

Teacher reasoning and concerns on their assignment to teach and conditions for teaching evolution in a Biology course in upper secondary school, Sweden.

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Abstract

In this study the quantitative difference in what experienced teachers in upper secondary school orientate their concerns when describing their practice in teaching evolution in a Biology Course. Twenty-one teachers all of good repute and with experience from teaching a specified fundamental course in Biology at the Natural Science Programme. Most students in that course are aged 16 to 18 years. The teachers from 17 schools participated in semi-structured interviews. From an phenomenographic analysis that in the interviews the teachers orientated their concerns

A phenomenographic analysis emerged five themes of description in the outcome space: **Worldviews, teacher self, students, organisation and content.**

The results show that teacher orientation towards **world view and students** and **world view and organisation** seems to from the most frequent category of teacher

orientation, when orientation on **content**, more rare and less concern is orientated towards **teacher self**.

Introduction

The background for this paper is that it forms part of a project to study the science content in school Biology, focusing on the topic evolution. Not much research has been carried out to ascertain which aspects of the content teachers find most necessary (Fensham, 2001,)

How teachers reason on what content to present, can be connected with how they reason on how to fit and adjust the specific content into the course. It is then of interest to investigate what teachers are orientating towards. It concerns how teachers interpret the curriculum in the current school tradition, and what they give emphasis to. (Douglas, 1982). The specific content on teaching Evolution is not reported here, but this paper will discuss how experienced teacher reasons about their assignment to teach and on how they adjust the curriculum content, reasons and regards for their teaching in Biology A, one of the courses in the Science programme in the Swedish upper secondary school. The National Curriculum (Skolverket 2002) sets out many aims, but it also gives the teachers a free rein, within their professional role, to make choices on which content to emphasize.

The aim of the research is to explore the content of evolution in a Biology course.

In order to

do so I have scrutinized teacher reasoning on what to teach, how to teach the content and why. Questions on a particular science content which in Science education can be described as didactical (some people would emphasize this as a German and Scandinavian tradition and even spell it Didaktical!) In the professional role of a teacher there are many aspects that could be of importance. Knowledge of variation in teacher orientation will help us to more specifically understand the relation between the content and what it means to be a professional Biology teacher. A description on which content that is chosen and reasons for the choices aims to support to define the actions of professional teachers and the influence they have on shaping the school subject content.

In this paper I focus on the specific content in a specified context, where the syllabus are the same, but raise questions on

- what does teacher orientate on when they describe their planning?

Context

Upper Secondary Schools in Sweden are optional, but as many as over 90 percent of the population of people in ages 16 to 19 attend upper secondary school. Natural Science programme is one of the theoretical programmes which prepare students in broad sense for further studies. The name of the programme implies the character as it contains studies in natural science and mathematics, and it is supposed to problematize what science is and its role in society, it is also known to give a broad education in Swedish, language, history, social sciences etc. The programme often collect as many as ten percent of the population who attend upper secondary school. The Natural Science programme has long history of traditions, even though the reformation of the upper Secondary School in 1993 involved changes in the curriculum and organisation, the programme still often is characterized as classical, in many senses, not least when teachers describe educational endings for the Biology course (Pettersson, 2008 in process). There is a National curriculum in Sweden and this curriculum is compulsory for all programmes in upper secondary school. Most schools in Sweden are run by the community, but new and independent schools appear. All schools in Sweden are free of charge. The course biology a is one within the subjects which is characteristic for the natural science programme. In some schools the course is placed in year one and in other schools in year two.

Method

Participants

21 experienced teachers from schools in different types of socio- economical surroundings where involved in semi-structured interviews. This approach enables descriptions and interpretation of data in order to reflect on teacher's different ways of orientation and concerns in the way they reason when they describe their planning. (ref.)

Selection

The teachers were contacted after they have been recommended as skilled, experienced¹ teachers by the school administrators/ managers or by teacher educators. By involving the school administration I was able to present the aims my study and to legitimize my presence at the school. All schools in Sweden which have had the National Science programme were first contacted, but of practical reasons a selection of schools had to be made. The selection was sometimes done from practical reasons (as that both the teacher and I could find time to meet and that I could be able to fit a visit in connections with other meetings (if there was a long distance). I tried to get in touch with teachers of both sexes. The ratio of female and male teachers correspond to the population of experienced teachers. The teachers were also selected by type of community and type of school (eg. How many students there were who were considered for the biology A course, that could be relevant to how much the teacher could discuss subject matter content with colleagues, how much experience could be expected and so on).

Description of variation in schools

Criteria for descriptions of catchment area for the schools described as in a scheme of categorisation modified from Kommunförbundet (according to Lundahl.L 2003)

- Big city- community with a population above 200 000 inhabitants
- suburban municipality

I have in my categorisation joined the these two categories

- City –community with a minimum of 50 000 inhabitants
- Fairy large city- community with between 20 000 and 50 000 inhabitants
- sparsely-populated area- community less than 20 000 inhabitants

The categorisation state only the size of the community.

¹ By experienced teachers are trained biology teachers, who have taught for at least five years and have repeated experience from the course Biology A.

Table 1. Distribution of teachers in the interviews regarding sex and type of community where they teach

Type of community	Number of teachers	Number of female teachers	Number of male teachers	Number of schools
1. Big cities- community or suburban municipalities	3	1	2	3
2. Cities	6	4	2	6
3. Fairy large cities	7	2	5	4
4. sparsely-populated areas	5	1	4	4
total	21	8	13	17

The aim of this selection was to represent experience of teaching in schools in a variation of
Different sized Communities.

Table 2. Distribution of schools where the teachers taught regarding population of students in the Natural Science programme at the school. Number of students in the school year 2005 according to SIRIS (statistics from Skolverket, the national Agency of School, Sweden)

Different types of schools	Number of schools
Approximately 50 students in Natural Science Programme	3
Approximately 100 students in Natural Science Programme	8
Approximately 150 students in Natural Science Programme	1
Approximately 200 students in Natural Science Programme	5
Approximately 250 students in Natural Science Programme	2
Independent school total number of students approximately 250, one group in The Biology A course each year	1
No students in Natural Science Programme. The course Biology A a choice, one group a year	1
total	21

The interviews

The interviews focused on planning for the topic evolution in the Biology course. The interviews were semi-structured where the teachers were asked to describe the course and in which way the topic evolution would fit in. Questions as why is this important? How do you present this? What do you want your students to understand when the course is done? Etc would attract the teachers to tell more and in depth describe their aims.

Analysis

The audio recorded interviews were transcribed and these transcripts were read over and over again. The transcripts from the 21 interviews were regarded as a whole and themes of what the teachers described emerged. There were five themes found. They were labelled as concerning **worldviews, teacher self, students, organisation and content**.

In all transcripts the statements regarding these themes were marked. From collections of statements from the teachers this analyse investigates how much each teacher is oriented into each theme. The procedure was to calculate words in each category, what teachers, when engaged in discussing their assignment to teach and the conditions for teaching evolution, stated. These descriptions were calculated in percentage of what each teacher described. These figures were scored in a bold scale from zero to ten, where the figures was rounded down as one to five percent counted as zero, and rounded up five to ten percent was scored as one, eleven to fifteen scored down as one, sixteen to twenty-five as two, etc.

By ranking numbers, categories of orientation were identified. On orientation is found when the score is three or higher. (If a teacher would have scored 2 on all themes that would be an example of general orientation)

Findings

All teachers emphasized one or two themes.

Table 3. Teacher scores into themes, the score three a higher shows orientation

Teacher	sex	worldview	student	organisation	Teacher self	content	sum	Categories of orientation
Dagmar	female	5	3	0	1	1	10	worldview student
Bertil	male	5	3	1	1	1	11	worldview student
Bodil	female	5	3	1	1		10	worldview student
Johan	male	5	2	0	1	0	8	worldview
Fanny	female	4	4	1	1	0	10	worldview student
Adam	male	4	3	1	1	1	10	worldview student
Niklas	male	4	2	3	0	1	10	worldview organisation
Erik	male	4	2	3	1	1	11	worldview organisation
Ludvig	male	4	1	1	1	3	10	worldview content
Cecilia	female	3	3	2	2		10	worldview student
Ivar	male	3	2	1	2	0	8	worldview organisation
Kalle	male	3	2	3	2	0	10	worldview organisation
Eva	female	3	2	3	1	1	10	worldview organisation
Martin	male	3	2	3	1	1	10	worldview organisation
Helge	male	2	3	1	2	1	9	student
Cesar	male	2	3	2	1	2	10	student
Greta	female	2	7		1		10	student
Helen	female	2	4	2	2		10	student
David	male	2	1	1	1	4	9	content
Gustav	male	2	1	5	1	1	10	organisation
Anna	female	1	4	2	3		10	student
total		68	57	36	27	18		

The themes most frequently attended to was world views and students.

In teacher reasoning on their assignment to teach and to the conditions for teaching evolution within the context of the course Biology A in upper Secondary School, Sweden, these categories of orientation can be seen.

Table 4. Categories in teacher orientation

	Number of teachers
World view <i>and</i> student	6
World view <i>and</i> organisation	6
Student	5
World view	1
World view and content	1
Organisation	1
Content	1
	<hr/>
	total 21

A combination of orientation towards world view and students and world view and organisation seems to form the most frequent category of teacher orientation, followed by orientation towards students.

Discussion

From this paper it is apparent that there is a variation in teacher's orientation. Further studies of statements within these described themes will give more information and examples of what teachers regard as crucial and which adaptations of the content teachers do in order to fit their students.

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