Abstract

With its background in research on the development of the second language and the language use of immigrant children as portrayed in political discourse, this article discusses the significance of the mother tongue in the access of newly-arrived pupils to teaching in school subjects while the development of their second language is in its earliest stages. The starting point for the project is a socio-cultural perspective of teaching and the development of knowledge, and that language is discourse. If one sees citizenship as an expressed goal of education with the aim of stimulating inclusion and critical thought, language plays a decisive role in how all voices can make themselves heard.

Two preparatory classes in Malmö were invited to problem-solving work sessions in the technical workshop at the School of Education. The student teachers acted as supervisors and observers alternately, and documented the conversations that took place. Sequences of conversation were recorded for analysis. The study illuminates and problematises the content of the conversations during problem-solving, what initiatives to conversation are taken by pupils and students, what the possibilities of problem-solving using the mother tongue are, and what the pupils' texts contain and if they are functional, in the sense that it is possible to understand what the pupil wants to mediate to the reader. Excerpts from the recordings show that both children and students use a variety of "strategies" in the conversations and this has a number of consequences for the processes of knowledge.

Nanny Hartsmar, Senior lecturer, Malmö University
Nanny.Hartsmar@mah.se

Maria Sandström, Lecturer, Malmö University
Maria.Sandstrom@mah.se

The right of all to inclusion in the learning process: Second language learners working in a technology workshop

Nanny Hartsmar & Maria Sandström

The review conducted by the National Agency of Higher Education of the new teacher education system highlighted the students' poor level of preparedness for assuming responsibility for their pupils' language development and early reading and writing skills within the context of all taught subjects. (Högskoleverket, Rapportserie 2005:17 R). Earlier, this issue has been viewed only as a question for teachers of Swedish and Swedish as second language

At the School of Education at Malmö University, teacher education is organised into major subject areas such as "Mathematics and Learning," "Knowledge of History and Learning" and "Culture, Media and Aesthetics." During 2005, a review of syllabuses was carried out with a view to bringing forward the issue of language development. The aim is that all students, regardless of choice of major subject, are equipped with sufficient knowledge of language development that by the time they graduate they are able to deal with this issue in their subject areas as a natural and self-evident process. Students studying to be teachers of pupils in the lower years of the compulsory school are also given instruction in early reading and writing.

Criticism, political discourse and consequent media debate has implicitly and explicitly focussed skills training without focussing on the question of content, both for those who have Swedish as their mother tongue and those who study Swedish as a second language. What has not been emphasised in the same way is the conversational use of speech, reading and writing and interplay with others in functional contexts, with their stating point in authentic texts.

The purpose of this article is to highlight and to discuss the importance of the mother tongue as a support for the successful development of a second language and of knowledge acquisition in school subjects, and to discuss the conditions applying to newly-arrived pupils.[2]

Language development and the political discourse

In the spring of 2002 the national report *Mål i mun* (*Goals for language*) (SOU 2002:27) was published as a proposed plan of action for the Swedish language. The proposal resulted in a language-political proposition (Prop. 2005/06:2) with the title *Bästa språket – en samlad svensk språkpolitik*[3] (*Best language use: a collective policy for Swedish*). Four basic goals have been formulated:

- That the Swedish language is to be the main language of Sweden.
- That Swedish is to be a complete language with the capacity to support all aspects of society
- That the Swedish used in official forums shall be well formulated, simple and easy to understand.
- That everyone has the right to language: to develop and to acquire the command of the Swedish language, to develop and use one's own mother tongue and national minority languages and to have the opportunity to learn foreign languages.

In consideration of the proposals about Swedish as a second language put forward first by the Liberal Party (*Folkpartiet, fp*) members and later also by members of the Moderate Party (*Moderaterna*) there is cause to look carefully at the fourth goal listed above. In *Dagens Nyheter*[4] *(The Daily News)*, two leading Liberal Party politicians in Malmö write that they would like to introduce into the local school plan the requirement that pupils should only speak Swedish during their lessons. "Then children from immigrant backgrounds will have better chances to practice their Swedish" is their argument. Those proposing this consider it to be self-evident that one teaches in Swedish in Swedish schools and that forbidding the use of other mother tongues in the classroom will make it easier for teachers to maintain discipline. While Minister for Integration Nyamko Sabuni (fp) thinks that this idea would work well in schools where many pupils come from immigrant backgrounds, the teachers' union points out that the proposal is at odds with the law that pupils may not be discriminated against on the grounds of ethnicity, and that the mother tongue is the only language that newly-arrived pupils have.

    Sydsvenska Dagbladet[5] (*Southern Sweden Daily*) refers to a motion from three Moderate party politicians to the Malmö Municipal Council. The purpose is to re-examine the guidelines for teaching in the preparatory class

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[3] *Bästa språket – en samlad svensk språkpolitik*, (Prop. 2005/06:2) *www.regeringen.se*
[4] *www.dn.se*, 10/1-08
[5] *www.sydsvenskan.se*, 2/1-08

which newly-arrived pupils with various mother tongues attend. The politicians maintain that if one only speaks Swedish in the preparatory class, one will be able to understand better the teaching in the ordinary classroom.

One can see historical parallels to today's demand for *one* language. Until 1809, the Finnish region of Tornedalen was part of Sweden. With the new borders that were established at that time, Tornedalen was split so that a part of the Finnish-speaking population lived on the Swedish side. Others came to belong to the Russian Grand Duchy. At first, Finnish children continued to be taught in Meänkieli,[6] but in 1888 it was decided that only Swedish was to be used both in the classroom and in the playground. School textbooks in Finnish were discarded from use and were not re-introduced until 1957, when the Swedish identity of the region was secure. Pupils were then also allowed to speak Finnish in the playground. The prohibitions had left deep scars in Finnish-speaking pupils and evidence given about this discriminatory school system has over time become overwhelming.

Today's syllabus for Swedish as a second language in the compulsory school[7] states that:

> The aim of the teaching is that pupils should acquire a functional command of the Swedish language which is at the same level as pupils with Swedish as a mother tongue. Ultimately, the aim is that the pupils should achieve the level of first language-users.[8]

One must ask the question what the political debate on "just speak Swedish" is really about and how the curriculum's direction to "achieve the level of first language-users" should be interpreted. Should this level be achieved in every respect? In a study made by Abrahamsson & Hyltenstam (2004), a comparison was made between individuals with good second language skills (L2), who had spoken Swedish for at least 10 years, with speakers born in Sweden (L1). L2-speakers were between 4-23 years of age when they started their studies in the second language. Researchers could show differences between L1 and L2 speakers, irrespective of what age the second language was introduced and that second-language speakers did not achieve first language level. Considering these results it is reasonable to problematise the curriculum's direction that second language speakers should achieve first language level.[9]

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[6] Meänkieli means "our language." The Finnish spoken in Tornedalen has particular characteristics that separate it from standard Finnish. (SOU 1997:192)

[7] The courses that are arranged at various universities have earlier been called Swedish for Foreigners, Swedish for Immigrants, Swedish as a Foreign Language. For a review of what is today known as Swedish as a Second Language, see Hyltenstam (1990).

[8] *www.skolverket.se*, Kursplaner och betygskriterier för Svenska som andraspråk. 2007-09-10

[9] Nationella utvärderingen av grundskolan 2003. (pp 93-95)

It is also interesting to consider what politicians think second language users should be talking, reading and writing about while they are developing their second language. "During the first year, no other studies should be conducted than those in the Swedish language" write three representatives for the Moderate Party. What does this mean, in concrete terms? Does one imagine that for a number of years the pupils should simply practice vocabulary and grammar as isolated skills, have lessons on verb conjugation, noun endings and pronunciation until they sound as Swedish as possible? When do the pupils start their education in other subjects and how should that be carried out? Let us imagine that a 15 year old who has arrived from Iraq is placed in a preparatory class. If he is only allowed to speak Swedish, it is obvious he will not gain anything from the teaching in the various subjects. He will not understand anything of the discussion about the Second World War, problems with the environment, social studies topics or in mathematics where one is to be able to "formulate and test assumptions and solve problems and critically review and evaluate statements and relationships." The consequences of the demand for *one* language would be that we robbed newly-arrived pupils of a number of years of knowledge acquisition because they have to "speak Swedish" first before learning anything. Mohan (2001) points out that schools must not put second language learners' knowledge development in a pause position while they are learning the new language. McKay (1999) uses the term 'bilingual interface' "to refer to the enriching and enabling knowledge, skills and experiences that ESL learners bring to their learning at school, and to the coming together of these with their experiences at school" and claimes "that bilingual support facilitates cognitive development and effective learning practices in a range of learning contexts."

School should be a place for social interaction of many kinds, a place where one encourages "citizenship education" by inclusion in democratic decision-making processes, and to be included in influencing the way society develops in various respects. The task of being a teacher includes the responsibility to stimulate a classroom environment where pupils develop both their cooperative skills and recognition of other perspectives than their own, and their knowledge within a variety of fields. If one sees citizenship as an expressed goal for education with the aim of stimulating critical thought, language plays a decisive role for how different voices can make themselves heard, Giroux (1992, p. 134). The political propositions and demands noted above do not encourage the pupils' acquisition of knowledge. They act instead in an excluding way as they derive from a one-sided perspective where second language pupils are considered to be disadvantaged. In a research review, Tallberg *et al* (2002) show that the status of language for a child's language development and perfect and accent-free Swedish are both "important marks of being Swedish," (p. 166). In the SPRINS project (Evaldsson, 2000)

the importance of the pre-school's and school's view of multilingualism is discussed, often defined as either a resource or a disadvantage. In a thesis on Swedish for immigrants, Sfi, Sjögren (2001) and Carlsson (2002, p. 133) show that the teaching in Sfi often reveals the dominance of the view of multilingualism as a disadvantage and its focus on problems.

The suggestion about only speaking Swedish at school also stands in stark contrast to the task given to the Agency for School Development and which in 2006 resulted in a national strategy for educating newly-arrived pupils in compulsory and senior secondary schools (U2006/5104/S) and comparative forms of schooling.[10] In this text the Agency emphasises the importance that teaching in mother tongues and the teaching of Swedish as a second language should be parallel processes and that positive work methods demand that the personnel involved have "intercultural awareness that supports the development of the individual," (p. 15).

In *National School Development – minimising differences and improving results*[11] it is stated again that special efforts are necessary to support language development in pupils with foreign backgrounds: "The road to a good command of the Swedish language is via the mother tongue and it is therefore necessary to strengthen both instruction in the mother tongue and in Swedish as a second language." Finally, a new evaluation (Skolverket, 2008) , carried out by The Swedish National Agency for Education shows that pupils who take part of Mother tongue education achieve study results higher than average.

Language is discourse

The starting point for the second language and technology project is that language is discourse. On a formal level, both in the syllabuses for Swedish and for Swedish as a second language, it is officially expressed that "language has a key role to play in the work in schools. Communication and co-operation with others occurs through language." It is through language that knowledge becomes "visible and usable," (pp. 96 and 102). The discourse on language as communication and the enabler of knowledge indicates a process-oriented view of learning and the development of knowledge. In the work carried out in school each day, various schools and individual teaching

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[10] "newly arrived" means children and young people who begin Swedish compulsory or senior secondary

schooling 0-3 years after their arrival in Sweden. See Authority for School Development (Dnr 2006:487).

[11] Nationell skolutveckling- för minskade skillnader och förbättrade resultat (Authority for School Development). *www.skolutveckling.se* 2007-10-19

styles show a variety of discursive practice. It is through the use of language in social interplay and interaction with others that children have their greatest potential to develop. The skill of speaking is developed by participating in conversations with others in a variety of contexts and on a number of subjects, and by listening to many voices. This occurs throughout life; in the family circle, together with friends and from the first attempts at reading or first picking up a pen to write down something one wishes to express. Kent Larsson (1995, pp. 37) emphasises that language *is* learning, thinking and communicating. "Language is our life world. It is our way of knowing, experiencing and taking notice." Language "requires at the same time the form of life: human intercourse and a social life." That language is our life world demands the insight that the use of language is much more than a formal technical skill. Language is all our experiences, our cultural and social belonging and it reflects a number of types of power relationships.

The subject of technology, according to Lpo94

With the introduction of the 1994 curriculum for the compulsory years of the school system, Lpo94, technology became a standalone subject with a separate syllabus, objectives and assessment criteria. By offering an attractive, exciting, creative and problem-solving technical subject, one hoped to encourage both girls and boys to choose to continue studying in the fields of science and technology. "Active citizenship" as well as the influence of technology on the development of society was emphasised in the syllabus.

Technology can be described as a subject where practical problem-solving with a theoretical groundwork is central. Products are made and these, like other complete technical solutions, are to be evaluated and discussed. Possible improvements, strengths and weaknesses are identified and in this process, scientific knowledge and explanatory models are used. Alexandersson (2008) problematises the division of schools into theoretical and aesthetic subjects and writes:

> Theoretical knowledge cannot be "thought forward" just as practical knowledge cannot be "made forward." If one cannot relate to a practical reality, it is difficult to create theoretical concepts about it. To learn geometry only as an abstract concept without transposing this to concrete practice – for example by measuring the schoolyard or calculating the area of one's own room – is just as mistaken as to create three-dimensional rooms in cyberspace without theorizing about the picture as one of a number of media for human communication. (p. 207)

To ask newly-arrived pupils to solve a problem in the production process in a technical workshop demands interplay between cognitive, manual and language skills, where the practical performance of the task is grounded in theoretical knowledge and vice versa. Our starting point is that second-language pupils need to be allowed to think and express themselves in their first language in order to have the opportunity to develop in all these areas.

The aims of the workshop project and research questions to be answered

Various situations and the content of various subjects require their own particular language. Björk & Liberg (1996, p. 17) exemplify this by talking of the difference between using typical formulations from a social science perspective to describe, for example, *democracy* and describing *sunlight* from the perspective of a physicist. Through the use of various types of text they show the language variance one needs to acquire in a systematic way.

Student teachers must in the course of their education identify and problematise what this means for their own major subject and how one can in different ways organise and stimulate the use of language in an intercultural teaching situation. Pupils in the project group are, through their second language, on their way towards new cultural and social experiences. The mother tongue has a key role to play in this socialising process in that it is in this use of language that children at the start are able to formulate questions, hypotheses and to discuss possible solutions. The projects brings forward both the children's and the adult's opportunities for communication during the work, the problems one encounters and how one deals with various situations which arise during the work in the technical workshop. Pupils 8-16 years old, teachers of preparatory classes, student teachers and teachers from the university took part in the work.

The project's basic idea was to allow student teachers to introduce and lead practical technical problems which the pupils in the preparatory class of the lower levels of the compulsory school were to solve in groups. During the course of the work, oral language use was stimulated through the use of both the mother tongue and the second language in conversations in the School of Education's technical workshop, in the preparatory class and in ordinary school work for those pupils who during the second year of the project attended regular classes. The oral communication in the technical workshop was followed up with conversations, the writing of texts and reading of texts both in the mother tongue and in the second language.

Project aims

The aims of the project were to:
- stimulate the development of the second language and of knowledge in pupils in the preparatory class through conversation and cooperation in authentic problem-solving situations through the writing of authentic texts and through reading
- challenge and support the student teachers' skills in planning and carrying out teaching within the framework of the technical subject that encourages both the development of language and of knowledge.

The aims of the study and questions were to enlighten and problematise:
- the contents of conversations during problem-solving
- which initiatives are taken towards conversation by children and students
- what the possibilities of problem solving using the second language are
- what the texts contain and if they are functional in the sense that it is possible to understand what the pupils wants to convey to the reader.

A socio-cultural perspective on learning

How pupils come to take initiatives in conversation during work is not dependent only on their *language ability* but also upon earlier *experiences* in a similar context and the new social *purpose-dedicated group* they now participate in. They have to feel secure and *accepted* when coming to and working in the unfamiliar university environment. The way in which children learn is closely connected to the environment they find themselves in. It also requires *authentic forms of interaction* with a *meaningful* content that stimulates the children in being *active* participants who are able to make use of the different *previous knowledge* they command. The work in the technical workshop introduces new tools that mediate learning. Some of these tools that are common in a Swedish context are new for some of the children in the project group. All these things are central to the social-cultural perspective on learning. (Dewey, 1938; Dysthe 2003; Lave & Wenger, 1991; Säljö, 2000; Vygotsky, 1978; Wertsch, 1991).

A socio-cultural perspective on learning emphasises the connection between social, cultural and linguistic aspects of children's experiences and understanding. In interaction with someone more experienced, a child is given the support which is needed in initial stages. Bruner (1983) calls the processes leading to the achievement of what is possible for that child "scaf-

folding." Rogoff (1990) also maintains that the child needs what she calls "guided participation" when it is confronted with a new learning environment. New learning environments require that one is included in the communication that is taking place. In agreement with Hundeide (2003 p. 151) we maintain that what is usually called competence or skill is to "master the communicative code in the inter-subjective room that dominates the classroom," or as in this case the university technology workshop.

Swedish as a second language and communicative competence

In the context of education it is common to hear opinions such as, "it's not strange that they can't speak-read-write about this. They don't know much Swedish." One can infer from opinions like this the assumption that one has to learn Swedish first in order to be able to use it to learn something about the world one is part of. What is it that one learns if one learns Swedish first? Which "Swedish language" is referred to? Is it items of vocabulary, individual words learned one after the other to be threaded on a string like a grammatically-correct necklace, or are we referring to subject content and subject language?

Small children develop their mother tongue in authentic contexts in the little world that so closely surrounds them. The child's understanding is widened by everything it meets in its surroundings at the same time as the parents help by putting words to all these new things. The first language is defined as the language used by the child during its first three years of life. There are also families where children grow up with two first languages, the mother speaks one and the father speaks one. The second language here is the language one acquires after the first language is established. "Swedish as a second language" is, since the middle of the 1980's, the official term used (Viberg, 1996). Children in the project groups come from different countries and speak a number of different languages. In the ordinary classroom and in the preparatory classroom and in the work in the technical workshop Swedish becomes both a second language and a sort of help-language, lingua franca, so that they can understand each other.

The acquisition of a second language differs from the acquisition of the first language in that it most often does not take place in the home environment and in that the pupils can have passed the age at which the basis of the mother tongue normally is founded. Viberg (1993; Gibbons, 2002) uses the terms foundation and extension to define the two components in the development of language. When, for example, a Swedish-born child starts school, the foundation comprises that the child has mastered the sounds, system of conjugation and syntax of the mother tongue. One has a vocabulary of 8000-

10000 words and has the skill of telling simple stories. The school assists in the extension of language in the form of subject and content-related language and the further development of grammatical and written language skills.

Hyltenstam (1996, p. 31) maintains that in fact it takes a number of years before the second language functions as well in the learning process as the first language. A sudden transition to a new language makes the learning process more difficult. The school has to handle the difficulty of allowing the children to successively grow into a second language at the same time as the school workday risks being experienced as boring and uninteresting if there is not much to talk about, because "they can't speak Swedish yet." If it is thought that one first has to lay the groundwork for a "general" foundation before one can study something of substance in the school subjects, going to school can in fact retard intellectual development. The starting point, therefore, is that the mother tongue has to, where needed, be allowed to support the development of the second language. This gives security in first being able to ask questions and to discuss things in a language one already masters. Cummins (1981) has shown that it takes 5-7 years to develop the second language to the level required for it to function in learning processes that are cognitively demanding.

In contrast to Swedish-born children, the children in the preparatory class work with foundation and extension language in parallel. The children who participate in the project are in this way at the beginning of their learning of a second language at the same time as they are being introduced to the concepts that make up the technical subject. The syllabus for Swedish as a second language directs that the language must be used in a variety of contexts and have meaningful content. This encourages the development of both thought and language skills.

> That which is typical for the subject may give opportunities for thought and communication on a knowledge or concept level which often is higher than the level of Swedish language. In this way the interplay between mother tongue and other subjects is important. (p. 104)

It is through cooperation and language communication that children grasp their own and others' experiences, and how they understand different phenomena in the world about them. By integrating new knowledge with that which already exists, one sees alternative aspects and contexts. Cummins (2000) defines a further element, which is dependent on situation and on level of cognitive difficulty, which is of importance for the child's ability to participate in language and knowledge development. In a situation of practical problem solving, the child in the project group can be supported by asking questions of students and teachers, by asking a friend to interpret via the

mother tongue or through the use of gestures making himself understood. Cummins (1996) uses the term BICS (Basic Interpersonal Communicative Skills) and CALP (Cognitive Academic Language Proficiency) to differentiate the use of various skills in the use of language. BICS is used in connection with the fundamental skill of communication, most often in context-dependent everyday situations. CALP-skills come much later and qualify the user for context-independent and cognitively more demanding learning.

In this way, communicative language ability in the school situation cannot be reduced to the simple oral form of communication. To communicate here has to mean that one has and can take part in conversations that are carried out in a given context of knowledge. Viberg (1996, p. 129) brings forward the importance in second language acquisition of varying "whole class" teaching where the teacher dominates the speaking that occurs, with activities where there is the possibility of cooperation in pairs or small groups. Mohan (2001) is rejecting the sometimes expressed idea that an integration of language, content and thinking is something that comes about by itself. Instead it requires systematic planning.

Gibbons (2002) with reference to Mc Groarty (1993), argues that working in groups in many ways and by genuine communication may support second language development, since the language use and the language development takes place in a meaningful way. The pupils get an opportunity to hear the language spoken by others than the teacher and this leads to what is called a larger inflow. Interaction between pupils also leads to a larger outflow since the work let them take more responsibility in making themselves understood if and when the teacher is not around. During the interaction in a well planned group work pupils exchange ideas and solve problems together. When they express their thoughts they do it in various ways and corrections and improvements of the language take place in a specific context.

Writing as a tool in the learning process

In the National quality audit (Skolverket, 1998), it was pointed out that the school's task was to "lead students to different ways of using language." The review team identified three varieties of language environments. The A-environment, which is to be preferred, promotes authentic, systematised and process-directed writing which is important in all subjects and which is seen as essential in knowledge acquisition. Activities should be multi-voiced and characterised by dialogue. The report emphasises the importance of the connection between what the children read and what they write as both activities support each other.

Writing in the project on second language and technical subjects has its starting point in the oral use of language during the work in the technical

workshop, and in one of the work sessions also in the story-reading the pupils have had in school. The written language is developed when the pupils afterwards retell their experiences orally and then later write down and rework them when they are back in their respective classrooms.

When the pupils tell a story and write it down, they are doing so from common experience; the work in the technical workshop. Teachers and friends in the preparatory class and the university teachers and students are all possible readers. "To write is to participate in a conversation," writes Dysthe (2002, p. 14), referring to the Russian language and literature philosopher Bakhtin's (1981) formulation that writing is like a dialogue which goes both backwards and forwards in time. When one again converses about common experience, both the cognitive and the literary processes are supported. By reformulating the subject matter of the experience into one's own words, one develops the thought processes about the "formal cultural terms employed," writes Dysthe (ibid p. 15). In writing "here and now," the pupils' thoughts return to the workshop "there and then." The chance to first orally tell a story about what they have done and listen to each other in the mother tongue gives the foundation for working on a text in two steps, first in the mother tongue and later in Swedish.

Project time and participants

The project was carried out during a two-month period in 2006. Two preparatory classes (named below groups A and B) from two compulsory schools in one of Malmö's suburbs, and the class teacher from the preparatory class in school A, participated in the project. The pupils were placed in the preparatory class as they were deemed to have insufficient language skills to be able to follow the teaching in an ordinary class. In each pupil group there were 10 pupils aged 8-12 years. One pupil was 15. The pupils had arrived in Sweden relatively recently and most came from non-European countries (Afghanistan, Bosnia, The Philippines, Iraq, Iran, Kurdistan, Palestine, Poland, Serbia and Somalia).

The work was carried out by Malmö University in the School of Education's technical workshop located in the building known as Orkanen. 13 student teachers who at the same time were following the course in technical education were present alternately as teachers and observers. One of the students used parts of the project documentation later in her thesis, (Gundersen, 2007).[12]

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[12] *http://dspace.mah.se:8080/bitstream/2043/427/1/Microsoft%20Word%20-%Gundersen.pdf*

Work sessions in the technical workshop

The students planned problem-solving tasks for the children in groups A and B to work with, and did all the practical preparations in advance for each session. Five different themes were prepared: boat building, strength/bridges, electricity, vehicle/Lego and parachutes.

Malmö University is situated in the old wharf area of Malmö harbour. Boat building was a natural starting point for the project. The bridge theme connected with common scenes in Malmö. When this theme was worked on it took the form of the bridge that all the children had heard and read and sung about in the tale of "The Three Billygoats Gruff." Teaching about electricity is part of the normal curriculum in schools and in the project the task was to make a torch, which is a tool or toy that all children have come into contact with at some time. Playing with and constructing with Lego is something that always happens in the homes of Swedish-born children. Of the children in the preparatory class, only a few had heard of Lego or built with it. The level of difficulty increased with this theme as the pupils were then required to follow and interpret a drawing for how to build a car. The final work with the construction of a parachute was the biggest task. It required much thought about how it should be constructed so as to bear the weight of a person, and also to be able to quickly and safely fly from the upper storey of the Orkanen building to the ground floor of its atrium. All the tasks were designed to stimulate the pupils' creative and aesthetic skills.

Documentation of conversations

Thirteen teacher students were engaged to work with the pupil groups A and B. Seven worked as teachers and six as observers with the task of watching and documenting the discussions. The students who observed and took notes directed their attention to particular children and their friends, but kept themselves at a discreet distance. The observations were done mainly on the contents of the discussions, how and what the pupils were communicating about between themselves and with the student teachers, and the exchange of experiences and construction ideas during the progress of the work, and the problems they confronted. Words and expressions which were used during the work were written on the board. These were then transferred to paper that the pupils later took with them to school.

Apart from the student documentation, parts of the discussions were recorded on minidisk by one of the project leaders. The recordings are of sequences of discussion. New recordings of the same children's conversations were made later during the work. Again, it is a recording of a discussion that

is already underway and then completed that is documented. This documentation was done in order to enlighten and problemize:

- the contents of conversations during problem-solving
- which initiatives are taken towards conversation by children and students
- what the possibilities of problem solving using the second language are

The problems of making such recordings are well-known. Participants show a varying degrees of sensitivity when a microphone is recording what they say. Barnes' (1978) experiences show the difference between speech when it is known or not that a recording is taking place. When the pupils were talking without a teacher present, the result was a probing discussion. This means that the pupils can freely try out their suggestions and points of view without the demand that what they are saying is correct, that there is a "right answer." Barnes describes how the conversation in the presence of a teacher becomes edited. Instead of trying out their thoughts, pupils try to establish what the teacher wants to hear.

The hope was that the use of the minidisc could help the pupils to forget that the recording was taking place and not become a distraction. It would have been optimal to record all the children's and students' conversations during the entire work session, but this would have been far too complicated to carry out with so many speaking simultaneously. The compromise with limited sequences of recordings ran the risk of being too fragmented to give a truly representative picture of the discussion that took place. The students' written documentation and the recordings are therefore intended to complement each other.

The students were not used to observation and documentation of this type. They prepared themselves by, together with one of the project leaders, discussing what was of interest and should be focussed on. The basis of the documentation became the students' question "what are they talking about?" and "what happens and what do you do if they don't understand you or each other in a teaching situation? None of them had any previous experience of teaching in a preparatory class. It is important to note that the question of the development of the second language within the framework of their major subject had not previously been considered by these student teachers.

The pupils wrote texts after each work session. The texts were later analysed in order to assess what the texts contain and if they are functional in the sense that it is possible to understand what the pupils wants to convey to the reader.

The writing was done in the preparatory class and without anyone from the School of Education present. There is an uncertainty in the documentation here concerning the instructions and directions in the writing situation in class B where there has not been much information from the teacher. The teacher of preparatory class A was present at all the sessions. The children from group B came without their teacher.

Ethical considerations

Before the start of the project, letters were sent to the parents. The schools helped with translations, where necessary, into their mother tongues. The letter contained a short description of the idea behind the project. The parents were requested to say if they did not want their child to participate, or if the child could participate but not be photographed or recorded during the project. All the children were allowed to participate, but five of them – two boys and three girls – were not allowed to be photographed if the photographs were to be published. In the PowerPoint presentation which has been prepared to document the project, these children have been made anonymous in the pictures.

Discussions in the technical workshop

Excerpts from the recordings of the pupils' discussion with each other and with the student teachers are given below. The morning group is called (school) A while (school) B stands for the afternoon group. Boys and girls in school A are denoted by B1 – B7 and G1 – G4. School B pupils are denoted by g1 – g6 and b1 – b4. The preparatory class teacher is denoted by tea, while the student teachers are denoted by stud1 – 5. The University's project leader is p-lead.

The recordings and questions to the children about why they shift between languages show that children who have been longest in the preparatory class try consistently to speak Swedish if they have different mother tongues. When the discussion dries up one turns to a friend with the same mother tongue for support and to express what one wants to say. Then they return to Swedish again and continue the conversation with the friend speaking another mother tongue. As some of the children explained it: "It feels safe to be able to ask N. when I can't understand what you are talking about" or this "trying in Swedish is the best way to speak with X who doesn't understand my language" and "well, you see, there is no way I can use Arabic when speaking to Y. He wouldn't understand." A Thai speaking girl with half a year in Sweden sums it up with: "It's good that we can manage like

this, but perhaps not for you" (the teachers). As the project does not have access to teachers competent in the various languages of the pupils during the workshop sessions, the students and teacher often needed this possibility to turn to different children for interpretation between the languages.

The risk of the use of recording equipment is noted above. The children's discussions can be influenced negatively so that the conversation takes on the form of edited speech. This is hardly noticeable at those times when the children themselves take the initiative and talk with each other about how best to solve a construction problem, and the adult's support is in the form of confirmation or encouragement and/or questions that arise from the topic under discussion by the children. These discussions are then probing in that the pupils are led to ask questions, try out hypotheses and ask for help only when they cannot go further by themselves.

In this context where the students' initiatives take the form of questions in the form of "the teacher wants a particular response" – for example "what is this called in Swedish?" or "why do you have to use one of these?" – the children's use of language takes on the form of edited speech. There are children who often respond with "don't know" or "I can't." In these cases the weight has been placed on the naming of things, and on the children working out what the teacher is thinking of.

Analysis of recordings

The recordings were listened through several times in order to see what each conversation was about. Names of conversational partners, language, shifts between languages and content were noted. The analysis of the recordings made it was possible to generalise three forms of discussion situations giving focus on content and the construction work. Parallel with this, there is always during each workshop some conversation which is entirely of a social nature. The social conversations are similar to each other but are exemplified under the final heading *When conversation stops*, where the differences between forms of conversation are obvious.

- *What is it called in Swedish? The adults are frustrated by not being able to understand* (Mostly conversation in the mother tongue)
- *The electricity has to go around or the lamp doesn't go on.* (Cause and effect)
- *When conversation stops.* (Short utterances, encouragement, humming, gestures)
- *What is it called in Swedish?* The adults are frustrated by not being able to understand

This group contains the conversations that are carried out mostly in the mother tongue. The adults, the preparatory class teacher and one student in a supervisory role are obviously frustrated by the children they have difficulty in getting to speak Swedish.

There is also an example here of two girls who take the initiative to open a discussion with each other. They speak Swedish, but do not use the terminology that the supervising student has indicated is appropriate during the work. Instead they paraphrase with the help of everyday words, where for example "shiny stuff" means aluminium foil. The student who was a discussion partner with the girls assumed the role of translator during the work and interrupted the girls' conversation about the work a number of times.

g1: It shines more with that shiny stuff in it

g2: why?

Stud4: What is this called? (holds a piece of aluminium foil to a torch)

g1: Don't know

g2: Glitter

Stud4: No, not glitter. That's what you have in your hair when you are Lucia at Christmas. Have you seen this? What is it?

g1: Don't know

g2: what do you do with the wire?

g1: it has to go there. There should be a circuit.

g2: Hmm

Stud4: Listen! Alu…

g2: Alu?

Stud4: Yes, and a bit more. Alumi…

g1: Alumi.

Stud4: Aluminium. Can you say that?

g1 and g2: Alumini..

Stud 4: ..um

The children continue working.

Stud4: What's the name of the thing you have there?

g1: Battery

g1: Do you have a paperclip? I have to connect the wire.

Stud4: Good! Battery. (To g2): Can you say battery?

g2: Battery

Stud 4: Battery, yes. Good!

g2: do you understand? Mine doesn't work.

g1: no, the wire is off there.

What was said by the girls shows them finding their way to the correct word "aluminium." The girls are engaged in conversation, sometimes in their mother tongue and sometimes in Swedish, about how to make their torch work when they are interrupted by the student who wants to check if they know to say "aluminium" instead of "shiny stuff." One of them has picked up the term "circuit" during the introductory discussion and uses it in the discussion. As soon as they have answered the student they return to their conversation about how to get the torch to work. They are interrupted again when the student wants to make sure they know what a battery is.

In the next example, two Arabic-speaking boys concentrate on making a boat. They talk together in Arabic and pass each other the materials they need. The teacher stops beside them, hold up various items they are using and asks what they are called in Swedish.

Tea to B5: This is a screw. Can you say "screw"?

B5 looks at the teacher but says nothing.

Tea to B6: Can you say "screw"? No answer

Tea to both: What's this called then? (Holds up the glue gun)

Tea to p-lead: They don't want to speak Swedish. It's a big problem.

P-lead turns to an older Arabic-speaking friend and says:

Can you ask how it is that they find it so easy to use the glue gun? They seem to have used one before.

The older boy asks the question in Arabic. The boys' faces light up. One of them answers and the older boy translates into Swedish:

It's easy. They've done it before. Their Dad works with tiles in bathrooms.

When the teacher becomes frustrated that the younger boys don't "want" to speak Swedish, she sees them from the perspective of disadvantage. The boys, on their part, respond to her negativity with body language and facial expressions. There is something they can't do. The teacher knows it and they know it. Bakhtin (referred to in , 1998) speaks of "adressivity" which means that what is uttered can be seen as a contribution from both from the one speaking and the one who is listening. In the case of the boys who only "want" to speak Arabic, one can interpret their body language, with bowed heads and voices lowered to a whisper, to mean that they know the adults expect that they "can't." The adults, through their voices, facial expressions and what is uttered become contributors in the boys' presentation of themselves. The older friend is an opposite type of contributor. Understanding the conditions applying to newly-arrived children and with a common mother tongue, he can make the adults see something other than the disadvantage. His translation elicits from the adults a positive response both through facial expression and their words. This is understood by the boys who in their turn look up and smile at the adults.

Goffman (1959) speaks of identities and the various roles we assume during a conversation. When we observe and document the boys working together, we observe that they are engaged in a conversation in their mother tongue and that the creative problem-solving is working well for them. The older friend alternates between his roles as pupil and interpreter. In the pupil role his listens attentively to his supervising student teacher. When he is an interpreter he has a skill the teachers do not. He can convey that the younger ones have a skill they have acquired with the help of their father. Zimmerman (1998) calls this kind of changed role in conversation *discourse identity*. The Arabic-speaking boys become strengthened in their identity as competent when they see the teacher's, student's and project leader's happy expressions when they have understood what they can do, when they are allowed to use their background and their mother tongue as help. The boy who acts as interpreter "grows" when he understands that his identity as bilingual has great importance for the adults.

The project leader continues with a new question: "Can you ask them to tell us what they were just talking about. They seemed to be discussing something." The same procedure begins. The older child asks, the younger ones discuss together in Arabic and the older one again interprets.

> They talked about another way than student's boat (model boat built by the students). Now they talk and think up better boat. That (points to a boat made from a bottle) went wrong. Now they have talked about how to make more speed.

The boys are in this way deeply concentrated on the work and they are discussing how they best can solve a technical problem. It would have been desirable, but there was no possibility within the framework of the project to have a mother tongue teacher present or interpreter who could have followed the sessions in the workshop. Such a resource would also be necessary to make a deeper analysis of the conversations that were carried out exclusively in Arabic. Thanks to the interpretation by the older boy from time to time during the work it was made clear that the boys chose to use their mother tongue for obvious reasons. They quite simply did not have sufficient skill in Swedish to be able to communicate with each other or with the student teacher about the tasks at hand. By using their mother tongue they had the chance to try out their hypotheses and discuss their way forward to a solution. The older boy concludes with: "They can't say in Swedish. They want to speak Arabic. I help them."

The older pupil continues later by translating and showing the younger ones every new word or expression that is used in Swedish and is written on the board. The problem for the teacher and the students is that they cannot really estimate where in knowledge development the pupils find themselves. Teachers are reminded often of Vygotsky's (1978) concept "zone of proximal development" and the students learn to repeat its main theme, which is that in order to stimulate the individual pupil further in their knowledge development one must first know to what extent he or she understands the concepts they are working with. In the situation with newly arrived pupils with very modest skills in Swedish, and in the absence of a mother tongue teacher, it becomes obvious that one cannot live up to this pedagogical creed. In dealing with the situation as well as possible for the time being, the risk is that the teachers limit their efforts and content themselves with seeing that the technical problem is solved and that the pupils take with them a number of Swedish words and expressions. In order that we too can understand how they comprehend what they have been doing and help them to deepen their knowledge demands a didactic cooperation with mother tongue teachers – a task one cannot lay on the shoulders of friends acting as interpreters.

Cause and effect

The second discussion situation is characterised by the recurring occurrence of cause and effect reasoning. The children in the example below speak Swedish during the whole recorded sequence. When they communicate by giving instructions to each other, the instructions are often followed by "because," "otherwise," "it doesn't work because," "if we don't … then." The pupils discuss and negotiate their way to how one best gets the boat to float

even in strong wind, and the connection between a large sail and better wind catchment becomes clear. In the following two conversation excerpts, the children speaking have spent one year in the preparatory class.

G3: I have to tape, no glue, the straw here.

G4: why?

G3: Yes, because the balloon with air goes in and makes speed.

G4: Yeees, for the sail … I don't get this.

G3: What? This straw is for motor boat and this for sailboat.

G4: Why is this sail not good?

G3: I think too narrow. The wind is outside the sail.

Stud1 to G3: Why didn't it work with the small sail, did you say?

G3: It is narrow sail. We have to have one of those too … ah – keel. It's up there (board), otherwise the boat falls over.

Stud1: OK. Have you checked what works instead?

G4: Yes, with big sail. Lot of wind there. It's better.

G3: Yes, there is more speed.

Stud1: Clever! How did you work that out?

G4: We try the small one you know … it wasn't good. So I thought there's more room for wind with a big.

Stud 1: Good explanation! Room for more wind.

During another session the group has listened to and sung the text of the story of the Three Billygoats Gruff. Later they make moving figures. Two boys discuss together with a couple of girls how they can get the Big Billy-goat Gruff to move his legs backwards and forwards instead of sideways.

b3: My goat is crazy. You can't walk like that.

g4: You have to fasten it like this.

b3: How?

b4: Move that thing so the leg goes forward. Otherwise the leg doesn't get room.

Stud5: It's a good idea to try different things. Then you learn what works.

g3: Ha ha. You can't put that there. Then the leg goes out and in. /…/

b3: Yes, you must hole for both, otherwise only one goes. Now I know. Have you got another one of those? One of those clips. /…/

g4: Bag clip is the sort I will have. So my goat shall have wool like that.

b4: Don't put the clip so hard. Then it can't move. It has to be loose on.

b3: Okay, okay, I understand now.

Stud5: What a cool goat you made. What if you hadn't fixed the legs and he could only move them sideways! What would have happened then?

g3: then if the legs only go out and in, then he stays here.

g4: Poor thing. Running in one spot all the time! We jump like that in gym. Legs out and in and out.

The student supervising the construction work takes note of their private conversation and challenges their thinking by – either directly or through an interpreting friend – consistently asking questions of the sort "tell me how you were thinking/what you were doing" and encouraging them to talk about other possible solutions.

It was also of importance that appropriate terms and expressions for the task at hand were written on the board, and there is evidence that these were used. In line with each child's need to connect understanding to expressing themselves correctly in a more formal way, they turn to the board, or ask someone. Another child who speaks of "boats falling over" has just previously said that "you have to have that thing too …aah, keel. There it is (points to the board), otherwise the boat falls over."

When conversation stops

The recordings illustrate that when the third work session with lego and the drawings takes place, what is said around the work in hand decreases in some cases to very short expressions or humming. This is true even for children who in earlier sessions have been more active conversationalists. The observations of the project leaders during the progress of the work confirm that more non-verbal communication took place in the form of gestures. One looks at the drawing, takes the pieces one needs and continues the construction. When one discusses the work it is when the children look at the drawing together in order to find the right part to continue building. One looks at

the drawing and uses short expressions such as "mhm," "that one," "no, that one," "yes," "which one is it?" "where is it?" Several students, like the children, get very involved in the drawings and return the pupils' expressions with "no, it has to be that one," "yes, that's the one you use," "that's right, that one," "mmm, good."

This change in the form of conversation applies when the task of following a drawing is in focus. In between, the recordings show that the same children in parallel are involved in social conversation which has more content and has the character of full sentences. The first example below has the social conversation in italic text to the right of the expressions that concern the work.

b3: Not that one	
b4: yes!	
	b4: *What are you doing* (calling to others) *Our car's going to win!*
b3: check the picture	
b4: Aha	
b3: that?	b3: *This is really fun! Look what I tried!*
b4: Give it here!	
Stud 4: Check the picture	
b3: Ah… but	b3: *have you tried this?* (asks others) *Does yours work?*
B4: Take it!	
Stud 4: That's it, that one.	
B3: OK	B3: (to others) *Ha ha. Yours isn't as good, is it? Ours is so cool! We're trying the ramp now. We'll see it work.*

How do we understand what we hear?

In the section above, "Swedish as a second language and communicative competence," the assertion that one must learn basic Swedish before learning anything of the content of other school subjects was problematised. For

second language pupils, learning is complicated by working with foundation and extension language in parallel.

Communicative questions

All the pupils we have worked with and hear in the recordings have, with the exception of the two Arabic boys in Class A, the ability in varying degrees to use Swedish as a lingua franca to communicate with each other. They have reached the level of what Cummins (1996) terms BICS (Basic Interpersonal Communicative Skills). When they talk to each other and reach conclusions regarding the constructions and problem solutions, they most often use an everyday language in the second language and revert to their mother tongue when the second language proves insufficient. Examples of everyday language can be found when, for instance, one of the children working on bridge construction answers one of the student teacher's questions about the stability of the bridge. The child answers: "We have made very strong bridge. It has many legs. Then it's strong." Another child has understood the significance of a boat's keel to avoid capsizing. When she explains this, she says that it is so that boat won't "fall over."

The adults' attitude

The attitude expressed by the adults also has importance for the children's conversations during the progress of the work. In one discussion where a boy shows that he both can use the correct term "circuit" and explain how it functions, the student teacher asks if he means metal and why he needs a circuit-breaker. The boy knows what function the paperclip will have, but wants to have the word for why in particular a paperclip can conduct electricity.

> B2: but look, the electricity must go around, otherwise the lamp won't work. Look at the board. Cir…cuit.
>
> G1: I don't know. What's this?
>
> Stud2: It's a paperclip. Are you going to use that?
>
> G1: Yes, and clip it on.
>
> B2: A paperclip is like … (to student) What is it? Not paper, not stone.
>
> Stud2: Do you mean metal?
>
> B2: yes, metal.
>
> Stud2: Why do you need a circuit-breaker?

B2: Then the electricity goes around. I can attach and take away the paperclip and then the lamp works or it doesn't work.

The boy explains that he has a dad who is an electrician and that his dad will now be proud of him, because he created his own electrical circuit with his torch. What he is struggling to express in language is something that, from previous experience, he has no cognitive problem with. The student in the example cooperates with the boy and asks him the question "Do you mean metal?" after he has listened and understood what it is the boy is trying to express. A new concept, "circuit-breaker" – is used without explanation. The boy has shown with his explanation that he has understood anyway.

By contrast, instead of supporting thought processes they can be interrupted, as seen in the example of the student who in her eagerness to get the children to say a word correctly focuses her efforts on the pronunciation of the words "aluminium" and "battery." The girls are involved in a private conversation which concerns why "it shines more with that shiny stuff in it" and that they need a wire so "there will be circuit." The student's directing and editing the conversation to concentrate only on language formalities overlooks the importance of noting the content and reflection the children are expressing.

The student with responsibility for the Arabic-speaking boys has without doubt the most difficult task. The recording shows a tendency to moralise, and interpret their silence as though they don't *want* to speak Swedish. The preparatory class teacher has daily responsibility for the boys' work with their language and knowledge development. Even she shows an obvious frustration over what she sees as unwillingness from the boys to speak Swedish. Just a few weeks after the project was completed the preparatory class teacher reported that it could be seen that the boys' communicative ability in their second language in their regular school work seemed to come into its own and was properly established.

The use of the mother tongue appears to have been one of the project's strengths, as it gave the children the possibility to try out their hypotheses and help each other. It is also clear that the presence of teachers of mother tongue languages was just as needed in the project as in the ordinary preparatory classroom. In that case the Arabic-speaking boys and other pupils with obvious need of support in their mother tongue would have had an equal opportunity to be included in the activities, and we would have been able to understand the content of their conversations and their reflections around the work in hand in a deeper and more meaningful way. The older boy, who had been a longer time in Sweden and therefore could act as interpreter from Arabic to Swedish for one of the project leaders, was prepared

for communication with both the boys during the whole project. In that way, he in effect took over the adults' responsibility for the boys' situation.

Why is it so quiet sometimes?
What was it about the work with lego and the drawings that reduced the conversation about the construction and problem-solving to absolute minimum for some of the children? One possible explanation is that most of the children had never before played with lego, which involves following a drawing – two new tools for the mediation of learning and therefore experienced as difficult and requiring much more individual concentration. Wouldn't it then be more natural with *more* cooperative effort and *more* discussion to solve a difficult problem? Or was it perhaps that the drawing simplified the work and that one didn't need dialogue with others to solve the problem one confronted?

Just as in the other examples discussed above, we see possible explanations in the form of interaction between the adults and the children. Vygotsky (1978) speaks of challenging children's thought processes. This requires an active adult. Both examples above, in the section "When conversation stops," show the importance of two diametrically opposed attitudes. In the first conversation the student's input is restricted to utterances that are just as short as the children's: "Check the picture." The children are not told why they should do this nor are they given a challenging question such as in the other example with the racing car and the wind. In that case, the children's short expressions change to longer reflections when the student chooses to get involved in the conversation about that strange part of the diagram. One of the children compares the car's large rear end to the boat's sail in the first construction task, and interprets this as wind catchment that will give greater speed. What is decisive in the conversation is the comment that the car has a motor, but the boat does not. The boy is stimulated to think again, and comes to the conclusion that it has the opposite effect.

Hägerfelt (2004) has documented the same type of short staccato conversations and long sequences of silence during science laboratory work with measuring and observations. The pupils are instructed to do experiments and to fill in a lab report. Hägerfelt maintains that it is "natural" that there is less conversation and says that "all factual procedures like this mean that the pupils during laboratory sessions don't need to be as linguistically active as during other conversations." (p. 126)

Both the reported laboratory session (ibid.) and the construction work from a drawing in the technical workshop need however to be discussed from the point of view of the aim of the work and the way it is to be carried out. Areskoug & Eliasson (2007) speak of "the number of degrees of freedom" or "the amount of open dimension" in an experiment. When pupils in a traditionally formal laboratory session just follow an instruction and com-

plete a form, there is not much to talk about. If one instead chooses to allow the method and the measurements to be open for creative ideas, conversation is stimulated. It is therefore not the laboratory work as such that produces a quiet form of work. In the same way, the conversation in the technical workshop is hindered in that the instructions tell the pupils that they should follow a certain number of points in a drawing. The project group has created silence instead of – in accordance with the aim of the project – stimulating conversation.

We have referred earlier to Barnes (1978) experiences of so-called "edited" or "probing" speech. Barnes maintains that children use probing speech when they are in dialogue with each other and the teacher stays in the background. When the teacher however enters the conversation, the pupils begin to feel around for what the teacher "wants to hear" and the conversation transforms into something teacher-oriented, or edited. We think there is a risk that this is interpreted that the teacher by definition always does harm by stepping in and joining the conversation. Our examples show instead that it is the conditions of the participation that need to be discussed. If the teacher takes over and interrupts the dialogue that is underway, as in the example with the pronunciation and vocabulary exercise "aluminium" and "battery," this leads to the conversation taking on an edited format. The teacher who, by contrast, takes time to listen to what the children are asking and to their reflections can instead with challenging comments – such as in the example of the racing car - support and contribute to reflection and development.

Documentation by pupils' texts

The writing in *class A* was structured by the preparatory class teacher and started with retrospective conversations. The words used in the technical workshop were written on the board and the mother tongue teachers helped the children with translations which were written in individual word lists. Introductory questions and challenges were then used to build up the description. These could take the form of: Tell us what you've been doing today?, What have you been up to? How did you begin? What did you use in your work? What did you do? Tell us how it worked out. Tell us how you liked working with this. What did you learn?

The teacher who had *class B* has not reported how the writing was conducted when the pupils returned to school. One of the pupils was therefore asked what the reporting sessions were like. She gave the following short description: "The teacher told us to write about what we'd done." Both groups had access to the lists of words and expressions that were written down during the sessions in the workshop. This lack of information on the writing

process in Class B leaves us with non-verifiable assumptions on why these children didn't seem to develop their writing as quickly as Class A.

In class A, two or three versions of text from each work session were handed in. Some of the children write first in their mother tongue, then in Swedish and finally after a supportive discussion with the teacher, a final version. Class B uses no texts in the mother tongue. They wrote one version in Swedish. The overview given below is based on the first version of the texts from class A and the only version from class B.

Texts from a couple of children in class A are missing for each work session. One of the boys stopped attending the preparatory class after the second meeting in the workshop. Class B has only handed over texts from the first three meetings. As well as this, texts are missing from the second meeting for two of these children. Finally, although differences between the groups are commented on, it is not possible to give definite comparisons due to the lack of texts in class B.

In the following we have used different numbers to denote the children. Class A again is denoted with letters were the girls are writers WG1 – WG3 and the boys WB1-WB7. Class B pupils are denoted by wg1-wg6 and wb1-wb4. One text from the work sessions "Billygoats Gruff" and "Torches" have been excluded in class B material as the texts were unnamed, and we did not know if the writers were boys or girls.

The texts were read in order by content from the different sessions. After the read-through an analysis was made for each session of the qualitative differences with consideration to:

- What the texts contain
- If the texts are functional – that is to say if one can understand what the pupil wishes to convey to the reader.

What do they write about?

Most of the texts begin with descriptions of the everyday situation of getting to the School of Education from their own school, but also deal with content that makes new demands. The children start from those experiences they take with them from the practical and oral work in the workshop "there and then," but work in the writing situation's "here and now" with a vocabulary which afterwards cannot give practical illustration in the same way.

The examples from the texts about boat building show how the separation was done. After that, an overview is given showing the analysis of all the texts we received from the various work sessions.

In the first group there are texts with content that speaks of where one has been and what activity has been carried out. The work in itself is not closely described. The texts are very short.

> We went to the university. Then we mad a boat me and X. Then we et apple. (wg4)

> I will make a balloon boat. I will make that boat with Y. (wg6)

Even these texts contain descriptions of the journey to and from the university and what one has been working with. As well as this, this group also accounts for – to a varying degree – the materials used during the session. There are also more complete descriptions of how one approached the work.

> We built a boat. We cutt with scissors. We drew on paper the boat. (WB1)

> We used many things, glue gun, milk cartons, tape, plastic bottles … (WB5)

In group three, the texts were expanded on in such a manner that as well as describing content and process, there were also comments on the construction and reasoning about causes for why the construction was functional.

> I think it floated because it was straight and not too heavy (WB4)

> It was difficult to build a boat. My boat floated because it was made of plastic and wood and it wasn't too heavy. (WB6)

The compilation shows that the majority of the texts belong to group two. With regard to the first text about boat-building, there are some borderline cases between groups 1 and 2 and some between groups 2 and 3. The texts in group 2 contain to a varying degree lists of the things used during the work session. Considering that these – sometimes quite difficult words – most often are correctly spelled, we interpret this to show that the children to a great degree have consulted the lists with words and expressions used during the work sessions. There are also more or less complete descriptions of how the work was carried out. After the third work session with torches, one can see that several of these borderline cases from the boat texts have changed to clear group 2 or group 3 texts.

As mentioned earlier, the information about how the texts were worked on in class B is insufficient. The short description that one of the pupils has

given indicates very different conditions in the two classes. Back in their home school, class A chose, after recapitulating the session orally, to first write their texts about the content and experiences of the sessions in their mother tongue. In this way the pupils could discuss with and ask questions of the mother tongue teacher who in turn could ask for further explanation. Only then did these pupils write their texts in Swedish. According to the children in class B, their texts were written without the supportive oral repetition or the first draft in the mother tongue. The sample from class B is small, but it is in this group that one finds the shortest texts and texts that are borderline cases between groups 1 and 2. There is cause to reflect whether it is the different writing situations, with or without the supportive preparatory work in the form of the oral run-through and the first draft in the mother tongue, which has contributed to this result.

The writing in the classroom is both an individual and a social process. Back in the preparatory classroom, the pupils are writing in that discursive environment that is the school, but also in dialogue with the experiences gained earlier. When one assumes a socio-cultural perspective on language use, both activities should be focused on; the activities in the technical workshop, and the activities in the preparatory classroom. This report is limited by resources to the study of the activities in the technical workshop.

Each pupil formulates their experiences as isolated writers, but they are at the same time participants in a kind of conversation with teachers and friends both in the preparatory classroom and in the technical workshop. We are all presumptive readers of their texts. Understanding, the earlier conversations in the workshop and the lists of words and expressions that were used during the work are all "language pillars" (Säljö 2000, p. 123) when pupils formulate themselves in writing about what they have experienced. It is, despite this, uncertain if the children in class B had the same help from the lists or if they had the same help as class A in using them. While the content of the lists for class A can have been linguistically supportive - as indeed they were meant to be - it is possible that the considerably less helpful effort by the class teacher in class B has reduced these to formal vocabulary knowledge and thereby resulted in fewer group 2 and group 3 texts.

The pupils can be said to be on their way to a command of two different sets of tools; the physical and the linguistic. Everything, for example the drawings, the lamps, the wires, the lego, the metal, paper, wool, glue, ramp, circuit-breakers etc that one has used during the work sessions occur also in everyday reality outside school. In the technical workshop, a new dimension has been brought into play, where one confronted with different construction tasks has to think about what choices one can and should make, and why. The texts that are written afterwards are authentic and can be said to be included in the inter-textual fabric (Vygotsky, 1986) where language mediates that which is important to the social practice that the work in the technical

workshops consists of. The writer interacts not only with the reader but also with a number of other texts, both those already written and those which will be written. There are always more or less visible connections between what we say and write and what has been said and written, and to the future. (Lökensgard Hoel, 2001 p. 42.)

Lökengard Hoel (2000) has as a starting point Bakhtin's dialogue theory (Bakhtin, 1986, p. 94) on linguistic acts as social rather than individual psychological phenomena. It is not enough that "one is good at writing in general" (p. 41). In order to participate in the writing of texts that describe technical work, one must understand the demands of the work or the oral and written work risks being limited to isolated word knowledge. When the preparatory class pupils in their writing situation enter the cultural text world that the descriptions of technical constructions are part of, it is necessary that they even in their mother tongues are helped both with their everyday understanding and the work and language use they have participated in through the activities in the technical workshop.

Functional texts

All the texts are functional in that they are readable and possible to understand. The children are in the beginning of their acquisition of their second language and battle with the interpretation of all the new words and expressions. Both consciously and unconsciously they are building up the rule system of the target language that native speakers developed during the first 6-7 years of life. The aim of the project has not been to judge the formal language competence of the children. Some examples from the texts illustrate briefly the simplifications and over-generalizations (Viberg 1996, p. 116) that second language pupils use and which demand a long-term and conscious use of language in speech and writing for the writers to develop greater certainty in their language.

"Jag klippt (klippte) i silkespapper" (*trans: I cut tissue paper*) is an example of a grammatical simplification where a verb ending has been left out. "Min båt flötade(flöt)" (*trans: My boat floated*) and "Vi gjorde många olika båtar som kan simma (flyta) i vattnet" (*trans: we made many boats that can float in the water*) are two examples of over generalization. Overgeneralization occurs when a rule is used that is not appropriate to the current case (the verb form for the verb float) or that one, as here, chooses the incorrect verb "simma" *(trans: swim)* instead of "flyta" (*trans: float*). In the sentence "Sen jag gjorde (gjorde jag) en stor bock (*trans: Then I made a big goat*), the writer over-generalises with regard to word order.

For obvious reasons, the texts contain formal language mistakes like the examples above. However, these do not detract from the reader's ability

to understand what the child wants to say. We see through these authentic texts a strength in the model for language use demonstrated in class A. After the first version of the Swedish text, one talks again with the teacher about the content, builds on the text with help of new support questions and with attention to simplifications, overgeneralizations and word order in the language. When the second version is written one has had help in reworking it.

Boys and girls

Boys and girls write the same kind of texts and the classification into groups 1, 2 or 3 can be said to be equivalent. Group A has handed in texts from all the work sessions. During the two months we met them within the framework of the project we can see that both boys and girls in this group develop their writing considerably. They write longer texts and become more confident authors who do not need to do as many corrections in the second version. We see the permission to choose to use the mother tongue as a communicative tool in the technical workshop and the recapitulating conversations and the authentic text writing with the help of the mother tongue teachers in the preparatory classroom as a catalyst for the development of the second language.

What the students say

The student teachers' reflections show that the project has had a positive influence for both the pupils and themselves. They express both worry and anticipation about what it will be like to work with children who don't speak much Swedish, and are pleasantly surprised at how much work they have actually been able to carry out.

Both the students who worked in supervisory roles and those who were observers wrote down their reflections after each work session. These express feelings of inadequacy when they are unable to explain to children who speak little or no Swedish but also how "impressed they were at how helpful the children were to one another." The students had developed "more understanding for the sorts of problems that can arise when children do not understand the Swedish language." The students who acted as observers commented that those who were supervisors had had "difficulties in formulating open questions and productive questions." One of the students with a supervisory role concluded that "it is very difficult to, in a relaxed way, ask investigative questions." Of the Arabic-speaking boys, one observer says "in a group, the children speak their own mother tongue. These boys are very con-

centrated on their work and approach their task with great seriousness. It is great to see this degree of involvement."

All the students have had new experiences and acquired new knowledge. At the same time, it is difficult to teach when you cannot make yourself understood and do not have access to mother language teachers, so new insight into the problems of developing new knowledge through the second language if the mother tongue is forbidden from use has also been gained. That different teaching strategies with focus on formal language knowledge or challenging children with questions gives different results became clear for them through the recordings and observations made by their colleagues.

Conclusion

The aim of the project was to stimulate language and knowledge development in pupils in the preparatory class through conversation and cooperation in authentic problem-solving situations and through authentic writing of texts within the subject of technology. The aim was also to support and challenge student teachers' skills in planning and carrying out teaching within the subject technology which leads to development in both language and knowledge. In this article we have chosen to emphasise and discuss the significance of the mother tongue as support for the successful acquisition of a second language and the development of knowledge in school subjects.

At first we made a number of assertions and asked questions that can be related to a socio-cultural perspective of teaching. The children have arrived in Sweden relatively recently and they are at the start of their second language acquisition. They have no earlier experience of a university environment and Malmö University's building "Orkanen" where the School of Education is housed, is unknown to them. They enter a foreign, purpose-dedicated environment where they meet new teachers and students. The area of the work they will carry out – technology – is new to them as a school subject and its contents represent at least partly a new world of tools that mediate learning. The learning in itself is social-based. To be a part of the discourse represented by the university and the technology subject itself, and there to participate in new groups is all part of the difficult learning process the pupils have been part of.

The ambition of the project has been to create authentic activities with content that is close to the children's own experiences. Authentic learning takes into consideration the participants' earlier experiences and their own questions are given a great deal of space. The texts one writes in this context build upon what one has been working on and they should be written primarily because one has something to tell, to ask about, or to report. The formal

use of language is trained by use of these texts and not by the isolated training of skills without a well thought-out content.

Excerpts from the recordings show that both children and the students use various "strategies" in conversation and that this has different consequences for the processing of knowledge. The analysis of the recordings showed the difficulty a number of students had in staying within the boundaries of authentic learning. Insecurity and lack of routine in teaching pupils with Swedish as a second language led them to falling into what is normally defined as the traditional teacher role. Instead of listening to the children's probing conversation, one took over and changed the conversation to "the teacher asks and the pupil answers." The questions used on those occasions were closed – that is to say there was a correct answer that the child was expected to elicit. The conversation became asymmetrical: on the adult's conditions. It is unsure if the children who were drawn into a pronunciation exercise on the word "aluminium" understood what was going on, but they answered politely, syllable by syllable, until the student was satisfied. Then they returned to what was important to them, namely that the electrical circuit wasn't working. Other situations show the opposite. The children are involved in a probing conversation and the supervisory students intuitively or consciously sensitively enter the conversation on the children's conditions. What becomes clear is that there is more than one way to demonstrate understanding of why "shiny stuff" (aluminium) makes the light reflect and the torch shine "better" and why the electrical circuit has to be closed in order for the torch to shine at all.

The conversations in the technical workshop have mostly been carried out with the help of everyday language. Afterwards, as the pupils themselves felt the need to find more precise words and expressions for what they were working with, they had assistance from the words written on the board or by asking the adults. Vygotsky (1986) describes this as a meeting between the spontaneous, everyday concepts they have acquired at "grass roots" level, and the abstract, scientific concepts of school. The children's explanation that the wind went outside the small sail and that it was therefore better with a bigger one, or that the boat needed a keel so as not to fall over, will be challenged by scientific explanation models. This is, of course, even harder when the teaching is being carried out in a second language. In the work process, all the children are included, while the recordings of the conversations show something different. The Arabic-speaking boys were excluded from the dialogue between the pupils who spoke Swedish amongst themselves and with students who led the work. At the same time, we see that giving them permission to use their mother tongue and as needed allowing them help with interpretation from an older friend, gave them self-confidence and security in that they could participate and carry out the work. We see the permission to choose to use the mother tongue as a communica-

tive tool in the technical workshop, and in the recapitulative conversations, and the authentic writing with the aid of the mother tongue teacher in the preparatory classroom, as a catalyst for the development of the second language.

There is no simple answer for why the conversations about the work sometimes became minimal or dried up entirely, while more social conversations continued unhindered. We have reflected on a possible explanation based on the contribution to the conversation made by the adults. Another explanation is the task itself. Interpreting a drawing and constructing thereafter was something new for the children. If you have understood the work process described in the drawing, there is not much you need to communicate about in order to build as directed. All you need to do is to pick up the right pieces and put them together. The task itself did not stimulate conversation. More studies and comparisons are necessary in this field to determine what it is that has this obvious influence.

For the pupils to achieve what is usually called competence or skill, we believe that both children and adults must – to use Hundeides' expression – "master the communicative code in the inter-subjective room that dominates the classroom" (2003, p. 151). Vygotsky's theory on the closest zone of development includes the interaction between the childrens' level of development and the social rooms they are participatory in. The preparatory class pupils are involved in a process where they do not yet command the Swedish language on either a foundation or extension level. The work and conversations in the technical workshop and the writing that followed are the rooms that offer meeting places for the children's individual and collective zones of development: collective, as the conversations and interaction in the work sessions offer an exchange of meaning and access to the other's perspective. To understand the knowledge development of the individual child, we must therefore understand what we do when we organise activities in various social rooms. The project has shown clearly the need of didactic cooperation with the mother tongue teachers, partly so that the work with newly-arrived pupils with very modest command of Swedish does not remain as formalised second language training, and partly so that the work becomes a link in the chain of knowledge development that starts in the mother tongue.

The student teachers worked both as supervisors and as observers during the work sessions. When they exchanged their functions, they also found themselves in different positions from which to interpret the work they have been part of. The written reflections after the teaching sessions show these various attitudes. When they act as supervisor they give more expression to how it is not to be able to make oneself understood, while as observers the weight shifted to the satisfaction felt when the children appreciated and felt the rewards of the work. As a supervisor it was easier to distance oneself and look at the teaching critically.

In the National Agency of Higher Education's evaluation of teacher education there was serious criticism that not all subject areas paid attention to the language development of pupils. Language development is a prioritised area and has been written into all syllabuses at the School of Education. The students have, through the project, experienced and become conscious of the possibilities and problems involved in work with second language and knowledge development in combination, and have become aware of the significance of language development within the framework of the subject. As well as this, they have increased their experience of leading and organizing, observing and documenting practical work with groups of pupils.

Active citizenship as well as the influence of technology on the development of society has been emphasised in the syllabus. The project shows that true inclusion, with the democratic possibility for all pupils to participate and make their voices heard, demands that they are permitted to use those voices irrespective of the language they employ.

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