeth here? – Can you see Jørgen? – Yes, I can see Jørgen. The text was written with a thin permanent black felt pen on Bristol paper in an A-5 format. Each page was hole-punched and put into a small folder. The students became very fond of these books. They read for younger and older children, for parents, siblings, grandparents and other attentive relatives. There were a lot of very thoughtful people out there with which happy children could share their newfound knowledge. Other teachers who have used this self-made reading book approach as a base for the early teaching of reading, have used photos instead of drawings.

The time used for this form of whole word reading should not exceed 2–3 months. After that, the first speech sound analysis with the follow-up synthesis began. The further reading process then consisted of a combination of whole-word and sound synthesis reading. The first words that students read were often words for class concepts such as smoke, ice, sun, etc. When these words were read in a class concept context, this led to many fun experiences. When Mona from the "reading group" held a piece of ice in her hands, she exclaimed radiantly: "I did not know that ice was so cold." The year after "my" students had learned to read, Nils said one day: "Now the students in S's group are learning to read smoke, I can sense it from the smell!"

Besides the tasks in the reading books, the students read "spontaneous texts" written on the blackboard. Below are a couple of small examples of the types of texts I wrote. Any objects that the students read about were either placed on the teacher's desk or, after a while, in various other places all around the room.

First there was a message showing who was to read:

*Let Nils read.*

*Lisa, can you see a sieve? (see and sieve were read through sound synthesis (phonetics))*

Lisa stretches her neck, catches sight of the sieve and answers yes.

*Does Lisa see a sieve?*

YES                      NO (Put a cross under the right answer)

All the students read the question and asked Lisa if she saw the sieve.

*Let Elisabeth read.*

*Nils, can you see a seal? (a model) Does Nils see a pilot?*

YES                      NO

Such types of tasks were varied within a reasonable work area. As more letters were learned, the task given became more comprehensive with challenges to "find, take, fetch, let, get, give, etc." After a while, the questions were printed on a sheet of paper in order for the students to keep and review for a specified period of time. The students worked together; the tasks could not be solved without real cooperation. They learned to carry out various tasks, receive messages, etc., from each another.

This form of work was so well learned that it still characterizes their work at school. They are used to the idea that what others read out loud concerns the whole group; this makes it simple to focus on reading texts. Reading material engages them all, either from feelings or knowledge.

When the students had learned 6–7 letters, they got their first printed reading book. I chose Sigrun Vormeland's book: "With A and B to Alibaba" (A Norwegian ABC). The students discovered that they could read many pages of the book entirely by themselves. This was a huge victory, especially for the more skeptical of them – those students who had wondered if they really could read. Nils and Jørgen had clear conceptions that reading was incredibly difficult, and not that the fun and engaging tasks they were solving were "proper reading."

As the students gradually learned more letters, I hung a letter poster over the blackboard that contained both capital and lower-case letters. When all the lower-case letters had been learned, they then focused on the capital letters. They had learned to recognize all the lower-case letters with my help and also to analyze them, using shape, direction and position concepts. As they were learning to write the capital letters, they all managed to carry out this same analysis on their own. After all the letters were acquired, the self-made reading book was filled with songs, rhymes or knowledge material about animals and human beings. Thus, the reading book became functional in music and other subjects, too.

When the students had learned all the lower-case letters, we changed the reader. They began using the Fabritius reading book: "I found, I found ...." After that, in the middle of the fifth school year, everybody began reading "Let's come and read," 4B. (A Norwegian book for reading that was often used previously in schools).

### A brief description of parts of the mathematics training

After Christmas during the 1st school year, all the students received two sets of textbooks in mathematics. These were the textbooks "Mathematics without numbers" (Published at "Det Norske Samlaget" (The Norwegian Associated Publishers) and the book that was at that time called "Elementary School Mathematics, (Dreyer publisher). The books were used for elaborating, maintaining and practicing the concepts they learned in their regular concept teaching lessons. The combination has functioned satisfactorily in all ways. It provided the students with the opportunity to learn to understand, before calculating using number symbols. It has become clear that they still master doing sums in their heads and problem-solving style tasks just as well as with formal written/printed problems (calculations).

When in the 3rd grade I chose the algorithm for multiplication, I chose the traditional form using the multiplier number first. In my opinion, this worked well for the students' thought processes. It helped them to turn their attention to the number which was to be multiplied. But just as I chose to use the word "group" instead of "amount," I did not see this as being particularly important. The meaning of all the mathematics training at elementary school was to enable the students to solve practical mathematical tasks they would meet in their independent adult lives.

The point of view I have presented was well described in Olof Magne's book: "Learning mathematics in elementary school" (Magne, 1980). All the students were able to work at their respective individual paces in their textbooks. Some were using books typically introduced at the start of the 3rd grade, whereas others were working in books usually presented near the end of the 3rd grade. They used my textbooks as a basis for comprehension, for conversations, and cooperation in learning addition and subtraction. Otherwise, additional books were not felt to be necessary. The only learning aid students used was a calculator. They used these to check their answers.

"The best calculator is now my head," says Lisa. "It works so much quicker in there."

They were now able to use weight measurements, length measurements and money sums in practical situations when necessary. They knew all the measurement units' areas of function through instruction in practical concept acquisition. The students have through the years used all kinds of available objects to promote the learning of concepts. Unifix cubes were fun to use for large quantities, but otherwise, toy animals, models, money and measuring instruments were much more interesting to use. I have found some Montessori material and Cuisenaire blocks very useful as part of the exemplification basis for multiplication.

All Concept Teaching had been done with the students in a group setting. When the students who got the furthest ahead in the textbook approached a problem area, I gave all the students the conceptual base which would enable them to solve the calculation problems. This gave the quickest students the possibility to move on further in the textbook while providing those who worked more slowly and needed longer to grasp the concepts the time they required to learn the concepts before using them to solve problems in their own textbook. The conceptual base established during the previous years had shown itself to be very useful for all types of calculation tasks given to the students during the first three years in a regular primary school. Besides, the students could calculate using decimal numbers and simple fractions (in practical daily life, as used by us all).

To study the transfer value of the decimal fractions, I recently gave Lisa the following task: read and explain the meaning of every figure in this numeral: 3.785 kg (kilograms). Lisa first read the numeral and then said: " This means that there are 3 whole kilos, 7 tenths, 8 hundredths and 5 thousandths. They must be thousandths, mustn't they?" Neither she nor any of the other students had ever been given any direct teaching on the concept of "thousandths."

### "Orienteringsfag"

"Orienteringsfag" is a Norwegian term used earlier in Norway to denote a school subject that included and integrated teaching materials/themes from humanities, social sciences and natural sciences related to learning in the close surroundings. This kind of integrating school subject does not exist anymore in Norway.

In the beginning, all concept teaching is orientating. This helps the students to integrate new information by emphasizing selective generalization, in which all kinds of experiences are collected, mentioned and assessed as similar, or not similar.

The possibility to change flexibly from one Basic Conceptual System to another is a precondition for being able to learn something in the continual interaction with close and, gradually, more distant surroundings. Since concept learning – or the kind of learning which can only occur in direct contact with the surroundings, without intermediate/explanatory illustrations – is the main purpose of all teaching, it is basically self-explanatory that the students become able to classify their surroundings according to what Vygotsky (1975) calls "scientific concepts." This provides opportunities to comprehend human beings, animals, trees, plants, insects, etc., all as parts of a total living environment. As the teaching the whole time is directed at cause-effect relationships, it is also possible to analytically code special characteristics of, for example, a certain bird, and thus understand that this bird, with its traits and life cycle,

has its special place in a complete living environment (biotope). Being able to understand that spoken, written, and read language is an expression of human communication through symbol functions, “representatives” for the real things, occurrences and feelings, it is not hard to understand the use of quantity symbols, graphics projections, maps, and timetables, etc.

To be able to profit from teaching in the natural sciences, health subjects, geography, and history, it is a precondition that a solid conceptual base has been acquired. Simultaneously, as teaching in “orienteringsfag” continues, the experience and conceptual base are expanded into larger and larger circles of knowledge.

An introduction to regular elementary school subjects – a special form of integration/inclusion giving a real feeling of being “integrated/included” into the larger school community

In the third grade, several of the students asked if they could start to learn their multiplication tables. They were aware that all third-grade students had begun learning this. Since the concept base, by teaching number concepts as thoroughly as possible, also included many tasks in which the students added groups with several similar numbers, it was quite natural to grasp the opportunity to start teaching multiplication and the multiplication tables.

The order and progression for the third grade have been accounted for previously. During the fourth school year, they learned the multiplication tables for 3, 4, 6, 7, 8, and 9. At the start of the fifth school year, they started to solve individual pieces of work. These were first set up as “fractions”:

$$\frac{18}{3} = 6 \text{ and later on } 18 \div 3 = 6$$

When they performed mental calculations or calculations on the blackboard, they often solved the tasks like this: If  $8 \times 6 = 48$  then,  $48 \div 8 = 6$ .

Just as it was natural to start with multiplication tables in the third grade, so it was, of course, natural to begin English, geography, natural sciences, history and social sciences in the fourth and fifth grades. All the students used regular elementary school books. It was my part of the work to arrange the learning materials conceptually and practice-wise so that the pup students would learn and remember what I had taught them. They were, by the way, very good at using television as a medium to learn from; utilizing both nature documentaries and other informational programs for further learning.

The speed of learning was probably somewhat slower than in regular elementary school; this was necessary when learning the conceptual base was always the main and essential part of the learning process. I used the material recommended in the national curriculum, as well as local materials and personal adaptations due to the area and type of school.

In the teaching of English, I had mainly emphasized conversations and reading. The written part of this work moved more slowly, with less learning effect. The fewest will not be able to write anything very good, I reckon. As all the students were focused on taking part in conversations, repeating words I had taught them and so on, it created a natural situation in which to teach the students simple pronunciation by way of

imitation and, where this was necessary, with conceptually directed instruction in the processes of articulation and intonation.

In conversations and plays, it was a lot of fun to translate the names of Basic Concept Systems such as color (Norwegian: farge), size (størrelse), shape (form), number (antall) in concept learning "into English." Reading English and New Norwegian (an alternative Norwegian language form) had made the students more linguistically conscious than I had previously thought was possible for them. This made it easier for them to turn their attention to what the words actually meant. I think that it was much easier for those students who had often been afraid of making a fool of themselves, to be able to comment about a word in a foreign language: "I do not understand that word. What does it mean?"

We regularly talked together in the class about going to an individual school for special needs teaching. The students were very focused on the terminology being used. They spoke of themselves as children with or, children who had learning difficulties. None of them wanted to transfer to the regular school. "I do not understand why I should change schools; I learn something here," said Jørgen. At the same time, they paid close attention to what their friends of the same age who were attending regular elementary school were busy with and had learned. They understood that the speed of learning was different. "But this does not matter, it is fun to think of everything we have left to learn," said Andreas one day. He had an older sister at the secondary school.

### *Self-awareness – body awareness*

There was a kind of trend in special education at that time to focus a lot of attention on students' so-called "bodily awareness." Since awareness cannot function without "understanding," I included work on this kind of personal growth in the general Conceptual Teaching/learning. Words like float, sink, have balance, etc., acquired a greater conceptual content when the students themselves carried out activities such as cycling, jumping, climbing, running, skiing, diving, swimming, scuba-diving, etc.

Achieving good skills in physical education fields is enriching and strengthens self-esteem. Anyone who has herself or himself been a "clown" in the gym or has never learned to sing correctly knows this – this limits this part of the field of human consciousness. Most of the students were markedly clumsy at the start of school. They were definitely not good at anything to do with slightly advanced body control. Now they can ski, they can cycle (everybody except Andreas), they can swim (Olav, Nils, and Jørgen recently swam 1000 meters to get their thousand meters badges), dive, use apparatus in gymnastics, follow instructions, warm up and cool down, take part in folk song games, ball games and much more of the things that make life lighter and more fun. And in the middle of all this, they all knew what is up and down, back and front in terms of their own bodies. They managed to find out which joints were hinged and which were ball joints and why it was like this.

### *Social consciousness – moral development*

The students in the group gradually developed a positive type of sociality and morals. (They had, by the way, just like other children of the same age, been concerned with religious issues, thoughts about doubt and faith, the existence of God, etc. Some of

Jesus' allegories went straight into their own life situations, and this they never failed to mention.

However, let us move back to the starting point. Since the students had always been taught in such a way that made them aware of parts of the learning process: Why is this so? - How could this happen? - What's this from? etc., it does not take much time before they began asking the same questions about themselves and their own school situation. They continued to be somewhat concerned with questions associated with having a learning difficulty: "When this is overcome, would most people think of them in another way even if they continued as students at a special education school? They were also very concerned about other children's' situations: children in underdeveloped countries really concerned them. They felt sorry that these children did not have the same opportunities for schooling as they themselves had. Regarding this point, they were completely aware of their own development at school. They all knew that they had changed a lot and that a lot of the change was related to their own "learning to think," as they expressed this.

Olav gave a good example of how "it" felt, being able to think. He often smiled at me and said: "I understand what you have done. You have taught us to think."

"How did you experience this?" I then asked.

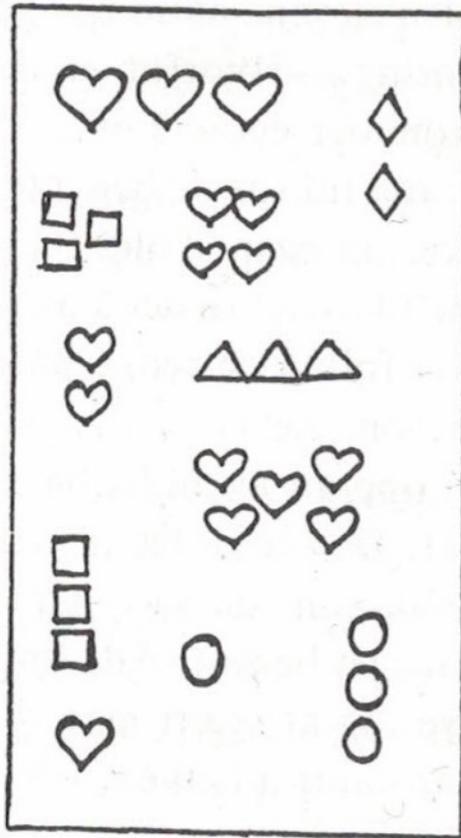
"Yes, you have given us words with which we can direct our thoughts," he said with the greatest matter of fact. "Thank you for the new words you gave us," he said with a smile after recently completing a good lesson on health.

Elisabeth had also thanked me spontaneously after a Concept Teaching lesson.

"Thank you for teaching me all this, Miss. You do not think I am stupid."

Nils and Jørgen were very concerned about all children with learning difficulties being given the opportunity to learn to think themselves. The best thing they could imagine was that anyone with a learning difficulty would learn to master this. Not by avoiding the difficulties but, through insight and understanding, deal with the challenges which could block good development. Jørgen had given me a very direct mandate. Every time I meet someone who works with children with possible learning difficulties, I need to tell them that it is possible to overcome these difficulties. "I can myself decide what I want to think about!"

To conclude this, I would like to tell about something which happened during the first Fall semester this class. To study whether all the students managed to keep their concentration on one instruction and not shift attention, or more rightly, avoid letting their attention be captured by something more interesting, they were given the following task:



**Figure 1.** Task focused on the student's ability to concentration on one instruction and not shift attention.

Directions: "Color all the figures in each of the groups that are similar in having the number three."

Lisa – who was very fond of heart-shaped figures at that time – colored with great enthusiasm all the figures that were similar in having a heart shape. When I told her that she had solved the task incorrectly, she asked quite calmly:

"Why is it wrong?"

"Yes, this is because you colored all the figures with a heart shape. I said to you that you should color all the groups that were similar having the number.

"Oh yes! The number three, that was it! The number three."

Then she solved the task without any problems, and afterward, she could tell me why she was so sure that the task had been solved correctly.

The next day she came swaggering into the classroom for the first lesson, and the first thing she said to me was:

"Miss, Miss, I can myself decide what I will think about! When I want to think about shape, then I think about shape. When I want to think about color, then I

think about color. When I want to think about quantity / number, then I think about quantity / number."

This manuscript has been handed out to all the parents in my class. They have given their permission for the article / case study to be published.

### Postscript

This Case study / article was written in February 1981. During 1981 and 1982, 6 of the 7 students decided to move over to their neighborhood schools. I have described my work in a more detailed way in my master's thesis in special education (R.H. Nyborg, 1983.)

I would like to repeat here some of the main conclusions of my thesis: I had, during repeated classroom visits and conversations with the students, their parents and their new teachers experienced that all the students' social and motivational development had continued in a positive direction. It must undoubtedly be correct to say that their self-esteem had significantly increased. They expressed joy over what had happened to them, and they were glad to be met with respect and goodwill at their neighborhood schools. (R.H. Nyborg, 1983).

### References:

- Turid Lyngstad / Magne Nyborg: Rapport om et treårig Spesialpedagogisk felteksperiment (*Report concerning a three-year special educational field experiment*). Del A-B-C. Oslo: Pedagogisk Forskningsinstitutt 1977
- Magne Olof: Matematikk-inlæringen i grundskolan (*Mathematics learning at elementary school – in Swedish*). Lund: Pedagogiska skrifter 261, 1980.
- Ragnhild Hope Nyborg: Frihet til å lære ved å lære (*The freedom to learn by learning*). Master's degree thesis in special education - SSLH- 1983
- Robert Rosenthal / Lenore Jacobsen: Pygmalion in the classroom. Teacher expectation and Students' Intellectual development. New York: Holt, Rinehart and Winston. 1968.
- Fred J. Schonell: The Psychology and Teaching of Reading. 4<sup>th</sup> ed. London: Oliver and Boyd 1961.
- Lev Vygotsky: Thought and language, New York: The M.I.T Press 1962–1975.