

2 The Influence of Societal Knowledge Traditions on Children's Thinking and Conceptual Development

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My interest is how children generate personal knowledge and thinking procedures through school activities. In this paper I will discuss how forms of knowledge and traditions for thinking are connected to procedures for knowledge generation at school and how this relates to children's concept formation and thinking.

School children's thinking and concept formation are characterized by idiographic personal characteristics, while at the same time reflecting the societal and collective traditions of forms of knowledge and methods of inquiry. The aim of this paper is to study and discuss this relation based on theoretical analyses and illustrated by an example of how the activities in a specific teaching experiment influence a particular child's thinking and concept formation.

The theoretical analysis will deal with Vygotsky's theory of psychic development as the foundation for analyses of both the general cultural and the specific idiographic aspects of children's development of thinking and concept formation.

Davydov in his characterization of Vygotsky's cultural-historical theory of psychic development, formulates this dialectic of interaction very clearly between the collective cultural activity and the idiographic personal activity as the basis for development of individual consciousness and thinking:

One pole of his [Vygotsky's] cultural and historical theory is represented by the concept of the historically developing generic, that is, the collective activity of people (and from this it is only one step to the concept of the collective subject and of collective consciousness). A second pole is represented by individual activity, by the concept of the individual subject and the individual consciousness.

For Vygotsky individual consciousness is determined by the activity of the collective subject. For it is just this activity that in the process of interiorization

forms individual consciousness. As Vygotsky wrote: 'In the development of the child's behaviour the genetic role of the collective changes. The child's higher functions of thought first appears in the collective life of children in the form of argument and only later lead to the development of reasoning in the child's own behaviour. (1987, vol. 3, 141)'. (Davydov 1995, 15)

Vygotsky's theory (1971/74, 1978, 1982, 1985/87) has influenced my understanding and empirical research of school children's personality development within three areas:

- 1) development of the personality/psychic as dependent on education and upbringing,
- 2) the interrelationship between thinking based on daily life activities and formal subject matter teaching at school,
- 3) the methodology of developmental research based on the 'genetic experiment'.

In the first part of the paper different approaches to thinking will be introduced. In the second part different knowledge traditions in school will be presented. In the third part I will discuss the relation between subject matter teaching and how it influences school children's thinking, concept formation and psychic development, and argue for how the cultural-historical approach to understanding knowledge also gives a possibility to understand individual thinking. In the fourth part I will present categories for interpreting specific children's learning activity with a focus on thinking and concept learning. I will illustrate this by presenting a boy's thinking and concept formation in the subject matter of history in fourth grade.

The boy attended a class which was part of a three-year teaching experiment. The teaching experiment was done within the cultural-historical approach of psychology. This experiment was the last in a series of teaching experiments done in cooperation with different teachers over the last 10 years. I have been involved in four experiments, two in the subject of biology and two in history (Hedegaard 1988, 1990, 1995, 1996, 1997, Hedegaard & Sigersted 1992a, 1992b).

The characteristics of the teaching tradition and the concrete experiment are not the aim of this presentation, but to describe the implication of teaching on a single child's learning activity with focus on thinking and concept formation.

Theories of Thinking

Vygotsky's theory of psychic development has influenced and inspired recent theories of thinking. Cultural and social aspects have become more common in the conceptualization of thinking over the past 10 years. There have been different ways of theorizing about the connection between thinking — culture and social activity. Theories about thinking can be found to vary from a conception of thinking as cognitive processes in persons inside the frame of social activity to a concept of thinking as an integrated part of the social activity between persons. I will distinguish four different approaches:

The *first* tradition can be named the 'cognitive situated approach' with Resnick (Resnick 1987, 1989; Resnick, Levine & Teasley 1991) and Greeno (1989, 1997a, 1997b) as key figures.

The *second* can be named the 'cultural daily life approach' with key persons such as Hutchins (1991, 1993), Lave (1991) Lave and Wenger (1991), and Scribner (1990).

The *third* is the 'socio-cultural communicative approach' with Wertsch (1991) and Billig (1991, 1993) as key persons.

The *fourth* tradition is the 'cultural-historical approach' with Vygotsky (1982), Elkonin (1971), Davydov (1977, 1985), Lompscher (1984, 1985) as key persons, and I will locate myself inside this category.

In the cognitive situated approach, thinking is still seen as an individual function of information manipulation supported by the social context. Collective procedures as a foundation for development of thinking are not introduced into this approach.

In the cultural daily life approach, thinking is located inside the existing practice of daily activities: i.e., manipulating a marine boat, tailoring, and milk delivery. This practice can be characterized by procedures for handling daily life activities. People are, according to this approach, socialized into being participants in procedure-guided activities, but they are not seen as modifying or reflecting on these procedures.

In the socio-cultural communicative approach, Wertsch characterizes thinking as a dialogue with historical roots. The dialogue of thinking takes

place between imagined different opinions, characteristic of significant persons in an individual's life. These opinions now appear as part of internal discourses (dialogue). Wertsch is inspired by both Bakhtin and Vygotsky in this characteristic of thinking. In some of his recent work Wertsch connects the discourse in thinking with the narrative form of knowledge in the subject of history. Together with Tulviste (Tulviste & Wertsch 1993) he has analyzed how different historical conceptions about the same event can exist side-by-side at the same time for a person and be part of a personal discourse.

Billig characterizes thinking by the procedure of argumentation with the forms of negotiation, acceptance, rejection, and critique. These forms are found as idealized social practices in the subject area of rhetoric. Billig sees these procedures as anchored in the material world of specific topics or themes of discussion.

Each of these three different approaches to thinking focus on aspects which are important to integrate into a cultural-historical understanding of thinking: the social aspect of thinking and its situated and distributed character being formed by everyday practice as well as the communicative and argumentative character of the thinking process. The integration of these characteristics leads to a characterization of thinking as a process guided by procedures of social practices, either in daily life or in professional life, with dialogue and argumentation as central activities.

There are two other aspects that I find important to mention in qualifying 'thinking', both of which relate the thinking person to the cultural-historical tradition of practice. The first is the content of thinking, in the form of knowledge; the second is the motive for thinking. This has led me to a characterization of thinking as personally acquired procedures of cultural and social activities. There can be qualitative differences between thinking procedures, according to which type of knowledge is available, and even in relation to the same subject area the same person can use different forms of knowledge and procedures dependent on his motivation and the social conditions.

By focusing on content, the procedural aspects of thinking can be related to knowledge traditions, therefore the societal forms of knowledge a child meets in education is important for his development of thinking. The personal aspect of thinking is connected to the problem of how a person's conceived knowledge becomes transformed into active knowledge. This aspect can only be understood if the person's motives are taken into account.

Societal Forms of Knowledge

To understand the relation between the collective and personal aspects of knowledge, a conception about collective knowledge has to be formulated. My theoretical conception is that collective knowledge is generated in daily situations in many different types of institutions by the tasks and problems that characterize these institutions. University is one of the important institutions, although not the only one, but is central in knowledge generation.

Inspired by Juul Jensen (1987), and Knorr-Certina (1981) my hypothesis is that the dominating problems at universities and research centres reflect general societal problems. Knowledge has evolved through the finding of procedures for solving societal important problems in different historical periods. Medicine is a prime example (Juul Jensen 1987). Today we have the information sciences and computer technology as other examples. The procedures for solving problems inside these areas become formalized through scientific methods and become knowledge types that characterize the institutional traditions where they first become formulated. But, gradually, knowledge divorces from the original problem area and through the educational system it becomes a general form of knowledge, no longer connected to the original problem area.

Societal Forms of Knowledge Dominating School Education

If we look at schools in a historical perspective, and use Scandinavia as an example, different forms of knowledge have dominated. Theological, narrative and empirical forms of knowledge can be identified, with empirical knowledge as the dominating form in the school today. When schools became public in Scandinavia in the 19th century, theological knowledge dominated the curriculum. This was because the Scandinavian countries were Protestant countries, with bishops supervising the schools. The Lutheran catechism was used both as a subject matter in itself and as a general reading book.

Theological knowledge and reasoning are not important in form nor content in subject matter teaching in Scandinavian elementary schools today. Neither are other forms of knowledge such as mythical knowledge and medical knowledge and methods.

The form of knowledge found in subject matter teaching in schools today is the empirical/paradigmatic and narrative knowledge with theo-

retical knowledge providing a new way to conceptualize subject matter knowledge.

Empirical/Paradigmatic Knowledge

Empirical/paradigmatic knowledge and methods have characterized the positivistic traditions in natural science and today characterize the fact-oriented teaching in school.

Empirical knowledge focuses on similarities and differences in the surrounding world and on creating consistency in information by using distinct categories that can be hierarchically organized. Paradigmatic methods according to Bruner (Bruner, Goodnow & Austin 1956; Bruner 1957, 1986) transcend the observable by seeking higher forms of abstractions that can combine observable categories.

This form of knowledge presupposes that the world can be represented correctly, and correct representation gives possibility for accurate measurement. Knowledge in this tradition is conceptualized as mental building-blocks that can be stacked up or conceptualized as puzzle pieces which can be collected. According to this approach, knowledge does not change unless the information is wrong. Just as a building is constructed or a puzzle is assembled, one can construct a whole from elements of knowledge that remains the same. This assumption is reflected in many of the school instructional materials (e.g., in history or biology) where the aim is to *represent* as much of a subject domain ('the whole building') as possible. Another problem in the tradition of teaching empirical knowledge at school is that content of knowledge is not considered as a defining aspect of skills and vice versa, therefore subject matter can be differentiated into skill subjects (reading, writing, mathematics, foreign languages) and content-matter subjects (history, geography, biology). On the one hand, skill in the first subjects can be taught without much attention to the content, and on the other hand the content of the other subjects can be lectured and the child's task is to listen and remember, without caring about the methodological aspects (acquiring methodological skills).

The risk of instruction based on empirical knowledge is that the child ends up with concepts and skills from different subject domains which are difficult to relate to each other. Unfortunately, most school-books present knowledge in a disintegrated way, with a few facts about many different areas within a subject domain and without an easy-to-understand organi-

zing principle that connects the different parts and surpasses the specific facts.

Empirical knowledge influences a great deal of the everyday life of people in Western industrialized societies. The argument is not to dismiss this kind of knowledge but to subordinate it to theoretical knowledge.

Narrative Knowledge

Narrative knowledge and methods can be found in human sciences in literary descriptions as well as 'folk theories'. The key characteristics of narratives are, according to Bruner (1986, 16-25), (a) changeableness in intentions, (b) the possible mutual perspectives and goals which interact, and (c) the involvement of feelings and emotions. The methods of narrative knowledge are connected to the problem of giving meaning to experiences.

Narrative knowledge characterizes the communicative activity of the children's daily life activity at home and among peers but is not so often promoted at school.

The narrative form of knowledge characterized history teaching in Denmark until the 1950s. With a school reform in 1957 this was changed and an empirical approach to history teaching was introduced to the Danish schools. The aim became teaching children objective facts of history (*Historiedidaktik i Norden* 2-3, 1985-1988; Sødring-Jensen 1978; Hedegaard 1998). But the value of the narrative form of teaching history is again promoted by several researchers in history didactics (Depew 1985; *Historiedidaktik i Norden* 3, 1988; Sødring-Jensen 1990) though it may be in another content than in the past. Today the same argument is presented for using the narrative method of history teaching as in the past, i.e., that this kind of knowledge is important for the formation of the children's personality and identity.

Narrative knowledge is a necessary and valid knowledge in subject matter teaching but I will argue that it has to be put inside a frame of theoretical knowledge whereby it is possible to combine situated learning and concrete life situations with theoretical concepts of subject matter knowledge.

Theoretical knowledge

Theoretical knowledge and methods have not been predominant in everyday life nor in the scientific traditions of Western cultures. But one

can find this kind of knowledge and strategies for thinking in different professional and scientific areas through the history of social science (i.e., in the work of Marx, Weber, Lewin, Vygotsky and Bourdieu).

Theoretical knowledge of a problem area has evolved through a historical process of experimentation with methods and strategies for solving problems and contradictions central to society.

A method of theoretical knowledge — for acquiring, creating and evaluating knowledge — is Vygotsky's method of genetic experimentation (Bakhurst 1990), in which an object of investigation is changed either concretely or imaginatively, and the effects of these changes are explored in relation to the effects on other objects, thereby the structural connections/or relations of the first object to the explored objects can be characterized.

Another method of theoretical knowledge is characterized by integration of the basic concept relations of a subject domain into models called *germ-cell models*. (Davydov 1977, 1982). The meaning of the concepts in a germ-cell model is dialectically formed through the concepts' relations to each other. For example, in the subject domain of evolution the concepts of species and population define each other.

The epistemological procedures of theoretical knowledge is both to relate concrete instances to general ideas, and to understand generalities in concrete instances (Davydov 1989). Using theoretical knowledge, the specific and unique situations and experiences are related to universal and general concepts. Acquiring universal concepts is not a goal in itself, but a medium that can be used to analyze and understand the complexity in unique situations. The strategies of theoretical knowledge have been characterized as ascending from the abstract to the concrete (Lompscher, 1984), so that more general knowledge is used to find situation-specific solutions.

Theoretical knowledge is a relevant form of knowledge in school teaching, because it opens for possibilities to combine general principles of subject matter studies with the content and cultural practice of the everyday life that children know. The central skills that children have to acquire are to construct models that can guide the research and evaluation of their knowledge of subject matter areas.

In relating empirical knowledge to theoretical knowledge through the use of 'germ-cell models', theoretical knowledge can become a frame for the facts presented in textbooks. Through this relation, the child can get a connected and deeper understanding of the phenomena in the world.

The dialogue characteristic of narrative knowledge is a central method

for developing social abilities and an important method for developing democratic institutions in society. However, if one does not have a framework of theoretical concepts for anchoring the dialogue, this method alone promotes relativism. If different persons select different narratives, then the procedures that characterize the production of narrative knowledge do not provide a way to resolve the conflict of what knowledge to rely on. The most fluent or persuasive speaker determines which knowledge is valuable.

By using the frame of theoretical knowledge in instruction it becomes possible to help the school child to organize his experiences and concepts around a conceptual 'germ cell' and thereby to connect empirical knowledge and the narratives of daily life into a system. By helping the child to do this inside the educational activity, the child acquires 'mental tools' that can be used to analyze and understand the complexity of the world around him.

Personal Knowledge and Thinking

One of Vygotsky's (1982) theses is that although formalized subject matter concepts can be learned at school, they do not become meaningful for the child until they become active in the child's life.

Activities in different fields of life — school, home, and work — with their different forms of practice result in different forms of concept formation and thinking. Scribner (1984, 1992; in Toback et al. 1997) and Lave (1988, 1992) have identified different ways of how mathematics is used in the different fields of school and work. The gaps between home, school and work as fields of learning are extended so much that many children have difficulty in combining knowledge of one field with the other. Therefore an issue of school teaching must be to connect the subject matter concepts with everyday concepts in a way that widens and develops children's abilities in these non-school situations.

There can be qualitative differences between thinking procedures according to which type of knowledge is available, and even in relation to the same subject area the same person can use different forms of knowledge and procedures dependent on his motivation and the social conditions. McDermott's (1993) description of 'how a learning disability acquires a child' gives us insight into how social conditions determine a child's capacity to think. He demonstrates how a child, in the relaxed situation of baking a cake, can read and calculate, but in a test situation does not even try to use his capability to read. Theoretical knowledge as

conceptualized in the earlier section can combine the life of everyday concepts with the abstract knowledge of different subject matter and thereby help children to overcome this gap between knowledge and thinking within and outside school.

Experiences with children show that most pre-school children have the conditions to develop theoretical thinking, because they can relate matters to each other and can ponder about relations that they cannot experience directly, such as the relation between life and death, the size of the world and where it ends, and many more 'big questions about the world and life'. A Swedish research group has focused especially on pre-school and early school children's conceptions of different domains, i.e., Pramling (1983) has interviewed pre-school children about their conception of learning, Dahlgren & Olsson (1985) have focussed on pre-school children's conceptions of reading. Often children in pre-school age and early school age have developed a connected system of understanding through participating in activities with older children and adults and through their own reflection about phenomena that are important to them.

Vygotsky (1982) characterized the differences between pre-school children and school children's thinking as primarily a difference in systematic methods and amounts of knowledge within the different subject domains.

The problem in teaching is then how can *conceived knowledge* at school be transformed into *active knowledge*. As Vygotsky points out, the formal abstract concepts a child learns at school do not become active until they become functional in the person's daily life. This implies that the aim of teaching must be to teach children concepts and methods that can enrich their understanding and capacity for action in the life they live outside school. As pointed out in the earlier section, theoretical knowledge and thinking procedures open up for this possibility.

Ways to Transform Subject Matter Methods into Personal Thinking Strategies

In a series of teaching experiments conducted from the educational program of the *double move in teaching* (Hedegaard 1988, 1990, 1995, 1996, 1997; Hedegaard & Sigersted 1992a, 1992b), the traditional teaching methods and the methods of cooperation between children changed from learning methods aimed at imprinting the material to methods of research and cooperation around key problems. In these experiments we used a

general method of research inspired by Lewin's social science method as well as methods characteristic of the subject matter.

I will draw upon one of the teaching experiments in history (Hedegaard 1995; Hedegaard & Sigersted 1992b) to illustrate the teaching methods, and use the same experiment to illustrate one particular child's concept formation and thinking about historical concepts.

The research procedure was the most dominating method used in this teaching experiment and was characterized by the following steps that were repeated:

What are we researching?

What do we know?,

What do we not know about our research problem?

How can we model the relation between the important concepts of our research problem?

Which methods can we use to find out about what we do not know?

Does the model need to be revised?

We also worked with methods of narrative knowledge: dialogue, argumentation, novel and film interpretation, dramatizing and play-acting.

Through building conceptual models, wholeness and perspective were generated for the single elements of knowledge.

In the history teaching experiment the aim was to build conceptual models. By using these models the children came to use conceptual relations (i.e., the relation between tools and way of living) to analyze historical periods. In fourth grade the teaching was conducted through 36 sessions. Each session lasted 3 hours. In the teaching, different phases can be differentiated: problem formulation, model formulation, model use and extension, formulating of task, evaluation of own capacities model evaluation (see Fig. 2.1).

Individuality in Thinking is Based on Differences in Motives

The individual and personally distinctive character of thinking depends on the child's dominating motive and motive hierarchy. Motives are related to the person's goals and characterizes the person's activities — surpassing the single situation, and can be characterized as longer lasting traits.

For example, a person's motives for learning should be seen as part of the person's motive system (Leontiev 1978), therefore development of the same motive (i.e., a learning motive) does not mean that children become standardized, because this motive interacts with a row of more specific motives for learning. The individual child's motive hierarchy creates the individuality and uniqueness of the person's relation to the world.

According to Elkonin (1971) different periods can be distinguished that characterize children's development. These periods are seen as connected to the institutions that dominate children's life and therefore are the basis for their acquisition of motives. In the industrialized Western societies of the 1950's when Elkonin formulated his theory, the three main institutions dominating children's lives were the family, the school, and work. Being part of the practice characterizing these different institutions the child develops motives. Activities connected to the institutions of family, school and work were, respectively, most important over varying periods. Each of these institutions contributes to the child's development of a corresponding dominating motive.

The pre-school period connects primarily to activities in the family. Two dominant motives develop through the pre-school years, the first acquired through social/emotional connectedness to other persons, and the second through learning everyday activities. So, the dominating motives for family activities are emotional closeness/exploration of the world; for early school activities they are role play and learning connected with literacy; and for late school age they are relatedness to peer groups and the appropriation of work competencies.

Motives develop through common cultural practice. This development takes place in situations where a common motivation can be found characterizing the cooperative interaction of the participants of an activity. To describe development it is necessary to distinguish between motivation and motives. Motivation is related to the practice of the concrete situation. For the person this characterizes the dynamic of her situated activities. Motives are related to the person's goals that transcends different situations, and can be related to imagined activities.

My interest has been to demonstrate how a child generates personal knowledge and thinking procedures through school activities. To demonstrate this I have discussed how forms of knowledge and traditions for thinking are connected to procedures for knowledge generation at school and how this relates to children's concept formation and thinking.

Thinking can be characterized as the personalized procedures of cultural and social practices of both daily life and professional life, with dialogue and argumentation as central activities.

Through participation in the social practice of the school the child conceives the content and methods that characterize the social practice of everyday activities in the classroom as well as subject matter activities. I have argued that the conceived knowledge and methods of school are transformed into individual knowledge and thinking by the child's active use of the formal subject matter content and methods in motivated class activity where children cooperate and communicate with each other.

A child assimilates values of material and spiritual culture in the process of teaching and upbringing through his personal version of procedurally determined activity in collaboration with other people.

A person has multiple thinking procedures available in relation to a subject domain. What is used depends on his conceptualization of the content of the subject domain, and the motives of the person.

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