How student teachers form their educational practice in relation to sustainable development

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This study investigates experienced student teachers' perceptions of their professional training to encompass education for sustainable development, ESD. Data were collected by using questionnaires. The findings indicate that teachers' implementation of ESD depends on both external and internal factors. Three major external factors have been found: colleagues, time and the curriculum. The internal factors were identified as transformative phases; especially a disorienting dilemma, self-examination, exploration of options for new actions, acquisition of knowledge and skills, and integration of new action in the teaching of ESD. Tensions between the individual teacher as a professional versus the teacher as a private person are explicitly mentioned as well as tensions with other teachers, principals and the community. These results may be important to teacher education as well as teachers' professional development as they provide insights for implementation of changes in the educational system.

Keywords: education for sustainable development, educational change, transformative learning, external factors, internal factors, student teachers, disorienting dilemma.

Education for change needs change in education

The research interest in this study is directed towards experienced student teachers, and how they reflect on education for sustainable development, ESD. The student teachers in this study are close to graduation, have already obtained another university degree and are complementing it with teacher training. ESD has been described in the Swedish curriculum since 1994 as a "learning to illustrate how society functions

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and the way we live and work can best be adapted to create sustainable development" (National Agency for Education 1994). However, the degree to which teachers are prepared to work with these issues varies with the consequence that ESD cannot yet be considered satisfactory implemented in all schools (National Agency for Education 2009).

Working with education in a changing social and policy context is demanding and the descriptions of education for sustainable development are still blurred since the widely accepted definition of ESD from *Our common future* (1987) "Sustainable development is development that meet the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, p. 48) depends on the reader.

Contributions from different areas of research – education for sustainable development, educational change, teacher identity and transformative learning – give an opportunity to identify and analyse new knowledge about how student teachers form their professional roles. The observation that "ESD is viewed as a catalyst of educational change that will allow for more meaningful, existentially relevant, transformative learning to emerge in our schools and universities" (Wals 2006, p. 41) emphasizes the connection between education for sustainable development and transformative learning.

For many years, Andy Hargreaves (2004) has studied the factors affecting teachers' professional role in educational change management, revealing complex relationships between personality, objectives, interests and implications for their business. Interviews of Canadian teachers' feelings about the changes demonstrate the need for a balance between innovators and more reluctant change agents. It depends on the context if a change is perceived as positive or negative. A study of Portuguese teachers (Flores 2005) highlighted challenge, ambiguity and tension as key words in defining their sense of professionalism in times of change. The teachers in the study agreed with the changes in the curriculum, but they were critical of the implementation, with insufficient training and resources to fulfill the expected roles. Another study regarding the process of becoming a teacher shows a lot of value ambiguities, tensions, conflicts and dilemmas in relation to their proposed occupation (Czerniawski 2009).

Education for sustainable development

Analysis of the concept "education for sustainable development" shows that it differs from environmental education and is more than a new name for the same content. Teachers thus need to change their teaching. This change is not only about new knowledge – but perhaps

involves even changing the frames of reference for how to understand the world. Research related to education for sustainable development shows that school education consists of fact- based knowledge as well as moral and value-based issues (Jensen & Schnack 2006, Öhman 2006) and that this teaching also deals with attitudes, reasoning and lifestyle issues (Sund & Wickman 2008). Education for sustainable development is about problematizing conflicts, tensions, dilemmas and contradictions (Lundegård & Wickman 2007).

According to Schnack (2000), tendencies in the postmodern perspective seem to favor the forming of individualistic decisions and choices instead of an active citizen approach when decisions and choices are connected to democracy, human rights and dialogue. Mogensen and Schnack (2010) describe that the challenge for ESD is to identify the kind of learning that motivates the learner to be an active citizen in a complex and uncertain reality, promoting a democratic citizenship working with conflicting interests and critical thinking, argumentation and alternative actions. Although education focusing on normativity and correct behaviors may lead to improvements, it is not seen as improving neither reflection nor the ability of learners to see the consequences of their actions. Instead transformative learning leads to new abilities (Jensen & Schnack 2006, Mogensen & Schnack 2010). In practice this may mean more interdisciplinary work with the surrounding society, more complex questions with no easy answers given, and a complex teacher role compared to a fact-based transmission. That implies a teacher role and a teacher identity that might mean a transformation for the teacher. The theories of transformative learning offer a theoretical framework for such research.

Transformative learning

Stephen Sterling (2010) interprets transformative learning as

> ... a quality of learning that is deeply engaging, and touches and changes deep levels of values and belief through a process of realization and recognition... I argue that it inevitably gives rise to a heightened relational sensibility and a sense of ethical responsibility (Sterling 2010, p. 512).

Transformative learning is described as a process in which individuals alter the frames of reference in terms of understanding the world in order to make them more comprehensive and perceptive. Jack Mezirow (2000) describes ten stages of a transformative process:

a. A disorienting dilemma; it shows when the learner describes some kind of tension or dissatisfaction with the situation, which could also be recognized as a trigger event for the transformation.

b. Self-examination; becoming critically reflective of the premise of the problem.

c. A critical assessment of assumptions.

d. Recognition that your discontent and the process of transformation are shared with others; there is a connection between your discontent and the process of transformation.

e. Exploration of options for new roles and actions, relationships and action.

f. Planning a course of action.

g. Acquisition of knowledge and skills for implementing your plan.

h. Provisional trying of new roles.

i. Building of competence and self-confidence in new roles and relationships.

j. A reintegration into your life on the basis of conditions dictated by your new perspective.

Critical self-reflection is thus necessary to bring about a change of frames of reference, a potential change of perspective. This approach to learning focuses particularly on values, ideals, and emotions, moral as well as abstract concepts such as liberty, justice, responsibility and democracy. Transformative learning is concerned with altering frames of reference through critical reflection of both habits of mind and points of view. Habits of mind are described as more durable and harder to change than points of view. A transformative approach to education emphasizes the ability of the learner to actively address social and political inequities that exist within society and encourage students to think critically about the implications of knowledge claims and also to consider how, why, and by whom knowledge is constructed (Miller 2007).

The critical theory of Jürgen Habermas as well as the work of Paolo Freire has influenced Mezirow's theory. Freire (1973) argued that for education to be empowering, the teacher needs not only to be democratic but also to form a transformative relationship between him or her and the students, their learning and society. To Freire, education does not stop in the classroom but continues in all aspects of a learner's life.

Patricia Cranton (1996) explains how practicing transformative learning can put teachers into an uncomfortable position; some professionals feel discomfort and worry about the reactions of colleagues, principals or parents. Mezirow (2000) also identifies the difficulties of the transformative learning process and suggests that if learning is too comfortable, we are

unlikely to undergo transformative changes in our understanding. Several studies have investigated the transformative learning linked to higher education in relation to education for sustainable development (Læssøe 2007; Moore 2004, 2005; Sterling 2010). Moore furthermore stresses that

> I believe sustainability education must be interdisciplinary, collaborative, experiential, and potentially transformative. Sustainability education is also a process of creating a space for inquiry, dialogue, reflection, and action about the concept and goals of sustainability (Moore 2005, p. 78).

Recent research connects social-ecological resilience with education and transformation (Lundholm & Plummer 2010). Resilience could be seen as the ability not only to withstand or adapt to difficult changes but also to transform into something stronger (Sterling 2010). The linkage between how things are done depends on how they are understood; reflection is an essential prerequisite for transformative learning to occur (Sterling 2011). Building on the work of Dewey the American researcher Kevin Pugh (2010) uses a transformative perspective of science education in which the goal is to motivate students in qualities such as values, attitudes, and perceptions in order to promote deep engagement.

Teacher identity research has found that professional identity has a major impact on the way teachers teach and their ability to cope with changes in the educational system (Nias 1989). Social changes must be taken very seriously by the school because it leads to educational changes (Carlgren & Marton 2000), this may point to changes in the pedagogical content as well as to the teaching methods. Teaching methods in education for sustainable development in higher education (Gustafsson & Warner 2004) could be, for instance, deliberative communication, described by Tomas Englund as

> … communication in which different opinions and values can be set against each other … seeking arguments and valuing, coupled to a collective and cooperative endeavor to find values and norms which everyone can accept, at the same time as pluralism is acknowledged (Englund 2008, p.103).

Rationale and research questions

Teacher education is a powerful arena for educational change and the student teachers are potential change agents who soon will be heading out into school as teachers. These new teachers could be vital for educational change when, for example, a new curriculum is

introduced. Thus, these experienced student teachers near graduation are an interesting group to study. The primary purpose of the study is to analyse how student teachers reflect professionally on education for sustainable development which leads to three research questions:

1. What external factors are described by the student teachers as barriers in their teaching of ESD?
2. What internal factors – analyzed in terms of the phases in the transformative learning - can be identified in the student teachers reflections about their relation to education for sustainable development?
3. What tensions, dilemmas and conflicts are described by the student teachers?

Method

The methodology and interpretation of the statements in this study is informed by a qualitative categorization (Cohen et al. 2007) where the qualitative data analysis involves making sense of patterns, themes, regularities and categories. The empirical design uses questionnaires. This collection of written data provides relatively short and reflected answers compared to oral interviews. The open-ended questionnaires were distributed and collected during a university class. The research questions are meant to discern the character of the different transformative phases and how they are expressed in the answers; in that sense they are closely related to the used questionnaire. The planning of the questionnaire included a pilot study.

All student teachers answered the following questions:

1. If you got unlimited resources, then how would you educate for sustainable development?
2. What barriers can you see in order to achieve your goals explained in the previous question?
3. If you compare your knowledge of sustainable development with your own lifestyle, what do you see? Are you acting on your speech? If not, do you know why this is so?

The first question gives a possibility to express visions and drivers. The second question refers to a teaching practice and offers a possibility to express barriers and shortcomings. The third question is about a possible correlation between lifestyle and knowledge about sustainability issues. Taken together, the three questions aim to capture the characters of what it means for these student teachers to form their teacher identity when educating for sustainability.

Participants

The sample in this study consists of 20 student teachers, with diverse subjects in their degrees; they will be teaching chemistry, biology, physics, mathematics, technology, media, Spanish, English, Swedish, French, history, religion, social studies, physical education, art and healthcare. These student teachers all have in common that they have another university degree before they started their teacher education. The age range of the respondents in this study is from 24 years to 55 years, with a total of 20 student teachers, 6 male and 14 female. Data were collected using questionnaires during a compulsory course in education for sustainable development and all of them answered the questions. To avoid a positive selection factor where the students have a declared special interest in sustainable development, it is also an advantage that the course is mandatory.

The selection is justified by the fact that these student teachers have had a university course in education for sustainable development, as well as teaching experience, a combination that proved difficult to find among practicing teachers at the time. The respondents have teaching experience from placement (teaching practice) or as unqualified teachers; most of them also have a professional background other than teachers, for example in business, industry, crafts, media and healthcare. This group is likely to be in the process of forming their professional role and in this changing process, they are moving on the scale from a novice to an expert (Lave & Wenger 1991).

All of the student teachers were given information about the study and its rationale. They could at any time terminate their participation in the study and their identity is encoded. Thus, the ethical requirements from of the Swedish Research Council (2002) research ethics guidelines are followed.

Instrument for data analysis

According to Cohen et al. (2007) qualitative data analysis involves making sense of patterns, themes, regularities and categories and by that using an analytical tool that fit the purpose of the study and the research questions. In this study two analytical tools are operationalized to fit the structure of the results. Firstly, Hargreaves (2004) distinction between external and internal factors is used in the analysis. These external and internal factors are used to analyse whether these student teachers refer to something external that affect their action, such as politicians, policy documents, pupils, community, colleagues, or if they describe more internal processes. Secondly the internal factors

are compared to the transformative phases and interpreted in order to discern similarities or differences. The collective conceptualizations are distributed across categories of description, referred to as the transformative phases. The analysis uses the theory of transformative learning as a way to highlight the dignity that in its extension; it can lead to a change of the frames of reference (Moore 2005). The method of using transformative learning phases was previously used in questionnaires from business students in higher education (Brock 2010). Using these transformative phases in the analysis could play an important role to understand how meaning is made when a student teacher forms a professional identity. In the second step of the data analysis all data from the questionnaires are compared to the different phases of transformational learning and interpreted regardless of a particular temporal sequence, rather more having different character (Mezirow 2000). These different characters could be operationalized as a possible analytical tool to see the student teachers' formation of their teaching practice related to education for sustainable development. These ten transformative phases were not specified for the student teachers beforehand, they were identified within the analysis. The interpretation of the answers aims qualitatively to discern the differences between the transformative phases that are possible to collect in a questionnaire. In the third step the analysed material is reassembled in order to find conflicts of interests and describe the tensions when different interests collide.

Results

The responses from the student teachers to question number 2 and 3 are interpreted either as external or internal factors. The quotations are coded by the principle (M/F/ age) where M is male and F is a female in order to make the statements more contextualized.

External factors

External factors are essential in this study to be able to cover all the statements from the student teachers when they describe the factors that prevent them to implement the changes they want to implement. The external factors are grouped thematically and typical statements are shown in Table 2.

Table 2. Typical statements in relation to external factors

External barrier	Typical statement
Other people- teachers, principals	"Head teachers and teachers who guard their subject are a problem" (F36) " ESD... require many enthusiasts for the work to get started" (F39) "...lack of interest from other teachers" (M30)
Time and resources	"Too little staff, too many administrative tasks "(F55) "It is changing too slow..." (F39) "Hectic schedule..." (M30)
Curriculum and policy	"Curriculum becomes just bureaucracy, therefore the teacher loses human aspects" (M40) "Curriculum describes more commitment today, I think "(M30) "From being a theme day at most is it is now being integrated in the same way as human rights in some schools "(F30).

The answers express how the student teachers discern certain external factors such as time, colleagues and the curriculum that impact their action. The student teachers also express knowledge about the writings in the curriculum regarding sustainability and often cite definitions and writings from the Swedish National Agency of Education.

The responses show descriptions of an educational system that is perceived to be too slow in its process of change. The answers also describe an educational system with a dependency on both enthusiasts as well as policy documents. It also appears that the student teachers are unsure of the exact nature of the requirements that the school has on the teachers related to ESD and what is expected beyond the more traditional environmental perspective "recycling and paperless classroom" (M30). Economic barriers for the implementation of ESD were mentioned by one of the student teachers, but the implementation of ESD in school is not an economical issue for the majority of the respondents.

When describing content and teaching methods the answers are more similar to each other than when they describe barriers. The content in ESD is described by the respondents as focusing on particular issues such as environment, consumption, health, democracy, energy,

justice, resources and economy. The answers also describe the teaching methods in ESD as collaborative and interdisciplinary; education for sustainable development requires individual skills as well as a collective competence. Some answers describe that the change must take place both from top-down as well as from a bottom-up perspective, the individual is responsible as well as the community.

Internal factors and the different phases of transformative learning

The different perceptions held by the student teachers are described thematically and then compared to the transformational phases and some excerpts of the typical statements are represented in this table. The internal factors were interpreted as they correspond to the transformative phases although the sentences often are difficult to precisely put in just one of the transformative phases.

Table 1. Typical statements compared to the ten transformational phases

Transformational phase	Typical statement
(a) a disorienting dilemma	"My placement experience tells me that there is great reluctance among colleagues, everyone wants to work with their own subject" (F24) "…We are destroying our world…" (F28)
(b) Self-examination	"The most important thing is that you are aware of your own actions and are self-critical" (F27) "However, I consume more than I should" (F27).
(c) recognition that others have negotiated a similar change	"…we don't act on our speech because of laziness or convenience" (M30) "I think both I and many others could have done more than we do" (F27)
(d) exploration of options for new roles	"…many study visits where they get acquainted with issues related to sustainable development. During placement I have seen some possible alternatives, such as interdisciplinary collaboration ... the idea is that all teachers should work together during these weeks; I would like to work more like that" (F27).

(e) a critical assessment of assumptions	"my knowledge in this area is not sufficient" (F27) "ESD demands more personal commitment "(F44)
(f) provisional trying of new roles	"I tried to show the students that everything matters, health and safety, environment, social perspective, everything affects us and the environment" (F28)
(g) planning of a course of action	"... more focused on discussion, this also make change for the teacher, you can not have all the answers" (F24) "... invite clever, inspiring people" (M30)
(h) acquisition of knowledge and skills	"I've tried project work in collaboration with various companies and organizations "(F36)
(i) building of competence and self-confidence in new roles	" I dare to break the 'ordinary' teaching and to allow any cross-disciplinary nontraditional teaching" (F24)
(j) a reintegration into one's life	"I often act on my speech... "(M49) ".. above all, never do the opposite of your values "(M30)

Signs of the different transformative phases

The internal factors were interpreted as they correspond to the transformative phases although the answers are not distributed equally over all ten phases. Some phases – such as the disorienting dilemma – are more common in the answers (phase *a* in Table 1). None of the answers suggest that the current situation is satisfying. When one of the student teacher says "… we are destroying our world " it is in the same answer described that she talks about human rights, environment as well as working conditions, that everything is connected, social perspectives as well as the environment.

Based on the nature of the phases of the transformative learning, the self-examination (phase *b* in Table 1) is an initially reflective mode when individuals look at their own situation. The competence in the field of sustainability issues – or rather lack of competence – is emphasized in several statements, for instance as described in "… that my knowledge in the field isn't large enough could also be a barrier" (F27). Sometimes personal shortcomings – such as laziness or shortage of time – are expressed in the answers, for instance "No, I don't always practice what I preach, but I'm aware of it and try to do something about it. Because of comfort, laziness and tiredness I prioritize other things…" (F29). The dilemmas are

sometimes described in terms of on one hand knowing what to do – as buying ecological products – but not be able to do it as in " I would like to buy more ecological and fair trade but it is hard as a student" (F28).

The recognition of that others have negotiated a similar change (phase *c* in Table 1) is expressed in different ways showing that they cooperate and talk with other about these issues, for instance " Teachers work more in teams now ,..., but still we see a lack of cooperation, knowledge and organization" (F27). Many answers talk about that it is important what other people do, for instance "Sustainable development demands cooperation, work interdisciplinary, work in teams" (F35).

Overall, many alternative actions are described in the answers (phase *d* in Table 1) in order to change teaching methods; to cooperate with the surrounding community, field trips, but also to welcome other professionals to school. No teacher student in this study is without suggestions for actions. Some of the answers show that it is work in progress "…sustainable development has a price, I try to live as lean as possible but I haven't acted in every way yet" (F35).

The exploration of options for new roles (phase *e* in Table 1) can apply to the teacher as an individual as well as a professional and these different roles are often intertwined in the answers. Some explorations are described not only for the individual's own action but for a collective action as well: "Send all teachers and principals together on professional development" (F37).

The provisional trying (phase *f* in Table 1) and the planning of a course of action (phase *g* in Table 1) are sometimes difficult to discern from each other in the answers, on teaching practice the student teachers have opportunities to both plan and try out new actions, such as "we plan a project about consumption, all teachers will cooperate about this for three weeks" (F27).

The student teachers also address several of the economical, ecological and social dimensions of sustainability (phase *h* in Table 1). The statements show that this group of student teachers describes interdisciplinary cooperation as important, tradition-breaking and unusual. Many of the student teachers describe that they want to work interdisciplinary and wish they would experience that in their professional training.

The building of self-confidence in new roles (phase *i* in Table 1) – which is an issue of identity – is described typically as "It's about working on issues that do not have simple answers, this requires a humble teacher's role, sustainable development also requires collaboration" (F35). Thus, openness to the surrounding world, engagement and non-prestige are characteristics that these student teachers express and are typical of the professional role related to education for sustainable development. Some of the student teachers describe

the acquisition of a competence that involves a change in attitude towards the teacher's control of learning. It is not necessarily so that the teacher should know all the answers and have a complete record, as in "…I wish it was changing from describing how it *should* be and instead talk about how it *could* be" (M44). Some express clearly that they are building skills in the new role and trying to incorporate it into their life-world, although not always successfully. The conflict dimension of education for sustainable development can also be seen in statements like "to understand that the conflicting demands and needs are always standing against each other "(M40).

The signs of reintegration in your life (phase *j* in Table 1) are recognized in different ways such as the student teacher highlights a thumb rule for how to act, for instance "to set a good example and practice what you preach, above all, never do the opposite of your values" (M30). Signs of courage – in not always having the correct answers – could be seen as expressed in "I do not always know the answer, but must have the courage to address things that are not entirely clear. Teachers have to be self-critical" (F27). The teacher role in education for sustainable development is described as "the role of the teacher seems to be quite fuzzy, some teachers, at some schools, seem to have come a long way, others have barely begun to reflect on sustainable development" (M41). The description of the integration of the new action is also depending on external factors such as colleagues, time, resources, leadership, policy documents and other incentives, which complicates the process of change for the teacher.

Summary of the results regarding internal and external factors

When all of the statements had been categorized it was possible to see internal as well external factors influencing the student teachers formation of their educational practice in relation to ESD. Together, the internal and external factors provide a picture of the student teachers' ability to form their teaching in relation to sustainable development. The internal factors were identified as different transformational phases and are in this study seen as an indication of that the student teachers are in a process of forming their professional identity. All transformative phases could be identified in the answers. The disorienting dilemma was described in a large variety of ways. It involves for instance conflicts between the private and the professional. Many answers describe how they try to see alternative actions and make a critical assessment of assumptions. The student teachers feel compelled to practice what they preach in order to be trustworthy in their pro-

fessional role and that is demanding. They have all in common that they wish to change their teaching but they identify many obstacles before change can be implemented. It turns out that all the answers together form a picture of how the student teacher wants to work, they all have a vision, and they are motivated to acquire knowledge and skills to execute the plan. Many of the student teachers in this study are prepared for a struggle when teaching sustainability issues as they describe many barriers and conflicts of interests.

Described conflicts of interest in ESD

Conflicts between various interests are described in the answers when the student teacher interact with teachers, management, policy documents, time, pupils, financial resources and their own lifestyles. Of the external factors affecting the student teachers emerge shortage of time, demanding curriculum, defense of subjects, assessment work and too many administrative tasks. Overall, an image is emerging in this study of student teachers who want to cooperate with others, allowing themselves not to know the answers to everything, who do not use an explicit norm about how society ought to be. This teacher identity seems to have a strong personal commitment, often self-critical and work with existential issues. That is expressed in "From describing how it should be to how it could be" (M44). However, between the lines a different picture emerges: other teachers who do not cooperate, who guard their own subject, not engaged in content or students, not reflecting on their teaching role, not changing their educational practice. These two poles: the individual self and the other lead to friction in the interaction, a tension between the individual and the environment.

Three tensions could be identified; either between the student teacher as having a professional role versus a more private role as well as tensions with other people (described as teachers and principals) and the educational system. The tension between the private and the professional is internal in its character, the other two more external.

Tensions between private life and professional teacher role

The student teachers put high demands on their own lifestyle, both as a professional with great insight into human needs and a strong character. Some of them express shame or guilt that they, as private persons, are unable to live by their ideals related to sustainability issues such as sustainable transport, sustainable consumption and sustainable energy. Other responses also describe how the teacher is

expected to "teach how things fit together" (F28). It is described as a high trustworthiness to act on your speech; this also seems to be perceived as something new and challenging in the teacher role. On the question how they act on their speech no student teacher in the study say that they can do that, typically expressed as "I don't always act on my speech, it's probably impossible, but I try to do my best" (F27).

Tensions between oneself and other people

Significantly the student teachers describe it as central to collaborate with colleagues when working with ESD. The answers are addressing that other people are a problem for the implementation of learning for sustainable development, such as perceived lack of interest among other teachers or uninterested principals. In this context it may be worth emphasizing that schools in Sweden have lately been occupied with developing written assessments, evaluation and extensive national tests which mean that the time for professional development in other areas such as education for sustainable development may have been limited.

Tension between the student teacher and the educational system

The content and the teaching methods of learning for sustainable development are seen as complex, extensive, more than single individuals are capable of on their own within the curriculum. Many stakeholders have opinions about educational changes such as pupils, parents, school policy makers, academia, business and industry as well as the Education Administration and the Education Inspectorate. A teacher needs to be well prepared to handle their expectations.

Discussion

The motivation to educate for sustainable development is strongly expressed for these respondents but they experience many barriers for the implementation of ESD, external as well as internal. The research question regarding the internal factors related to education for sustainable development has been compared to the different phases of transformative learning. According to the transformative learning theory the student teachers will undergo a process of change only if they are dissatisfied with the way they perceive the current situation. All these external and internal factors put the student teachers into dilemmas and conflicts when reflecting over their teacher identity. Their dealing with these conflicts, tensions, dilemmas, arguments and disagreements are described in the answers. This implies

a teacher identity that is different from transmission of facts or norms. The difficulty to identify a common framework of understanding what education for sustainable development could mean contributes to the difficulty the student teachers say they perceive.

Many responses to the questionnaire highlighted other teachers' lack of interest as a major problem. That becomes a democracy problem since the description of ESD in the Swedish curriculum as a "teaching to illustrate how society functions and the way we live and work can best be adapted to create sustainable development" (National Agency for Education 1994) concerns all subjects and all pupils in school. But without explicitly explaining the content the interpretation might be too wide and could mean almost anything depending on the interpreter. It also seems to matter what subject is taught, as seen in the results from this study "... they are really inspiring for many students, it may be because they are teachers in chemistry and biology" (K36), it implies that the traditional view that the science teachers have great responsibility for sustainability issues in education is still existing in some of the student teachers. A concept like sustainable development used by so many different stakeholders and with so many different implications makes education for sustainable development a complex and challenging task for the student teacher. All of the respondents describe how they want to be involved in ESD even if they see the difficulties, for instance if colleagues are reluctant to cooperation.

Perspectives on the method

The results of this study have been described on the basis of the ability of the chosen analytical instruments to show what the student teachers reflect on when they form their professional identity related to education for sustainable development. The transformative phases could be identified in the answers and they provide useful information about the progression in educational change. In addition the division of the internal and external factors does provide useful structure for analysis. The empirical design to use an open-ended questionnaire has limitations, when a question arises in the analysis it is not possible to ask the respondent again as you could in an interview. On the other hand the average lengths of the answers are two pages of hand-written text rich in information. Due to the small sample size this study does not allow for quantitative conclusions, e.g. concerning gender variations. However, it gives indications and illuminates how the student teachers identify internal and external factors affecting their teaching practice and what tensions they describe related to their teaching of ESD.

The timing of these research questions is relevant since many major changes in the Swedish primary and secondary schools take place at present, it is reasonable to assume that many successive changes are affecting the daily work more than a few and that in massive change processes some educational changes may have higher priority than others. The timing of the survey is also contextualized since it was conducted at a time when many national and international events were discussed daily in the media about sustainability, climate issues in the UN's Copenhagen meeting (COP 15) and energy discussions. This is reflected in some of the responses, e.g. "after the Copenhagen Crisis I understand that it is important that we as teachers will affect the pupils, just as they are forming their lifestyles" (F55). Reports from media are important as a context, the global news are reporting sustainability issues every day which affect us all; floods, droughts, pollution, armored conflicts, financial crises', health problems, nuclear power and other energy problems. At the end of the day the teachers' challenge is to transform that reality into education.

Implications

By using the characters of the external and internal factors and the transformative phases it could be possible to help student teachers and teacher educators to analyse their pre-service training. Anxiety for not being good enough as a teacher can lead to many things: dropouts from the profession, illness or even turning towards a cynical approach to the profession. These possible consequences need to be addressed, as noted by Hargreaves (2004). If we can understand the change process that these experienced student teachers undergo, it could also lead to better continuing professional development for teachers.

Recent research related to education for sustainable development shows promising national and international attempts to address the complexity and at the same time offer teaching methods to use such as action competence (Jensen & Schnack 2006), deliberative communication (Gustafsson 2004) and resilience (Lundholm 2010). In deliberative communication different views are confronted with one another and arguments for these different views are given time and space, typical for ESD according to Moore (2005). The possible connections between education for sustainable development, resilience and transformative learning could be useful in further research to unveil mechanisms in the learning of sustainability.

The student teachers in this study are forming their educational practice in relation to sustainable development but there is still much more to identify, analyse and improve to be able to stress that the implementation of education for sustainable development is based on both research and best practices.

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