

To teach others to learn Generic educational teacher competencies and subject knowledge

Teachers' and teacher students' development of competencies is going to be studied in order to develop knowledge about how the mentioned actors, in a good way, in one context, have possibilities to develop relevant competencies. How teachers conceive relevant competencies in relation to in-service training and activity is described in Nilsson (2006). The interviewed teachers' conceptions of development of competencies in in-service training show a relation between the complexity of conceived relevant content and the complexity of conceived area of use. The individual's conceptions of competencies as relevant is a prerequisite for the individual's development of competencies in the activity. Another visual angle according to teachers' competence development is the competence relevancy for the activity. A difference between relevant competence between individuals and activity is possibly problematic but also a source for improvement.

Background

There are at least three groups of actors, whose competencies are discussed in contexts where learners and learning are discussed: In this project teachers, teacher students and pupils are lifted forward. The actors' competencies are supposed to be developed inside the institutions of teacher education and school activity.

Lindberg (2002) is lifting forward research about teacher education, showing that historically has teacher education been steered by ideologies of politics with the aim to change school and society. Success according to political ideologies has seldom corresponded to the expected impact in the activity. In Utbildningsdepartementet (2007) (Government's Department of Education) there are in the directives for a committee concerning a new teacher education indications of that teacher students are not developing enough relevant competencies.

Present teacher education, starting 2001, (Regeringens proposition (A government bill) 1999/2000: 135) developed in cooperation with changes in the other school system. The political ideology is pervaded in all political outlines for teacher education, upper secondary education, compulsory school and pre-school. Ideologically generic educational teacher competencies as prerequisite for teaching the subject and areas of subject are emphasized and generic educational teacher competencies are lifted forward in the government bill (1999/2001:135) as the "generic educational area".

The mentioned ideological perspective and others have sharply criticized teacher education in general. The critics concern among others, lack of integration in different respects (Utbildningsdepartementet, 2007). More specified there are, concerning the criticism, a lack of systematically progression inside the generic educational area and between the generic educational area and the subject areas and specializations of teacher education. Another problematic integration is between university courses and teacher students' practice. An example is that teacher students should be educated by the teachers in practice and not only practice in a vocational way. A clearer developed dialectic between university courses and teacher students' practice has to be developed.

As a consequence of the critique the generic educational area is presumed to be in front of radical changes both according to content and size. Important is that the content is relevant from different perspectives e.g. universities', school activities', pupils' and politically.

Demands from the activity on teachers and pupils are in change, as demands on teacher education, depending on among others ideology of politics and economic prerequisites. Teachers who are instructing e.g. in mathematics, find it problematic to develop relevant competencies in practice on the basis of subject knowledge and generic educational teacher knowledge offered by in-service training (Nilsson, 2006). The problem was lifted forward already when the new curricula Lpo 94 (Utbildningsdepartementet, 2006b) and Lpf 94 (Utbildningsdepartementet, 2006a) were introduced. Madsén and Risberg (1994) were at the time for the introduction of the steering document writing about a new and changed teacher role and a new teacher commission with base in the curricula. According to the author the commission included that individual teachers should be able to integrate for the commission relevant competencies.

Based on a widened teacher role there where consequently changes in instruction. Pupils were supposed to develop lifelong learning and pupils' ability to plan and be responsible where emphasized. Lpo 94 (Utbildningsdepartementet, 2006b) is lifting forward the need of increasing pupils' influence, also according to questions concerning the pupils' education. Teachers should take a base in each individual's needs and "own work" in which the pupil were supposed to plan when some parts of school work should be executed within a period, became a solution of pupils' influence and individualization e.g. in mathematics.

One change that appeared was the competence to include all pupils in ordinary education, see e.g. Persson (2001). Some professions e.g. special teachers were phased out and other professions with less operational responsibility were added. The pupils social competence in school activity were increasingly questioned during the 1990-thies, with consequences that schools work with plans for equal treatment according to the value base in the curricula were lifted forward ideologically. The complex of problems is also mentioned in Hargreaves (1999). The circumstances of power between teachers and pupils changed in general so that pupils were not supposed to act upon a teacher as an authority. The power in the class-room should be distributed by relations between teachers and pupils. Difficulties concerning the

development of relations were that the youth culture was doubted by adults and e.g. the youths' use of Internet and mobile phones was looked upon as problematic.

In Lpo 94 (Utbildningsdepartementet, 2006b) and Lpf 94 (Utbildningsdepartementet, 2006a) the goal and effect steering, in the opposite of the rule steering, were obvious. Simultaneous with demands for a widened teacher role according to pupils' social competencies and inclusion, the demands increased according to teachers' responsibility concerning pupils reaching of goals in subjects. A norm related mark system with grades 1-5, were changed to a knowledge related system with three qualitatively different grades: Pass, Pass with distinction and Pass with special distinction for compulsory school and Fail, Pass, Pass with distinction and Pass with special distinction for upper secondary school. The demands were that all pupils had to reach the goal Pass in at least the subjects Swedish, mathematics and English at the end of year nine. In-service training in the mentioned areas became a problem because of the economic lowering during the 1990-thies.

One consequence of the goal steering and effect steering was that in year five the pupils were supposed to reach goals specified by the government and controlled by national tests in Swedish, mathematics and English. The subject goals were, according to knowledge as the goals in year nine, qualitative. According to assessment of quantitative and qualitative knowledge goals Biggs (2003) is lifting forward the SOLO – taxonomy, "Structure of the observed learning outcome". The taxonomy is developed according to complexity starting in simple facts, continuing with relational constructed knowledge and developing to abstract expanded knowledge. The criteria for the marks Pass and Pass with distinction have similarities to the relational level and criteria for Pass with special distinction has some similarities to the abstract expanded level. Svensson (1976) emphasize the holistic learning approach in order to develop deep knowledge and deep knowledge is required of teachers for the possibility to help pupils develop deep and higher forms of knowledge. The demands on pupils' competencies have changed both in respects to social competencies and to the qualitative character of the knowledge that is to be developed and assessed. In Utbildningsdepartementet (2007) there are also indications of that teachers' instruction in e.g. mathematics do not good enough, result in that pupils are reaching the national goals. The Pisa investigation 2006, according to Skolverket (2007) (Swedish National Agency for Education), shows that the Swedish pupils in mathematics admittedly are scoring well in an international perspective, but fewer pupils are reaching higher levels 2006 compared to earlier investigations.

To sum up, the demands on the actors' competencies and development of competencies grounded in ideological political steering are illuminated above. The actors, teachers, teacher students and pupils are acting in the same context for developing competencies. Although the competencies are developed in the same context the different actors competence development are looked upon as separate. Teacher students competencies in the generic educational area and subject knowledge from teacher education is developed together with the practice teacher' s generic educational knowledge and subject knowledge, grounded in knowledge from university, in-service training and professional experiences. The aim for the teacher

student is the development to a professional teacher, which means to be able to influence pupils learning in different areas. For practice teachers the aim is to influence teacher students' development to professional teachers, and to influence pupils learning in different areas. In all, the central part of the development is teachers' competencies for pupils learning.

Aim

The overall aim is to critically review content of the generic educational area to legitimize content scientifically even in relation to practice. A specified aim is to investigate and make visible which aspects of generic educational teacher competence that are used by teacher students and teachers when planning and instructing in Learning Study in the school subjects mathematics, Swedish, civics and sciences.

Learning Study is developed for instruction of specified content in subjects as mathematics, English and Swedish see e.g. Holmqvist (red) (2006). Marton, Runesson and Tsui (2004) describes that the base for Learning Study is a learning object with variation in critical aspects, which the learners have possibility to conceive and as a consequence develop learning. Learning in Learning Study is a possibility for contingent learning for teachers by the direction to the pupils learning. The contingency with usefulness in the instructional situation could make it possible to conceive the content as relevant, see Nilsson, (2006). The aspects of generic educational teacher competencies made visible are going to be related to the generic educational area in teacher education by the questions:

1. What central areas of knowledge from the generic educational area are made visible as aspects of generic educational teacher competencies in learning studies in the different subjects?
2. What interdisciplinary knowledge from the generic educational area, are made visible as aspects of generic educational teacher competencies in learning studies in the different subjects?
3. How are the aspects of generic educational teacher competencies related to the school subjects mathematics, Swedish, civics and sciences in a Learning Study?
4. Is it possible to find and in that case use critical aspects of generic educational teacher competencies in a Learning Study, so that teachers and teacher students are developing good teacher competence?
5. How in one way, is the legitimizing or in another way is the making invisible of content in the generic educational area e.g. democracy, school history, teaching and thinking, visible in a Learning Study?

Research area

According to integration of different forms of teacher competencies there are different perspectives upon what knowledge and competencies that ought to be integrated and upon how the knowledge and competencies should be integrated. Generic or general educational competencies could be made superior, placed on equal level or subordinated in relation to the subject content. Lipman (2003) is e.g. lifting forward integration of different kinds of knowledge in instruction and takes the base in thinking and reflection. He sees neither thinking nor reflection as strategies that per se are developing academic knowledge or integrating knowledge. The starting point is that teacher students as well as their pupils have to develop the ability of critical thinking. The critical thinking, should according to Lipman, be used together with creative and social thinking in multidimensional thinking. In Lipman's multidimensional thinking the three aspects critical, creative and social thinking are of the same weight. Critical thinking could be looked upon as a process and also as a product according to assessment, at least when knowledge is used in practice. In practice there is a demand on the professional, an ability to assess what is good practice and what is good knowledge and also how they can be used in a good way. The critical thinking is supporting assessment and Lipman is writing: "I will argue that critical *thinking is thinking that (1) facilitates judgement because it (2) relies on criteria (3) is self-correcting, and (4) is sensitive to context.*" (Lipman, 2003, s. 210-211)

Lipman thinks that classrooms environment should be prepared for inquiry, making pupils able to multidimensional thinking. Critical thinking is a generic competence that teacher students, teachers and pupils are considered to use in development and application of knowledge. Subject knowledge e.g. development of concepts is lifted forward but are considered to need a base in good ability of thinking and to assessment. Lipman puts generic competencies as critical thinking and assessment in a superior position. Pupils in Swedish schools should, as mentioned before, show qualities in knowledge, as regarding the national goals requires ability to think relational and to a point also abstract expanded and develop higher order knowledge. Biggs (2003) describes, as also mentioned, abstract expanded knowledge in terms of that with the already given e.g. reflect, analyze and conclude in order to develop new knowledge.

Marton, Runesson and Tsui (2004) is lifting forward learning as a generic educational competence, mainly the pupils' learning, and teachers competencies are based in generic educational knowledge in learning used in relation to learning e.g. in a subject. Learning is always learning about something and in instruction the learning object could be related to a subject.

Other ways of lifting forward how teacher competencies should be integrated and used, is to see subject knowledge, knowledge in subject instruction and generic educational knowledge in balance with the same weight. Banks, Leach and Moon (2005) are developing a model for how pedagogical knowledge, school knowledge and academic subject knowledge could be

integrated dynamically through the teacher student's personal construction of knowledge in the subject.

In research in didactics in relation to school subjects the generic educational competencies are frequently integrated, but subordinated the subject. Bednarz, Acheson, Bednarz, R. (2006) are writing about teaching subject, an area mostly considering methods and strategies for research about instruction in subjects in civics and humanities. Research about instruction in sciences and mathematics is frequently lifting forward the concept pedagogical content knowledge from Schulman's model, see e.g. Seymour and Lehrer (2006).

It is problematic to categorize the mentioned research in terms of more or less right because the different perspectives have the possibility to contribute with important knowledge according to integration of different competencies. In one way if you in all circumstances are using generic educational competencies as the most important goal for learning, it could prevent teachers' and teacher students' development of subject knowledge. In the other way round, if you in all contexts are using only subject knowledge as a goal you can prevent teachers' and teacher students' ability to think and learn higher order knowledge in subjects.

Besides research that Marton, Runesson and Tsui (2004) are lifting forward concerning Learning Study, it is clear in Rallis, Tedder, Lachman and Elmore (2006) that Learning Study is a development of Lesson Study. Learning Study is directed specifically on pupils learning in a subject, in relation to research, compared to Lesson Study which is developed as a method by practitioners. Research also shows possibilities to develop competencies in a good or best way called good and best practice according to Ruthven (2005). The author is also lifting forward that Lesson Study is promising in this case. Davies and Dunhill (2008) uphold the possibility to use Learning Study in teacher education for the developing of teacher students' competencies.

The planning of the pilot project and preliminary results

With the base in Learning Study the approach of the research will be in the perspective lifted forward in Marton, Runesson and Tsui (2004). Research with Learning Study is as mentioned directed to pupils' learning and the pilot project's focus is teachers' and teacher students' learning and development of competencies according to pupils' learning. The major researchers in this area should be Marton, Runesson and Tsui.

The fall semester 2007 six teachers were interviewed about how they looked upon integration of subject knowledge, knowledge in subject instruction and generic educational teacher knowledge. Four of the interviewed teachers and one more teacher are during spring semester educated in Learning Study in cooperation with the University of Gothenburg. The fall semester 2008 one more Learning study will be conducted with both teachers and teacher students,

Two of the teachers were interviewed in depth according to the learning outcomes of the syllabuses in Educational sciences with base in the generic educational area. Relevant areas

for the Learning Study were also discussed. The aim of the later interviews was to gain knowledge about the teachers' views of the knowledge lifted forward in teacher education. Concurrently the teachers should be aware of what generic educational competencies that were lifted forward in teacher education.

On a meeting for planning the Learning Study at the end of the fall semester 2007 with the teachers involved, a discussion started about what learning object that was appropriate for the teachers to use in a Learning Study. They thought quiet vaguely that fractions could be suitable. Next meeting started the course in Learning Study and concerned the research approach, which was mediated as action research with learning study, aiming at in the best way to be able to teach problematic aspects of subject content in mathematics. Instruction was lifted forward as a process aiming at all the pupils' reach of a learning outcome: In the Learning Study the teachers were using theory of variation (Marton, Runesson and Tsui, 2004). The theory of variation means that a learning object should be made visible for the pupils by critical aspects lifted forward by the teachers. The teachers now specified the learning object to calculate fraction, specified in subtracting parts from wholes.

Next meeting the discussion was mostly about variations in the learning object that make the learning object visible for the pupils, with the aim to work out a pretest. The learning object was specified to fraction subtracted from wholes and parts. Aspects that had to be visible were subtraction of fraction, and the difference between part and amount. The pretest was worked out and was carried through in three school classes. The first lesson was planned next meeting based on the results from the pretest, showing critical aspects needed to be lifted forward. One critical aspect lifted forward were extension of fraction, made concrete by the question if the pupils should choose $\frac{1}{3}$ of or $\frac{2}{5}$ of a chocolate bar.

The time for each lesson was limited to one hour. The lesson was filmed and a post test was carried out, and the film and the post test were analyzed the following meeting. The test showed that all pupils managed some tasks but the task with the chocolate bar had to lift forward the extension by using variation. Variations decided was e.g. that the denominator should be constant and the numerator vary, and the numerator should be constant and the denominator vary and also that both the denominator and numerator should vary. The learning object was decided to be differences between fractions. The improved lesson was filmed in a new class. Aspects lifting forward were that fractions are based on a whole and the problem of comparing fractions from different big whole. The pupils, divided mostly in pairs, got two "chocolate bars" with $9 \cdot 20$ squares and the pupils had to decide which of $\frac{1}{3}$ or $\frac{2}{5}$ of a chocolate bar is the most and how big the difference is. A new critical aspect was made visible: The pupils needed to conceive that the parts of the chocolate bar should be divided in similar parts for the comparison by $\frac{2}{5}$ with the base 20 and $\frac{1}{3}$ with the base 9. Or else the judgment of the size is dependent of counting squares one by one.

In the analysis during the next meeting the results of the post test were analyzed and the teachers found out that the pupils did not improve according to the learning object. (For an

overview over the results se Appendix 1) When observing the film it was clear that during the lesson the learning object was not obvious for the pupils. In the lesson, extensions of fraction were lifted forward, but the first learning object was subtracting parts from wholes. In the discussion the teachers started to reflect upon if it really was important to be able to manage extensions of fractions to be able to subtract parts from wholes. Of course it is crucial to know about extension if the subtraction means to subtract mixed forms with different denominators, but to start with e.g. $1 - \frac{1}{3}$ or $1\frac{1}{4} - \frac{3}{4}$ it is not necessary. On the other hand, what is necessary is to know that 1 is the same as $\frac{3}{3}$ or $\frac{4}{4}$. A new lesson was worked out for the next film in line with the findings. At this moment two different lessons have been carried out and still one is going to be carried out.

According to the research questions the analysis of the generic educational competencies is not yet developed systematically so the following results are to be interpreted with caution. Another aspect of the interpretation is that teacher students are not involved yet. During the two analyses the teachers were increasingly using critical thinking according to Lipman (2003). An example is when the teachers were concluding with a judgment when they decided that the extension of fractions was superfluous, at least at the moment. In the process they corrected themselves, in relation to a learning object as criteria and sensitively made a change to the context with pupils. Another interesting preliminary result is that the reflections increasingly seemed to concern the pupils learning, which can be a sign of integration of mathematics and educational sciences if you regard learning as educational sciences. Completing interviews have to find out in a more systematic way. In the last analysis it is possible to interpret the change back to the first learning object as critical aspect of generic educational teacher competence. The teachers' had to understand what basics that needed to be developed in order to make the learning object clearer for the students.

Literature

- Banks, Frank; Leach, Jenny & Moon, Bob, (2005). Extract from new understandings of teachers' pedagogik knowledge 11. *Curriculum Journal*, 2005, Vol. 16 Nr 3, pp. 331-340, 10 pp.
- Bednarz, Sarah Witham; Acheson, Gillian & Bednarz, Robert S. (2006). Maps and Map learning in Social Studies. *Social Education*, Nov/Dec2006, Vol. 70 Issue 7, p398-432, 8p, 1 chart, 3 maps; (AN 23160885)
- Biggs, John (2003). *Learning at university. What student does.* Society for research in higher education.
- Davies, P. & Dunnill, R. (2008). 'Learning Study' as a model of collaborative practice in initial teacher education *Journal of Education for Teaching*, Feb 2008, Vol. 34 Issue 1, p3-16, 14p. DOI: 10.1080/02607470701773408; (AN 29984053) 20080228
- Hargreaves, A. (1999). Schooling in the new millenium: Educational research for the post modern age. *Discourses: Studies in the cultural politics of education*, Vol. 20, No. 3, Dec., (p. 335, 23 pp.). Tillgänglig: Ebsco host: Academic Search Elite, (6402704), [20060703].
- Holmqvist, Mona (Red) (2006). *Lärande i skolan Learning study som skolutvecklingsmodell*

- Lindberg, O. (2002). *Talet om lärarutbildning*. (Örebro studies in Education, 5). Örebro: Örebro universitet.
- Lipman, Matthew, (2003). *Thinking in Education*. 2nd edition. Cambridge: Cambridge University Press.
- Madsén, T. & Risberg, O. (1994). Från fortbildning till en lärande organisation. I Madsén, T. (1994). *Lärares lärande. Från fortbildning till en lärande arbetsorganisation*. (ss 129-156). Lund: Studentlitteratur.
- Marton, F., Runesson, U. & Tsui, A. B. M. (2004). The Space of Learning. Chapter 1 pp 1-44. In Marton, F., Runesson, U. och Tsui, A. B. M. (Eds.) (2004). *Classroom discourse and the space of learning*. Mahwah, NJ: Lawrence Erlbaum.
- Nilsson, I. (2006). *Lärares tankar om kompetensutveckling*. Lund: Lunds universitet, Pedagogiska institutionen.
- Persson, B. (2001). *Elevers olikheter och specialpedagogisk kunskaps*. Stockholm: Liber.
- Rallis, Sharon, Tedder, Jane, Lachman, Andrew & Elmore, Richard. (2006). [Superintendents in Classrooms: From Collegial Conversation to Collaborative Action](#). *Phi Delta Kappan*, Mar 2006, Vol. 87 (Issue 7, p537-545, 9p) (AN 20022851) {061204}
- Regeringens proposition 1999/2000:135*. En förnyad lärarutbildning. Utbildningsdepartementet. Stockholm: www.riksdagen.se.
- Ruthven, Kenneth (2005). Improving the development and warranting of good practice in teaching. *Cambridge Journal of Education*. Vol. 35, No. 3, November 2005, pp. 407–426. University of Cambridge, UK.
- Skolverket (2007)*. PISA 2006 - 15-åringars förmåga att förstå, tolka och reflektera - naturvetenskap, matematik och läsförståelse. Rapporter, nr. 306. www.skolverket.se
- Svensson, L. (1976). Study, skill and learning. Acta universitatis Gothoburgensis, Göteborg Studies in Educational sciences 19.
- Utbildningsdepartementet (2007)*. Kommittédirektiv En ny lärarutbildning 2007:103. Utbildningsdepartementet.
- Utbildningsdepartementet (2006b)*. Läroplan för de frivilliga skolformerna Lpf 94. Gymnasieskolan, gymnasiesärskolan, den kommunala vuxenutbildningen, statens skolor för vuxna och vuxenutbildningen för utvecklingsstörda. : www.skolverket.se
- Utbildningsdepartementet (2006a)*. Läroplan för det obligatoriska skolväsendet, förskoleklassen och fritidshemmet, Lpo 94. Utbildningsdepartementet: www.skolverket.se

Appendix 1

Table 1 Pre test and post test in 6 A and 6 B

Task	Posttest 6 A	Pre-test 6A	Comments	Post test 6 B	Pre- test 6B	Comments
1.	23	23	Unchanged	22	21	+1
2	17	11	+6	10	6	+4
3a	22	23	-1	21	21	Unchanged
3b	18	17	+1	19	10	+9
4	20	21	-1	18	20	-2
5a	18	20	-2	18	21	-3
5b	17	15	+2	13	18	-5
6a	18	18	Unchanged	18	18	Unchanged
6b	14	9	+5	6	5	-1
7a	23	22	+1	17	17	Unchanged
7b	17	14	+3	9	9	Unchanged
8	7	5	+2	2	1	+1
9a	23	23	Unchanged	19	21	-2
9b	12	7	+5	9	9	Unchanged
10a	15	11	+4	5	6	-1
10b	13	9	+4	6	8	-2
11	14	14	Unchanged	15	13	+2
12	22	21	+1	22	20	+2
15	21	18	+3	19	16	+3
16	21	18	+3	21	19	+2

