The use of language tools for writers
in the context of learning Swedish as a second language

Specific goal
Technology has the potential to play a large role in the process of learning a second language (Warschauer,1996; Warschauer & Meskill, 2000). However, the development of this potential is still in the early stages. Issues on which the realization of this potential depends include "the shift from thinking of technology as assisting instruction to thinking of it as [supporting and facilitating] learning […]" (Garrett, 1991, p.95). On the one hand, computer programs for learning language should be able to understand a user's input and evaluate it not just for correctness but also for appropriateness. On the other hand, "the use of the computer does not constitute a method" (Garrett, 1991. p. 75). Rather, the computer is a tool, an instrument, in which a variety of methods, frameworks, and pedagogical philosophies may be integrated and implemented. The usefulness of computer assisted language learning cannot reside in the medium itself but in how it is put to use.
This project aims to investigate issues that are related to the use of computer support for language learning. In particular, the project deals with the problem of the role of computer-based language tools for writers in the context of learning Swedish as a second language. This project will pursue the following goals :

1. To study how learners develop their writing practices in the context of learning Swedish as a second language. How do they use available writing tools and how do these tools shape learners' understanding of the new language.

2. To contribute to the improvement of the design and development of existing language tools for writing in learning contexts.

We believe that the study of these questions will contribute to a better understanding of the role of computer-based language tools in complex processes such as second language learning and that this will help developers to better understand what is at stake when designing for learning purposes.

A brief overview of research in the field of Swedish as a second language and computer-assisted language learning in Swedish as a second language
The study of acquisition and development of Swedish as a second language is a vast research area that goes back to the early 70's in Sweden. Two of the foundational research projects were SSM (Svenska som målspråk), conducted by Björn Hammarberg and Åke Viberg, and focusing on writing abilities of adult immigrants (Hammarberg and Viberg, 1976; 1977; 1979 and Viberg, 1979; 1980; 1981) and SPRINS (Språkutvecklingen hos invandrarbarn i Sverige) that focused on written L2[1] Swedish development in bilingual children (Tingbjörn, 1976; Pitkänen, 1980). This work together with research conducted by Kenneth Hyltenstam (1979a; 1979b; 1983), has contributed considerably to the understanding of the type of language that immigrants develop, their error types, their syntactic problems and, in particular, how

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[1] L2 stands for second language

immigrants acquire and use the Swedish grammar. Three main perspectives can be distinguished:

- *The linguistic perspective* focuses the acquisition of syntax, morphology and semantics of Swedish as a second language, and it is represented by the extensive research work conducted by 1) K. Hyltenstam at the Center for Research on Bilingualism, Stockholm University; 2) B.Hammarberg at the Department of Linguistics, Stockholm University; 3) Å. Viberg at the Department of Linguistics, Uppsala University, 4) Sven Strömqvist at Lund University, 5) U-B. Kotsinas and G. Jansson at the Department of Scandinavian languages, Stockholm University, and by 7) G. Håkansson, at the Department of Linguistics and Phonetics, Lund University.

- *The socio-linguistic* perspective focuses on how social context affects and is affected by language and it is represented by the work carried out at 1) the Rinkeby Institute of Multilingual Research, 2) the Multicultural Center and 3) the Immigrant Institute.

- *The pedagogical perspective* focuses the development and improvement of language teaching. It is represented by 1) Professor Inger Lindberg at the University of Gothenburg, Institute of Swedish as a second language, 2) Monika Axelsson from the Department of Teacher Training at Uppsala University and 3) Gunilla Jansson at the Department of Scandinavian Languages at Stockholm University.

Studies conducted through these perspectives agree on viewing the acquisition and development of Swedish as a second language as a multifaceted process in which is necessary to combine different foci. They have, however, most often focused on the study of speech and the development of immigrants' communicative competence (cf. Kotsinas, 1982, 1983, 1985). Questions regarding the role of writing during the acquisition and development of a second language have usually been overlooked. One exception is the work conducted by Gunilla Jansson (2000) on writing strategies developed by writers who have Swedish as a second language. Our interest in writing relies on the central place that writing occupies in the development of language and thinking processes (Vygotsky, 1962; 1978; Luria, 1946; cited by Downing, 1987).*"Cognitive processes and structures are transformed significantly by the acquisition of our best recognized cultural (and intellectual) tool, namely, writing"* (Olson, 1995,p. 96.). Both Vygotsky and Luria suggested that writing not only allowed one to do new things but more importantly, turned speech and language into objects of reflection and analysis (cf. Olson, 1995). From this perspective, writing is of utmost importance as it affects consciousness and cognition through providing a model for speech and a theory for thinking about what is said. It is in fact this new consciousness of language that is central to the conceptual implications of writing. *"Far from transcribing speech, writing creates the categories in terms of which we become consciousness of speech"* (Olson, 1995. p. 119).

Another common characteristic of all three perspectives is that they have neglected the question of the role of language tools in supporting learning, and more in particular, in helping learners to reflect on and develop awareness of the language they produce. According to Säljö (1996), the role of tools – psychological as well as

technical- and the concept of mediation play a fundamental role in the understanding of human thinking and learning. For Säljö, the most important psychological tool is language, understood as a semiotic resource providing signs that can be flexible and creatively used in social practices. Quoting Wertsch (1991), he emphasizes that "*in contrast to many contemporary analyses of language which focus on the structure of the sign systems independent of any mediating role they might play, a sociocultural interpretation presupposes that one conceives of language and other sign systems in terms of how they are part of and mediate human action*" (Säljö, 1996, p. 84-85).[…]. "*By acquiring concepts and discursive tools, we appropriate ways of understanding reality that have developed within particular discursive practices in different sectors in a complex society*"(p. 87). From this perspective on language and tools, the use of language tools may alter writing processes. Our inquiry entails examining not only the transformative power of tools on developmental socio-cognitive processes, but also how the computer-based language tools are developed, and how they get transformed by the users (cf. Verillon & Rabardel, 1995; Cerratto, 1999).

Computer-assisted language learning (CALL) is the name of the discipline that is concerned with the development, deployment and evaluation of computer applications in language teaching and learning. To date the most common CALL applications have been email, chat and multimedia programs that have been developed and used by language teaching professionals with very little input from language technology[2] research (cf. Cerratto and Borin, 2002). In this sense, it should come as no surprise that computer-assisted language learning applied to Swedish as a second language very rarely incorporates features that are able to analyze and provide appropriate feedback on the learners' written texts (cf. Cerratto and Borin, 2002). Most of these applications are often combined into a multimedia production and some others are web-based. But method of delivering does not change the underlying assumptions, formats or their limitations. These language tools are rarely able to analyze learners' written or spoken productions.

As mentioned in our prior research application, research and development of language tools has been going on for many years at Nada, KTH. It started in the early 90's (Severinson Eklundh, 1991; Cedergren & Severinson Eklundh, 1992) and has since then grown with contributions from several researchers in human-computer interaction, computational linguistics and computer science. Recent work in the group has considered the integration of different functions such as grammar checking and proofreading, linguistic editing functions, language rules and help system into the processes of writing and document handling. This work has resulted in Granska, a prototype Swedish grammar checker and general language toolbox which has attracted interest from both researchers and potential users (Domeij et al, 1998; Domeij, Knutsson, Carlberger and Kann, 2000; Knutsson, 2001; Domeij, R., Knutsson, O. and Severinson Eklundh, K. 2002).

The development and use of such language tools for Swedish have an important place within the writing process of native speakers. However, concentrated as they have been on the development of robust and highly efficient algorithms and rules that are able to correctly detect and diagnose language errors, they have neglected the pedagogical potential of such tools (Vernon, 2000). Developed to support correct writing, they have often been based on models of native Swedish writers/users. An

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[2] Language technology is the term we use to describe a range of computational techniques designed to process real human language, whether that language presents itself in spoken or textual form.

important category of users has therefore been forgotten: writers who are learning Swedish as a second language. Our intention is to work towards the development of integrated language tools for non-native writers who are learning Swedish as a second language. At present, the cooperation with the theoretical computer science group at Nada/KTH in the context of the "*CrossCheck*" project[3] concretizes an important step towards the consideration of users having limited knowledge and experience of the Swedish language. Unlike this project that focuses pedagogical and human-computer interaction issues of the use of language tools, the *CrossCheck* project concentrates on the development of an error typology for second language Swedish and on the technical implementation of grammar checking rules according to the typology. The work carried out by the *CrossCheck* project provides us with important input regarding pure computational aspects involved in the study of the use and development of language tools for second-language writers.

Description of the research project
Our interest in the use of writing software for learners of Swedish as a second language has to do with the influence of tools in the development of writing and reading processes involved in the acquisition of a second language. This issue is here regarded from both theoretical and applied perspectives. From a theoretical perspective, the project aims at understanding the impact of writing technology on the second language learning process; from an applied perspective, the project aims at contributing to the adaptation of existing Swedish writing language tools for second-language learners. Both perspectives raise central issues in the understanding of learning with computer-based language tools. Among them, we concentrate on the following research questions :

1. What's the role of writing tools in second-language learning ?
This question entails a serious look into the technology question (cf. Haas, 1996). Many researchers who are interested in the integration of computers in learning activities have recognized that technology does matter; however few of them can explain precisely how technology matters and in which ways. Research in the field of computers and learning does not directly examine technology in any systematic way. Technology is often viewed as transparent or as all-powerful and self-determining. Viewing technology in this way has important consequences on our understanding of writing and learning with language tools. It encourages a belief that writers can use computer technology without being shaped by it and therefore discourages any examination of how technology shapes language and how it in turn is shaped by language. The interest here does not lie on the effects of technology on classroom, writing or learning, but rather on how tools are understood, used and even transformed by users and when in use.

2. How should writing tools be adapted for users who are writers and learners of Swedish as a second language?
This question aims at problematizing the design and development of writing tools for language learning and, more in particular, the models of learners that have been implemented into language tools, the mode of dialogue and interaction between the learner and the computer program and the appropriateness of feedback (see further our prior research application). In particular, the design of feedback on the

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[3] *The "CrossCheck"* project is funded by Vinnova within the language technology programme.

user/writer/learner's input seems to be an important issue for teachers of Swedish as a second language. In interviews that we have started to conduct with such teachers during 2002, they mentioned that providing individual written feedback demands a lot of effort; they referred to their lack of time for providing adequate written comments on learners' production although they do recognize the central role of useful feedback on learners' language understanding. There may probably be misfits between the written feedback that teachers provide on composition and the learners' interests- that is, between what the teachers can give and what the students would like to get (cf. Cohen and Cavalcanti,1990 and Fathman and Whalley,1990). Our interest in written feedback does not rely on the idea of replacing teachers' feedback by a computer program but rather to design feedback that could both help teachers in their language teaching and learners in their language learning.

Theoretical framework
Among the theoretical frameworks used to approach the problem of human-computer interaction in learning situations, those related to mediated action (Vygotsky,1978; Engeström, 1987; Cole & Engeström 1993; Rabardel, 1995; Wertsch, 1998; Bliss & Säljö, 1999; Béguin & Rabardel, 2000) offer fruitful conceptualizations of the problem of interacting with computers. One of the fundamental notions is that there is a psychological relation between user and object of activity through the use of a tool (Rabardel, 1995; Cerratto, 1999; Cerratto, forthcoming). This notion inherited from the cultural-historical school of Russian psychology, puts tools in the position of *intermediators* of human action. Considered as intermediators, tools in use are far from being transparent. They are material, presenting characteristics that are not created in a vacuum; they do not emerge from the head of developers. Just as language carries ideology within it, so too do tools (Haas, 1996).

Methods
The preferred research methods are qualitative. Ethnography in particular is viewed as an adequate methodological approach for the study of the interaction between second-language writers and language tools (Krapels, 1990). Ethnography can certainly produce meaningful an useful insight into second language writing and use of learning language tools because it requires the kind of in-depth inquiry that is necessary to implement in young areas of research. Techniques include those used in field studies: direct observation or videotaped protocols based on composing-aloud (Domeij, R., Knutsson, O. and Severinson Eklundh, K., 2002), retrospective accounts of composition drawn from interviews and, user studies of the Granska prototype at different stages of its development. Workshops with the teachers are also a good way of gaining an understanding of their views of teaching, on learners' language errors and on the use of technology.

Research design
Discussions and interviews with teachers at two different second language institutions that have accepted to participate in this project– Folkuniversitetet and the Department of Scandinavian language at Stockholm University- have allowed us to make preliminary choices for the design of the research.

Subjects. The groups selected for the project are people with a university education from their countries, motivated in learning and writing Swedish and interested in going further with their university education and/or getting a job that better fits their

background and working experience. Language levels vary. Groups from Folkuniversitetet consists of one group studying one-month intensive language courses for intermediate students and another group studying a three-month intensive program called "Svenska för sjukvårdspersonal". In this program physicians and nurses prepare a language exam in order to be able to practice their professions in Sweden. Groups from Stockholm University study a seven points course on composition studies in Swedish as a foreign language for advanced students. Studying groups with different language levels correspond to our interest of starting to identify types of grammatical errors that are "usual" and are "important" to correct.

Tasks. Essays, argumentative texts and working documents such as physicians' journal, have preliminary been chosen.

Phases. The project is divided into four main phases :
1. Planning phase that started at the end of 2001 and currently running
During the planning phase of the project we have confirmed and consolidated our research network. We have started to cooperate with two main institutions that teach Swedish as second language: Folkuniversitetet and the Department of Scandinavian languages at Stockholm University. We have concretized our cooperation with the department of Computational linguistics at the University of Stockholm through the elaboration of an overview of Swedish as a second language and a state of the art of CALL application in Swedish as a second language as well as the available corpora and projects conducted in this field (Cerratto and Borin, 2002). Together with the group lead by Professor Viggo Kann from Nada/KTH we recently organized and participated in the "Temadag om datorstödd språkgranskning för andraspråksinlärare" (see appendix 1).
As mentioned earlier in this application, we have already started to interview teachers who have expressed an interest in the design of tools that are able to help them to cope with the writing activities of their learners. So far, teachers seem to recognize the important role of writing in the acquisition and development of a second-language although they confess their lack of time for coping with learners' texts revisions.

2. Collection of data and analysis. January 2003-December 2003
Phase two builds on results provided by prior work conducted in the areas of language technology and computer support for second language learning of Swedish (cf. Knutsson, 2001; Staerner, 2001 ; Öhrman, 2000). The goal in this phase is to learn more about the genre of texts that learners need to write, their type of errors, and their way of reading, revising and correcting their texts. It also aims at getting teachers and learners' opinions about the use of computer programs for second language learning.

3. Prototyping language tools and conducting user studies. January 2004-December 2004
In phase three we analyze the use of Granska for naturalistic writing tasks. The texts produced will also be studied from a linguistics point of view, investigating error types and error frequencies. The goal in this phase is to work close to the teachers and learners in order to articulate users' experiences. Results may lead to design changes in Granska.

4. Evaluating the design of the language tool in the context of second language learning. January 2005- December 2005

The aim of phase four is to evaluate the final version of the prototype and report the general findings of the project. Expected results aim to contribute to the educational area with knowledge and experience about the role of computers in learning and writing Swedish as a second language as well as to the human-computer interaction research field with a methodology for the design of computer support for learning environments.

Preliminary results
Preliminary results consist of those mentioned in the planning phase of this project and in the prior research application. In particular, we refer to Staerner's master's thesis (2001) studying the pedagogical possibilities for a Swedish grammar checker, Granska, to be used in a second language learning environment. One of the main questions addressed in the study was how a grammar checker should be modified and adapted to second language learning. The master's thesis reports findings from interviews conducted with six second-language teachers. On one hand, the teachers express that computer-assisted language learning gives new possibilities of pedagogical variation and user adaptation. On the other hand, the teachers mentioned that the current programs are too limited and that the technology is not reliable. The teachers expressed that false alarms from the programs are dangerous for the learning process and will do harm to the students self-confidence. Integrating language technology with computer-assisted language learning programs represents a great challenge for future research in writing and second language learning as well as for the development of usable language tools.

Relevance
The number of people learning Swedish as a second language has increased and the composition of the student population has changed over the last years. Today, more than one million people or one-ninth of the Sweden population, are either not born in Sweden or are the children of immigrants. Although English represents a bridge between Swedes and foreigners, it does not always open doors to the Swedish culture and the Swedish society. To master Swedish as a second language is therefore a key to the integration of foreigners to the Swedish society as well as for integrating Sweden into a multicultural Europe. This project aims to contribute to a better understanding of the processes involved in learning Swedish as a second language with the support of computer language tools. It is of particular interest for us to define the role of technology in this context and to identify design principles for the development of computer writing tools for second-language learning purposes.

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