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# Immersion Students' Subject Specific Production from a Terminological Perspective

## Abstract

The present article discusses the application of terminological methods when analysing knowledge structures in students' second language production. Our study is a part of the research project *Conceptual Worlds in Swedish Immersion* (CSI) at the Department of Scandinavian Languages at the University of Vaasa. The project aims at investigating students' ways of expressing and developing their conceptual worlds in different ages and in different school-related situations via a second language. The material collected comprises both written and spoken material (Swedish) produced by immersion students in grades 3 (9 years of age), 6 (12 years of age) and 9 (15 years of age) in Finland. In this paper we focus on the written project material which is based on a task concerning the use of content specific concepts and consists of 344 individual texts. Our article concentrates on methodological issues. By examining and modeling what kind of characteristics and what kind of concept structures immersion students express at different ages we expect to be able to contribute to a cross-disciplinary design of second language teaching. The suitability of terminological methods in a subject specific but non-expert context will thus be discussed in a new theoretical framework.

## 1. Introduction

This paper discusses the use of terminological methods in the analysis of students' written work in L2 (second language). The paper is part of a larger research project **Conceptual Worlds in Swedish Immersion. LSP-oriented modeling of second language proficiency and age-related cognitive growth (CSI)** undertaken at the Department of Scandinavian Languages at the University of Vaasa. In the current paper, we are interested in how terminological methods can be applied to a content-specific context which is not communication between experts. The paper focuses on concept models constructed in the texts of students from different grades. The expectation is that studying concept structures will help in forming an overall understanding of the students' ability to categorize information at different ages. Finally, we will also consider other ways terminological methods may contribute to analysis of this type of material.

### 1.1. CSI project and material

The overall aim of the larger research project (CSI) is to study how immersion students' content-specific knowledge structures and knowledge management develop during compulsory education, which is delivered in both the immersion language (Swedish) and the students' first language (Finnish). The CSI project combines two research traditions of the Department of Scandinavian Languages at the University of Vaasa i.e. research of Swedish immersion and research of LSP. The team consists of post doctoral researchers of LSP and language immersion as well as students at different levels (PhD and Master). This combination is expected to yield both new insight into age-related content-specific competence in L2 immersion and new knowledge of the application of terminological and LSP methods in the context of teaching. (*CSI* 2009)

Swedish immersion in Finland is a multilingual education program in which children who speak Finnish as their first language learn both language and content at the same time. Language

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immersion was introduced in the mid 1980s in Vaasa in one kindergarten group (Laurén 1999). Today about 4,000 Finnish students take part in language immersion in kindergarten and compulsory education in 13 municipalities (Laurén/Buss 2009: 3).

Data collection for the project (CSI) started in 2004 with a written pilot study and it was completed in 2009 with class room observation and teacher interviews. The corpus consists of survey data, oral and written data, and classroom observation of three grades (3, 6 and 9) in three cities in Finland (Espoo, Turku and Vaasa). This paper will focus on written material collected in October 2005.

On the exercise sheet students were asked to tick a box for gender (girl/boy) and identify their class. The instruction for the task was:

> Tell an Australian language immersion student what happens when winter comes to Finland. There are some clues on the sheet to give you ideas of what you can write about. You can select as many of them as you wish. Write ”It is now going to be winter in Finland” as your title.

Students' task was to write an essay in approximately 30 minutes on the topic of *It is now going to be winter in Finland* with the help of six content-specific stimulus words (*weather, ground, waterways, plants, animals, people*). This paper focuses on the first stimulus word and will investigate what aspects students attach to the concept of **weather**.

Students in grades 3, 6 and 9 in Espoo, Turku and Vaasa wrote 344 essays which contain altogether 42,746 words. Words were counted as graphical words in their original context using Microsoft Word word count software. Spelling compounds incorrectly as separate words (e.g. *minus grader, jätte kalt*) as well as writing separate words together (*myckesnö, snöenkomerimarken*) result as one, two or several words. According to the information given by students on the exercise sheets, participants included 172 girls and 169 boys. There were also 3 students (two in year 6 and one in year 9) who had not indicated gender. One of these is categorized as a girl (has written 93 words) and two are categorized as boys (have written 104 / 214 words) in tables 1 and 2.

| | Girls | Boys | Total |
|---|---|---|---|
| Grade 3 | 64 | 52 | 116 |
| Grade 6 | 57 | 62 | 119 |
| Grade 9 | 52 | 57 | 109 |
| Total | 173 | 171 | 344 |

Table 1. Grade and gender

The number of students is fairly evenly divided between grades and genders. The written exercise was undertaken by 116 students in third grade, 119 students in sixth grade and 109 students in ninth grade.

| | Girls | Boys | Total |
|---|---|---|---|
| Grade 3 | 5 304 | 3 063 | 8 367 |
| Grade 6 | 10 843 | 7 081 | 18 121 |
| Grade 9 | 9 398 | 6 646 | 16 258 |
| Total | 25 545 | 16 790 | 42 746 |

Table 2. Number of words in essays

Girls have written over 25.500 words (on average 148 words/essay) and boys just under 17.000 words (on average 98 words/essay). On average students have written 134 words in their essays (the title is not included). The range in length as measured in words in the selected material is 6–388 words which indicates great individual differences in the data. Third grade essays have a range of 15–198 words, sixth grade's range is 10–388 words and ninth grade has a range of 6–350 words per essay. On average sixth grade students wrote the longest texts (152 words/text) and stu-

dents on third grade the shortest texts (72 words/text). Third grade students' texts in this data are on average slightly shorter than texts of sixth grade students (149 words/text). According to word counts, third grade students have written approximately half the number of words written by ninth grade students (see table 2) which affects the total number of concepts.

A quantitative review of the material regarding the topic of weather, reveals that 16 students of 344 (5.5%) do not discuss the concept of weather in their texts. Grade 3 students have most often chosen not to write about weather (14 students, 12%) while in grades 6 and 9 there are only 2 and 3 students respectively who have not included weather in their texts. A qualitative analysis of how 328 students as a group present the concept of **weather** in their texts is done by analyzing concept levels and categorization, dichotomy and deixis in the material.

In our analysis we will use terminological methods with some modifications (see Nissilä/Pilke 2009). Since the texts are written by children/teenagers in their second language, the terms cannot be expected to be entirely correct or the different concept levels and concept relations expressed explicitly in the texts. However, it is interesting to investigate which concept levels Swedish immersion students appear to favor, what conceptual content the used characteristics give to the concepts students have chosen to discuss, and how they express the content-specific material in their texts.

### 1.2. The focus of the paper

The aim of this paper is not to look at how students define the concept of **winter**, but to concentrate on the characteristics they use to describe weather. Specifying which characteristics have been included in the analysis is based on the definition of weather in the *Nationalencyklopedi* (1996) where **weather** is defined as follows:

> Current conditions regarding wind, precipitation, temperature and similar natural phenomena in the nearest ambient atmosphere in a particular place under particular circumstances or within a particular period. (Translated by T.L.)

*Encyclopaedica Britannica* (2009) defines the concept in a similar way, but there are more features and they are presented in a different order:

> State of the atmosphere at a particular place during a short period of time. It involves such atmospheric phenomena as temperature, humidity, precipitation (type and amount), air pressure, wind, and cloud cover.

Regarding the term **precipitation** we have included in the investigation expressions which refer to the weather (e.g. events *it is snowing*, *it is raining*, *snow is falling*), but have not included expressions which describe what Finland looks like in the winter (e.g. circumstance *the ground is completely white with snow*). According to the same principle we have at this stage left out expressions such as *the ground gets colder and colder* and *the ground is frozen* and have instead focused on expressions which clearly relate to **weather** and **temperature** (e.g. *then the weather gets colder* and *it gets all the time colder and colder*). Amount of daylight and darkness are not included in the definition of weather. Thus, descriptions such as *It is much darker than in the summer* are left out of the current analysis. The same applies to circumstances such as *it is gray* which can be seen to result from, for example, the sun not shining, it not raining or there being no snow yet.

## 2. The concept of weather in the essays

The role of terminology as a device is important in understanding and processing complicated issues. Concept maps, for example, are helpful devices for both students and teachers, especially when difficult subjects are being taught, because they help human beings to understand big, complex totalities (Novak 2002: 41, 85–86). We study the students' concept orientation with the help of concept maps which are expected to show how students categorize a given theme in relation to

different levels. We have developed a satellite model for each grade (for more about satellite model see Nuopponen 2000) based on the concepts and characteristics that appear in the essays. The satellite model can be used as a device when creating divisions of a larger area. It can also be used to store the concept system of a language for a special purpose. The satellite model can be used as a visual device in illustrating complex concept problems and as a live conceptual device which allows changes, redefining, and specifying while working. (Nuopponen 2000: 130, 142).

We have excerpted characteristics of **weather** from the essays and use the satellite model to illustrate collectively all the characteristics that appear in the essays. In doing this our aim is to illustrate and compare how children organize their knowledge and what kind of concept hierarchies children create when they describe the concept of **weather**. The three different satellite models (grade 3, 6 and 9) about the concept **weather** have three satellite nodes in common, *precipitation*, *temperature* and *other phenomena* (see figure 1).

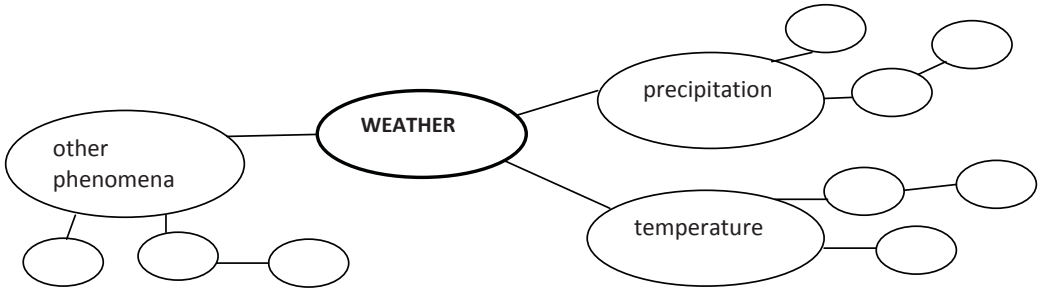


Figure 1. Satellite model with three nodes

In terms of frequency, cold **temperature** and **precipitation** in the form of snow are the two most important characteristics of 'winter'. These two have been given their own nodes in the satellite model of weather. The less frequent phenomena in the essays, i.e. the sun, overcast sky, wind and thunderstorm have been presented in the third node (**other phenomena**).

The concept models created based on the material differ both qualitatively and quantitatively, but they also have certain similarities. What all models have in common on a general level is, for instance, that in the winter it may snow or rain, the weather is cold and the temperature is below zero.

The texts of third grade students have no occurrences of snow fall. They have not written about how often or rarely it snows in the winter, which the sixth and ninth grade students have done. Third grade students' texts have no mention of **slush** either, or division of temperature into minus and plus degrees (cf. absolute dichotomy below). As it is, they only write about temperatures below zero, unlike the sixth and ninth grade students. The concept model of grade nine students has a lot of characteristics and the model is varied in its categorization. There are aspects which are missing from the other two concept models (e.g. definition of place in connection with cold temperature). Interestingly grade six students' concept model does not include a general statement of the weather (e.g. *the weather is fine*, *the weather is bad*) unlike the other two concept model.

## 2.1. Levels and their categorization

The number of concept levels increases according to grade so that third grade students have less concept levels than sixth or ninth grade students. For instance, snow fall in the **precipitation** branch of the concept map is in third grade texts said to occur in Finland (example 1A) and more generally "in almost all of Finland". Sixth grade students write that snow fall is, in addition to the general statement of it taking place in Finland, limited geographically to Lapland in particular (example 1B). Ninth grade texts contain the division into Southern Finland and Northern Finland

which demonstrates that they categorize the phenomenon in a more multifaceted way (example 1C).

(1) A I Finland börjar snöa. (3PEC3) [It starts to snow in Finland.]
B Det kommer mera snö i Lappland. (6PV27) [There is more snow in Lapland.]
C För att Åbo ligger så söder, händer det ofta att vi inte får riktigt snö förrän i december. (9FÅ1) [Because Turku is in such a southerly location, we often don't get snow before December.]

Another example of differences in categorization is found in the **temperature** branch.

(2) A Ny är det 2- (3PEC18) [Now it is 2-]
B I vinter kan det vara -20°C (6FÅ4) [In the winter it can be -20°C]
C Jag skulle tro att medeltemperaturen i Åbo är ungefär -10°C. Förstås i Lappland är medeltemperaturen mycket lägre. (9FÅ1) [I should think that the average temperature in Turku is about -10°C. Of course in Lapland the average temperature is much lower.]

In third grade texts an exact statement of degrees is rare (example 2A), a temperature range is even rarer (occurs in one text). Sixth grade texts have both individual temperature degrees and temperature ranges (example 2B). Ninth grade students structure the temperature both as one value (e.g. -20°C) and as temperature ranges (e.g. 0 – -20°C) as well as, on the one hand as average temperature, and on the other as the lowest possible temperature (e.g. 2°C ).

## 2.2. Dichotomy

There is dichotomy in the concept models created based on the texts. Dichotomy is defined as "a (logical) division of a class into two mutually excluding subclasses" (*Stora Svenska Ordboken* 1996) Dichotomies can help to identify both the subject studied and its theoretical and methodological principles (Myking 2007: 281). The result is a simplification which can be seen as both an advantage and disadvantage. Picht (2005: 190) says that communicative reality can seldom be seen as simply black and white. According to Myking (2007: 271) dichotomies (like any contrasts) can be thought to have three main functions: cognitive, didactic and sociological function. The cognitive function of contrasts helps us, for example, to categorize and organize knowledge. In their didactic function contrasts help by providing focus when contrasting is used as a rhetorical tool. In the sociological function contrasts express group belonging (ibid.) A good contrast is built on a characteristic that is easily seen to have two antipodes 'p' vs. 'not p') (Cruse 1986: 262).

The dichotomy in relation to the concept of **weather** in the current data is mainly relative and not absolute (cf. Douglas 1966: 9). In an absolute dichotomy the pairs are mutually excluding (e.g. below zero – above zero). In a relative dichotomy the categories are defined in relation to their contexts (e.g. it rains a lot – it rains a little). In our data dichotomy is present in many concept models in many contexts, such as in the south – north definitions mentioned above. The dichotomy is particularly clear when comparing the **snowfall**-branches.

| Grade 3 | Grade 6 | Grade 9 |
|---|---|---|
| x | x | none |
| x | x | very little |
| little | little | little |
| x | x | not so much |
| x | quite a lot | quite a lot |
| much | much | much |
| x | x | quite enough |
| very much | x | very much |
| x | more | more |

Table 3. The dichotomy in snowfall-branches with regard to amount of precipitation

As the table 3 shows third grade students present the amount of precipitation as small or great (little – much – very much). In the sixth grade concept model the continuum is wider extending from little to much (little – quite a lot – much – more). The dichotomy in the ninth grade concept model consists of concept characteristics of none at all and very much, between which there are several characteristics (none – very little – little – not so much - quite a lot – much – quite enough – very much – more).

Third grade students' way of comparing only two concepts (winter – summer) can also be seen to express dichotomy. On higher grades concepts are often considered more comprehensively in relation to superordinate, subordinate and coordinate concepts. See example 3.

(3) A Vädret kommer mycket kallare en sommer (3FV28) [The weather gets much colder than in the summer]
B Vädret kommer att bli kallare än i sommar eller höst. (6FV216) [The weather gets colder than in the summer or in the autumn]

## 2.3. Deixis

Deixis is "particular to spoken expressions which refer to something in the actual situation" (*Stora svenska ordboken* 1996). Abstract phenomena can be made concrete by tying them for example to time, place, person or a quantity which are central to human cognitive thinking (see e.g. Aristotle 1989). Concepts of time are used to structure stories, but they can also give a point of reference to a phenomenon. Example 4 includes time concepts **now**, **today**, **in the autumn of 2005** and **last year**.

(4) A Nu är ganske –miinus ett på termometer (3PEC17) [Now it is maybe one below zero on the thermometer]
B Snöar idag (6PV212) [It is snowing today]
C Hösten 2005 har varit varmare än vanligt, men det ändå känns att vintern skulle ha kommit snabbare och plötsligare än på förra år. (9FEE8) [The autumn of 2005 has been warmer than usual, but it still feels as if winter has come quicker and more suddenly than last year.]

Because the instructions for the task mention Finland and Australia, they also occur in the texts. The deixis of place is also clear in how the students mention their home town (Espoo, Turku, Vaasa), the area (Southern Finland) or write that it is snowing outside or that it is below zero outside.

Expressions of quantity make it easier to process and understand many everyday phenomena (Saarinen 1999: 140f.). In the current data for instance the expressions of degrees are this kind of deixis. (See example 2.)

## 3. Discussion

In our paper we have tested and described how terminological methods can be used to analyze concept structures in students' written texts in L2 (second language). Concept maps show how students from different grades categorize the given theme with respect to different levels. Concept maps give an overall picture of what kind of concept hierarchies, what type of dichotomies and deixis there are in the texts. The concept map based on the texts of ninth grade students is the most detailed both with regard to its concept levels and concept categorization. Dichotomous thinking through contrasts is most evident in concept maps created from third grade students' texts. In sixth and ninth grade students' concept maps dichotomies spread over a more refined continuum. The deixis of place and time are present in concept maps of each grade. The deixis of quantity is present for example in the expressions of temperature degrees in the texts of sixth and ninth grade students, but is missing almost completely in the texts of third grade students.

Having an overall idea of how students as a group and as individuals think when they structure content-specific material at a certain age can be considered advantageous, for instance, for a language immersion teacher who should adapt both content and form of delivery in their teaching according to students' skills and level of development. Concept maps allow us to look at the

students' output in its entirety and compare it, with regard to content and language, to the core content of the curriculum (must-know), content that has some importance (good-to-know) and to knowledge that is peripheral (nice-to know). We expect concept maps to be helpful also in ascertaining how students categorize different types of concepts (e.g. animate vs. inanimate).

Concept analysis will continue as part of the CSI-project with the study of concept relations both at group and individual levels. On the one hand this will be done by studying the six stimulus words (*weather*, *ground*, *waterways*, *plants*, *animals*, *people*) separately, on the other hand by studying how students have linked the concepts when writing about the stimulus words (e.g. *weather* and *people*). Compared to analyzing a language for special purposes, one of the challenges presented by the current type of data is its variety and consequently the room left for interpretations.

In the future, research will extend to language level i.e. terms and definitions. A characteristic that all grades share in describing the quantity and quality of weather phenomena is the use of the prefix *jätte-* (very), e.g. *jättemycket* (very much), *jätteofta* (very often), *jättekallt* (very cold), *jättevackert* (very beautiful) (cf. Björklund 1996: 215). The definitions that occur in the data appear to resemble definitions in popular science which connect the phenomenon being explained to the writer's own (and reader's assumed) world of experience, e.g. *Snö är sådana vita bollar som regnar från himlen* (6FV14) [Snow is those white balls which rain from the sky]. Students try to make information concrete through their own world of experience (Koskela/Pilke 2001: 161–163). This aspect of everyday knowledge is a considerable challenge when using methods which have been designed for the purposes of LSP research (cf. Laaksovirta 1986: 57).

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