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BIRGITTA NORDÉN

LEARNING AND TEACHING SUSTAINABLE DEVELOPMENT IN GLOBAL–LOCAL CONTEXTS

MALMÖ UNIVERSITY

LEARNING AND TEACHING SUSTAINABLE DEVELOPMENT IN GLOBAL–LOCAL CONTEXTS

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Malmö University, 2016
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ABSTRACT

The overall aim of this thesis is to develop knowledge of teaching and learning sustainable development in global–local contexts. The research field is global learning for sustainable development (GLSD). Phenomenographic approach and contextual analysis were used as methods of analysis, and data was collected by Semi-structured interviews at secondary and upper secondary schools in Sweden.

In Study I, a strategic and systematic literature review was conducted of recent trends and critique to the dominating rhetoric on policy level concerning global education and global learning on sustainability issues. The complexity represented in GLSD is of global interest to face current challenges. The *global–local context and the process for global learning* were characterised by the learner's perspective and self-efficacy. The variation of ways in which contextual features were revealed, affected how participants experienced their own learning global learning space.

In Study II, empirical investigations were conducted of students', teachers', and head teachers' conceptions of implementation of GLSD. Results indicate that *critical knowledge capabilities* were needed to act towards sustainability globally. *Critical knowledge capabilities* developed in the processes were to *take command* and *collaborate as a team*. Capabilities that were identified as necessary but which had not been sufficiently developed were to *be prepared, act in a transdisciplinary manner* and *lead for holistic understanding* in the learning process. *Critical knowledge capabilities* to handle complex knowledge were characterised by volition, self-directed learning, and knowledge formation.

In Study III, a re-analysis was conducted of the data from Study II. The results shed light on pertinent transition skills in GLSD: (I) *transdisciplinary action* via knowledge formation in actual practices, (II) *democratic collaborative action* via processes of understanding, respectively (III) *self-directed learning and independent initiative*. These transition skills, enabling young people to be prepared for unpredictable changes, were perceived as key features in developing young people's capability in an uncertain world. They developed worldview understanding, and advanced transformation competencies including critical reflections upon questions of current normativity.

In Study IV, collaborative and transdisciplinary teaching with a global–local perspective was investigated in a study with teachers committed to global learning and sustainable development at an upper secondary school. *Two main transdisciplinary teaching approaches* of GLSD were distinguished: *Contributing: Assist and Take Part* respectively *Ownership: Possess and Reconceptualise*. The contributing approach was divided into the sub-categories: *(I) Disheartened, (II) Supportive*, and *(III) Complementing* teaching approaches; while the ownership approach comprised *(IV) Decisive*, and *(V) Multi-dimensional* teaching approaches.

Various dimensions of the results appeared to be relevant for sustainability teaching and learning in global–local contexts, when connections between the studies were analysed in relation to the context and the overarching aims of the thesis. Through transdisciplinary teaching *deep approaches to learning* can be developed and Global teaching for sustainable development (GTSD) could be advanced. *Individual and collaborative learning* characterised by self-determination, responsibility, and social readiness leading to action emerged as key aspects

At a global–local level, there is a growing need to develop competencies and capabilities for transitions towards sustainability. Conflicts and climate change are drastically increasing the number of displaced people who need transnational education on proactive preventive strategies, as well as develop to critical knowledge capabilities that

can be useful across numerous contexts and in the face of changing circumstances. Increasingly, also young people need to manage their own learning processes in self-directed learning, regardless of where they are physically or may move in their lifetimes. As established social structures struggle to address global challenges, people across the planet need to be able to organise themselves and to take initiatives.

Keywords:
Contextual Analysis, Critical Knowledge Capabilities, Deep Approaches to Learning, Deep Approaches to Teaching, Education for Sustainable Development (ESD), Environmental and Sustainabilty Education Research (ESER), Global Classrooms, Global Learning, Global Learning for Sustainable Development (GLSD), Global–Local Contexts, Phenomenography, Sustainable Development, Teaching Approaches, Transdisciplinary Teaching, Transitions.

For Julia, Siri and Hjalmar

ÖNSKAN

Ack låt mig leva riktigt
och riktigt dö en gång,
så att jag rör vid verklighet
i ont som i gott.
Och låt mig vara stilla
och vörda vad jag ser,
så detta får bli detta
och inget mer.

Om av det långa livet
en enda dag var kvar,
då sökte jag det vackraste
som jordlivet har.
Det vackraste på jorden
är bara redlighet,
men det gör ensamt liv till liv
och verklighet.

Så är den vida världen
ett daggkåpeblad
och ini skålen vilar
en vattendroppe klar.
Den enda stilla droppen
är livets ögonsten.
Ack gör mig värd att se i den!
Ack gör mig ren!

Karin Boye (ur Glömda land)

STUDIES INCLUDED IN THE DISSERTATION

This thesis is based on the following studies. All articles are reprinted with permission from the copyright holders and appended to the end of the thesis.

Study I

Anderberg, Elsie, Nordén, Birgitta & Hansson, Birgit (2009). Global learning for sustainable development in higher education: recent trends and critique. *International Journal of Sustainability in Higher Education, 10*(4), 368-378.

Study II

Nordén, Birgitta & Anderberg, Elsie (2011).
Knowledge capabilities for sustainable development in global classrooms–local challenges. *Utbildning & Demokrati – Tidskrift för Didaktik och Utbildningspolitik [Education & Democracy – Journal of Didactics and Educational Policy] 20*(1), 35-58.

Study III

Nordén, Birgitta, Avery, Helen & Anderberg, Elsie (2012).
Learning in global settings: developing transitions for meaning-making. *Research in Comparative and International Education, 7*(4), 514-529. Special Issue.

Study IV

Nordén, Birgitta. Transdisciplinary teaching for global learning of sustainable development in a whole school project. *Environmental Education Research*. (Manuscript under revision).

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1 INTRODUCTION

Awareness of global sustainability questions has increased in many parts of the world. A large number of teachers want to make a difference, and feel the urgency of the situation the planet is facing. Nevertheless, working with education for sustainable development (ESD) in practice, teachers frequently experience difficulties dealing with the multiple dimensions of sustainable development, and do not know how to educate on complex issues that stretch across and beyond school subjects. Despite the need for knowledge and research on these questions, issues of introducing a educational development processes for ESD have not been extensively researched to date. This is particularly true at upper secondary school levels. Rather than taking a whole school approach, and working with the processes of development in a sustained and continuous manner, the approach of education for sustainable development at schools has instead often been fragmented, and depended upon individual interests and the work of particularly motivated teachers.

The importance of advancing the quality of ESD was early recognised by Hart & Nolan (1999). It has also been concluded that future research in ESD, as well as the particular challenges in global learning for sustainable development (GLSD), have to focus more on support to teachers (Scheunpflug & Asbrand, 2006; Scheunpflug, 2011, 2014).

This thesis takes its point of departure in experiences from the Young Masters Distance Education Programme, which started in 1999 (Nordén, 2005), and a series of projects that connected to

this programme. The Young Masters Programme (YMP) led to an interest in the potentials of the global classroom, and various ways to approach global–local settings pedagogically as a context for ESD. These questions underlie the notion of global learning for sustainable development. Action oriented teaching within the YMP further raised the question of how ESD can contribute to transitions into adulthood. Challenges for teacher collaboration relating to complex ESD learning environments was another key issue that became visible through the YMP experience. In subsequent projects, this interest has led to a focus on transdisciplinary teaching in ESD development at a whole school level.

The Global Classroom as a point of departure

Since its early days in 1994, the International Institute for Industrial Environmental Economics (IIIEE) at Lund University in Sweden has offered courses, master programmes, and later even specialised distance education for global leaders on sustainability solutions. The Young Masters Programme (YMP) on sustainable development was developed and coordinated at the IIIEE during 1999–2009. As Director of Distance Education of the YMP during that period, the author of this thesis was responsible for the educational development of the YMP. Prior to this time, the author had worked as a science teacher in secondary schools for several decades. The opportunity to take care of and conduct the YMP, with the responsibility for the design, development, delivery, implementation and evaluation, led to the author's research in the specific sorts of learning that took place in the global classroom. This led to a series of studies investigating the learning and teaching in the local–global settings that the YMP provided. A first study focused on youth's learning sustainability issues online (Nordén, 2005, 2006). This was followed by a study on transnational teaching experiences (Nordén, 2008).

The YMP is a global online learning network to learn about sustainable development. Still ongoing, the YMP is free of charge and open for school students and their teachers from all over the world. So far more than 20 000 students from 120 countries in the age group 14–18 years have participated in the YMP. Learning takes place in web-based global classrooms. Each classroom brings together up

to 40 students and teachers from around the world. In this virtual environment, students undertake the same readings and assignments to compare and discuss their results. They share experiences and knowledge and give each other feedback. By interacting with students from other countries in the online-community, they learn from each other, get an understanding of global sustainability challenges, and get to know that there are many different local perspectives and solutions. The course thus includes an important component of global interaction, where young people exchange experiences, and develop their own ideas and descriptions. The programme adopts a transdisciplinary approach, focusing on social, economic and environmental dimensions of the students' daily lives (Nordén, 2005). Since 2009, the programme has been governed by the Young Masters Programme Foundation (YMP, 2016) and is supported by UNESCO. UNESCO has identified the Programme as "one of the best Education for Sustainable Development (ESD) initiatives in the world" (UNESCO, 2011).

The YMP was an interesting context to study empirically because of its scale, by its use of a large virtual classroom comprising student groups from numerous countries, and considering that the programme has been offered for so many years. The size of the programme and the distribution of teachers across national contexts made several issues of course design and teacher collaboration more visible than in small teacher teams where many issues can remain unverbalised and implicit. Studies emanating from the YMP therefore provide useful insights with respect to pedagogical opportunities and limitations of the global–local classroom. The studies also point to needs in teacher collaboration and teachers' professional development to enable ESD teaching (Nordén, 2008; Nordén & Anderberg, 2012).

The empirical studies emanating from the YMP include several reports as well as articles. Nordén (2005) investigated young people's learning for SD, analysing their experiences of online learning in a global setting. The study was part of the research project *Learning in the ICT-extended University* (LiEU), conducted at Lund University (Booth et al., 2007), and awarded funding by the *Committee for Educational Science of the Swedish Research Council* during three

years, starting from 2004. Data was collected through a semi-structured online questionnaire, with both closed and open questions, and the analysis took its point of departure in the answers to this questionnaire, provided by participants during the second part of the YMP in the spring semester 2004, ahead of the Global Environmental Youth Convention (GEYC, 2004), that took place at the Library of Alexandria in Egypt.

Results show that the YMP (Nordén, 2005) was important to the students as individuals, and as members of both local and global society. They felt it had contributed to their knowledge formation by allowing them to explore a global learning space, interacting globally through ICT-mediated ways of communication. Participants also expressed the importance of the transdisciplinary approach that encompassed social, economic, ecological and ethical dimensions. Feedback was experienced as essential, and the global meetings seemed to particularly commit the students in their learning process towards a more sustainable direction, based on the concept of preventive environmental management strategies. Young people as stakeholders outside the university had the opportunity to challenge the academic world, and offer a unique opportunity for dialogue about the role of institutions of higher education in an overall societal transition towards sustainable development. To increase the understanding of how global learning processes could be designed and carried out as outreach at the university, the YMP might therefore serve as an educational example.

Besides the various dimensions of ESD, *what* the students learned was, above all, teamwork, collaboration, and awareness of challenges in lifestyles. The students recognized that their learning process was rewarding, and felt that *how* they learned was through didactical feedback from one another, through the challenges and problem solving activities that they worked on collaboratively, as well as through the remote contacts with advising expertise – here provided by doctoral/master students at the IIIEE and researchers worldwide connected to the online networks. The YMP students also learned via their teamwork with enthusiastic and pioneering teachers, and facilitating mentors from more than 100 countries.

The main advantages with GLSD initiated by the YMP online were, according to the participants: having accessible knowledge, which was experienced as a way to come to know more; global citizenship, as if talking and having a dialogue online was similar to 'walking around globally', in a kind of meeting and learning from other individuals' points of view; being a part of 'culture meeting culture' in a learning context; learning to work with a globalisation tool, and finally the flexibility. Some disadvantages the participants of the YMP experienced were: insecurity concerning the relevance and the quality of information available via the internet; control of how adequate references and different sources were; content efficiency and admittance; technology dependency; time scarcity for communication and interaction. Interesting is that students in a global setting wanted more feedback from experts and students in other cultures, particularly, from teachers in other countries.

Although the target group of upper secondary school students is not always aware of certain issues, such as the urgency of the distribution of resources on our earth, and various conflicts of interests (Hansson, 2004), many of the YMP students globally had already embraced the ecological, the economic and social perspectives of SD (Nordén, 2005). Some of these students experienced that thanks to this opportunity to combine learning ESD content in a global setting with learning at their school locally, a process started that allowed them to include various kinds of subject matter more widely and deeply. Teaching about SD was deepened by using reliable and meaningful learning content provided by experts globally.

The YMP has also developed a concept that legitimates the schools' work with a more transdisciplinary approach. The forms for GLSD used by the YMP may help many participating nations include economic, ecological, cultural and social aspects in the further development of GLSD. Exchange of didactical experiences and the pedagogical research within the field of GLSD could also encourage steps to be taken towards developing the integration of GLSD in the curriculum.

Teachers' experiences of the YMP were investigated by Nordén (2008). The data consisted of interviews undertaken in the spring semester 2006, with the written answers from 26 teachers in Africa, Asia, South America and Europe. The interviewed teachers worked in a total of 16 countries (P. R. of China, Colombia, Denmark, Egypt, Ghana, Greece, India, Jordan, Lithuania, Mauritius, Poland, Sweden, Tanzania, Turkey, the United Arab Emirates and Vietnam). The teachers were found to partner up and cooperate with colleagues globally. This is the underlying ground for teachers' community of learning and teaching in a global setting. A transformation affects the teachers when they go from providing education by teaching, to assuming a mentor role instead (Nordén & Hansson, 2006). The mentor role involves facilitating for young students to unpack, decode, transform and make knowledge applicable. To enter the global learning space for SD, students further need to train a certain kind of literacy skills. Together they could *co-create*, to attempt to understand the complexity code (Nordén, 2008). The 'global teacher team', networking online in a 'global teacher room', provided an option for professionally developing teachers and helped them acquire the skills needed to reach out in various learning environments in a variety of countries. This professional skill development might include pooling knowledge among colleagues, and exchanging ideas for designing teaching in complex knowledge areas of a global character, such as GLSD. A beneficial process of sharing contributed to teachers´ personal and professional development, and thereby enhanced the process of implementing GLSD (Nordén, 2008).

Drawing on the YMP experiences, different models for teacher support were contemplated. Local teacher teamwork of the kind observed in the YMP could serve as a support to take on transdisciplinary knowledge formation, since despite their ambitions, teachers frequently experienced that they lacked full competence in the knowledge field of SD (Nordén & Anderberg, 2009, 2010). Teachers from various disciplines, teaching different subject matter, could cooperate as a professional local teaching team. Together they could achieve a kind of transdisciplinary integrated competence, for additional steps towards the implementation of GLSD in all its complexity. Within the GLSD context, teachers motivated by

professional development were found to aim at further extending their teaching (Nordén, 2008).

After the studies focusing learning outcomes from the YMP in the virtual classroom, an additional series of projects focused learning and teaching issues in the local schools working with this programme. These projects also concerned educational development and implementation, which is of interest empirical studies of implementation of international ESD programmes at secondary levels are rare (Olsson, Gericke & Chang Rundgren, 2015).

Local-global perspectives take their point of departure in efforts to bring about change for sustainability locally, while global-local perspectives position local issues as 'examples' of the wider global challenges. In both cases, making the connection across scales destabilises taken-for-granted assumptions.

An empirical study was conducted by Nordén and Anderberg (2010) concerning the implementation of GLSD in the Swedish pilot project *Lund Calling*. The project concerned the intention to facilitate a pilot effort in a number of schools, aiming at implementing the YMP as part of their regular curriculum. In collaboration with the teachers and the head teachers, the objective was to eventually initiate the YMP as an integrated tool in Swedish compulsory schools (school years 8-9) and upper secondary schools. The intention was that the YMP would be progressively offered to all teachers in Lund municipality at these levels. The focus was partly on the development of a new curriculum, and also included the criteria for marks and the assessment of the integration in upcoming ESD programmes. Results from this study and the accompanying literature review showed that competence to act in a global context requires a holistic approach, including both the concept of a global didactic angle and the subject matter of SD. This means that knowledge, skills, and attitudes are closely linked and developed together. The data consisted of semi-structured interviews with students, teachers and head teachers at schools in Lund municipality. Shifting from the notion of 'environmental knowledge', to 'knowledge for SD' globally, has fundamentally changed the character of learning, from seeing 'knowledge as a possession',

towards developing 'knowledge to act' (Rickinson, 2001; Hansson, 2000). The main results show that the relevant skills that teachers and pupils needed to develop included the ability to analyse conflicts of interest. Jensen and Schnack (1994) have pointed to a similar set of skills as a kind of 'grassroots action competence', required for acting globally. The formation of knowledge and attitudes during the implementation process of GLSD, depended very much on the extent to which such skills were developed, an aspect which has also been highlighted by Anderberg, Nordén & Hansson (2009). See also Booth et al. (2007) and Nordén (2008).

Education to change for sustainable development – a problematic challenge

The role of education in responding to sustainability issues was identified early on at a global level. Environmental Education (EE) was proposed to achieve environmental sustainability in the 1972 Stockholm Declaration (included in the 24 principles), which later lead to the concept of 'Education for Sustainable Development' (ESD) (Jickling & Wals, 2012). The development has enriched reflection with many valuable aspects, but Gough and Gough (2016, p. 10) draw attention to how an enhanced focus occurs on *cultural and economic relationships* in various international discourses of EE and ESD. Also, "the changing representations of environment" seem to move away from the former focus on *human relationships with their environments*. Importantly, this is, argued by Jickling and Wals (2008, p. 2), due to "globalizing ideologies" rolling over the planet "homogenizing the educational landscape". During such a time of transition, people "need to recreate the world as a place for everyone" (Gough & Gough, 2016, p. 10).

A heuristic for reflection on EE and ESD was presented by Jickling and Wals (2008), examining whether anomalies occurred in the interpretation of relationships between education and sustainable development, environmental thought, globalisation, and democracy. Scheunpflug and Asbrand (2006) have researched similar connections. Investigating the education-for-sustainable-development debate, Jickling and Wals (2008) were concerned about tendencies of globalisation and environmental education towards obedience

—acquiescence in the face of hegemonic discourses. Education for sustainable development can thus be perceived as problematic, to the extent that it can become a product and a carrier of globalising forces. A risk appears of marginalising or excluding traditional environmental education, as well as alternative currents of thought, such as ecojustice. A consequence of such tendencies could be that possible commitment in various ways of how the human beings and other species live on the planet might disappear. To counter such risks, through non-conformism in the public place, individuals and communities might in "a self-determined, relatively autonomous, and contextually grounded way" (Jickling & Wals, 2008, p. 19) deal with new initiatives, and find one's own place within present debates. From this perspective, teachers are encouraged to evaluate and re-invent their needs of education initiatives concerning global agendas, such as social justice, development, poverty, and health. Similarly, students should also be prepared to create solutions to sustainability, since these do not actually exist yet. At the same time, the purpose needs to be clear in advance, before reflecting on what kind of education for sustainable development is useful (Jickling & Wals, 2012).

Great regional differences in interpreting the meaning of various forms of education exist considering environmental education (EE), education for sustainability (EfS) and education for sustainable development (ESD) (Tilbury, 2010; Wals & Kieft, 2010). In particular, at the start of the UN Decade of ESD (DESD) 2005-2014, promising approaches appeared, emerging from whole school sustainability approaches to cross-boundary forms of learning around local sustainability issues, despite certain tensions in the debate:

> //... a bit more pragmatic and less convinced that underneath ESD and sustainable development lies a conspiracy to eliminate environmental education and to distract people from more fundamental matters (e.g., societal critique, deep democracy, questioning capitalism, (re)connecting people with each other and with the natural world). Whereas in the early years of the DESD, there appeared to be a strong push for replacing EE with ESD and for arguing that EE was too narrow in its focus, the people behind the DESD and the early advocates of ESD recognise that: (a) EE in the

> spirit of Tbilisi highly resembles what many consider to be ESD, (b) in some parts of the world it is more generative to work under the umbrella of a well-established EE movement and infrastructure, and (c) what is actually done on the ground in terms of teaching and learning is more important than the label under which these activities and actions take place. (Jickling & Wals, 2012, p. 53)

They conclude that:

> It is unfortunate that the UN resolution for the DESD fails to mention ecology and the environment. This last point does, however, illustrate how plastic the sustainable development rhetoric can be, and how it can be easily manipulated, or inadvertently bent, in ways that favour the global status quo. (Jickling & Wals, 2012, p. 56)

The tensions discussed by Jickling and Wals (2012) are ongoing, although there today seems to be a consensus that the different dimensions and approaches are needed in the field. In 2014 a new network established in the European Educational Research Association was given the name Environmental and Sustainability Education Research (ESER), which emphasises once again the environmental part within the scientific domain of the EE/ESD research area.

Future directions in Environmental and Sustainability Education Research

Concerning insights, gaps, and future directions in environmental education research, Reid and Scott (2013) revisited a retrospective analysis and prospective critique of work published in the journal Environmental Education Research (1995–2009), and compared with later and contemporarily articulated needs. Mapping the current research area with a view to identifying trends and challenges, they found three key organising ideas, leading to recommendations in the form of an expression of need for environmental education research. Here, only the following two recommendations are presented, since they support the lay-out of the current thesis:

1. The need to continue ”study and learn from research in wider education, learning and environmental contexts“ (Reid & Scott, 2013, p. 521).

2. Sustainable development as a learning process would underscore a need in researching the dynamics of such learning.

Reid and Scott further emphasise the need to:

> //... acknowledge that we currently know little about the nature and dynamics of learning in relation to sustainable development/ ESD. ...//
> //... achieve a deeper understanding of the relationship between learning, society and sustainability. In order for our understanding of learning as process and outcome to develop and deepen, we need to become more:
> - reflexive about what we mean by learning, and wide-ranging in where, when and how we seek to research such learning;
> - sophisticated in our use of theory (learning, social, cultural, environmental…) and existing traditional and non-traditional forms of knowledge...// (Reid & Scott, 2013, p. 527)

One of the points raised by Reid and Scott is thus a focus on qualities of learning. Scheunpflug (2014) underscores that a paradigm shift in the latest decades has changed focus from input-quality to outcome, which demands global learning (GL) with a deep approach in order to bring about competences for sustainable development. To mainstream GL at school, it is necessary for the teacher to reflect on the learner´s perspective and consider the learners´ benefit of the outcome. Therefore the concept of ESD is not only a matter of introducing curriculum content for sustainability, but of working with more and new approaches to pedagogy (Hopkins, 2014).

Emerging issues are possible changes in ways of learning and teaching through educational development. According to Olsson et al. (2015), the implementation of the UN DESD in Swedish upper secondary school has not been successful with respect to pupils' knowledge, attitudes, and behaviour associated with the SD dimensions.

Learning is seen as a closed process (Van Poeck, Vandenabeele, & Bruyninckx, 2013), if education is essentially about the transmission of facts, skills and values, compared to a more open process of learning seen as transformative (Jickling & Wals, 2008) with space provided for the learner's self-determination (Rauch & Steiner, 2006). From the latter point of view, the individual learners in a social role as educated citizens have the ability to create knowledge and understanding within a social context, as participants in their community (Van Poeck et al., 2013). Jickling and Wals (2008) regard globalisation principally as a risk for transformative and participatory learning processes. Dobson (2003), on the other hand, begins from the asymmetrical character of globalisation to redefine citizenship for achieving added justice and sustainability.

In the light of globalisation and sustainability, Van Poeck et al., (2013) examine if a broader view on citizenship can grasp ESD adequately, legitimise citizenly activity, and add essential elements such as stress on rights, responsibilities and obligations, to reveal the complexity characterising the ESD practice. By employing the non-territorial concept of (sustainable) ecological footprints, sustainable citizenship is strengthened, and a post-cosmopolitan form of ecological citizenship (Dobson, 2003) is suggested. A multidimensional approach to the conceptualisation of sustainable citizenship can be achieved by capturing four strongly intertwined dimensions; scale, ethical, relational, and political dimensions (Van Poeck et al., 2013). The key issue concerns in which way this multidimensional perspective on ESD is brought into practice in spaces not governed by the boundaries of nation-states.

This is taken one step further, by attempting to anchor the dimensions in suitable social theory and the emerging theory and practice of – what Huckle and Wals (2015) term – global education for sustainability citizenship (GESC). Focusing upper secondary and secondary school students, Huckle and Wals (2015) propose that UNESCO promote sustainable development through GESC (Van Poeck et al., 2013), while showing also the implications for curriculum content and pedagogy. Also, supported by an analysis of DESD publications that may influence school teachers and teacher educators, and an earlier

evaluation considering the four dimensions of GESC, Huckle and Wals (2015) look beyond the DESD to face up to current global realities for a critical and transformative ESD development in the future.

Alternative approaches to global citizenship education and GESC appear according to Huckle and Wals (2015), drawing on Shultz (2007), as radical and transformationalist approaches. Cosmopolitan global education, environmental global education and global critical justice education are outlined by Gaudelli and Heilman (2009). Huckle and Wals (2015) describe the sustainability citizen as displaying "pro-sustainability behaviour, in public and private, driven by a belief in fairness" (Dobson, 2011, p. 10). But the connections between values, culture and sustainability go much further, both with respect to individual behaviour and the direction societies develop in. Scott and Gough (2003) draw attention to cultural theory and see it as a useful heuristic in understanding problems related to complexity and uncertainty. Engelhardt (n.d.) underlines this:

> //...individuals within a society have very different values and beliefs about how society ought to be. People have differing 'cultural biases' or 'ideologies', which are socially created, often incompatible, and mediated through intersubjective value systems. These ideologies determine people's understanding of the world. (Engelhardt, n.d., Learning Lab)

Culture is not only an explanation for behaviour and the ways we understand the world. The differences in how we understand and value phenomena make it possible to adopt a critical stance and question assumptions that might otherwise be taken for granted. Dialogue on diverging ideas and values provides rich conceptual resources and allows new ideas and solutions to emerge:

> Cultural theory acknowledges that the diversity of world views within one society might result in reciprocal blind spots, making it really hard to understand each other. But on the other hand, the diversity of world views provides security against one-track solutions for society as a whole. Diversity and incombatibility among

> beliefs and value systems might thus be a painful experience for a democratic society seeking consensus decisions, but they are nevertheless perceived as a positive attribute by cultural theorists. (Engelhardt, n.d., Learning Lab)

For diversity to lead to constructive action, however, it needs to be coupled with sufficient shared understanding and intercultural competences to enable dialogue (UNESCO, 2006). More generally, positive dynamics build on openness, with an interest to explore variation and conflicting standpoints.

Scott and Gough (2003) emphasise that the view on learning should be as inclusive as possible for the individual learner and on the societal level and stress that "learning and SD are inextricably entwined" (Scott & Gough, 2003, p. 1).

The aim of the thesis

The scenario pictured above provides a brief introduction to some of the educational challenges of teaching and learning sustainable development in relation to global–local contexts. Besides the educational opportunities and challenges of introducing global dimensions in teaching for sustainability, it should be noted that including both global and local dimensions is required in accordance with national and international regulations and agreements. The research interest of this thesis is primarily didactic, however, and does not aim to highlight policy rhetoric (Serder, 2015; Nordin, 2012), or historically outlined anthropologic, or sociological/societal agendas. A wish is also to better understand how the transdisciplinary knowledge content of ESD in learning and teaching becomes subject to different conceptualisations and approaches. The overall aim with this thesis is to contribute to knowledge of learning and teaching sustainable development in global–local contexts, while the research field of this thesis is GLSD, a rather young and relatively unexplored research field within the massive research area of ESD.

Specific aims

In Study I the purpose was to provide a synopsis of some major trends that have marked discussions on global learning for

sustainable development (GLSD). The aim is formulated against the background of the complexity represented in GLSD, as well as the fact that sustainable development (SD) is an issue of global interest for institutions in higher education as well as schools. This study constitutes a necessary backdrop for the consecutive sub-studies and the thesis in general. Study I contributes to a foundation of the concept GLSD through a strategic and systematically conducted literature review.

In Study II the purpose was to investigate fundamental abilities needed to act globally, which is crucial in a global–local context. These abilities are referred to as "knowledge capabilities". The study describes how they relate to the continuation process of initiating global learning for sustainable development (GLSD). The research focuses on certain aspects of the implementation process and the critical abilities needed in a net-based global–local learning programme on sustainable development in the secondary schools of a Swedish municipality. Study II draws on the results of an empirical investigation of pupils', teachers', and head teachers' conceptions.

In Study III the purpose was to analyse and describe transition skills that enable young people to be prepared for a rapidly changing and uncertain world, and a number of features perceived as crucial in developing young people's capability to act towards sustainability under circumstances that are difficult to predict. Study III highlights the reanalysis of empirical findings (study II) from the investigation of pupils', teachers', and head teachers' conceptions.

In Study IV the purpose was to analyse and describe how teachers in different subject matters experienced their collaborative and transdisciplinary teaching. The study investigates the transdisciplinary teaching of education for sustainable development with a global perspective at an upper secondary school in Sweden.

Outline and structure of the thesis.

The disposition of the dissertation is composed of six chapters. In this first chapter, a brief introduction has been provided of the dissertation, describing the empirical context and its background. Chapter 2

provides an overview and discusses the research field of learning and teaching sustainable development in relation to global–local contexts through reviews of the literature on global education, global learning for SD (GLSD), and attempts to position the dissertation in relation to previous research. An operational definition of GLSD is proposed in relation to ESD. Chapter 3 presents perspectives on learning, phenomenography and qualities of learning, and discusses the theoretical framework. Chapter 4 outlines the methodology and the design of the empirical investigations. Chapter 5 sums up the result of the four sub-studies. Finally, Chapter 6 discusses the findings and clarifies the most important contributions of the thesis to the conclusions, as well as presenting some considerations regarding future research.

2 LEARNING AND TEACHING SUSTAINABLE DEVELOPMENT IN RELATION TO GLOBAL–LOCAL CONTEXTS

The concerns of the present thesis lie in the intersection between Global Learning for Sustainable Development (GLSD) and transdisicplinarity in ESD. However, much of the relevance – as well as certain problems pertaining to GLSD – are connected to the assumptions and aims of the wider fields global education and global learning. In the following, the relevance of global education for teaching sustainable development is therefore discussed, as well as some points of critique that have been directed at the notion of global education. The more specific concept of Global Learning for Sustainable Development is introduced, and considered in relation to various competencies that need to be acquired, as well as with respect to the curriculum. The chapter discusses the demands that this places on teachers, the teaching and learning environment and conditions for school development. The importance of transdisciplinarity in teaching and learning for sustainable development is then briefly outlined.

Global Education and Education for Sustainable Development

Numerous definitions of the term global education (GE) have been formulated, since it was introduced in the 1960s (Gaudelli, 2003). The US civil rights movement of the 1960s and 70s gave impetus internationally to reflection on conditions for social change.

Environmental education (EE) was one of the areas that emerged from such reflection and was during the next decades followed by the development of education for sustainable development (ESD), as well as other transdisciplinary alternatives to national, subject-based curricula (Standish, 2012).

Since the mid-1990s, the term GE has been used in a more inclusive sense to discuss at least a dozen partly interrelated fields, such as: development education; education for development; environmental education, education for sustainable development; global citizen education; global perspectives in education; human rights education; inter-/multicultural education; education for international understanding; internationalized education; international relations; peace education; third world education; world studies (Standish, 2012; Knutsson, 2011; Scheunpflug & Asbrand, 2006). Despite certain efforts to provide definitions, the notion of global education remains very broad. Above all, there have also been numerous and rapid developments over the past decades concerning the urgency of global challenges, and new perspectives have emerged on how education can address issues of global concern.

Critiques of Global Education

Certain efforts have been made in the wake of the calls for global education, to give more emphasis to global perspectives in school curricula (Gough, 2000, 2014). The rhetoric of school curriculum policies and priorities in many countries have undoubtedly been influenced by international organisations, and their emphasis on the global significance and dimensions of issues such as the environment, and peace in developing nations. But despite the spread of such concepts, the policy statements do not necessarily reflect "the possible meanings that actually circulate among teachers and students in schools" (Gough, 2000, p. 82).

Already as early as 1974, an international environmental education programme sponsored by the United Nations Environment Programme (UNEP) sought to promote educational action, based on concerns about the quality of the global environment. However, the original UNEP programme was also criticised for perpetuating a

neocolonialist discourse in environmental education (Greenall Gough, 1993), rather than promoting genuine international cooperation among its participants.

In some of the 1980s curriculum development initiatives, the global themes became an explicit focus in emerging areas such as development education (Fien, 1989), or peace and world studies (Huckle, 1988). Nevertheless, it is obvious that environmental education was in the 1980s not yet conceptualised as a global theme. At that time, environmental education was mainly understood either as a gradually increasing alternative to, or as a limited addition to the conventional curriculum content (cf. Hunt, 2012; Irving, Yeates & Young, 2005).

The effects of globalisation on education are situated in a field of tension between opposing perceptions of the relative importance of the global and the local, as well as conflicting visions for how these two levels interrelate with respect to education. To address urgent global issues, it is clear that curricula cannot be defined by narrow Euro-North American-centric, past-centric, anthropocentric, or state-centric concerns; instead, a truly global perspective is needed.

> …//…"thinking globally" in environmental education research might best be understood as a process of constructing transcultural "spaces" in which scholars from different localities collaborate in reframing and decentering their own knowledge traditions and negotiate trust in each other's contributions to their collective work. For those of us who work in Western knowledge traditions, a first step must be to represent and perform our distinctive approaches to knowledge production in ways that authentically demonstrate their localness. We might not be able to speak—or think—from outside our own Eurocentrism, but we can continue to ask questions about how our specifically Western ways of "acting locally" (in the production of knowledge) might be performed with other local knowledge traditions. (Gough, 2012, p. 41)

Gough (2000) looks more specifically at the concept of internationalisation in school curricula against the background of globalisation, examining the question, *In which ways is local knowledge globalised?* His analysis is based in a postcolonial point of view, and situated in Australian and Southern African (Zimbabwean) contexts. The research angle, adopted by Gough points to difficulties of curricular renewal and the complexities of this process.

Importantly, Gough (2000) highlights that few school-based curriculum debates have expressed local expressions of the transnational imaginary of globalisation or mobilised any significant changes, and the 'container' metaphor of curriculum has hardly been challenged in environmental education or in ESD. In principle, the call to "think global" could be a powerful imperative in thinking about more deep-reaching changes in school curricula. Instead, the global perspective has functioned as a sort of "noise" in curriculum specifications (Gough, 2000, p. 81).

Gough (2000) suggests that involvement of teachers and students expressions via concepts and methods of their school programmes, could shape school curricula and deal with global concerns, but from the viewpoint of local perspectives and positions. Gough's discussion highlights how the construction of school knowledge could in this matter emerge as the transnational imaginary of cultural globalisation, at the same time represented through a dynamic process of research and educational development.

According to Standish (2012, p. 28), a global perspective is informed by a pluralistic vision:

1) understanding of the earth and its inhabitants as parts of an interrelated network;
2) awareness that there are some alternatives facing individual nations and the human species, and that choices made will shape our future world;
3) ability to recognize that others may have different perceptions and may prefer different choices.

In this vision, having a global perspective is not only about substituting one worldview with a new one, or declaring that one way of observing the world is superior to another. Rather, students are supposed to form their own knowledge and choose their own values. While many authors believe that access to multiple perspectives is necessary for learning to work with the complex challenges the world is facing, Standish sees this openness as problematic, and feels that young people need to have a clearly defined set of norms as a starting point.

Another type of critique looks at the theoretical underpinnings of GE. For instance, in a recent research review, Knutsson (2011) remarks, that "much of the previous work on global education is theoretically shallow" (p. 57). Knutsson further stresses that, considering the relatively large amount that has been written on the topic over the four past decades, it is remarkable that so little empirical research has been conducted. Tensions can be observed between the volume of potential knowledge content (from practitioners and educational developers) and a limited research-based scientific pedagogical context of GE. Definitions tend to be prescriptive, while the suggested pedagogical approaches are highly normative.

He therefore suggests a new operational definition of the term 'global education' that suits his object of study. GE is characterised (in a Swedish context) by knowledge content (in compulsory and upper secondary school) that

> ...revolves around global development issues and events; is problem-oriented; is formed in a field of tension between social and ideological forces; is implemented in school through many different modes; and, has historically received, and still receives, curriculum support through different organizational arrangements, where a key role is played by the national development cooperation authority. (Knutsson, 2011, p. 13)

In the Swedish education system, practice and content are defined by the centralised national curriculum and school law. In this highly regulated context, it is astonishing according to Knutsson (2011) to

attribute a key role to SIDA, the Swedish international development cooperation agency. At the same time, Knutsson's operational definition with reference to Gaudelli (2003) has some similarities with GE as described by Anderberg, Nordén and Hansson (2009).

Global education (GE) has also sometimes been accused of building on 'charity' concepts (Scheunpflug & Asbrand, 2006). It has been argued that what is provided through GE might not be appropriate or respond to the authentic needs identified among the learners (Anderberg, Nordén & Hansson, 2009).

Thus, we can see a tension between GE as an international project, driven by UN agencies and other international organisations, and GE seen from the perspective of a national school system. From a national perspective, considerations are not only more pedagogical, but also shaped by the specific institutional structures and legislation of each country.

The term 'global' is often associated with issues of globalisation, and much of the critique looks at social and societal impacts. According to Stromquist (2002), a key concern in theorising, from a comparative research perspective, how globalisation influences education instead has to do with its distributive consequences on knowledge production and transmission. Stromquist's research has critically explored the way that contemporary society is represented, in a discourse that depicts it as being in the process of becoming a knowledge society through globalisation.

According to Stromquist, the educational content favoured by policies of globalisation is in many cases adapted to standardised international measurement criteria, such as those used in OECD studies. A consequence of such standardisation is that teacher responsibility in selecting the teaching content and directing the learning process in ESD may be constrained by the pressures of performativity and demands to conform to criteria of quality proposed by international organisations (Serder, 2015).

While pointing to the problematic effects of globalisation and brain drain on education systems, Stromquist and Monkman (2000, 2014) have recognised several positive aspects of global learning, in the sense of opportunities for people to meet across borders and learn from each other. They highlight that global learning has the potential to support development of sharing in horizontally approached dialogues, promoting critical thinking and allowing young people to identify the underlying issues of global challenges. Such skills and awareness are a necessary starting point for any form of practical action.

Global Learning

There is no absolute boundary between the research fields of global education and global learning. However, while focus in global education lies on a macro level, considering overall societal impacts and ways to address global challenges, the area of global learning has a narrower focus on developing competencies and looking at concrete learning processes (Scheunpflug & Asbrand, 2006). In the UK, the 'global dimension' concept was constructed around 2000 by development education organisations.

> The global dimension explores what connects us to the rest of the world. It enables learners to engage with complex global issues and explore the links between their own lives and people, places and issues throughout the world.. /.../ It helps learners to imagine different futures and the role they can play in creating a fair and sustainable world. (Qualification and Curriculum Authority, 2007:2)

Policy-makers have used global learning (GL) as a way of distinguishing between education and campaigning agendas. For example, in a review of practice, the European Commission distinguished between a 'global learning approach' aiming to increase the competences of the individual learner, in comparison to an 'advocacy approach', which had the aim of effecting actual changes in individual behaviour or institutional alternatively corporate policies (Rajacic, Surian, Fricke, Krause & Davis, 2010, p. 11).

At the same time, it is important to note that the use of the term 'global learning' by policy-makers differs somewhat from the way the notion is used in education and education research. While research on global education looks at the importance of different strategies at a global level, and how these can be implemented, research on global learning instead considers characteristics and qualities in student learning. Thus Scott (2010) argues that GL results from taking sustainability seriously, and that it therefore needs to relate to the individual learner´s process and learning outcome.

Bourn also stresses that the learning process must be taken into consideration.

> Global learning is an approach to learning that necessitates both reflection and critical thinking on the part of the educator. It is not about reproducing bodies of knowledge about development, but rather is about engaging in a process of learning that recognizes different approaches and different ways of understanding the world, and engages with them through different lenses. (Bourn, 2014, p. 6)

Hunt (2011) emphasises that global learning is not mainly a question of what is taught, but rather a matter of *how* issues are taught. Researchers on global learning, such as Bourn (2012) and Shah and Brown (2010), promote the active and participatory characteristics of global learning, also signified by questioning and critical ways of seeing involved in the teaching approaches. With these approaches, the teacher is not the sole transmitter of knowledge, but rather takes a facilitating role for committing students to contribute to the construction of knowledge in the classroom:

> This knowledge may be complex where concepts are contested and understandings not straightforward. Global learning challenges stereotypes and asks participants to feel comfortable with ambiguity and multiple perspectives. It promotes responsible social action to generate change. (Hunt, 2012, p. 15)

Hunt (2012) found that the biggest inhibitor to global learning was demand on time, followed by the need to focus on core subjects and demands on pupil time in the UK. Schools that practiced global learning included it into subject knowledge and curriculum content – particularly in subject areas such as geography, personal, social and health education (PSHE), and citizenship. Motivated individuals appeared to play the most important role as facilitators enabling global learning. Global learning further had a positive impact in the schools as it enhanced community cohesion, school ethos and pupil voice. Overall, however, the programme seemed more likely to encourage small-scale lifestyle changes, and develop a greater interest in global issues, rather than necessarily lead to children's involvement in social action (Hunt, 2012).

Looking at the interactions of the local and the global, Martin (2012) has conducted modelling on multicultural educational context expressions to highlight how extremely problematic it is to teach about global issues, people, places and cultures. At the same time, when it is related to and challenged by an 'uncomfortable' focus on differences, these approaches can lead to long-lasting transformative changes in perspective. The educational implications are to come to more complex teacher understandings of global issues. It is fundamental to grasp that sameness and difference are neither 'good' or 'bad', they just are (Martin, 2006, 2012, p. 12). To avoid a boxed-in mentality, challenging taken-for-granted values could be used as a basis for identifying similarities or connections between cultures, as well as supporting students' understanding of global issues (Martin, 2012). It can be noted that Scheunpflug (2011, 2014) proposes similar ways for developing competence of acting and reaching for solutions through dialogues.

An expanding view of knowledge was contextualised, when the teachers experienced diversity while visiting a variety of places and interacting with different people, thereby gaining multiple perspectives (Martin, 2012). By processing their experiences, teachers could consider the epistemological basis for the knowledge which they need to teach. Such reflection contrasts with teaching that provides worldviews as object-focused and ready-made solutions,

and where possibilities for the learners to become aware of different perspectives close down (Martin, 2013).

Scheunpflug (2011) suggests that global learning should not be defined as a subject matter in schools, but rather as a guiding principle identified by thematic topics such as environment, development, and interculturalism. Global learning elements may therefore be incorporated not only in geography and citizenship education (cf. Huckle & Wals, 2015; Van Poeck et al., 2013; Standish, 2012) but in every subject (Scheunpflug, 2014). Similar to Scheunpflug (2011, 2012), Bourn (2012) also emphasizes that global learning helps develop awareness and competences for sustainable development through subject-based knowledge and skills, since global learning might contribute to learning about places, cultures and peoples in another place on earth (cf. McKenzie, 2008). Such knowledge also makes connections more apparent between people's lives and those of people elsewhere in the world.

Bourn (2014) suggests a more integrated approach with greater emphasis on the processes of learning, including critical reflection. This involves placing greater emphasis on the formation and application of knowledge – an objective which can be achieved, for instance, by teaching sustainable development in GLSD themes. In other words, the aim is to combine the development of action-oriented competences with critical reflection allowing students to assess the accuracy or relevance of knowledge pertaining to different topics.
The ability to interpret various perspectives in relationship to applied knowledge seems to be allied with action skills. To strengthen students' judgement and the capacity to make well-informed decisions on complex issues, students need to work with concrete questions and also to relate their reasoning to existing bodies of knowledge. Thereby, learning about specific situations – what we could term themes, subject matter, or content more generally – is at the core of the practice of global learning.

Although there is no absolute consensus in the literature as to which aspects and qualities of learning are most central, the research does agree that global learning involves more than learning a set of facts

– or even the ambition of acquiring separate instrumental skills. To achieve the necessary qualities of learning, there is a need for what Scheunpflug (2014) calls 'embedded competences'. For example, to go from a broad knowledge, which forms a base, to a broader understanding of knowing how to act, the competence of reflecting on global learning needs to be developed.

Scheunpflug (2014) also argues that looking at learning processes through the lens of 'competences' has the potential of making global learning more efficient and more sustainable. For each aspect of teaching and learning practices, it is worth devoting attention to which competences should be achieved. According to Scheunpflug (2014), fruitful questions include: what competences are linked to the learning processes; what kind of learning leads to various kind of competences; what could modelling of competences look like; at different levels of competences and competence measurement (cf. Tilbury, Mula & Ryan, 2014).

Recognising competences, global learning elements can contribute to a broader knowledge formation process, preparing for acting (Scheunpflug, 2014). GL competence could lead to broader understanding of knowing how to act (Scheunpflug, 2014), which could be discussed and compared with 'domains of competence' approaches (cf. Rost, 2004; Scheunpflug, 2011; Bourn, 2012). The reasoning of competences is further developed also by Barth and Michelsen (2013). This is partly in line with environmental and sustainability education research focusing on learning and teaching capability (cf. Reid, McKenzie & Nordén, 2016), and lies close to the knowledge capability theory (Bowden & Marton, 1998; Bowden 2004) concerning knowledge formation and learning – leading to acting (Nordén & Anderberg, 2011). It further is important to differentiate between personal and social transformation, which could be recognised as a sort of transition (cf. Nordén, Avery & Anderberg, 2012).

According to Scheunpflug (2011), global learning should be defined by competences that need to be acquired to live in 'a global society' (p. 33). These competencies include the ability to:

> …understand and critically reflect global interdependencies, own values and attitudes, develop own positions and perspectives, see options, capability to make choices, to participate in communication and decisions within a global context. (Scheunpflug, 2011, pp. 33-34)

Scheunpflug (2011) emphasises that teachers need competencies to address the challenges of globalisation, including the ability to handle the complexities of a knowledge society. Linear processes of learning and one dimensional solutions do not address the complexities that often need to be addressed (Bourn, 2012). The ability to deal with uncertainty is therefore also very central to Scheunpflug's arguments. The more there is to know, the more an individual does actually not know (Brunold, 2005). Everyone – even if they are generally knowledgeable, must understand that they can be wrong. To assist the process of decision-making, also under circumstances of a relative absence of knowledge, new kinds of education are needed (Scheunpflug, 2011).

However, relatively few empirical studies with a pedagogical focus have been conducted in the area of global learning to date. What the terms global learning and development education actually mean and the value and contribution to educational goals, has been described and defined in only a handful of publications, according to Bourn (2014). Among those relating more closely to the concerns of the present dissertation, Scheunpflug (2014), Hunt (2012), McGough & Hunt (2012), Bourn (2012, 2014), Martin (2006, 2012, 2013), and Scheunpflug and Asbrand (2006), will be discussed below.

Global Learning for Sustainable Development

The research in the present dissertation is situated within the research field of global learning for sustainable development (GLSD). The term GLSD was first introduced by Nordén, Anderberg and Hansson (2007). GLSD has since then emerged as a research field drawing on diverse strands of research from the areas of education for sustainable development (ESD), environmental education (EE), global education (GE) and global learning (GL). Among this family

of interrelated research concerns, GLSD appears as a distinct subfield that places emphasis on learning for sustainable development in a global learning context. In other words, it is argued that this type of learning context can affect learning affordances, and in particular, that it can strengthen the potential for learning through interaction, both globally and locally (Anderberg, Nordén & Hansson, 2009).

Besides this emphasis on global learning contexts as a means to deepen learning for sustainable development, GLSD additionally differs from the broader terms ESD and GE. In a sense, the meaning given to learning is narrower and more closely associated with pedagogical research and theories. GLSD is less oriented towards direct involvement in social change, and participation via policy-framing international organisations, or intergovernmental organisations, but may include teacher and student networks i.e. non-governmental organisations (NGOs) when their main focus is on environmental and sustainability education.

This delimitation is not unproblematic, however. On the one hand, it positions schools and formal education as somehow separate and insulated from society at large. On the other hand, the delimitation affects the very meaning given to the notion of education for sustainable development. Nevertheless, it must be stressed, that learning in the sense it takes in GLSD is not necessarily restricted to formal settings. Learning in non- and informal settings can also be considered, to the extent that they seriously focus sustainable development teaching and learning in local–global settings.

Most approaches in ESD stress interconnectedness, learning for action through action, and the need for authenticity. Typical NGO cooperation programmes, for instance, may encourage the participation of different kinds of civil society organisations and non-state-actors, regarding them as privileged partners to work towards more of participatory development. This fits into the concept of democracy as negotiable concerning curriculum interpretations, and according to changing opinions over time and place. A number of researchers, such as Knutsson (2011) justify the openness to redefinition processes of GE depending on forthcoming

circumstances, and stress connections between educational agendas and democracy. Thus Knutsson (2011, p. 29) argues that in a democracy the curriculum is subject to "different interpretations and inherent contradictions are constitutive". Knutsson´s interest in GE is formulated through historical conditions, but also conceptualisations rooted in political and intellectual rationalities. This broader collaborative and participatory understanding of how GE can support education for sustainable development is also in keeping with many conceptualisations of what education for sustainable development entails in terms of a wide mobilisation of society, as well as the manner it is defined in international documents. By contrast, GLSD has much narrower ambitions.

Additional arguments in favour of working outside and alongside formal education systems is that, in many countries GLSD also may face challenges related to restricted legal and political space, as well as policy-thinking, in which education for sustainable development often has had to operate. If the teacher has to choose between offering, or not offering, ESD at school, the way out could be to utilise the accepted and promoted ways facilitated by non-governmental or supra-governmental entities such as the UN.

The research field GLSD has in particular a focus on education for sustainable development in global learning contexts. The role of sustainability – just as the commitment to sustainable development – is a key part of global education (Standish, 2012). Hartmeyer has pointed to these interrelationships:

> The interfaces between world-wide equity, multicultural society, global environment issues, the peace issue, and the limits of growth in industrialized countries are all in the center of global learning. (Hartmeyer, 2008, p. 37)

So far, relatively little research has been conducted on GLSD in the compulsory and upper secondary schools – mostly GLSD-related research concerned higher education (Brunold, 2005; Toakley, 2004). The aim of the research by Bourn (2012) was to showcase existing research and outline some potential theoretical models for global learning and development education in order to stimulate a

discussion. While the teaching approaches used in the investigated case led to interesting potentials in terms of building skills, Bourn (2012) also observed that, global learning in the context of teaching individual school subjects was "perceived as being outside the core elements of the subject" (p. 6). In relation to elements positioned as central by the curriculum, a distraction from priority learning was required to develop skills in the area of sustainable development. Finally, Bourn (2012, p. 6) concluded, that:

> The research and broader evidence also suggests that many teachers and trainee teachers feel ill-equipped to incorporate a global learning perspective into the subject because of lack of confidence and skills to address the complexity of development and global themes. (Bourn, 2012, p.6)

Thus, the 'Global Dimension and Sustainable Development' was featured as a cross-curricular concern in the revised curriculum Qualification and Curriculum Authority (2008) in the UK, but no specific guidelines for mapping each dimension through different curriculum subjects were provided (Bourn, 2012). Schools had the freedom to address each dimension in ways they felt were appropriate, but in practice this might entail simply ticking a series of boxes around a series of concepts (Bourn & Hunt, 2011).

Again in a UK context, a large scale primary school study by Hunt (2012) looks at global learning approaching sustainable development, where sustainability was one of "eight key concepts" pupils were expected to learn (DFES & DFID, 2005).

The main findings from Hunt´s research, showed that a *'soft', non-threatening form of global learning tended to be promoted* to enhance pupils' awareness and interactions with diversity. Besides that, the pupils' discussions dealt with sustainability in very general terms. Subject matters that may be perceived to be too critical, complex or difficult for pupils and/or teachers tended to be avoided in primary schools (cf. Stagell, Almers, Askerlund & Apelqvist, 2014). This included learning about conflict, the political, economic and social contexts of people within the world and social justice.

Similar results are shown from research at upper secondary schools in Sweden (Öhman & Öhman, 2012) concerning the ways of understanding how the ESD, as a concept, invites the teachers in a school practice to constitute a harmony vs. a conflict perspective on sustainable development (Öhman & Öhman, 2012). However, Sund (2015) claims that Swedish upper secondary school students' *awareness* of their relations to *the world in large* (globally) leads to a changing focus in ESD from human-nature relations (and nature ethics) to human-human relations (and human ethics).

McGough and Hunt (2012) have focused on issues relating to the curriculum and teaching materials, and have examined how global learning and sustainable development are positioned in relation to each other as well as to the teaching of school subjects. Another type of question in GLSD concerns how the notions of 'global' and 'local' are conceptualised, and how they interrelate (cf. Gough 2012; Stromqvist, 2002).

These strands of research attempt to go beyond the 'container' metaphor. Rather than looking at the global and the local as 'settings' for learning, they attempt to see how discussions on values and challenging taken-for-granted assumptions in our worldviews can contribute to education for sustainable development.

Among the key challenges of GLSD is also the question of how to work with specific and concrete content, while at the same time avoiding a content-based approach. In a content-based framework, focus will tend to be placed on what is taught, and the global perspective easily becomes additive (Gough, 2012). This is to compare with EE or ESD, also by disciplines often seen as not mandatory due to curriculum, but rather characterised as a teaching and learning process added to the subject matters.

Irving et al. (2005) discuss some of the problems inherent in a content-based teaching and learning, and instead suggest a process-driven approach focusing on how learning takes place. From this perspective, learning is seen as a dynamic and interactive process of continual knowledge construction. To make their understanding

meaningful, students carry out a variety of cognitive operations. Instead of a simple expansion of content, this requires a more objective- and process-driven approach, according to Irving et al. (2005). Process-driven teaching and learning in turn requires suitable structures and corresponding learning aims that can be achieved, for instance, through competence-driven and principle-led curriculum change.

Rost argues that with ESD provided as such, people should become motivated and competent through gained knowledge, developed values and action. These are supported by skills underlying the ESD competencies for global learning, such as system thinking competency, valuing competency and shaping competency (Rost, 2004, p. 6). Additionally, global problems add a concern with culturally defined value systems, which have to be considered when issues of sustainable development are dealt with. Especially awareness (cf. Brunold, 2005; Hunt, 2012; Standish, 2012; Martin, 2013; Stromquist, 2014) tolerance and acceptance of cultural particularities are required concerning the values of other cultures.

> Parallell to what students know and how they act, education for sustainability also concerns the area of values and valuing. In the term "sustainable development", development means that the whole system of our global co-habitation is constantly developing and we need criteria with which to evaluate and influence this development. (Rost, 2004, p. 7)

With an overflow of poor quality or surplus information it is not ensured that young people will be capable to handle or intervene in the globalisation processes, due to lack of adequate knowledge or competence (McKenzie, 2014; Scheunpflug, 2012, 2014). Instead, the power of knowledge and action are left to external actors.

For Rost (2004) a framework of competencies for education for sustainable development does not have its own teaching topics, knowledge areas or content. Nor is it defined through its set of educational goals, or based on general pedagogical theories. ESD rather stems from initiatives on the international political arena.

Certain competencies are needed for global learning (Rost, 2004) with a view to achieving sustainable development. The students need (1) to recognise and understand global interconnections; (2) the ability to use value indicators; and (3) an ability to handle complex systems toward sustainable development. The objective of learning directed to the students by the teachers (as education professionals) consists of the process of connecting the learner's own value system with acquired knowledge about systemic interconnections and developments. It is meant to avoid a competency gap between the values and the individual learner's knowledge, so the ability to utilise and relate these to one another also appear for future decision-making in complex situations. "The pedagogical challenge lies in enabling learners to consciously allow their value systems to influence their decisions and actions", according to Rost (2004, p. 8). Consequently, the aim is not that students reach the same conclusions as their teacher or as one another.

Brunold (2005) describes and analyses in his research how globalisation as an irreversible world-wide phenomenon is affecting education. According to Brunold, there is a false assumption of an interrelation in knowledge – attitudes – behaviour (KAB), for learning towards sustainable development. In fact, no substantial connection has been demonstrated empirically verified between environmental knowledge, attitudes towards the environment and environmental behaviour (Brunold, 2005).

It has also been argued that teaching and learning will have to be modified towards a sense of relativity and uncertainty due to what orientation or direction environmental knowledge may take, when human use of ecosystems changes continuously and in unpredictable manners. Then, also awareness raising (cf. Martin, 2013; Gough, 2012; McKenzie, 2009) of uncertainty in (or lack of) environmental knowledge becomes an educational aim.

Another fundamental issue is that learning sustainable development needs to adapt to current circumstances and local conditions. Taken as a whole, for instance, the absence of personal nature experiences and understanding in individuals' ordinary lives (Brunold,

2005) contributes to a demand of global learning for sustainable development (GLSD), to gain access to other experiences, as well as developing awareness of the local place. Substantiate support for this claim is found in recent research on place-based knowledge in rural and/or urban contexts (Gruenewald & Smith, 2008; Smith, 2013).

Relatively few theoretical studies with a pedagogical focus have been conducted on the relationship between global education and education for sustainable development, according to Scheunpflug and Asbrand (2006). Scheunpflug and Asbrand (2006) shed light in their research on the observation that the initial contribution of GL originates from the German-speaking area "Global Lernen" 1996 (VENRO, 2000) emanating from the Swiss forum "School for One World" 1995. This has in different concepts of GL been influential in various ways in response to its basic conceptual ideas of GE (Bühler, 1996; Fountain, 1996).

Scheunpflug and Asbrand (2006) argue that a changing world requires a fundamentally different kind of approach to education. World society is characterised by delimited space and increasing complexity in the globalisation context. There is no longer a clear connection between intentions and consequences. Through abstract thinking, problems can be tackled, whereas knowledge quickly loses its meaning. Abstract learning to shape abstract social relations is also necessary for orientation within and beyond the local. To distinguish global complexity might be complicated since humans prefer concrete perceivable surroundings. Their capability of solving problems is orientated towards social closeness and groups of manageable size. By contrast, for orientation within the global context, any sort of responsible ethics refer to the environment, future generations and distant people: "The assumption is that interconnectedness may not be understood by orientation in the local but needs abstract cognitive understanding and learning" (Scheunpflug & Asbrand, 2006, p. 37)

Finally, Scheunpflug and Asbrand argue that learning theory also needs to be revised:

> The systems concept of learning pays respect to the fact that learning takes place not through the imparting of knowledge or values, but via self-organized learning by learners. ... /.../ From this point of view the assumption that educational activities could directly cause learning processes in terms of changes in attitude and behaviour is treated with reserve. Thus, global education can only offer arrangements for self-organised learning, while the learning processes are not predictable, and a strict line from information by awareness to acting is to be doubted. (Scheunpflug & Asbrand, 2006, p. 37)

Although these arguments are clear with respect to the global challenges that need to be addressed, it is not equally clear how global and local modes of thinking can be developed and connected to each other in educational contexts. A common approach is to take a point of departure in students' own experiences, to move onwards to a more general level of thinking. Thus in a study by Karlsson, Booth and Odenrick (2007) it appeared that when a gap was identified between theoretical knowledge and personal experiences from students' everyday life and then needed to be filled, they participated in arranged learning situations intended to provide holistic approaches.

From disciplinary towards transdisciplinary

In the following, the application of transdisciplinarity in ESD is discussed, as well as some of the critique that has been directed at the different ways it has been conceptualised, including the use of notions such as cross-, multi- or interdisciplinary teaching and learning. Additionally, the more specific concept of Global Learning for Sustainable Development is considered in relation to attempts to apply of transdisciplinary teaching and learning of sustainable development worldwide. A few empirical studies in this area are presented.

A global perspective in the curriculum offers students the potential to relate their experiences to a more extensive context. According to Reid and Petocz (2006), this can also contribute to increasing a public awareness of environmental issues, promote environmental

training among educators, and improve provision of basic education. As already emphasised with respect to global learning, the ability to understand global interconnections systematically needs to be supported by an interdisciplinary knowledge structure from many separate disciplines (cf. Rost, 2004, above). Crucially, to many teachers, transdisciplinary teaching extends far beyond the school context. In particular, the increase of knowledge in several individual scientific disciplines makes it virtually impossible to define a finite and static 'core of knowledge' for school-based learning. Brunold (2005, p. 298) has highlighted that global learning relies on extended education and requires interdisciplinary methods, as a result of the globalisation processes. Still, interdisciplinarity, like pluridisciplinarity, mainly concerns the transfer of methods from one discipline to another, allowing research to 'spill over' disciplinary boundaries, but nevertheless staying within the predominant framework of disciplinary education respectively research.

Terms such as interdisciplinary or transdisciplinary are not used in a consistent manner. Considering the lack of regard for traditional subject area lines, education for sustainable development has for instance frequently been described as 'interdisciplinary' (Fien, Heck & Ferreira, 1997), but the term here is used in a relatively vague sense. Transdisciplinary ESD is described as "breaking free of disciplinary perceptions and traditions to create new meanings, understandings, and ways of working. Simply putting disciplines together by contrast, is more than the sum of the parts", quoting Huckle and Sterling (1996, p. 23). This is a conceptualisation of transdisciplinarity that we could call holistic. Wals (2006) has pointed out that integration of disciplines or subjects is not enough to achieve a holistic approach with wholeness in focus.

There are also concrete implications of bridging disciplines in both local and global contexts. Bart and Michelsen (2013) accordingly suggest:

> As learning happens in the constant comparison of different approaches and ways of problem-solving, diversity is a crucial factor. The more heterogeneous a group is in which learning takes

> place, the greater the variety of solutions as learning outcomes. To facilitate such learning in the research process means favoring inter- and transdisciplinary settings with a great variety of different disciplines and actors and an openness even to unusual combinations. (Bart & Michelsen, 2013, p. 114)

Heterogeneous learning contexts are valuable and enriching for teachers to learn within. An important dimension of heterogeneity is the background and interests of the learners. Other dimensions include the teachers, types of activities and learning outcomes involved, as well as the complexities of the content. Global learning environments that cross national boundaries and involving several teachers present additional opportunities for professional development.

Though not all environments have this global dimension, in common for many teaching and learning environments working with ESD is the ambition to cross disciplinary boundaries. Through such collaboration the cross-disciplinary approaches may differ on a scale from non-cross-disciplinary (single subject focus ie. subject-bound tradition), via cross-curricular towards multi-, inter- to even transdisciplinary approaches (Karlsson, 2008).

Simlarly, Paige, Lloyd and Chartres (2008) emphasise the necessity of developing conceptual understanding, and the importance of bringing complexity to classroom practices. In a context of 'teaching for learning' (p. 20) a professional competence (cf. Nordén, Avery & Anderberg, 2012) has "to do with knowledge, understandings and dispositions associated with teaching and learning, that is, the teacher as a professional".

> //...there is also a need to develop conceptual understanding, skills in the synthesis of ideas from a number of discipline areas, and dispositions to want to take social and environmental action. So the challenges for the //...// society and environmental teaching team is to take these ideas of transdisciplinary approaches to solving real problems and explore what they may look like in a primary/middle classroom. (Paige, Lloyd & Chartres, 2008, p. 24)

Paige, Lloyd and Chartres also state that knowledge fragmentation could be challenged by transdisciplinary teaching, where students critically explore not only the uniqueness of the various disciplines but at the same time realize how each discipline complements each other by contributing with important concepts. Accomplishing this differentiation smooths the path of various ways of knowing, taking into consideration also effective learning approaches in a context of the students' world - including their prior experiences and specific abilities (Paige, Lloyd & Chartres, 2008).

Despite the solid arguments for transdisciplinary learning, difficulties can appear in practice when attempting to apply a holistic approach to ESD. There are relatively few empirical studies on these issues, however, and particularly with respect to teacher team collaboration and transdisciplinary education for ESD, or in GLSD teaching and learning environments.

In Taiwan, efforts to implement government decisions to support ESD were driven by individual teachers' and head teachers' choice and commitment (Yueh & Barker, 2011). The sustainability issues themselves were transdisciplinary in nature and could not be addressed by single subjects alone. In this context, Yueh and Barker (2011) showed that a separate *subject thinking* corresponded to traditional time-tabled disciplines which often were taught by subject specialists. They compared this to *framework thinking,* embraced by all teachers in a school, whatever the teacher's area of specialisation. In *framework thinking* attention was paid to the generic aspects of overarching aims, goals, visions, and core competences in a setting of an integrative and transdisciplinary nature of education for sustainable development.

The research conducted in the Taiwanese schools suggested that, overall, the transdisciplinary framework initiatives for ESD ended in a truncated ESD, emerging from a pervasive subject-dominated and exam-driven educational climate (Yueh & Barker, 2011). The implementation of ESD in the curriculum launched by the government in 2004 – even though resonating well with the transdisciplinary and integrative nature of ESD – was at the end

of the day conceived as a minor priority, and was finally declared as non-mandatory in Taiwan. Yueh and Barker (2011) compared their results with surveys in Australia and New Zealand that showed that it has often been a complex and difficult process introducing governmental level proposed strategies for ESD in the context of national curriculum innovations. Attempts with an inclusion of a cross-curriculum dimension of sustainability in the Australian curriculum until 2010 were not considered encouraging, according to Yueh and Barker (2011). The Australian Government Department of the Environment faced similar challenges, as the discourse of sustainability implementation through the New Zealand Curriculum (Eames & Barker, 2011) was exploring what was conceived as a 'future focused' theme and value (Yueh & Barker, 2011).

Different empirical studies of ESD shed light on cross-disciplinary teaching characteristics among teachers in collaboration, involved in shared educational development projects also in Swedish schools. For instance, Borg, Gericke, Höglund & Bergman (2014) investigated in an empirical study differences in teachers' subject- and experience-bound conceptual understanding of sustainable development. Their results are based on a nationwide questionnaire study of Swedish upper secondary school teachers' conceptual understanding of sustainable development in relation to their subject discipline and teaching experience (n=3229). Previous research has shown their difficulties understanding the complex concept of sustainable development. All teachers in all subjects should integrate a holistic perspective of sustainable development including economic, ecological, and social dimensions, according to the Swedish curriculum. The study showed that teachers differ in their understanding of the concept mostly according to their subject traditions. Thus social science teachers emphasise social dimensions, while science teachers focus on ecological dimensions.

Borg et al. (2014) further found that teachers are aware of the relevance of the three dimensions but lack a holistic understanding in general. No experience-bound differences of the teachers' understanding were found, though recently qualified teachers consider their understanding of sustainable development to be poorer in comparison with more experienced teachers' self-evaluation. A need for further training in

sustainable development is stated by 70% of the questioned teachers (Borg et al., 2014).

At a global level, it thus appears that there is a widespread recognition of the necessity to integrate ideas of sustainable development within the curriculum in all disciplines, as well as to make it an integral component at all levels of education (Reid & Petocz, 2006; Nordén & Anderberg, 2012). Such objectives were already stressed at the World Summit on Sustainable Development (WSSD) at Johannesburg in 2002 (UN, 2002). The global call for integration of sustainable development at all educational levels requires a response. But any concrete response will ultimately depend on how those responsible for teaching about and for sustainable development understand the notion and its underlying premises (Reid & Petocz, 2006).

In this respect, it has for instance been suggested that ESD should be holistic, transdisciplinary, participatory, critical, multi-method, value-driven, and relevant also locally (Robinson & Shallcross, 2006). Such qualities should not be understood as a list of separate aspects, since they interrelate and build on each other in various ways. Clearly also, any of these qualities has deep-reaching implications for how ESD can be taught. In the context of ESD, and following Robinson and Shallcross, transdisciplinarity would thus be understood as part of a dynamic whole, allowing relevant pedagogical approaches.

It has further been pointed out, that when integrating sustainable development in the curriculum, educational focus must be quick to respond to changes in the global challenges through contemporary, appropriate and convincing knowledge and practices (Gough, 2014). Acting and reflecting over values becomes a mandatory foundation for knowledge formation. It follows that objectives of knowledge relate more to the ability to act, rather than to holding knowledge as a 'possession' (Hansson, 2000, 2004). Learning for sustainable development also demands that "the learners' experiences are confronted with challenges, on both local and global levels, formulations expressed in a foreign language, abstract inter- and transdisciplinary scientific concepts, as well as de-contextualised knowledge formation" (Nordén & Anderberg, 2010, p. 4).

To face major societal challenges and find adequate solutions, complexities have to be considered by applying systemic and holistic approaches, to not further generate "ever greater harms to Society and Nature, because of our partial, fragmented and limited visions and assumptions" (Max-Neef, 2005, p. 15). Learning to reflect in transdisciplinary ways is therefore one of our most urgent priorities, since it is the foundation of joint actions for sustainability (Barth & Michelsen, 2013). If the new global Sustainable Development Goals, SDGs, (UN DESA, 2015) are supposed to become a central dimension of all education, then collective and individual self-development and self-determination further need be stressed, both in a global and local educational context (Anderberg, Nordén & Hansson, 2009), since students need the capability to apply and initiate important societal transformations themselves. To achieve this, education must therefore also involve transformative learning, which stresses "'learning for being', alongside learning for knowing and learning for doing" (Wals, 2006, p. 55).

3 THEORETICAL FRAMEWORK

The theoretical framework for the understanding of learning in this thesis was developed from the phenomenographic research tradition presented by Marton (1981), Marton, Hounsell and Entwistle (1984), Marton and Booth (1997), and Svensson (1997). How individuals experience the world and the ways they learn how to act in it are of central interest for phenomenographic research.

Cognitive (Vosniadou, 1994), socio-cultural (Säljö, 2000), and phenomenographic traditions (Marton and Booth, 1997) represent three different perspectives on learning The cognitive perspective uses the notion of 'concepts' and 'systems of concepts' seen as a foundation for knowledge building. In the socio-cultural perspective, language use and discourses are in focus, since patterns of communication and language are assumed to constitute a foundation for knowledge formation. The phenomenographic perspective instead focuses variations of conceptions (ways of experiencing phenomena) and emphasises learners' experiences of a learning situation. How the relation between the individual and the world is constituted and experienced lays the ground for knowledge formation, according to the phenomenographic perspective. This can also provide a basis for improving teaching through an understanding of individuals' development of personal knowledge.

Phenomenography – a perspective on learning

Phenomenography makes it possible to focus on the different ways of experiencing a particular phenomenon, which in education consists of a learning and/or teaching situation. The focus is placed on the relation

between the learner/teacher and the immediate and/or wider context. The strength of the phenomenographic approach is that it lingers by the object, and attempts to stay away from hurried statements. Rather than imposing a pre-established set of categorisations, the categories of analysis are grounded in the empirical material. Important issues are carefully investigated, including the questions of "what the learning environment is" and "what the learner needs to learn". A further advantage is that the understanding is expressed from the participant's perspective, that is, a first order perspective. First order perspective statements about phenomena as experienced by people, are complemented with a second order perspective, on underlying ways of experiencing the world and various phenomena, revealing characteristics that the individual is taking for granted or is not aware of (Marton & Booth, 1997).

Both first and second order perspectives in phenomenpgraphy can contribute to improving teaching practices. The first order perspective sheds light on details of the participants' conceptions of a phenomenon. This can for instance be used to gain a picture of aspects concerning learners´ progression towards a particular learning objective, or to see how they understand their learning environment. At the same time, to improve teaching and be better able to develop competences, it is useful to also go beyond the first order perspective, and reflect on the underlying issues that might explain why some learners have made more successful progress.

Generally speaking, the distinction between first and second order perspectives can be seen as a distinction between two kinds of objects of research. Relatively few research strands yield statements about people´s experience of the world. Phenomenographic investigations belong to this latter group, along with some orientations in anthropology, history and the philosophy of science. The phenomenographic perspective makes it possible to compare and describe statements about the relationship person-phenomenon - that is, how a phenomenon is experienced by a person - as well as how the relationship changes and develops over time (Marton & Booth, 1997).

Phenomenography is developed for mapping the qualitative different ways in which people "experience, conceptualise, perceive, and understand various aspects of, and phenomena in the world around them" (Marton, 1986, p. 31). This is done by seeking and finding out how aspects of their world are experienced.

An individual experience of the world constitutes what is in phenomenography called an 'internal relationship', and is treated as a whole, because individuals only have access to the world through their experiences (Marton, 1981). That relation is seen as responsive and intentional and must be understood accordingly (Svensson, 1997).

Marton and Booth (1997) have found that the internal relationships are the driving force of learning, through which the learner comes to experience something, which she has not been focally aware of before. From a phenomenographic perspective, learning means changing in a way of experiencing something, in direction of relevant structure and situational appropriateness. Marton and Booth (1997, p. 109) further argue that we can gain interesting insights through a shift from understanding only the anatomy of individual awareness to considering a collective awareness – what has been called "collective mind". Researching learning involves considering the varying ways of experiencing a certain phenomenon and the specific meaning it has to learners (Marton & Booth, 1997).

Knowledge capabilities

The knowledge capability theory originates from a phenomenographic perspective on learning (Bowden & Marton, 1998; Bowden, 2004). Bowden and Marton emphasise that it is not appropriate to describe outcomes of education merely based on what professionals are believed to be capable of doing right now, since education should serve to prepare students for future situations beyond the moment these capabilities were taught in. The knowledge capability theory defines learning in terms of expected and achieved outcomes, instead of just considering educational inputs (Bowden and Marton, 1998). The notion of "knowledge capabilities" as learning goals emerges from a central idea of capabilities to act in new situations, and the

ability of individuals to learn for an unknown future. It is suggested that learners become capable through learning to use their current knowledge for dealing with different new professional, personal, or social contexts.

Capability cannot be described in terms of what a person can do, since effective and appropriate actions will vary from one situation to the next. Learners need to learn how to focus on critical aspects of professional situations, and understand how to simultaneously discern and concentrate on relevant aspects of a specific situation. In their future professional lives, the students will meet a great variation of conditions. Therefore, having the capability of paying attention to critical aspects in a particular learning situation provides:

> … a far more holistic capability than those commonly defined in competency–based approaches. Moreover, such holistic capabilities represent the links between disciplinary knowledge and professional skills. They are the transformation of the eyes through which the professional world is seen. (Bowden & Marton 1998, p. 12)

Knowledge capability (Bowden, 2004, p. 40) means being able to:

1) work out what key aspects need to be dealt with in each new situation;
2) relate aspects to the knowledge already acquired and / or to knowledge the graduate knows how to access;
3) determine the underlying task or problem;
4) design a process or solution to deal with the situation;
5) have the ability to follow through and complete the task or solve the problem, either alone or with others.

The theory of knowledge capabilities (Bowden & Marton 1998; Bowden 2004; Booth & Anderberg 2005) was used as an underlying framework for analysing the data in Study II. In particular, two of Bowden's criteria: "to work out what are the key aspects to be dealt with in each new situation" and "to have the ability to follow through and complete the task or solve the problem, either alone or

with others". The critical knowledge capabilities described in the results in Study II can be seen as examples of these criteria in relation to a global–local context of ESD.

The relationship between teaching and learning

Teaching influences learning directly by making ideas and knowledge available, modelling ways of thinking, and showing how arguments are built up by evidence. The approaches students use when tackling their assignments are also essentially influenced by teaching that affects learning – but indirectly, according to Entwistle (2009).

The purpose of teaching is frequently described as making student learning possible. Teaching subject matter might also be seen as a rhetorical activity, seeking to persuade students to change the way they experience the world. Vygotsky (1962) made a distinction between experiential learning, direct knowledge, or spontaneous concepts – which are grounded in concrete experiences and learned in everyday life – and scientific concepts, learned in classrooms in mediated learning, and developed through analytical procedures in particular social contexts. From this perspective, teaching should be designed so the learning is situated in the domain of objective scientific knowledge, and the activities should match this domain. At the same time, however, teaching should consider the learner's experience of the world, and the reflection on the experience producing personal knowledge.

Another issue, raised by Laurillard (2002), is that educators want more to be learned than is available from experiencing the world. It is not enough with a first order experience. Each subject matter could provide different ways of thinking. It is challenging to help students go beyond their own experiences, to use and reflect upon the subject matter, and thereby change their perspectives and the way they experience the world. That is the reason why education must act at the secondary-order level of reflecting on experience (Laurillard, 2002).

Learning as an integrative whole could be divided in many ways. To make the discussion about learning more manageable, Laurillard

(2002) suggests that five general aspects encompass the essence of the learning process: apprehending structure, integrating parts, acting on the world, using feedback, and reflecting on goals-action-feedback. There is no logical order of the parts of the process. Each part is constituted in its relation to the other parts, given the integrative nature of the learning process, the inseparability of knowledge and action, and of process and outcome (Laurillard, 2002).

When research is cooperative, a phenomenographic approach, using qualitative data to produce descriptions is recommended by Marton and Ramsden (1988), to come to know more about how students learn. A cooperative style could be democratically extended, and give full representation to the students´ as well as the teachers´ experiences. It might be prescriptive only at a level of how dialogues should be carried out. Although phenomenographic research primarily considers individual learning, certain reflections can also be found concerning cooperative learning and democracy. Marton and Ramsden (1988) argue that working with a democratic cooperative approach might improve the quality of learning, since democracy stipulates a form of interaction between students and teachers, including head teachers at local schools that provide a structure for improvements.

Research results provide new ways of generating teaching strategies according to Laurillard (2002). The learning process might be constituted through the dialogue between student and teacher at the level of descriptions of actions in the world, recognising the secondary order perspective of academic knowledge, and building on discursive, adaptive, interactive and reflective characteristics (Laurillard, 2002; Tsui, 2004). Both Laurillard and Tsui emphasise that for mutually beneficial learning to take place, one condition is that the teacher and the learner share a large common ground in relation to the learning object. The implications for the practitioner could be that the discourse is focused, and defined as a process in which meanings are negotiated and stated, and common grounds are established and widened.

A discourse is a key motivation for people to talk, and through the discourse knowledge could enter a shared space of learning.

In particular, learners engaged in group work might bring in their previous experiences and their own knowledge of the world. Such shared spaces can help to construct concepts and contribute to the collaborative construction of meaning among learners. However, because of the unequal power relationship between the teacher and the student, certain assumptions may not be shared, and valuable contributions from the student might be dismissed, rather than valued. The teachers (and the head teachers) need to be sensitive and able to respond to signals by engaging in a negotiation of meaning with their students.

Conceptual change – information transmission

Two specific ways of teaching are stressed by Trigwell (2012). These are respectively (1) Information Transmission/Teacher-Focused approach to teaching (ITTF), and (2) Conceptual Change/Student-Focused approach to teaching (CCSF) (Trigwell (2012, p. 617). In the latter approach, teachers focus their attention on the students and monitor their perceptions, activity and understanding. Even though not considered to be sufficient, transmission of content is nevertheless seen as necessary for enabling student understanding. Lecturers using the CCSF approach consider that students form their own knowledge, and that the teacher's job is to encounter students' existing ideas through awareness-raising discussion, posing problems, asking for meaning-making questions and performance. This approach includes leading teaching techniques associated with presentation and transmission, but goes beyond those techniques. In the Information Transmission approach, the differences in students' outcomes of learning tend to be seen as a result of the teacher´s actions. By contrast, when adopting the CCSF approach, teachers describe the differences in students' outcomes of learning as depending on relations between students and contexts – in which the teacher also plays a role (Prosser & Trigwell, 1997; Prosser, Martin & Trigwell, 2007).

Deep and surface approaches to learning and teaching

The understanding of learning which underpins this thesis has emerged from phenomenographic studies (Marton & Booth, 1997). This involves the learner becoming able to discern new qualities in

some phenomenon or aspects of that phenomenon, which demands opening dimensions of variation in awareness and becoming able to see beyond that which has been taken for granted (Marton & Booth, 1997). Phenomenographic research studies generally focus on what is learned, and/or how the tasks of learning are approached, and/or how learning in a particular situation is experienced.

Many ESD contexts present a number of potential challenges for students. Classes might not have sufficient maturity to adopt what Biggs, Marton and Booth, and Entwistle have termed a 'deep approach to learning' (Biggs, 1990; Marton & Booth, 1997; Entwistle, 2009). Biggs claims as part of his definition that a deep approach to learning involves intention, meaning, innate curiosity, felt need, need to know and genuine preference. But, according to Howie & Bagnell (2012), this occurs without defining or even describing these concepts.

In the defining features on approaches to learning, Entwistle (2009) has set out deep respectively surface approaches to learning as they have emerged from research (Marton & Säljö, 1984). *Deep approach to learning* is about *seeking meaning* characterised by the intention to understand ideas for yourself. This results in students being aware of their own understanding as it develops, becoming more actively interested in the course content (Entwistle, 1997). By contrast, a *surface approach to learning* is about *reproducing*, as the intention is *to cope with course requirement*s. As a result, students surface approach to learning has difficulty in making sense of new ideas, feeling undue pressure, seeing little meaning or value in either courses or the tasks set, and do worry about work, according to Entwistle (1997). Marton and Säljö (1984) emphasised that approaches should be seen as relational. They depend on how the student interprets a particular task and certainly change as students meet different types of teaching.

Most students' approaches are essentially variable, and the approaches lie between the extremes (Entwistle, 2009). Through a broader, integrative conception of knowledge and learning, students' expanding awareness helps to recognise differing forms of knowledge and learning processes (Entwistle, 2009). With a gradual development

in conceptions of learning, a progression from surface to deep approaches to learning leads students to improving awareness of the appropriateness of which learning processes to choose for specific purposes. In each subject area, topic and collaborating contrasting disciplines, it is necessary to clarify for the students the learning processes needed for a deep conceptual understanding. By taking the effort to define the context, a deep approach to learning – as well as a deep approach to teaching – may be applied (Entwistle, 2009).

An inherent problem might be that even if the model of deep and surface approaches to learning is theoretically and philosophically underdeveloped, it has been seen as paradigmatic and as allowing ever-expanding applications (Howie & Bagnell, 2012). Howie and Bagnell nevertheless underline many positive impacts of the model on teaching institutions, teacher training and teachers. Together with Prosser and Trigwell (2001), Howie and Bagnell (2012) highlight that the model has proven to be a catalyst to action, leading to a flow in practically adapted critical reflection on and rethinking of student and teacher assessment and evaluation processes; syllabus and curriculum development; as well as teaching practices and teacher training. Trigwell (2012) highlights that there are systematic relations between the ways teachers emotionally experience the context of teaching and the ways they approach their teaching e.g. motivation, safety, embarrassment, frustration, courage, or risk-taking.

Even if ESD can be presented as a single 'topic', for teachers to handle from their own subject specialist perspective, the teacher-focus characterised by mainly transmitting information leads to surface approaches to learning in class (Trigwell, Prosser & Waterhouse, 1999), since the students then are expected only to absorb, rather than join in a learning process of enhanced understanding. When students use a surface approach to learning, they 'cut corners' and understanding is substituted by memorisation, in order to use a low level of cognitive activity, even though a higher level is required for the learning task at hand (Howie & Bagnell, 2012).

Prosser, Martin & Trigwell (2007) found that student-focused perspectives on teaching are associated with more complex and

research-based understanding of subject matter. They show how qualitative variation in the way teachers experience their understanding of their subject matter is related to their experiences of teaching. This is of interest to consider, when analysing how and to what extent participants experience their understanding of a complex subject matter in a variety of ways, as in this case ESD. In particular, the issue becomes relevant when considering this in relation to approaches of the teachers in their transdisciplinary teaching.

Summarising the results presented by Prosser et al. (2007), it appears that "students are more likely to be helped into a relationship with the field as a whole and to experience, and develop, a personal understanding of that whole" (Prosser et al., 2007, p. 55), when the subject matter is seen by the teacher as a coherent whole. On the other hand, if the teaching focuses unrelated parts and the subject is seen as a series of issues with little attention being paid to the whole discipline, students struggle to make sense of what they are learning. The latter approach to teaching could be recognised among teachers who tell about delivering to their student packages of information (Prosser et al., 2007). In such cases, the students can hardly be expected to see how they might integrate a series of isolated facts – which was what they were taught – into a larger field of knowledge. According to this theory, how effectively students learn a subject thus depends on how well the teachers present that subject to their students. But the teachers' approach to teaching is in turn affected by how they understand their subject. Since ESD – with its many dimensions – could be seen as consisting of many subject matters, this is a challenging task. The process of achieving integrated understanding is further complicated by the fact that ESD is sometimes taught by teachers from different disciplines in a shared ESD project course. Difficulties ensuing from the need for integrative processes and collaborative teaching make ESD particularly challenging.

Entwistle argues that by seeking to redirect teaching in ways making understanding a more explicit goal (Entwistle, 2009), through active involvement of teachers and a curriculum framework, a wider range of learning, thinking, and teaching aspects could be considered.

> A contextual analytic approach is relevant and called for when there is an interest to understand investigated phenomena as wholes in terms of parts and relations between parts making up the whole. This is relevant in the development of knowledge of most human and social phenomena. It is especially relevant when phenomena are delimited from a more precise perspective and/or approached based on the formulation of a problem. Such an approach means that the object of research is delimited within a broader context, and that it is seen as consisting of some main parts constituting the phenomenon. (Svensson & Doumas, 2013, p. 446)

In particular, Svensson and Doumas (2013) look more closely into the relation between the teaching/learning environment conditions and the individual learning activity and outcome. Such considerations would be important in reflection on ESD teaching, as well as making it possible to take into account the significance of different educational contexts and global–local dimensions of the teaching and learning situation.

4 METHOD

This chapter presents the methods used, and how they were used throughout the design of the empirical investigations. The thesis builds on the phenomenographic research tradition. According to Marton (1986), the object of phenomenographic research is to discern the variation in ways of experiencing, conceptualising, or understanding a phenomenon (i.e. a research object). Phenomenography is also used as a qualitative research approach, through data gathering, data analysis and research conclusions. The phenomenographic tradition used here is concerned with describing the range of the diverse ways in which the students, teachers, and head teachers experienced a phenomenon. By analysing and describing the experiences, a clearer understanding of the research object is developed, and light is shed on relationships pertaining to their significant characteristics (Svensson, 1997).

Due to the complexity of the phenomena which were investigated, a combination of contextual and analytic qualities were integrated in the research design. This kind of contextual analysis has been used in other studies on teaching (Svensson & Doumas, 2013). To give a valid foundation for development of knowledge through descriptions, both contextual and analytic methodological characteristics are of concern (Svensson & Doumas, 2013).

Describing experiences of learning and teaching

Learning might be seen as an experiential relation between the learner and an object of learning. This relation involves conceptions that can be described in terms of: (1) holism (holistic thinking) versus atomism

(unconnected atomistic bits) (Svensson, 1976); and (2) surface and deep learning (Marton, 1976).

In the studies of the present thesis, differences and similarities in conception were examined. The phenomenographic approach to learning additionally aims to clarify two other kinds of structures involved in learning. "How" – individual and collective ways of how and what individuals actually do to learn something - is fully integrated with "what" – the actual content (the object) individuals obtain an understanding of and learn about (Marton & Booth, 1997). The how-dimension consists of the way or the act of learning, and includes the quality or direction in learning. Surface and deep-focused approaches, as well as atomism and holism, can be seen in the ways people learn (Svensson, 1986).

The aim of the analysis in the empirical investigations for this thesis was to find qualitative differences in the experiences of learning and teaching GLSD. The research has been influenced by a phenomenographic approach (Marton, 1981; Marton & Booth, 1997), where the goal has been to capture the ways in which learning is experienced by the teachers, head teachers and students in different settings. The investigation attempts to capture, analyse and describe qualitative variation in significant features of the experience of learning about sustainable development. It also presents an analysis of how the teachers, head teachers and students understand the research object global learning for sustainable development.

Obviously, there is a risk that important parts are left out of the synthesis when experiences of the explored phenomenon are synthesised (Svensson, 2009). Also emphasised within a phenomenographic research approach is that: "the exploration of the whole has to be in focus and the exploration of parts has to be done within the whole" (Svensson, 1997, p. 69-70). In this tradition, it is recommended not to approach analysis as a sort of aggregation of specific data given general interpretations (Svensson, 1976). Instead data about parts of the same phenomenon should be delimited as related to one another.

An exploration of experiences through the process of interviewing participants in the studies makes an analytic approach necessary, in order not to presuppose meaning – but reveal the experience by using the whole material in the interpretation (Svensson, 1997).

Data collection

The first study was a literature review based on systematic search strategies. The analysis of earlier research carried out in Study I resulted in the concept of global learning for sustainable development. GLSD was further discussed and examined empirically through investigations of ESD in global settings with respect to implications for didactical situations in Study II and Study IV.

The data gathering and analysis were conducted in line with how this process is described by Marton and Booth (1997). The empirical data collection was carried out in the context of two different secondary school implementation projects focusing GLSD. Concerning data collected in Studies II-III, a Swedish municipality had chosen to let secondary schools participate in the Young Masters Programme (YMP), to implement ESD in a global–local setting. Within this framework, educationally critical aspects in learning sustainable development (SD) with a global focus were investigated from the point of view of the individual.

Study III was a further analysis of some empirical data from the empirical investigation in Study II, where findings were framed in theories and practices of transitions. The results of Study II suggested that further research concerning the role and thinking of the teachers would be called for, and that it was important to look at a number of issues other than just their ways of supporting learning within GLSD. Relevant issues concern how students could conduct and implement more self–directed learning in a global–local context, and how teachers could support these processes. A need to develop more knowledge on transdisciplinary teaching and the specific capabilities teachers require became evident. Investigating the challenges in such complex fields of learning was seen as a promising topic for further research, which led to the choice of problems examined in Study IV.

The empirical data for Study II came from interviews using semi-structured questions in six different local compulsory and upper secondary schools, which participated in an international online-based Young Masters Programme course with global learning for sustainable development that ran in 2008-2009. This data was reanalysed for Study III. For Study IV, a local upper secondary school project on global learning for sustainable development in 2010-2011 provided the empirical base.

In Study II, 8 students (13–19 years old), 5 teachers, respectively 2 head teachers were asked to report on general features of their learning respectively teaching on GLSD, as an aspect of ESD. A total of 20 interviews were conducted with the 15 participants in the study. Some of the participants were interviewed at the start and in the middle of the YMP course, while one head teacher from a compulsory school and another head teacher in charge of an upper secondary school were interviewed after the YMP course had been finalised (cf. Nordén & Anderberg, 2010, Tables 1-2, p. 15-16). Retrospective interviews were made with 2 upper secondary teachers and 4 students who participated in the YMP a preceding year. They were interviewed one semester after their participation. The interviews were conducted individually with the researcher, and lasted between 30 and 60 minutes each.

In Study IV, which was an empirical study, a total of 12 teachers in different subject matters at an upper secondary school were interviewed individually by the researcher on three different occasions (before, during and after the project). These interviews lasted between 30 and 60 minutes each.

The material was transcribed verbatim. The interviews were carried out and transcribed in Swedish, and the analysis was made on the Swedish transcriptions. These were analysed to find themes in the broad concept of GLSD that the students related to their learning, respectively the teachers related to in their teaching and their understanding of the students' learning. Quotations from the empirical material used in the English texts were translated from Swedish to English by a translator fully familiar with the research

field. The translation of the interviews aimed at reflecting the Swedish wording faithfully, rather than providing a more idiomatic English equivalent.

Ethical considerations

The ethical codes of the Swedish Research Council (2011) that regulate and place ethical demands on the research process have been followed. The interviewees were informed that they participated voluntarily. They gave consent orally in connection with the start of the interviews, which were digitally recorded. The researcher presented the research and the studies, and explained the aim of the interviews. The material was handled in a manner that ensured anonymity. All the participating interviewees were given pseudonyms and specific numbers as the dialogues were transcribed, only gender, the teacher's subject, and the individual teacher's or student's education context (i.e. compulsory or upper secondary school) were recorded. The informants' names are fictive, and throughout the research, any references to the informants which would identify them were removed. Permission has been obtained to use their answers and to quote from their interviews.

The phenomenographic research interview

The phenomenographic interview is characterised by posing open introductory questions, whereby the interviewee has to define one or more aspects of the focused content (Kroksmark, 1987). The aim is to reach conceptions closely related to the immediate experience, and avoid opinions expressed only as a result of the interview situation (Theman, 1983; Kroksmark 1987).

In Studies II-IV, the phenomenographic research interview (Marton & Booth, 1997) was used for conducting the investigation through semi-open questions. The interview form has the aim that content of the experiences of the interviewee and his/her own reflections should be expressed through the communication. The form aspires to be similar to communicative situations in daily life (Marton & Booth, 1997). At the same time, the relation between the interviewer and the interviewee allowed self-reflection for the interviewee by being questioned about what was hitherto seen as obvious, which made

the interviewee reflect upon un-reflected parts of their experiences. Thereby, the interviewee was brought to focus on the content of their experiences, but with a new awareness created through a meta-perspective (Theman, 1983; Kroksmark, 1987).

Data analysis

By coming to see something (i.e. the object of learning) in a new way, learning evolves as a function of what people are capable of experiencing. Any phenomenon in the world has different meanings to different individuals. A combination of aspects of a phenomenon - discerned and presented in focal awareness simultaneously, through dimensions of variation - constitutes the experience of the phenomenon. The phenomenographic analysis aims to envisage a complex of categories of description depicting the qualitatively different ways in which a phenomenon is experienced. Thereby, the collective anatomy of awareness is revealed and a domain of knowledge pointed out (Marton & Booth, 1997).

Qualitative similarities and differences in the interview responses are described and the content-related complexity of the conceptions is recognised. Categories are created by decontextualisation of conceptions (of the concrete activities that the interviewees described). The researcher creates a "pool of meaning" (Marton & Booth 1997, p. 133). In the analysis of responses, conceptions are compared and assigned into categories in a content-focused way that is contextualised.

A phenomenographic framework gives priority to analysing and describing the experience of the students, and teachers respectively, at a collective level. By collective level is meant that the analysis aimed to abstract from the data a number of qualitatively distinct categories of description. The quotes are seen as examples of relations between the collective of students, teachers and/or head teachers and the phenomenon they were sharing. An individual student/teacher may have contributed quotes to more than one category, and each category is constituted of quotes from several participants. The categories build on several individual interviews. Different parts of an interview may have contributed to different categories, either adjacent

or even opposite categories. The categories are not categorisations of persons but expressed experiences. The categories can be seen as idealised ways of experiencing the phenomenon, and they constitute an outcome space (Marton, 1978; Marton & Booth, 1997) of the ways of experiencing the phenomenon which is connected to the collective of students in a many-to-many relation.

Phenomenographic research takes an epistemological standpoint that knowledge is relational – knowing is a relation between the knower and what is known, and learning is a change in that relation. Consequently, coming to experience, see, understand, or know the nature of the phenomenon in a distinctly new way is the kind of learning focused. The phenomenon, as the object of learning, has to be present always in data and its analysis.

In the data processing, pools of meaning are considered. Categories of description, the outcome space, structure within the outcome space, and dimensions of variation in the outcome space, are considered. Categories of description describe the qualitatively different ways of conceiving a phenomenon, based on that the variation in experiencing a phenomenon is identified (Marton & Booth, 1997). This research was founded on the ambition of coming to a valid and rich understanding of the meaning that the phenomenon holds from the perspective of the participants (Ireland, Tambyah, Neofa, & Harding, 2008).

Contextual analysis

Contextual analysis is not primarily a method but a methodology based on epistemological and ontological assumptions about how scientific knowledge should best be developed. Methods are only tools that should be developed and used within contextual analysis as research approach and methodology. According to Svensson and Doumas (2013, p. 442), dealing with similarities and differences is at the core of the issue, and gives the basis for generalisation. But, the understanding of the phenomenon should come first of all.

> A more serious attempt to develop knowledge, grounded in a thorough understanding of what is investigated, would take a contextual analysis and description of the phenomena. The openness and uncertainty of descriptions, due to the context dependent nature and complexity of human and social phenomena, cannot be solved by denial of this character. The traditional escape from the problem to abstract predefined concepts, categories and variables, and to statistical generalizations, is no solution, and only gives weaker and more uncertain evidence than case-based descriptions have the potential to give. The context dependence of the phenomena has to be dealt with by thorough descriptions of similarities and differences between individual cases, and groups of cases, as a basis for understanding and generalization. (Svensson & Doumas, 2013, p. 449)

Fundamental for the methodology is to approach a phenomenon in an open way and search for its delimitation in context. The same goes for seeking what characterises the phenomenon.

> This approach involves two sides, the analytic of delimitation of the whole of a phenomenon and of its parts, and the contextual of discerning and delimiting this whole and the parts in and as dependent of their contexts. Thus, the delimitation is analytic and contextual at the same time and based on approaching phenomena rather than defining them beforehand. (Svensson & Doumas, 2013, p. 447)

Contextual analysis is based on a specific understanding of analysis and involves a clear starting point in a phenomenon as a whole (Svensson & Doumas, 2013, p. 445), and discerning parts of the whole as parts, rather than identifying and isolating units, and giving them general meanings. The meaning of the part is seen as depending on its relation to its context. To reach deeper understanding, contextual analysis works with internal relations, where units get meaning through their relations.

In the analysis, qualitative contextual analysis was used, following Svensson (2004). By linking both the analytic delimitation of a

research object or a phenomenon including its parts, besides being contextual in delimiting how the parts depend on their contexts (Svensson & Doumas, 2010), this research design could be considered as analytic and contextual at the same time.

Subsequently, in the analysis, the object of research had to be delimited, as the individual's experience of processes of GLSD.

5 SUMMARY OF THE STUDIES

This chapter presents the aim, the method and the main results of each study, clarifying the connections between the studies in relation to the context and to the overarching aims of the thesis. Both theoretical perspectives and methodology are discussed elsewhere, and will not be repeated in this summary.

Study I

Anderberg, Elsie, Nordén, Birgitta & Hansson, Birgit (2009). Global learning for sustainable development in higher education: recent trends and critique. *International Journal of Sustainability in Higher Education*, *10*(4), 368–378.

The purpose is to provide a synopsis of some major trends that have marked discussions on global learning for sustainable development (GLSD). The aim is formulated against the background of the complexity represented in GLSD. Key developments in schools as well as institutions in higher education are recognised in the movement promoting global learning for sustainable development and its challenges, as well as a critique of certain aspects.

Study I makes a wide overview of the emerging field of GLSD. A literature review was conducted, studying publications in ERIC and Google Scholar using the keywords global learning, global education and higher education for sustainable development. Certain relevant material relating to secondary education was included. Key developments promoting GLSD were traced, primarily in English language publications during the last 20 years. Study I also included

some empirical research that was conducted in the research project *Learning in the ICT-extended University* (Booth et al., 2007; Hansson & Nordén 2007; Nordén, 2006). This research focused on learning and teaching issues in GLSD in a global online learning context about Preventive Environmental Strategies promoting sustainability. 7,000 students from 120 countries had worked interactively on a common subject matter, using a problem-oriented approach within the Young Masters Programme during 1999-2004. Data were collected from questionnaires online 2003-2004 with answers from 535 students aged 13-19. 45 students were invited group-wise during the Global Environmental Youth Convention 2004 at the library of Alexandria for in-depth-interviews concerning how and what they learned. The aim of the analysis of the data was to find qualitative differences in the students' experiences of their learning in the context of GLSD.

Global learning for sustainable development is still a very new research field. Results from the literature review show that only relatively limited steps had been taken to support GLSD at the time of the study. Rhetoric dominated academic discussions, and little empirical research had been undertaken on learning in global settings. In particular, hardly any research could be found from secondary schools.

Several researchers had identified the need for a competence-based curriculum for GLSD. Nevertheless, how knowledge, values and abilities are formed and developed from the global learner's perspective still remained an open and fundamental question. In a global context, students' knowledge formation of complexities in the field of SD depends on how competencies are developed. From this perspective, the study showed that the question of how teaching and learning is best developed in a global context is another knowledge field that urgently needs to be developed. Additional motivation is required for holistic approaches to teaching and learning. The study further underlines the crucial role that higher education plays in global learning for sustainability on all levels, also for secondary schools. Finally, schools, teachers, universities, and students need to consider taking greater responsibility in directing innovative educational approaches. Concrete steps towards GLSD and a competencies-driven

curriculum are called for, also in secondary schools, facilitating the acquisition of capabilities to learn and handle complexities.

Study II

Nordén, Birgitta and Anderberg, Elsie (2011). Knowledge capabilities for sustainable development in global classrooms–local challenges. *Utbildning & Demokrati – Tidskrift för Didaktik och Utbildningspolitik [Education & Democracy – Journal of Didactics and Educational Policy] 20*(1), 35-58.

The purpose of this study was to investigate fundamental abilities needed to act globally in relation to the implementation process of GLSD through a net-based global–local learning programme on sustainable development in secondary schools of a Swedish municipality.

Participants' experiences of the changes in the regular school activities were analysed and described in the context of creating a learning environment on sustainable development within the Young Masters Programme during the project *Lund Calling*. The data consisted of semi-structured interviews (n=20) with 15 informants as follows: interviews (n=12) with 13-19 years old students (n=8); interviews (n=6) with teachers (n=5); interviews (n=2) with head teachers (n=2), all collected from 2008 to 2009 at three compulsory schools and three upper secondary schools in a municipality in southern Sweden. The project *Lund Calling* was a pilot effort in implementing the Young Masters Programme as an integrated tool in Lund's compulsory schools (years 8-9) and upper secondary schools.

The notion of critical knowledge capabilities is derived from the theory of knowledge capabilities (Bowden & Marton, 1998; Bowden, 2004; Booth & Anderberg, 2005), which outlines what students need to learn in order to develop appropriate ways of solving problems and managing situations in a future that cannot be foreseen.

Changes that were experienced by the participating pupils, teachers, and head teachers as contributing to enhanced learning and educational development were distinguished from changes that did

not result in such development. These experiences were then related to critical knowledge capabilities which respondents felt had been developed in the project, respectively considered necessary to support GLSD, but which were not sufficiently developed in the project. Thus, examples of critical knowledge capabilities had a foundation in participants' experiences. These experiences of changes were grouped into the following two parts:

1) Experiences of changes identified as giving rise to educational development supporting GLSD, related to examples of critical knowledge capabilities which had been developed.
2) Experiences of changes that did not lead to educational development supporting GLSD, related to examples of critical knowledge capabilities felt to be necessary (identified but not developed).

Some of the changes experienced by the participants gave rise to educational development (cf. part I), while other changes were not experienced as educationally productive developments (cf. part II). Each part described initially adequate changes that gave rise to and/or that did not favour educational development, followed by examples of critical knowledge capabilities identified as related to these changes.

In part I *to take command* was recognised as a critical knowledge capability, gained by responsible seeking and autonomously managing to organise the way to work. *To collaborate* was another critical knowledge capability, gained by initiating sharing for solving complex learning tasks, trying out ideas on each other and reaching adequate conclusions.

In part II, *to be prepared* was identified as a critical knowledge capability that would have been needed, but which had not been acquired by teachers and students in the project. This capability would have provided clearer instructions and given students a clear idea of what to do and how to do it. *Transdisciplinarity* was recognised as another critical knowledge capability, which the teachers felt would have been needed, in order to integrate colleagues' various subject

matter perspectives in the learning environment. Finally, the critical knowledge capability of *holistic understanding and approaches* was recognised as lacking.

The findings indicate critical knowledge capabilities for GL, in relation to a global–local context that teachers, head teachers and students saw as critical for the success of the project. In addition, the study shows the specific capabilities teachers require to meet the challenges of transdisciplinary teaching, besides raising questions on how to conduct more self–directed learning in the complex fields of learning SD.

The critical knowledge capabilities found in this study could be considered not only as skills that are critical for learning and teaching, but also as democratic skills. Above all *to take command* and *to collaborate in a team* could be regarded as tools attaining deeper levels in the knowledge formation process, by grasping the complexity of sustainability issues through global learning. Understanding collaboratively is a form of learning that evolves in a process perspective.

Results from Study II overall showed that competence to act in a global context requires a holistic approach, including both the concept of a global didactic angle and the subject matter of SD. This means that knowledge, skills, and attitudes are closely linked and developed together. The relevant skills that teachers and pupils needed to develop included the ability to analyse conflicts of interest, similar to skills as a sort of 'grassroots action competence', required for acting globally. The formation of knowledge and attitudes during the implementation process of GLSD, according to findings in this study, depended very much on the extent to which such skills were developed. This aspect has also been highlighted in earlier research (Almers, 2009; Mogensen & Schnack, 2010).

The conception of competence is to be understood as a relational, interpretive, holistic and contextual conception, according to Velde and Svensson (1996). Competence is seen as a holistic quality – in the focused relation between an individual or group and a situation,

founded on an understanding of the variation in whole characteristics of both successful and unsuccessful performances of certain tasks. The kind of capabilities brought about (through teaching) to empower the learners, should focus on how teaching is dealing with the object of learning rather than being considered in terms of teaching methods solely (Bowden & Marton, 1998).

Study III

Nordén, Birgitta, Avery, Helen & Anderberg, Elsie (2012). Learning in global settings: developing transitions for meaning-making. *Research in Comparative and International Education* 7(4), 514-529.

Global teaching and learning for sustainable development reaches from the classroom to the world outside, and is therefore interesting as a setting for practicing skills that young people will need as adults. The aim of the study was to propose a conceptualisation of transitions to adulthood as gaining the competence to act locally and globally. The study suggested some features perceived as crucial in developing young people's capability to act in a changing world under circumstances that are difficult to predict, including the formation of communities of learning for necessary action.

The study was a re-analysis of Study II. The result of the re-analysis suggested that young people can form communities of learning through the competence gained through participating in GLSD projects and developing critical knowledge capabilities. These are necessary for various sorts of action-taking on local and global levels. One of the main results of the study was that today young people cannot possibly rely on institutions and the society, nor underpin their accomplishments completely on the family. In its place, they have to gain knowledge of how to outline their own communities, to become and be capable of acting at both local and global levels. Education is a key for extending the crucial transition skills that permit young people to be equipped for a fragmented, uncertain and rapidly changing world.

By going beyond competence and approaching different levels of "competency movement" (Bowden & Marton, 1998, p. 113), different perspectives on what represents competence are featured,

from simple work-place performance(1), through additive knowledge plus performance (2) – where each of these are linked to competency-based approaches – to a holistic competence considering knowledge in context (3), in relation to performance (and not separated from it), i.e. favoured by an integration of performance and knowledge. Preferably any educational approach should attempt to direct further on towards a three-way integration of individuals' ways of seeing themselves as professionals (4), their capacity to undertake that role and the knowledge base with which their professional identity and performance are interwoven. At this level an intentional dimension might be included – which then is content-related but also acquires learned meaning. Thereby, knowledge, skills and attitudes required to perform complex professional activities are identified – even though the outcome cannot be assessed directly (Bowden & Marton, 1998).

To elaborate on a more meaningful sense of competence than observable units of behaviour in a workplace only, a conceptual distinction could be made referring to "capabilities that frequently integrate disciplinary and professional knowledge" (Bowden & Marton, 1998, p. 114). The knowledge capability theory (Bowden & Marton, 1998) does not define learning in terms of educational inputs, but by considering expected and achieved outcomes. Students are supposed to be enabled to deal with a range of contexts and many unique situations that cannot be defined in advance. They should be equipped for later confronting the unknown, and need to learn to develop capacity to perform in novel problem situations. Reliable forecasting of accurate problems in the future, preparing for how to apply various concepts to these years ahead, is not possible, since conditions in the world are changing every day.

In the context of this study, critical knowledge capability can be seen as ability enhanced by a deeper interpretative transformation process to acknowledge critical aspects in a particular learning situation. This process aims to activate preparedness and volition for upcoming unpredictable challenging occasions under unknown future conditions. This definition is grounded on the definitions made by Bowden and Marton (1998) and Bowden (2004) as presented in Chapter 3.

Bowden (2004) originally used the term knowledge capabilities to describe the analytical toolbox needed for knowledge formation supporting a readiness to act during unforeseen circumstances, by choosing to use the approach most appropriate, while moving freely between different recognised approaches. In that case, the competence headed for is the capability of choosing and adopting any one of the approaches when effective and adequate.

In many circumstances, however, the point of departure is instead an established – but sometimes unsatisfactory, non-flexible or poorly developing – knowledgeably locked position, building on educationally non-dynamic taken-for-granted assumptions of how learning occurs. In such cases, we witness so-called surface approaches in taking on new problems (Booth, 1992).

Regarding the critical knowledge capabilities described above and in Study II, three aspects appeared to be pertinent as transition skills in global learning for sustainable development:

1) Transdisciplinary action: Reflecting on how different components interconnect and are consistent with the broader context, when looking for reasonable solutions. Knowledge formation in collaboration occurs in actual practices. Endeavouring intentionally for knowledge capabilities, by means of a transdisciplinary and transcultural approach, suggests that any sort of identity and experience can be an acquisition.

2 Democratic collaborative action: The process perspective in the context of understanding collaboratively crafts and shapes a development of learning through a process of coordinating teamwork, debating concerns and arriving at conclusions. Diversity extends the variety of perspectives that can be conceptualised. Values are examined and brought forward for consideration or acceptance, instead of just advancing assumptions.

3) Self-directed learning and independent initiative: Students were obliged to organise themselves, make decisions autonomously, and deal with and apply the mind to learning and understanding the subject lacking education/attendance of a teacher - outlined

by work in dialogue with other individuals in local teams spread out worldwide as a global learning environment, besides a parallel work as individuals in small teams in the local learning environment.

Transition was mainly influenced all the way via the synergy of the students' own life-experiences, their transcultural discussions and the course materials, in all orchestrating and constituting an enriching and self-motivated context for learning.

The literature review within this study presented a picture of growing up that included both changes in the direction of individualisation and disembeddedness (Bäckman, 2009), besides continued structural inequalities (Danielsson, 2010). Against this background, the GLSD reaching out through the YMP showed a potential to provide equal opportunities for all students, at a time where many education systems favour uncritical flexibility, training young people in generic skills which match the expectations on the labour market as it stands today. In most discussions in the literature, it appears that young people's passage to adulthood focuses on identity. Young people have difficulties finding viable channels for concerted social action. Instead they invest their energy searching for identities that can provide a sense of belonging and acceptance, making them easy victims of consumerism (Röpke, 1999). Focusing on the knowledge capabilities that underpin young people's ability to take action allows us to move beyond some of the limitations of current conceptualisations of transition. With multiple approaches students were gaining confidence by being allowed to interpret and decide themselves what their task would be, when working with a concrete project locally. How students perceived their study conditions, and their opportunities to influence these, interacted with their motivation, self-efficacy, approaches to studying and eventually their transition to work (cf. Jungert, 2009).

Study IV

Nordén, Birgitta. Transdisciplinary teaching for global learning of sustainable development in a whole school project. *Environmental Education Research*. (Manuscript under revision).

Study IV focuses on transdisciplinary teaching in a joint teaching project on education for sustainable development (ESD) in an upper secondary school. The purpose was to analyse and describe variations in how nine teachers in different subject matters experienced collaborative teaching in the context of a whole school educational development project.

Data were collected from 2010 to 2011 and consisted of semi-structured interviews (n=27) conducted with teachers (n=9) at three occasions (before, under and after) the educational development project "Educational group: City Planning and Sustainable Development" at a Swedish upper secondary school. The study investigated teachers' reflections about their experiences of teaching and developing an ESD project course with a global dimension, and their intention to create an educational innovation based on the students' abilities, as well as designed to fit the Swedish national curriculum. Questions in the interviews concerned teachers' approaches to teaching. Variations were analysed in how the teachers in different subjects experienced collaborative teaching, dialogicity and cooperation between teachers.

Two overarching categories of description corresponding to different teaching approaches were distinguished: "Contributing: Assist and Take Part", and "Ownership: Possess and Reconceptualise".

In the first approach, subject matters were experienced as separate parts. Characteristic for this approach was to assist and take part in the collaborative processes, but not fully contribute to the group's discussions dealing with the teaching of an undefined complex GLSD. Category 1 could thus be considered as additive and subject-based. Subject matters or disciplines were experienced as part sectors of the whole, undergoing a spiral process of a reciprocally growing disciplinary exchange of conceptualising knowledge formation. Borders were recognised between different subject matters, which appeared to safeguard characteristics for traditional teaching on a disciplinary basis. Nevertheless, the intention was expressed to broaden the applications of the GLSD perspective, so that it could be viewed upon from many different subject matter angles.

In the second approach, subject matters were understood in a transdisciplinary framework. Characteristic for this teaching was to assume collaborating more actively, the feeling of possessing the project, and the ability to reconceptualise knowledge formation processes through reflections on the global dimension. In this approach, sustainability problems were seen as affecting the whole world. This led to a realisation of the significance of holistic thinking. Category 2 could be considered as phenomenon-based, combined with holistic and transformational strategies. The subject matters were experienced as interconnected perspectives on the same larger global–local phenomena, pedagogically conceptualised within GLSD, which formed the foundation for the transdisciplinary teaching experience. Characteristic for this category was that the involved disciplines' subject matters were all 'boiled down' and became integral parts of a common teaching process.

These two main transdisciplinary teaching approaches of global learning for sustainable development could be divided into five sub-categories. The Contributing approach was divided into the sub-categories: (I) Disheartened, (II) Supportive, (III) Complementing; while two sub-categories could be seen within the Ownership approach: (IV) Decisive teaching, and (V) Multi-dimensional teaching.

Overall, teachers worked in the project with deep-level processing for learning ESD in an integrated manner in a transdisciplinary framework. However, they experienced tensions between their resources and capabilities, and the challenges they faced in the project. Working with ESD is shown to be a highly challenging and complex task for teachers, in devising learning activities and support structures for students that involve these various dimensions (Reid, 2016). Despite their aspirations to achieve ESD learning goals expressed in the national curriculum, teacher teams frequently experience that they do not have full capability to cover a complex knowledge field (Öhman & Öhman, 2012). Teachers are challenged to work with their own professional development, exchanging experiences and knowledge simultaneously (Reid, 2016). This also involves coping with deep questions of their inner (re)orientation, and developing extended external teaching forms corresponding

to transdisciplinary learning processes (Sund & Wickman, 2008). The study concludes by arguing that by enhancing the ability to deal with global processes, involving critical thinking, skills and values, ESD simultaneously attempts to foster students to become responsible citizens (Scheunpflug & Asbrand, 2006; Anderberg, Norden & Hansson, 2009). This is facilitated by approaches, that from the outset integrate global and transdisciplinary dimensions, and thereby address the challenge of teaching about complexities (Sund, 2015), with considerations of local situations, and diverse values or cultures (Reid, 2016). Importantly, working with the global dimension allows students to better understand conflicts of interest underlying different suggestions for dealing with sustainability issues and making decisions in the future (Biesta, 2009; Howie & Bagnall, 2012; Gough, 2012).

6 DISCUSSION

Among the main findings of this thesis is that the global dimension of ESD is constituted in various forms. This is shown in the empirical studies, as well as in the literature reviews. This chapter consists of a discussion, conclusions and further research recommendations.

The leading concerns throughout the thesis have been opportunities for learning offered by global–local contexts, combined with a transdisciplinary approach in teaching and learning. The diversity of interpretations, concrete experiences and conflicting values that these rich environments offer, allow learners to negotiate possibilities, reflect critically and develop capabilities to handle unforeseen and complex challenges, both individually and in collaboration with others. The studies also point to important conclusions concerning teachers' professional development and shared efforts to improve learning environments for their students within environmental and sustainability education.

Deepening approaches to teaching, learning and curriculum in environmental and sustainability education

Approaches to teaching, learning and curriculum need to be deepened and given sufficient attention in environmental and sustainability education. Sterling (2005) has suggested transformative, deeper and more dynamic approaches to learning, maintaining that "the process of sustainable development or sustainable living is essentially one of learning, while the context of learning is essentially that of sustainability" (Sterling, 2005, p. 52). Wals (2006) has also emphasised the need to focus on the E in ESD, in the sense of heading

towards transformative learning. He thereby acknowledged that the design of learning processes and curricula are consistent with both theories of "good education and of some of the core ideas underlying sustainable development" (Wals, 2006, p. 41).

According to Barth and Michelsen (2013), education in environmental and sustainability education aims at a more learner-centred approach, supporting an extended understanding, by using shared and interactive learning processes. Pedagogical approaches in the matured ESD research field thus stretch from teacher-centred instruction and training, to learner-centred learning, as well as moving towards capacity-building and critical knowledge capability formation. Other central issues are how to support the development of competence and the use of transdisciplinary studies (Hoare et al., 2008).

Strategic issues in education further comprise which knowledge is of most worth with respect to the challenges ahead of us, what schools should teach, and how particular ways of knowing and knowledge(s) are selected, organised and transformed during formal education (Deng & Luke, 2008; Biesta, 2010; Baker, 2014). However, questions of the knowledge or content taught in school have in recent years been frequently subsumed by an intensified focus on 'competencies, learning outcomes and high-stakes testing', according to Reid (2016). The task of formalised curriculum development — concerned with knowledge selection, organisation, sequencing and transformation — is ignored or bypassed in favour of the work of developing academic standards, competency frameworks and evidence-based practices (Deng, 2015, p. 723). Against the backdrop of such tendencies, it becomes important to reflect on what counts as powerful and 'hazardous' knowledge (Reid, 2016), as well as paying sufficient attention to the underlying assumptions in theories of knowledge and knowing (Biesta, 2005; Hopmann, 2008; Young & Muller, 2013). Such issues are particularly relevant in relation to everyday life challenges of the current socio-ecological climate and context for education, as shown also in the intersections of some studies by Reid (2016), McKenzie (2016) and Nordén (2016). It is thus clear that developments of the past years advance fresh arguments for

deepening approaches to teaching and learning in the curricula of environmental and sustainability education.

Both global and local contexts matter for education for sustainability, and the specifics of different perspectives cannot be ignored. According to Reid (2016), attention needs to be devoted to getting questions as the following off the ground:

1. What counts as 'critical knowledge capability' and 'transdisciplinarity', and how is this understood, practiced and developed?
2. How have the 'conditions' and 'ecosystems' of knowledge and knowing changed, as questions of place, relation, materiality, sustainability and transformation are pressed further for contemporary curriculum theory, content and practice?
3. From which positions and perspectives should we (now) discuss and evaluate notions of depth in learning, teaching and curriculum?

Wiek et al. (2013) have pointed to a gap between the knowledge needed among students tackling sustainability problems in a globalised world, and the forms of knowledge they are given opportunities to acquire. In a globalised world, schools that provide students with international learning opportunities on sustainability issues play a critical role (Wiek at al., 2013), since these are the issues young people will need to deal with to address contemporary and future sustainability problems. Teachers can support processes for educational development of teaching and learning SD, and through changes in teaching both facilitate for students and motivate them. Such educational development can extend opportunities for students to develop critical knowledge capabilities to handle sustainability issues in local–global contexts. Teachers can also play a vital role by providing students with international sustainability tools and helping them acquire powerful GLSD knowledge approaches. In contrast to shallow and narrow approaches, deep approaches to learning,

attitudes and skills, can be developed in mutually beneficial global learning communities, as curriculum and knowledge focus re-emerge. The studies in this thesis could be said to address these concerns. Much of what has been recognised as "success criteria or general learning objectives" for international sustainability experiences, as presented by Wiek et al. (2013, p. 19), was also observed in the findings of the studies conducted here. These notably include *taking command* in leading the team's learning processes forward and *collaborative learning* (Study II).

A focus has further been on internationally-sourced options for developing solutions that can inspire ideas adapted to different local contexts. Sustainability problems are worked out by students, in processes of perceiving the contexts from various cultural, historical, ethical and epistemological perspectives. Wiek et al. (2013) conclude that this demands approaches functioning across cultural, geographical and national boundaries, leading to actionable knowledge. In other words, students need to develop knowledge capabilities (Booth & Anderberg, 2005; Nordén & Anderberg, 2011) to operationalise sustainability ideas and address sustainability problems through concrete action in local–global contexts. Parallels can be drawn to action competence thinking (Almers, 2009), which prefigures some of the contemporary approaches as a critical approach. An important aspect of this type of knowledge capabilities concerns transboundary competencies (Wiek et al., 2013).

The competence discourse has largely come from higher education and vocational areas, and is not always compatible with school level curriculum frameworks or transdisciplinary approaches. However, in this thesis, it has been argued that critical knowledge capabilities (Study II) can be developed through teaching approaches involving complex open-ended tasks and stimulating students' learning of SD in global–local settings. Students were allowed to practice the kinds of activities that are involved in working with real sustainability issues, and thereby developed competences and capabilities.

The literature review (Study I) investigated Global Learning in connection to ESD. Local–global settings were considered with

respect to their implications for teaching sustainability issues and developing relevant skills and capabilities. At the time of the study, little empirical research had been undertaken on learning in global settings. Above all, empirical research rarely focused on teaching and learning of sustainable development in global–local real life contexts. The empirical studies of this thesis thus responded to a need for additional research at the time they were undertaken. Although the studies and references presented in Chapter 2 suggest that the research field of GLSD is under progressive development, in many respects the situation today remains substantially the same.

Alongside the questions of content, tasks and learning environments, Rieckmann (2012), Bourn (2012), and Scheunpflug (2011) identify the need for a competence-based curriculum for GLSD. However, most of the research on GL and the combination of GL and SD that Scheunpflug (2014) conducts and refers to, does not build on empirical studies of educational development projects or courses, nor does it concern global learning exchange among students or teachers globally. Scheunpflug's global learning takes place in the local classroom (Germany), whereas the Young Masters Programme (YMP, 2016) which served as the point of departure for studies by Nordén (2005, 2008), involves a global classroom, with more than 100 countries represented.

As the connections between the studies were analysed in relation to the context and the overarching aims of the thesis, the following dimensions of the results appeared as particularly relevant for future SD teaching and learning occasions in global–local contexts:

1. The global–local context and the process conditions for Global Learning (GL), characterised by the learner's perspective, the learner's benefit, strong self-efficacy for self-regulation, positive study experiences, and highly motivated learners.
2. Transdisciplinary approaches in teaching and learning, characterised by deep approaches to learning and deep approaches to teaching, GLSD (and GTSD).

3. Critical knowledge capabilities to handle unforeseen situations and complex knowledge. These capabilities are characterised by intrinsic motivation, volitional mind-set, self-directed learning, knowledge formation, critical capabilities, transition skills, worldview understanding, and transformation competences.
4. Individual and collaborative learning and acting, characterised by self-determination, collaboration, responsibility, and social readiness, leading to action.

1. The global–local context – process conditions for Global Learning (GL)

There is a worldwide call for knowledge on how to integrate a global perspective in SD. Based on the findings of this thesis it appears that central concerns for GLSD are connected to how the potential of learning is strengthened through interaction, both globally and locally, shaping and specifying learning in a global–local context. An important aspect is that GE does not aim to solve sustainable development problems through interdisciplinary reflection, nor does it integrate disciplines in the way considered needed for ESD. However, ESD has been inspired by GE to enlarge its perspective, which is of particular relevance for learning about complexities. Reflecting on the relationships between GE and ESD has given rise to a conceptual and theory-related debate.

Stromquist (2002) argues that the connectivity of economic power, technology, and knowledge has negative impacts on education in a globalised world, such as brain drain and loss of competences that would otherwise have contributed to GL, if people were allowed to deal with challenges from local perspectives, and while staying in their local society. She emphasises that it is necessary to also put primary and secondary education under a closer lens, but leaves the responsibility to the teachers/educators as professionals to become conscious of the role knowledge plays in shaping our contemporary world. At the same time, education has an important a mission for fulfilling the vision of social change and a democratic implementation of an ethical and just education on sustainable development, aiming at strategic points of departure in worldwide solidarity. These objectives

have particular relevance for displaced people and with respect to supporting refugees and poverty reduction according to the SDGs (UN DESA, 2015).

Due to the frequent absence of the ecological dimension when ESD is presented in GE and GESC, the latter approaches tend to engage core issues of global learning less as an outcome of a shrinking planet (cf. Jickling & Wals, 2008; Reid & Scott, 2013), and more as the perception of a rapidly changing social landscape threatening the future of education. Students have to be challenged to form a worldview on their own (Martin, 2013). Standish extends his critique of GE into a debatable position, suggesting that it is not unproblematic to exchange locally defined worldviews with another that has been designed, decided about and delivered ready-made to students by nationally and/or internationally governing experts or other specialists. He contends that the push to extend global education, supposedly on behalf of all its contributing cultures, in fact results in the silencing of the local perspectives. In other words, according to Standish, local voices are not contributing in the knowledge formation process actively. Standish (2012) further criticizes GL for its lack of interest in valuing history, democratic awareness and sense of politics. Like Young & Muller (2013), Standish thus appears to be arguing against managerial vocationalist competency agendas, for a return back to disciplines and high status, reflexive knowledge. Nevertheless, Standish's claim that GL shows a 'laissez-faire approach' (Standish, 2012, p. 135) to learning by leaving students and young people with the possibility to take responsibility for knowledge formation of a worldview on their own, clashes with findings from empirical research (Nordén, 2008). Instead, it appeared that students develop advanced competencies through learning processes, if they are given opportunities to train and practice (Study II and Study III), including the competency to reflect critically upon various normative positions.

In the empirical study of learning in the YMP online initiative (Anderberg, Nordén & Hansson, 2009), complexity, distance, diversity and flexibility appeared to be the most prominent features. These affected the ways in which the participants experienced their own

context for learning in the YMP and some other similar outreaching online projects (Booth, 2007). The quality of learning was strongly influenced by the global learning space offered, as well as the variation of ways in which the contextual features were revealed.

GL can thus take place among students who are in learning settings that involve contacts spread in many countries. Numerous examples of how a global dialogue could be encouraged by GL are found in the empirical studies. Study II in particular investigated the connection between learning and critical abilities to act: global learning for global acting. Such settings imply global learning opportunities for their teachers as well.

This type of GL resembles problem-based learning through task solving activities, and occurs in task-oriented learning dialogues connecting students in different parts of the world (cf. Brown, 2011). The results in the Studies I-II show similarities with those suggested by Cotton and Winter (2010), which are based on stimulus activities, critical incidents, reflexive accounts, personal development planning, critical reading and writing, debates, group discussions, case studies, role plays and simulations, beside problem-based learning.

ESD with a global dimension could be seen as the kinds of education, teaching and learning concerned about ensuring social, economic and ecological wellbeing. GLSD could prepare young people to cope, manage and shape social, economic and ecological conditions characterised by change, uncertainty and risk (cf. Sterling 2005) within a framework of sustainability education. The development of such teaching and learning environments remains unevenly distributed however, and requires different approaches in different contexts, The focus in learning will also depend on the underlying theoretical perspectives that are adopted.

According to Stromquist (2002), students and teachers participating in GLSD contexts could, take on the challenges in the ongoing globalisation of educational policy and practice, and "become key players in a globally democratizing transformation" (Stromquist, 2002, p. 188). Their work could contribute to establishing bridges,

going beyond school and local community, reflecting and planning with other students and teachers "in venues of transnational action"(Stromquist, 2002, p. 188). Above all, education should be used "as a means to create active citizens, moving people from passively observing the actions of others to undertaking action themselves" (Stromquist, 2002, p. 188). Educators could thereby play a central role in moving minds from *globalisation*, with its focus on expanding markets, to *internationalism* defined as "the promotion of global peace and well-being through the development and application of international structures" (Jones, 1998, p. 143).

2. Transdisciplinary approaches in teaching and learning

Student-focused perspectives on teaching are related to extended complex understanding of subjects, and are often founded on research (Prosser et al., 2007). Qualitative variation – in the way teachers experience their understanding of their subject – is associated to the mode in which they experience their teaching. Looking at relationships between teaching and learning, Entwistle, Hanley & Ratcliffe (1979) concluded that approaches to teaching may be paralleled by similar approaches to learning, with characteristic strengths and weaknesses. Trigwell (2012) highlights that there are systematic relations between the ways teachers emotionally experience the context of teaching and the ways they approach their teaching. Examples found by Trigwell include pride, motivation, safety, embarrassment, frustration, courage, or risk-taking. Deep-level processing (Marton, 1976) – covering both intention and process – is additionally an important component of motivation in teaching as well as learning (Entwistle et al., 1979; Meehan & Thomas, 2006).

Through their teaching, being able to re-orient education towards sustainability, teachers are key agents with respect to bringing about change towards a sustainable world (Birdsall, 2015). Birdsall (2015) found a "diffused learning" when teaching a personal understanding of sustainability concepts among teachers. Additional key features included teachers' ability to translate sustainability into their pedagogy in ways that makes it accessible to their learners (cf. Johansson, 2015).

With respect to the concerns of this thesis, teachers' stance towards transdisciplinarity is a central issue. It is therefore important to note that many teachers feel content with one major subject teaching identity - and 'transdisciplinary' isn't usually such an identity, e.g. teachers introduce themselves as a teacher of this subject or that. Compared to findings in Study (IV), it can be noted that Yueh and Barker (2011) identified unstructured opportunistic attempts to apply transdisciplinary teaching. An elusive infusion pedagogy appeared in the 'framework' approach, when moving from subject-focused environmental education (cf. Deng & Luke, 2008) in the course of implementing curriculum change in secondary schools in Taiwan. Difficulties appeared in teaching the complex concept of sustainability, due to the complex interaction of its pedagogical components. These challenges open up further avenues for research into the development of effective strategies for transdisciplinary teaching and learning (cf. Biesta, 2010). From horizons considering local to international manifestations connected to SDG #4 on Education (Reid, 2015) – and in terms of what is learned in schools and how – rapid deep-reaching developments are called for, with respect to pedagogy, curriculum and teacher education (cf. Lundholm, 2011; Nordén & Anderberg, 2011).

The findings of Borg, Gericke, Höglund and Bergman (2012) differ to a certain extent from the results presented in this thesis (cf. Study IV). For instance, they observe that science teachers seemed to be traditionally grounded in fact-based lecturing methods, worried by their lack of necessary expertise about SD. On the contrary, Study IV points to collaborative educational development and motivation to teach with transdisciplinary approaches. At the same time, the research of Borg et al. (2012) also confirms the difficulties and obstacles experienced by upper secondary school teachers in attempting to teach SD in a transdisciplinary manner. Teachers in their study lacked inspiring examples and expertise about SD. Borg et al. (2012) thus conclude by pointing to the need for further training for adjusting their teaching towards an integrated format (Borg et al., 2012) across disciplinary boundaries. Study IV suggests that such developments might be achieved by collaborating teacher teams coming from different subject matters. Including knowledge traditions and epistemologies from different places and contexts,

various social-geographic perspectives ranging from global to local (Pacione, 2005) could then be featured.

In comparison to the study conducted by Borg et al. (2012), the transdisciplinary teaching observed in this thesis (Study IV) could mainly be characterised as collaboration among the teachers when they were involved in common projects. The study also suggested a dimension of variation in the forms of collaboration, ranging from single subject focus, via cross-curricular forms of working, and moving towards multi- and inter-, or transdisciplinary approaches (Study IV).

Knowledge formation was in this study developed through collective action in a teaching context with a situated and more meaningful learning approach (cf. McKenzie & Bieler, 2016). At the same time, it appeared that some of the teachers in Study IV initiated, took command and made decisions about in what context and how the design of the learning process should be, and where it should take place. This type of approach could be seen as a relatively traditional and normative way of teaching ESD (Biesta, 2013; Öhman, 2008). Nevertheless, compared to the teachers' role in the study by Borg et al. (2014), the teaching approaches in sub-categories IV-V in Study IV showed efforts made to invite and convince the students about their motivations and driving force. Teachers tried to explain why they wanted students to carry out a locally anchored learning project that aimed at raising awareness of the common global impact (cf. Martin, 2013; Gough, 2012; Brunold, 2005; Rost, 2004). The teachers worked to build knowledge that would be valuable and relevant for the students. Importantly, teachers realised that this work of creating suitable content for the learning activities had to take place across disciplinary boundaries. Finally, they attempted to reach a common understanding of content, form, and learning process, in order to achieve a holistic teaching approach. Based on these findings, for ESD, the key issue is not so much to determine whether teaching is 'student-centred' as opposed to 'teacher-led' practices, but rather to consider the opportunities that are offered in different settings for active engagement, critical reflection and their relevance to real life questions.

3. Critical knowledge capabilities to handle unforeseen and complex knowledge

Scheunpflug (2011) emphasises that teachers need competencies (cf. Study II) to address the challenges of globalisation, including the ability to handle the complexities of a knowledge society. The result from Study IV seems partly to show that much of ESD teaching (sub-category I-III) takes its point of departure in, and is conducted as belonging to what Öhman (2008) names as the 'normative tradition' (Öhman, 2008, p. 27), which presents learning content as objective, and founded in scientific evidence that cannot be questioned. It can restrict space for critical discussion or reflection on underlying values, and lead to strong reliance on experts, as well as obscuring historical and political processes leading to the creation of bodies of knowledge.

As seen also in Study II and Study III, this is not unproblematic, since much of the ESD teaching seems to start and is conducted within the normative tradition, according to Öhman (2008).

> ...the normative tradition was found to be democratically problematic as the democratic conversation is not included in the learning process. It is also philosophically questionable as it relies on science as an objective foundation for value judgements. (Öhman, 2008, p. 27)

Consequently, Öhman (2008) argues for teaching ESD with the aid of a pragmatic perspective (Hansson, 2000; Pierce, 1934). Öhman's arguments have implications for transition skills that young people need in an uncertain world, and with respect to how to develop their processes of meaning-making, considering the complexities of SD. Additionally, a pluralistic methodological approach could be understood as important for the enhancement of students' communicative capability concerning ethics and morals (Öhman, 2008).

Through the result in the thesis, the conditions for a global learning (GL) could be seen as processes based on the development of a number of key characteristics; including self-determination, volition, self-directed learning, critical knowledge capabilities, competences, skills, and worldview forming. Not least important is the recognition of volition that is the act of making a choice (Scheunpflug, 2014).

Other relevant aspects include the need to consider local conditions for working with critical knowledge capabilities, such as the different teachers' prior training and commitment to GLSD aims. Conditions further include constraints set by national curricula or work organisation at the school. A closer look at variation in collaborative teaching approaches across disciplines and from a global learning perspective is therefore called for.

Another important aspect which needs attention is the outcome of GLSD experiences for students in the form of transitions skills, in particular if society is calling for development of sustainability. Young as well as old citizens have to learn to deal meaningfully with ambiguity, complexity, normativity, fragmentation and uncertainty to respond to the key issues of our time.

The critical knowledge capabilities recognised in Study II can be understood as an incitement founded in self-directed learning through global learning activities – in this case relating to sustainable development education (cf. Bourn, 2008; Kumar, 2008). Given responsibility, individual students developed their competence also by having a collaborating teacher as partner. By taking part in global (learning) activities, as during the YMP (see Study II), young people "developed their capacity to manage work independently" (Nordén & Anderberg, 2011, p. 43).

Critical knowledge capabilities were developed among students, when they realised that they themselves – both as individuals and while sharing work tasks between themselves – had to be capable to be in charge of, direct, define and conduct an optimisation of any learning process, by focusing on critical aspects as in future professional situations.

4. Individual and collaborative learning

With the intention of creating ESD, many teachers engage in collaboration activities that relate to their teaching (cf. Study IV). This may result in learning and interactive knowledge production processes of various kinds - for students as well as teachers. Such forms of teacher collaboration can be beneficial for the teachers' professional development through GL (Scheunpflug, 2014; Sund, 2014), but also lead to and motivate a deeper investigation, change and development of global teaching (cf. Study IV). Global teaching and learning environments provide additional opportunities, where teachers can find international colleagues as experts in different disciplines to collaborate and work together with, in connection with the same programme, project or course. In such environments, teachers from different countries may be working with the same students in a shared group, or they may have an exchange of teaching experiences with the other teachers of the students in the same course/group, and communicate the teaching challenges within the SD issues of various sorts. They might strive to identify a common globally functioning strategy with diversity and flexibility built in the GLSD and even for developing a kind of GTSD (Global Teaching for Sustainable Development).

In view of such potentials for teacher collaboration, if supported further by institutions and schools structures, the concept might develop and lead to useful courses at different local learning environments. Complex GLSD spaces imply collaboration with other teaching practitioners in a transdisciplinary manner. By creating such a learning context and interactively generating relevant place-based knowledge through global exchange, teachers gain opportunities to develop professionally (Karlsson, 2008; Bursjöö, 2014). For students, participating in arranged learning situations encouraging deep level approaches to learning, there are opportunities to bridge the gap between theoretical knowledge and personal experiences from their everyday life, as shown by the results of this thesis.

An ESD teaching profile and serious plans for a whole-school implementation of ESD are not in themselves a guarantee for success, according to Olsson et al. (2015). On the contrary, they found

that in Swedish compulsory schools with an explicit ESD teaching profile, the ESD teaching profile school rather had a negative effect on the pupils' sustainability consciousness in grade 9, in terms of sustainability knowledgeability, attitudes, and behaviour (Olsson et al., 2015).

An important consideration is that by exchanging experiences and perspectives in global classrooms, students may also acquire capabilities that can help them later in working life (Karlsson et al., 2007). The findings of Karlsson et al. are in line with the results in Study II-III. Such interaction between students concerning their own experiences as well as similarities and differences in the various local contexts, is not something that takes place spontaneously, however. Teachers had to guide the processes and arrange activities that provided structure for a holistic approach to learning (cf. Svensson, 1997). Similarly, the results of Study (II) highlighted the importance of head teachers as role models for the teachers, as well as taking a role as pedagogical leaders to support the process of collaborating in GLSD, raising crucial questions and talking frequently with the teachers of the key issue of heading for a holistic approach of GLSD. To fulfil these expectations required critical knowledge capabilities according to one of the head teachers, who stressed that such capacity-building and educational design in general is central, and implies re-thinking teaching and learning pedagogy and didactics.

Thanks to networked learning and collaboration in the global settings, young people were positioned and received recognition as practitioners and stakeholders in society (Nordén, Avery & Anderberg, 2012). The pragmatic and holistic approach contributed with an epistemological interest for authentic and important matters that affected young people's lives. Students' critical knowledge formation could thereby involve and integrate a complexity of demands that they recognised in society (cf. Karlsson, 2008), in ways that could be useful for them beyond the school walls and in their future lives (Nordén, Avery & Anderberg, 2012). Transition skills were developed as a consequence of the various new, unpredicted and in many respects inconvenient situations that they were exposed to in the extended learning environment within a local–global context.

Overall, the findings of the empirical investigations in this thesis are in line with the conclusions put forward by Scott (2010), pointing to the urgency of providing students with international learning opportunities on SD. GLSD offers interdisciplinary educational experiences with the intention to equip the students with knowledge, skills, and attitudes needed to take on sustainability challenges seriously in international and global settings (Scott, 2010).

Teachers' professional development and shaping learning environments for GLSD

Transdisciplinary teaching of education for sustainable development (ESD) with a global dimension as examined at an upper secondary school (see Study IV), showed that in these contexts, content and teaching forms were not established in advance, making it possible for students to develop critical knowledge capability. This is facilitated by approaches that, from the outset, integrate global and transdisciplinary dimensions, and thereby address the challenge of teaching about complexities (Sund, 2015), with considerations of local situations, and diverse values or cultures. Importantly, working with the global dimension allows students to better understand conflicts of interest underlying different suggestions for dealing with sustainability issues and making decisions in the future (Biesta, 2009; Howie & Bagnall, 2012; Gough, 2012; Nordén, 2016).

The important differentiations in the content and teaching methods of EE/ESD (Sandell, Öhman & Östman, 2008), have been identified as fact-based environmental education, normative (focusing attitudes and behaviour) environmental education, respectively ESD with its focus on political issues and dealing with democracy (Sandell, Öhman & Östman, 2008). It is time to take our reflection one step further. Even when education supports attitudes leading to environmentally more sustainable behaviours, learning facts in a normative way is not enough. It is not adequate for students to be learning a subject matter once and for all, for narrow nationalistic purposes, in order to achieve a certain predicted behaviour for reproducing a culture in a specific country and in ways that have been defined beforehand. Instead, as emphasised by Cotton and Winter (2010), students will in their future life be required to make value judgements about the

appropriateness of their actions. For many of the vital decisions young people need to take, there are no simple answers corresponding to established facts. In an age of uncertainty and rapid changes, young people need to be able to debate conflicts of interest or value, as well as making informed hypotheses about the long term effects of their actions.

Findings in this thesis suggest that the overall learning challenge, in trying to enable young people involved, must be on how – not what – to think. Thereby, the learning continuum advances as youth and their teachers attain a sense of community and find their place within the local–global context by engaging in network activities. According to Cotton and Winter (2010), students need to develop the ability to think creatively and holistically and to make critical judgements (1), develop a high level of self-reflection (2), and understand, evaluate and adopt values conducive to sustainability (3). The students need, also, to develop their ability to bridge the gap between theory and practice (4), to count transformational action only as sustainable development (5), participate creatively in inter-disciplinary teams (6), and the ability to initiate and manage change (7). Additionally, schools must work with problem-solving and continuous learning to develop new alternatives.

At a global level, there is a growing need to develop competencies and capabilities for transitions towards sustainability. Conflicts and climate change are drastically increasing the number of refugees and displaced people who need proactive preventive strategies, as well as skills that can be useful across numerous contexts and in the face of changing circumstances. Increasingly, also young people need to manage their own learning processes in self-directed learning, regardless of where they are physically and where they may move in their lifetimes. As established social structures struggle to address global challenges, people across the planet need to be able to organise themselves and to take initiatives. Against this background, several aspects of the GLSD approaches investigated in this thesis are highly relevant.

Further research

The studies analysed in this thesis include knowledge formation processes which consider local to global environmental and sustainability education and its various research issues. Symptoms of climate change due to the Anthropocene (Rockström, 2015) add urgency to educational debates and influence how they are advanced, but also explore the implication of diverse and compelling socio-ecological horizons within terms of what is learned in schools and how. Such responses often have a key theme found contributing directly 'reading off' from these horizons' strong messages of imperative action, and the necessity of immediate and imminent change to schooling, including key elements of pedagogy, curriculum and teacher education (Lundholm, 2011; Nordén & Anderberg, 2011).

Against this background, three intersecting areas of curriculum theorising and research in environmental and sustainability education might be addressed (Reid, McKenzie & Nordén, 2016). These are, as summarised by Reid (2016):

1. Questions of epistemology – such as the ways of knowing that are privileged and marginalised in learning, teaching and curriculum about environmental concerns and imperatives
2. Questions of normativity – including the purposes of schooling historically and in relation to current and future generations, viz. sustainability
3. Questions of practice – drawing on aspects of curriculum-making, development and policy direction in general as well as in relation to specific fields of activity, such as environmental and sustainability education, their intra– or in(ter)dependencies and subsidiarity.

With respect to these different areas and based on the findings of this investigation, different directions could be contemplated for further research. These include the role of pedagogy for students, teachers and how the learning experiences in GLSD lead to higher order capabilities (Barth & Michelsen, 2013); the impact in GLSD of links between formal curricula or disciplines and wider learning

(social) contexts; the overarching issue of the role pedagogical considerations play in the innovation in practice, as well as the theoretical development of GLSD.

Further research is called for, concerning the teachers' role, their thinking and ways to support pupils' learning in connection with GLSD. This involves the question of how to conduct and implement more self–directed learning in a global–local context. Finally, more knowledge is needed concerning the challenges of handling transdisciplinary teaching, and the specific capabilities teachers require, to meet these new complex fields of learning.

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What does it take to enable students to see the planet as one interdependent environment? It can happen when students meet and work together across national borders. Meetings in the global classroom can fuel the desire to develop strategies which enable them to act through their education. I have seen the emergence of a deeper awareness, when I was working establishing worldwide networks of students and teachers who share environmental concerns, and who are willing to do something about these issues.

Networks like Caretakers of the Environment International intend to be a podium for teachers and students to promote environmental and sustainability awareness by exchange of ideas, strategies, actions and projects in the field of global learning for sustainable development.

The time has come to act. Over the past decades, at summits across the globe, this conclusion has become painfully clear. Most probably, to follow this injunction means that the core of scholarly life will change. For many of us, the voyage is envisioning one's work creatively. The idea is never simply to only write, but rather to – in thoughtful ways – help bring about change.

Many things you can do alone. Still many more things could be achieved, if you meet, collaborate and make an effort together. I am so glad for all I have met and have had the opportunity to come to know, the extended global family of researchers, teachers and students working towards sustainability.

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APPENDIX

Policy Background

Past international governmental declarations for commitment in sustainability education

The first international conference at governmental level on environmental education (EE) was held and organized by UNESCO and UNEP in Georgia 1977. Among the goals stated in the Tbilisi Declaration (UNESCO, 1978) for environmental education was "to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment" (UNESCO, 1978, p.26). Concerns about both "natural" and human-made environments, was proclaimed in the Declaration from the United Nations Conference on the Human Environment held in Stockholm 1972, and "to defend and improve the environment for present and future generations has become an imperative goal for mankind" (UNESCO, 1978, p. 24). Already then, the environmental education discussions included several vital concepts such as holism and interdisciplinarity (Hansson, 2000). Referring back to that, the urgency in achieving sustainable development through education was declared as critical in Chapter 36 in the "Agenda 21" during the Earth Summit in Rio de Janeiro 1992 (UNCED, 1993). The importance of global partnership was also emphasized – reflecting adjustment of behaviour and "a commitment to the improvement of the quality of the environment and of life for all the world's people" (UNESCO, 1977).

Contemporary international governmental initiatives for commitment in sustainability education

Global Action Programme (GAP)

In November 2014, UNESCO proclaimed a follow up to the UN Decade of ESD (DESD, 2005-2014) named the Global Action Programme (GAP), a global strategy to accelerate and intensify the work on ESD worldwide and emphasize global learning competences needed for a sustainable future (Tilbury et al., 2014; Scheunpflug, 2014; Wiek, Withycombe & Redman, 2011). According to that Aichi-Nagoya Declaration on ESD (UNESCO, 2014), GAP will during 2015-2024 upscale five priority areas of which - for this thesis - particularly notable are: (1) increasing the capacity of educators in ESD; and (2) strengthening and empowerment of youth in ESD. Besides that, but of minor interest, also (3) integration of sustainability practices in educational settings i.e. whole-institution approach are focused (Tilbury et al., 2014). Hopkins (2014) summarizes the effect of the influences during the decade as a movement conceptually of ESD from the periphery to a core component of quality education.

The UN 2030 Policy Agenda of SDGs

International governmental agreements as incitement for schools to continue develop ESD world-wide

World leaders of (193) member states have agreed to meet at the United Nation Sustainable Development Summit in New York in September 2015 and adopt 17 new global Sustainable Development Goals (SDGs) as in the finalized text document named *Transforming Our World: The 2030 Agenda For Sustainable Development*. The aim is to end poverty, promote prosperity and people's well-being while protecting the environment by 2030, according to the Division for Sustainable Development at United Nations Department of Economic and Social Affairs (UN DESA, 2015).

Goal 4 has as aim to "ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" and it holds two sub-goals that are, in particular, related to this thesis:

> 4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes;

> 4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development (UN DESA, 2015, pp. 14-15).

Building on former agreements and policies implementation attempts via United Nation, the agenda for 2016-2030 might complete parts that these earlier did not achieve (i.e. the Stockholm Declaration, 1972; Tblisi Declaration, 1977; "Agenda 21" (Chapter 36) in Rio de Janeiro, 1992; the Millennium Development Goals, 2000 etc). The SDGs seek to integrate and balance various dimensions of sustainable development (i.e. the economic, social and environmental) and might stimulate action "in areas of critical importance for humanity and the planet" (UN DESA, 2015, p. 2). This type of agreements might be of importance as an incitement for schools, and teaching and learning SD in many countries around the world.

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Global learning for sustainable development in higher education: recent trends and critique

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Abstract

Purpose – to provide a synopsis of some major trends that have marked discussions on global learning for sustainable development (GLSD) in higher education. The aim is formulated against the background of the complexity represented in GLSD, as well as the fact that sustainable development (SD) is an issue of global interest for universities.

Design/methodology/approach – The authors conducted an overview in recent trends in research on GLSD in higher education over the last 20 years, based on the combination of the keyword *higher education for sustainable development* with *global learning* and *global education*.

Findings –The overview suggests that only relatively limited steps have been implemented to achieve GLSD, and rhetoric still dominates the discussions. It appears that little empirical research has been undertaken on learning in global settings. Several authors have identified the need for a competence-based curriculum for GLSD,

Originality/value – Universities, professionals and students need to take greater responsibility. How knowledge, values and abilities are formed and developed from the global learner's perspective therefore remains an open and fundamental question. The article underlines the crucial role that higher education plays in global learning for sustainability.

Keywords Sustainable development, learning, teaching, global, overview
Paper type Research paper

Introduction

Education for sustainable development (ESD) has been one of the top priorities in national policy documents and on the global agenda since the Earth Summit in Rio in 1992. It was again brought to the forefront of international attention at the UN World Summit on Sustainable Development (WSSD) in Johannesburg 2002 (UN, 2002). The Global Higher Education for Sustainability Partnership (GHESP) initiative aimed to make sustainability an integral part of college and university curricula around the world (UNESCO, 2001). UNESCO has played a central role in implementing ESD objectives by means of the *Framework for a Draft International Implementation Scheme* (UNESCO, 2003), where a new vision of education is expressed that will hopefully lead to profound changes in higher education. It therefore provides the starting point for the present overview:

> Education for sustainable development has come to be seen as a process of learning how to make decisions that consider the long-term future... This represents a new vision of education, a vision that helps people of all ages better understand the world in which they live, addressing the complexity and interconnectedness of problems ...The vision of education emphasizes a holistic, interdisciplinary approach to developing the knowledge and skills needed for a sustainable future as well as changes in values, behaviour, and lifestyles. (UNESCO, 2003, p. 4)

Wright (2004) describes the evolution that can be discerned in policy declarations in higher education from 1970 onwards, and examines the patterns and themes that have emerged. Although evidence of an interest in the global dimensions of environmental issues is found as early as the1970s, specific awareness of these issues in the context of higher education is only found from early 1990. The Kyoto Declaration of 1993, adopted by 90 universities across the globe, challenged higher education worldwide to accomplish an essential mission in global sustainable development. One of the two major themes outlined in the Kyoto Declaration public outreach activities (see discussion in UNESCO, 1998; Wright, 2004). In particular, the Declaration points out the responsibility universities have to students, as well as to the broader community, in calling for an increased awareness of the need for sustainable development. The document highlights the priority and significance of a global perspective on higher education, and thereby also marks the origin of the notion of 'global learning'.

The present article attempts to trace some of the key developments in the movement to promote global learning for sustainable development (GLSD) in higher education, and presents an overview of what is still a very new field. It takes its point of departure in recent research on GLSD in higher education, primarily published in English. Since this research field has only recently emerged, the literature review is limited to the last 20 years. Searches were initially made on the databases ERIC and Google Scholar, using the keywords *global learning*, *global education*, and *higher education for SD* (HESD). This study was then used to guide a further review of related documents. In the process of scanning the field and studying publications, it became clear that the research relating to higher education is comparatively rare. Certain relevant material relating to secondary education was therefore included. Very few empirical studies appear to have been conducted, and the bulk of the collected documents is characterised by visions, ideas, recommendations, suggestions and general comments. Because of the limitations in the available material, the authors see this study above all as a discussion of some of the important challenges in the evolution of GLSD.

The emerging of GLSD

Brunold (2005) argues that the emergence of international concern with issues of SD increases the demand for both global learning as well as education for SD. By 'global learning', Brunold means (with reference to Gugel and Jäger, 1996) developing learning on the uncertainty of knowledge, in the process of establishing links between everyday problems,

global processes and lines of conflicts. Brunold (2005) further contends that global learning requires new values, giving up the aim of reaching the "right" or the "most appropriate" answer, based on a logical interpretation of natural balance. Also, the character of knowledge has changed over recent years. This is why it is increasingly problematic to accumulate knowledge additively. Principles of cause and effect are not available in a global context. The amount of information is vast. Knowledge has become valid for shorter periods of time, and individuals are less aware of the collective knowledge in society, since knowledge tends to be more and more specialised. Taken together, all these factors have led to the need for new modes of learning in a global context. The very question of how to grasp the relativity and uncertainty of knowledge is now coming to the foreground. Finally, the appearance of global online learning settings is calling for new modes of learning, such as learning by simulating and learning in networks (Brunold, 2005). According to Rauch and Steiner (2006) the concept of 'global learning' gradually came to replace the notion of 'development-policy education' (plausibly corresponding to the term 'global education' as used in England), which lacked didactic references.

GLSD has also emerged from the more general area of global education (GE), first introduced in the 1960s, and a multiplicity of definitions of the term have been formulated since then (for an overview see Gaudelli, 2003, pp. 7-8). A large number of educational theories and practices have also been applied to this area. However, Gaudelli has shown that, in spite of a very lively debate, very little is actually known about the effectiveness of global education or how it develops students' learning. There is a growing need to cooperate and collaborate in both developed and developing countries on GLSD. SD issues need to be reformulated to incorporate diversity and multilingual aspects, and it is important to examine how local experiences can be related to global perspectives more concretely.

Literature review findings: Challenges of GLSD in higher education

University level/Institutional level

Toakley (2004) examines patterns of development and globalisation, and reviews some of the critical issues bearing on SD. He also discusses the role of higher education as a part of this process. In particular, universities are seen as playing an important role in SD in developing countries. A key factor is information technology and internet-based distance education, which allows for reduced costs and increased flexibility in offering materials, making high-quality lectures available to a wider audience. However, Toakley (2004) cautions that for such education to be successful on a broader scale, careful planning is required. Of utmost importance is the development of local universities, since these frequently perform key functions in the knowledge infrastructure of developing countries. Learning, research and innovation are vital parts of this process. With respect to ESD, universities play a particularly central role in developing areas, helping to raise community awareness and carrying out critical analysis of policy issues for public debates (Talloires Declaration of Universities for a Sustainable Future, 1990). Toakley (2004) concludes that universities have only taken some initial steps, such as: educating for learning and teaching in a global context, where the local universities are aware of the vital role they play; assuming the task of educating for environmentally literate students who are able to assume responsibilities for a sustainable future; and taking a more active role towards integration into the national knowledge infrastructure.

Marsella (2007) has claimed that the majority of challenges of global learning cannot be met within existing theories, assumptions, research methods, or curricula. He argues for mapping out three core elements of particular interest: the characteristics of the students, a philosophy of education, and the process and content of education. Marsella encourages the development of knowledge and skills that promote multidisciplinary, multilevel and

multicultural approaches in research and education. Adequate training involves multidisciplinary methods, distance learning, new technologies, as well as requiring knowledge of global modelling, global communities and extensive field research. In practice, he concludes, teaching and developing such strategies would require adjustments and changes at multiple levels in universities and colleges.

These visions, recommendations and suggestions lead Marsella (2007) to conclude that the educational focus at universities must be more responsive to the global challenges, by virtue of knowledge, methods, and practices that are valid and relevant to our times. Finally, he emphasizes that the crisis of unsustainable development and the challenge of SD are therefore not seen only as an environmental problem, but also as social and ethical issues in education.

Western culture, as presented in school curricula today, contains both obstacles and possibilities for SD. It is contended that to achieve SD, people need to be more motivated and employ multifaceted approaches to the challenges of globalisation (Yagelski, 2005; Marsella, 2007). Above all, a far-reaching change is needed in attitudes among academics in order to promote GLSD, focusing how learning is developed in a global context. Whereas Marsella starts his discussion in more general subject areas, presenting visions and recommendations that concern research and educational systems, as well as concrete activities on an individual level, Yagelski's ideas focus on English education in the US, taking his point of departure in SD. Nevertheless, they both agree that academics bear a share of responsibility in the failure to meet the challenges of SD.

Curriculum level

Global learning (GL) – learning in a global context - has received considerable attention since the 1970s. GL has been of major interest in recent years with the introduction of ESD. In the 1990s, education was faced with new challenges, these challenges derived from the fact that GL was not seen as a question of learning 'facts', but rather as a critical approach leading to commitment in learning, with the goal of encouraging self-determination in a global context. This type of critical approach presupposed a set of specific competencies. Rauch and Steiner (2006) mention competencies such as: systems thinking, team skills, the ability to deal with insecurity, integrated thinking, the readiness to cooperate, coping with change, creative and lateral thinking, and readiness to compromise. In Austria, for instance, GL has been developed in classrooms via interactive exhibitions, workshops, classroom activities, and the use of auxiliary curriculum materials for teachers. A two-year education programme on global learning also exists. Rauch and Steiner outline how the concepts 'environmental education', 'education for sustainability development', 'global learning' and 'peace education' have been handled in teaching practices. They see SD primarily as a regulatory idea, arguing that such ideas provide heuristic structures for reflection, as well as providing a direction for processes of research and learning. This example shows that visions of SD needs to be constantly renegotiated by participants in every concrete learning situation, both at school and in higher education. Consequently, if SD becomes an integral feature of all education, both individual and collective self-development and self-determination need to be stressed.

Irving, Yeates andYoung (2005) review how the global perspective enriches and challenges conventional teaching and learning methods, showing how this perspective informs teaching and learning experiences in British social policy teaching. Their article focuses on the question of how a global perspective in social policy is fostered in the higher education curriculum, in order to promote awareness, knowledge and understanding of different topics relating to SD. Various ways that the global perspective has been integrated into social policies are described. In this context, Irving, Yeates and Young suggest that a global perspective on social policy enhances curriculum development, because a global perspective has topicality and dynamism. There is an increased awareness in the academic

community of the global perspective. The global perspective can stimulate students to widen their thinking and go beyond their own national context, by being more critical and imaginative when considering how classical concerns of social policy are developed in a global context. Also, a global perspective in the curriculum provides students with possibilities to relate their experience to a wider context.

The main challenges of GLSD are identified in the area of avoiding a content-based approach (a focus on what is taught), since a global perspective becomes merely additive in a content-based framework. Instead, Irving, Yeates and Young (2005) suggest a process-driven approach, that is, a focus on how learning takes place. When learning is seen as a process of knowledge construction, students carry out a variety of cognitive operations to make their understanding meaningful. This demands a more principle-led and competence-driven curriculum change, than a simple expansion of content.

According to Stevenson (2007), the new globally-based economy has profoundly changed the conditions and culture for teaching and learning. As a result of these changes, teachers in the US are now more focused on preparing students for their individual life and rights, rather than preparing them to become responsible environmental citizens, with the capacity to collaborate for a better world. Issues of SD have been marginalised, compared to economic arguments in the political concerns of a majority of Western countries. However, this trend has begun to shift again, since notions relating to environmental issues, such as 'global warming', are becoming more established concepts. Stevenson further suggests moving from a content-focused and subject-based curriculum, to fostering responsible citizens and promoting the development of essential skills, including problem-solving and critical thinking. Here also, the focus is on a competence-driven curriculum of the kind suggested by Irving, Yeates and Young (2005).

Rost (2004) articulates similar recommendations in his article *Competencies for global learning*. Like Stevenson (2007), Rost wants to move away from the purely rhetoric level and instead focus on the practical issues of implementing ESD, including GLSD, to guarantee that people in the future are able to deal with and handle globalisation processes. The ideas presented by Rost in the article concern a framework for competencies that give students the possibility to handle complex development issues, and as a consequence behave in more sustainable ways. This functionalist educational idea takes its main point of departure in the basic principles of Agenda 21, where education has the objective of fulfilling learning for SD (Agenda 21, 1993, chapter 36). Three types of competencies are presented, located in the three classical fields of knowledge, values, and action, with the aim of formulating a model for an ESD curriculum. First, global development processes are characterised by their complexity. To develop knowledge competencies, Rost therefore suggests a systems-oriented approach, to foster students' ability to deal with global systemic interconnections. Second, since global problems mean that culturally different value systems need to be taken into account, developing competencies to value involves the ability to understand, recognise and compare different values. The third area of competence, that of action, is seen as the most important. It deals with the ability to approach and direct developmental processes, involving the ability to predict, to set relevant goals, to anticipate events, and finally, to shape processes of change.

Individual level

Very timely, and contrary to much of the rhetoric in SD, Reid and Petocz (2006) have identified the problem that teachers rarely share a common language about SD. Consequently, a common understanding of the issues involved in SD is also missing, and it becomes difficult to integrate SD into the curriculum. Reid and Petocz conclude that if the aim is to empower learners in formal institutions at any level concerning SD issues, the teachers themselves need

to understand these issues, both in their global perspective, as well as constituting the core business of their particular discipline. Reid and Petocz referring to Prosser and Trigwell, (1997) further point out that limiting conceptions of a subject (in this case SD) often relates to limited approaches to teaching that subject, whilst holistic (or expansive) conceptions tend to broaden the teaching and learning approach. When disciplines are woven together, a holistic ESD programme conveys knowledge, issues, skills, perceptions, and values associated with searching for and progressing towards SD - strengthening learning for SD.

Related empirical research has been conducted, in the research project *Learning in the ICT-extended University* (Booth et al., 2007), where a prominent part focused on GLSD. Based on this empirical research, learning and teaching issues in GLSD are identified and discussed (Hansson and Nordén 2007; Nordén, 2005). The results were based on data from the Young Master Programme (YMP), offered by the International Institute for Industrial Environmental Economics (IIIEE) at Lund University, Sweden, and involving young people learning in a global online context about Preventive Environmental Strategies (PES), with a view to promoting sustainability. A total of 7 000 students from 120 countries participated in the YMP, working interactively on a common subject matter, using a problem-oriented approach. Data were subsequently collected from questionnaires online, with answers from 535 students and 45 students group-wise who were invited for in-depth-interviews concerning *how* and *what* they learned. The aim of the analysis of the data was to find qualitative differences in their experiences of their learning in the context of GLSD. The results show that learning meetings in a global context particularly catalyse students' commitment to SD. Students experienced that they developed their critical thinking skills, and became aware of the complexity and the interrelation between the different concepts in the area of SD, as well as modifying their understanding of this interrelation. They learned to ask, search and reflect on subject matters relevant for SD, and were engaged by the dialogues. They found it useful and rewarding to be involved in an extended global learning space. The students thereby developed potentials for more critical learning and thought processes. Conclusions drawn from the YMP studies is that meeting other students on a global online forum is a good start for learning on issues and challenges in the area of SD. A further conclusion is that online discussions provided students with an opportunity to work in a-deductive way, not only inductive (Hansson, 2004), which is of major importance for a holistic approach and for learning about complexities.

Discussion

Historically, the shift from environmental education (EE) to education for sustainable education (ESD) started during the United Nations conference 1992 in Rio de Janeiro, at a time when the policy discourse widened the questions to more prominently incorporate global perspectives, as well as a new mix of ecology and economy, integrating social, political and ethical dimensions (Agenda 21, 1993). The tension between approaches to learning and teaching reflected in EE and GLSD have not been treated throughout this article. However, the authors have noted that the vision of changing curricula, pedagogical approaches and institutions to include ESD has laid new ground for increasing the global perspective in ESD (see Figure one, p. 8). Major environmental problems and global challenges have been focused in ESD for several decades. Unfortunately, dealing with world problems, without simultaneously acquiring tools to deal constructively with the situation, may underline feelings of losing control. By contrast, in GLSD, the scale, complexity, and the impact of a global web of political, economic, social, and environmental forces and events that require recognition and acknowledgement, all shape the context of our learning for SD globally. At stake in GLSD is not only resolving pressing global problems. The learning outcomes also include the acquisition of critical thinking skills, values, and socio-cultural awareness.

How GLSD has emerged from ESD, GE and GL is illustrated in Figure one. The differences mostly concern emphasis, related to shaping and specifying learning in a global context that can strengthen the potential of learning through interaction, both globally and locally. With respect to the difference and the relationship between GE and ESD, an important aspect is that the former does not aim to solve sustainable development problems through interdisciplinary reflection. GE has therefore sometimes been accused of building on charity concepts which no longer match reality (Scheunpflug and Asbrand, 2006). It is true that GE does not integrate disciplines in the way that is needed in and for ESD. On the other hand, GE has inspired ESD to widen its perspective, to take into account the need for learning about complexities. Although research in the theory and history of GE has evolved to some extent, giving rise to a conceptual and theory-related debate, the field remains largely underdeveloped. Scheunpflug and Asbrand (2006) point out that GLSD is a field that clearly still requires a basis for a theoretical frame. This is particularly called for with respect to the implementation of GLSD in higher education, concerning the relation between global education and the didactics of SD.

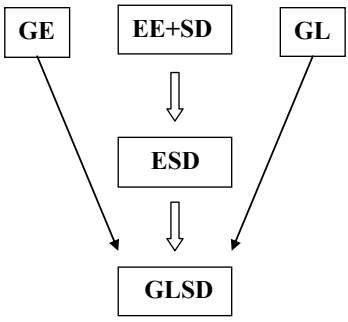

Figure 1. Related concepts in GLSD

The worldwide call for integrating SD in higher education demands a response, not only to the question of how a global perspective could be integrated. In addition, generating knowledge on how learning in a global context is best developed is also needed. GLSD includes the objective of resolving global problems, involving critical thinking, skills and values, as well as socio-cultural awareness. Determining the characteristics that could guide teaching strategies, inform curriculum design, and serve as a reference for teachers, administrators and policy makers in charge of the practical implementation of GLSD, are all questions which need further research and debate. Substantial empirical research is needed on learning in global settings, in particular when dealing with complexity in the context of a world society, focusing competencies both as means and outcome. Innovative educational approaches that facilitate real multi-disciplinary, multi-lingual and multi-cultural understanding in global settings need to be investigated, and competence-driven ways to integrate SD into curricula must be prioritised. Universities play a crucial role in the future to be more responsible for concrete steps in this direction, both globally and locally.

Conclusions

The literature that has been examined reveals the urgent need to recognise and develop alternative, multidisciplinary theories, research strategies and interventions for GLSD at the university, curriculum and individual levels. Irritation is expressed by several authors over the fact that many measures have remained on a purely rhetoric level, that many efforts are ineffective, and that universities do not appear to take their responsibilities seriously. Following the three types of competencies presented by Rost (2004, p.5) and an integration of a global perspective on more principle-led curriculum formulated by Irving, Yeates and Young (2005), this competencies-driven curriculum offers one way to move from the dominance of rhetoric level to practice. However, the steps that have been implemented, so far, concern mostly how a global perspective could be integrated into the curricula, rather than the question of how students learn in a global context. Knowledge on how teaching and learning is best developed in a global context would therefore need to be developed. The pioneer research projects on learning in global context, reported by Nordén and Hansson above (see p. 7) are just an example of such processes, and additional research is clearly called for in this area.

The emergence of GLSD is an area of particular interest in higher education (Nordén, Anderberg and Hansson, 2007), since the kind of knowledge that students need to learn in the field of SD typically involves complexities, which is an additional motivation to develop holistic approaches to teaching and learning (Hansson, 2004). Thus, students' knowledge formation of complexities in a global context is to great extent dependent on how competencies are developed. An integration of competencies and knowledge based curriculum has been developed in the knowledge capability theory (Bowden and Marton, 1998; Bowden, 2004; Booth and Anderberg, 2005; Anderberg et al., 2008), performing a double function of competencies: both as a means and an outcome. On the one hand, it provides the means to achieve holistic understanding of complex knowledge, and on the other it facilitates the acquisition of capabilities required to learn and handle complexities.

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II

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Theme: New Swedish environmental and sustainability education research

Knowledge capabilities for sustainable development in global classrooms – local challenges

Birgitta Nordén & Elsie Anderberg

The Young Masters Programme provides young people around the world with a net–based global–local learning environment for sustainable development. The present study investigates certain aspects of the implementation of this programme in the secondary schools of a Swedish municipality, in the context of the Lund Calling project. The research focuses on critical abilities to act globally, referred to as "knowledge capabilities", and how they relate to the implementation process of initiating global learning for sustainable development (GLSD). A phenomenographic approach and semi–structured interviews were used in the investigation of the experiences of secondary school pupils, teachers and headmasters who participated in the project. Participants' experiences of the changes carried out are described in relation to examples of knowledge capabilities needed for GLSD. Critical knowledge capabilities found to have been developed through the implementation were: to take command, and to collaborate. Critical knowledge capabilities perceived as necessary, but not developed through the programme were: to be prepared, to act in a transdisciplinary manner, and to lead for a holistic understanding.

Keywords: global learning, sustainable development, critical knowledge capabilities, global classroom, phenomenography.

Introduction

Various recent reports (Tilbury 2010, Wals & Kieft 2010) have recognised the urgency of developing appropriate tools for learning among pupils within the complex and transdisciplinary field of Education for Sustainable Development (ESD), also emphasizing the significance of

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global learning. Global learning (GL) is understood in different ways; in this article it will be seen as a process, as well as one of the outcomes of educational programmes which take sustainability seriously (Anderberg, Nordén & Hansson 2009, Scott 2010). To be meaningful, global learning" needs to be regarded from the individual learner's point of view, according to William Scott (2010). In other words, we have to consider *what* the learners really leave the activity with (Rauch & Steiner 2006, Brunold 2005, Hartmeyer 2001).

The project Lund Calling was initiated in 2008 by a Swedish municipal department of education, in cooperation with a university outreach initiative. The municipality had chosen to let secondary[1] schools participate in the Young Masters Programme (YMP), to implement ESD in a global–local setting. Within the frame of this project, educationally critical aspects in learning Sustainable Development (SD) with a global focus were investigated from the point of view of the individual, in an earlier report (Nordén & Anderberg 2010). The process of initiating practical activities to support learning for SD in global settings was also highlighted in the study. The YMP is an example of the so–called "third mission" in higher education in Sweden (Booth et al. 2007). The programme consists of an adapted version of what was originally a transdisciplinary Masters programme on SD at university level. The YMP is offered online for secondary school pupils only, without cost. Since the start in 1999, 10,000 participants in 120 countries worldwide have connected, via global classrooms, to the still ongoing YMP (www.iiiee–ymp.org).

In the earlier report (Nordén & Anderberg 2010), the qualitative similarities and differences of experiences of participating headmasters, teachers and pupils were grouped into four "aspects": (1) promotion of local commitment in global settings; (2) global–local interaction, which contained the two sub–aspects (1a) silent global classrooms and (1b) active global classrooms; (3) knowledge formation about teaching and GLSD in a global–local context, which consisted of the three sub–aspects (3a) towards pupil democracy, (3b) reflective learning, and (3c) pedagogically anchored teaching: and finally (4) the ability to act globally.

The aim of the present study is to closer investigate the fourth aspect, which is crucial in a global–local context, particularly in relation to the continuation of the GLSD process. In the following, the fundamental abilities needed to act globally will be referred to as "knowledge capabilities", according to definitions made by John Bowden (2004), and John Bowden and Ference Marton (1998), presented below. Focus here lies on how important features in the development of those capabilities relate to the way the process of initiating the YMP was experienced among the participants.

Background

According to Andreas Otto Brunold (2005), the emergence of international concern for issues of SD increases the demand for GL, as well as education for SD. To shed light on what GL means in an ESD context, it is helpful to compare various interpretations, and analyse commonly used definitions from different fields. The following clarifications thereby provide a background for how "global learning" should be understood in this article, as well as connecting the notion to the research field of GLSD. With respect to the implementation of GLSD, Annette Scheunpflug and Barbara Asbrand (2006) highlight that global learning calls for a foundation and a theoretical frame that can be explicitly related to SD. Scott (2010) points out that "global learning" should be the result of educational programmes taking sustainability seriously. Additionally, to be meaningful, GL needs to relate to the individual learner's process and learning outcome. In an attempt to establish some parameters, Scott suggests the following way of reasoning about GL:

> 'Global learning' if it is to be meaningful, it has to relate to educational/learning outcomes. This is one way of expressing this: The government wants all young people to be interested in and feel knowledgeable about sustainability, to be able to critically reflect on how they wish to live their lives, to understand how their own actions impact on other people, and to feel empowered to act on this awareness to work with others to create a more just and sustainable world. (Scott 2010)

The learners thus need to bring outcomes with them from "global learning" activity, including a set of capabilities that relate to the field in question. Elsie Anderberg, Birgitta Nordén and Birgit Hansson (2009) assume that learning about sustainability issues in a global–local setting is above all characterised by learning to manage uncertain knowledge concerning complexities. Links need to be established between everyday problems, global processes, and lines of conflict. Their assumptions in this respect are in line with the claims of Brunold (2005), Günther Gugel and Uli Jäger (1996), and Scheunpflug and Asbrand (2006). It is argued that the development of such capabilities is supported in learning contexts, where learners' local experiences are incorporated as central aspects of the course. These experiences are exchanged, through dialogues within global settings, and progressively reformulated in the process of learning.

According to Franz Rauch and Regina Steiner (2006, p. 124), "learning aims at acquiring a reflective ability to shape the world". This is quite different from uncritically adopting a previously defined

set of action patterns. They further suggest that SD and GL are related through reflective abilities, stressing pupils' self–development and self–determination through interaction in global classrooms with pupils in other countries, as well as with their local society. Rauch and Steiner bring up the exciting potential of communities of learners – teachers, pupils, and researchers – who were given the opportunity to reflect in collective settings, spotting interrelations and opportunities for action. This view on GLSD lies close to Nordén (2008), and Anderberg, Nordén and Hansson (2009), who also identify the need for extending the individual's knowledge capabilities to act, involving part–to–whole relationships between process and content.

GL *per se* cannot serve to create a better world, but encourages self–determination in a global context. It performs a critical function, with respect to creating interests and necessary experience (Rickinson 2001, Rauch & Steiner 2006). However, earlier tends to take for granted specific competencies, which individuals need to develop, in order to work for SD These competencies include leadership skills (Olum 2004), such as team skills, readiness to compromise and to collaborate, coping with change, creative and lateral thinking, the ability to deal with insecurity, integrated thinking, and systemic thinking. The role of the teacher changes from being the expert, to "seeking out interesting real life problems and framing questions around personally discerned needs in collaboration with pupils" (p. 160). Per Sund and Per–Olof Wickman (2008) highlight that teacher and pupils need to work together in a team, define problems, as well as analyse and answer SD questions from a variety of scientific perspectives. In other words, a fundamentally transdisciplinary approach is required.

Improving teaching and learning in the field of ESD requires of the individual teacher, not only knowledge of the subject matter, but also an ability to adapt to various learning situations in a flexible way (Sund & Wickman 2008). Sustainable development is by Sund and Wickman (p. 160) identified within the international educational research field as *abilities* required for open–ended learning. Bjarne Bruun Jensen and Karsten Schnack (1994) emphasize the importance of using conflicting interests as a starting point for the development of *action competence*, thereby adding an essential learning outcome into their concept of ESD. A further step in this direction is the kind of youth action competence which is developed through informal learning, as Ellen Almers (2009) has highlighted in her research. Developing relevant skills, with competence to act globally, also presupposes a holistic approach to the relationships between knowledge, abilities and attitudes. Findings from the earlier study (Nordén & Anderberg 2010) indicate that the formation of knowledge, abilities and attitudes,

during the implementation process of a project for GLSD, depends very much on the extent to which *capabilities* are developed in the course of that process, and how they are related to the content focused in the particular learning setting. This type of fundamental knowledge capabilities differ from isolated, more specific abilities, and can not be developed in *over–simplified* problem–solving process situations. Relying on logic–deductive thinking (Sund & Wickman, p. 160), it is possible to consider capabilities as characterised by abduction (Hansson 2000, Peirce 1934) processes, allowing learners to deal with complex and entirely new situations. This has also been highlighted in earlier research in GLSD (Nordén & Anderberg 2011, Anderberg, Nordén & Hansson 2009, Booth et al. 2007, Hansson 2000, and Nordén 2008).

Knowledge capability theory

The knowledge capability theory derives from a pedagogical theory within the phenomenographic perspective on learning (Bowden & Marton 1998, Bowden 2004), in which individuals are learning for an unknown future. The notion of "knowledge capabilities" as learning goals thereby emerges as a central idea – that is, capabilities to act in new situations. It is argued that pupils are "learning through interaction with current knowledge, so as to become capable" of dealing with situations in the future.

> … [the] ability to handle previously unseen, real–life situations, to make sense of them, to figure out what the relevant aspects are, to relate them to what you know and to find out what you don't know but need to use … to define the problem and only then solve it, is what I have termed knowledge capability. (Bowden 2004, p. 40)

The precise characteristics of these future situations can not be specified in advance, regardless of whether they pertain to professional, personal, or social contexts. According to the knowledge capability theory, learning cannot be defined in terms of educational inputs, but rather in terms of expected and achieved outcomes. This aspect remains in line with the competency movement (Bowden & Marton 1998). Education is about the future, not the present, according to Bowden and Marton (1998), and they emphasize that it is not appropriate to describe outcomes based on what professionals are believed to be capable of doing right now. Capability can therefore not be specified simply in terms of what a person can do, they argue. Since pupils in their future professional lives will be facing a great variation of circumstances, effective and appropriate actions will vary from situation to situation. Above all, pupils need to learn how to focus on critical aspects of professional situations, i.e. they

must understand how to simultaneously see – discern – and attend to relevant aspects of a particular situation. Having the capability of focusing a set of critical aspects in a particular learning situation, provides

> … a far more holistic capability than those commonly defined in competency–based approaches. Moreover, such holistic capabilities represent the links between disciplinary knowledge and professional skills. They are the transformation of the eyes through which the professional world is seen. (Bowden & Marton 1998, p. 12)

Knowledge capability, according to Bowden (2004, p. 40), is characterized by being able

1. to work out what are the key aspects to be dealt with in each new situation
2. to relate those aspects to the knowledge already acquired and/or to knowledge the graduate knows how to access;
3. to determine what the underlying task or problem in that situation might be;
4. to design a process or solution to deal with the situation; and then
5. to have the ability to follow through and complete the task or solve the problem, either alone or with others.

Booth and Anderberg (2005) use this theory when describing teachers' experience, in terms of teaching knowledge capabilities when participating in educational courses at an institute of technology. The aim was to develop clearer principles for the design of programmes of educational development, helping university teachers to become developers of their own practices.

Choosing knowledge capability theory as a point of departure, the expression "ability" which was used in the previous study (Nordén & Anderberg 2010) will here be substituted by "knowledge capability". In the present research, our aim is to make use of this theory as an underlying framework, when investigating the data more closely.

Method

The earlier study

In the earlier study reported by Nordén and Anderberg (2010), the background of the process of implementation in the municipality of Lund was presented in detail, as well the YMP course and the design of the study itself. The interview guides were described in Appendices

1–8, pp. 47–54. Data was collected from 2008 to 2009. Pupils (13–19 years old), teachers, and headmasters were interviewed, coming from a total of six different compulsory and upper secondary schools. The number of informants was 15. A total of 20 interviews were carried out, and later fully transcribed. Some of the informants were interviewed at the start and in the middle of the YMP course, while 2 teachers and 4 pupils from upper secondary schools were interviewed after their participation, as well as 2 headmasters (one from a compulsory school, and the other in charge of an upper secondary school). Retrospective interviews were also made with upper secondary teachers and pupils who participated in the YMP a preceding year.

Analysis of the fourth aspect: examples of critical knowledge capabilities to act globally

A number of changes in the regular school activities took place in connection with the initiating of the implementation of the Lund Calling project. Some of the changes experienced by the pupils, teachers, and headmasters gave rise to educational development, while other changes were not experienced as educationally productive. In the present study, the answers from the semi–structured interviews were analysed with respect to this issue also using a phenomenographic approach (Marton 1981, Svensson 2004). Changes that were experienced by the respondents in the study as contributing to improved learning and various forms of educational development were distinguished from changes that did not lead to such development. These experiences were then related to knowledge capabilities which participants felt had been developed in the programme, respectively considered necessary to support GLSD, but which were insufficiently developed in the programme. Examples of knowledge capabilities were thus grounded in pupils',teachers' and headmasters' experiences. Experiences of changes were grouped into two parts in the results (I and II), as seen below. Pupils' experiences dominate in the results, since the number of interviewed pupils was larger (n= 8), than the number of teachers (n= 5) and headmasters (n= 2), respectively. The headmasters' contributions are valuable, however, since they provided a wider perspective, both on the organisational conditions of the implementation, and concerning the educational development it involved.

I. Experiences of changes identified by participants as giving rise to educational development supporting GLSD, related to examples of critical knowledge capabilities developed through the programme.

II. Experiences of changes that did not lead to educational development supporting GLSD, related to examples of critical knowledge capabilities felt to be necessary.

The presentation of the results is in those two parts. Each part begins with descriptions of changes that gave rise to and that did not favour educational development, followed by examples of critical knowledge capabilities related to these changes.

Results

I. Experiences of changes identified as giving rise to educational development supporting GLSD, related to examples of critical knowledge capabilities developed

a) Changes that gave rise to educational development

Pupils experienced that the arrangement of the YMP offered "global classrooms", making the YMP content accessible globally online. Developing contacts with pupils from so many countries was considered as having great value, and experienced as important.

> you get contact with the surrounding world, and know what it is like there and their opinions. [pupil, secondary school]

According to one headmaster, the meaning of the term "sustainable development" assumed a different significance in the course of the implementation. From only having been a politically correct term, the headmaster experienced that the meaning of ESD shifted, and actually became a matter of how to be better prepared for the future. Then, the question was no longer *if*, but rather *how* this task could be accomplished at school. It had become obvious, according to the headmaster, that there was no choice – this is the core of what the teachers and the headmaster at school have to work for.

> I have learned quite a lot on the journey getting here, of course, from sustainable development being more sort of a politically correct notion /…/ I have probably come to realise that the core of our mission is likely working with sustainable development, and then I also got it described as it is actually all about working with our future. So it is not sort of a question of if?, but it is a question of how? we shall work with it. [headmaster, secondary school]

> /…/ of course, it is a question of pupil influence, about being able to work across disciplinary borders in a collaboration, and also about dealing with questions around and about the environment, both in a practical sense, and how do you deal with all the situations of conflict that you have to define your standpoint towards as a child or young person today, that is, via media: what is happening in the world? In small matters as well as large ones, that is contradictory facts and facts that change over time. [headmaster, secondary school]

The local politicians and national school steering documents had assigned the task of teaching SD to the schools in the format of a quality assurance task. The school employees, i.e. the teachers and the headmaster, work under a "SD–umbrella". This not only includes thoughts about learning for SD or relating to particular environmental aspects of SD, but is very much a matter of pupils' influence, transdisciplinary collaboration within a cooperative framework, and learning to handle questions about environmental issues in real life.

> /…/ the pupils get another way of working, because they need to learn that too, so that it is not just sustainable development, but it is also that they work sort of in this virtual classroom, that is also an experience, and getting feedback from others in other parts of the world. It is /…/ an element of tension, just that, actually meeting people /…/ to se the reality of others – others' daily lives – that it is so different. [teacher, secondary school]

b) Examples of critical knowledge capabilities developed

To take command

Some of the pupils felt that they learned that they had to take command. They found out lots of things themselves, by seeking guidance in the learning instructions of the YMP, among themselves, and via Internet in general. Those pupils proved they had the competence to work more independently without the attendance of a teacher, and study on their own online. This is a form of critical knowledge capability that can also be interpreted as the responsibility taken by individual pupils, using a potential for competence building, through global learning activities relating to sustainable development. It seems that these pupils experienced the role of the teacher as a collaborating partner. By taking part in global activities during the YMP, the pupils developed their capacity to manage work independently.

> It is just way more independent, you get to take many more initiatives yourself, and you get to develop your things on your own, and then you also see in a much more responsible way that this work has to be done, sort of. Then you feel that you yourself have to organise the way you work, instead of the teacher standing and telling you now this is what you have to do. [pupil, secondary school]

> /…/ well I have learned a terrible amount, but in some way it feels like that it was a lot as part of myself, so to speak, because I was looking for the information and writing my papers and talking with my mates above all, we were the ones who exchanged ideas. [pupil, secondary school]

> …/ well, I got a head start in some subjects [thanks to the YMP–course] and I have become better at dealing with debates, since I thereby knew more… [pupil, secondary school]

Those pupils experienced participation in the YMP as rewarding, through the specific knowledge and skills that they gained. These contributed to developing their knowledge capabilities to participate actively in discussions, to debate challenging issues pertaining to GLSD, thereby further advancing their knowledge formation.

Through self–determination and self–directed learning, the pupils gained learning advantages and could balance the absence of supervision. They found out the point of departure for his/her own role concerning some SD problem, and thereby gained knowledge about other similar or related dilemmas. This helped the learner to see and understand more holistically, and get an overview of SD challenges of a fundamentally transdisciplinary nature.

> I learned a huge amount, absolutely /…/ before I wrote a module like I was told /…/ I found some information on the internet generally, and felt a bit where I stood in different issues and problems. So I feel that I learned quite a lot about problems that exist today. [pupil, upper secondary school]

One headmaster also experienced that some pupils developed the capability to work independently and take responsibility. Those pupils worked on their own with the learning content, since supervision time was limited. At the same time they developed the capability to cooperate with other pupils. A strength built into the YMP is the worldwide outreach, and the opportunity to get acquainted with a variety of perspectives, by meeting people from all parts of the world in global classrooms via the Internet.

> /…/ the way of working I think is good: you read and then you work, using your own local area as a point of departure, and then you have your room where you meet others who have done the same task, but in their own parts of the world. [headmaster, secondary school]

> /…/ the independence, that we get to work in groups on our own, and sort of write ourselves and submit /…/ it is very exciting /…/ the website, that there are loads of Chinese and /…/ Dutch who are there with you so you can talk with them yourself /…/ magnificent that there are really many. [pupil, secondary school]

> /…/ it is very much a matter of getting a functioning pupil influence, both on an informal and a formal basis, so that you can get both adults and pupils not just to learn about democracy and influence, but work with it all the time. Plus then being able to cooperate as much as possible. Between teachers and teachers and pupils, to reach so, actually something more than just basic knowledge, but some sort of what they describe as competence to act for the future. [headmaster, secondary school]

By making global classrooms available to pupils, they were able to develop knowledge capability for networking and communicating with pupils in different countries, as a part of their GLSD learning process. Those participants experienced that one of the foundations for SD was thereby made accessible, and recognised that a democratic GLSD knowledge capability process had been developed among the learners.

To collaborate a team

Some pupils understood that they themselves had to organise the way they managed the tasks, and initiate cooperation in small teams locally, while solving the numerous YMP tasks. They drew benefit from sharing the job, and from exchanging new ideas, so that they could reach original conclusions together. The critical knowledge capability, in this respect, was the ability to see that the complex content needed to be handled collaboratively. Experiencing this process resulted in the pupils themselves independently arranging for new alternative learning management strategies, and knowledge formation among themselves while networking:

> /…/ you could try out ideas on each other and reach good conclusions. [pupil, secondary school]

These pupils recognised that they had to develop, to be able to fully participate in a learning process which they largely defined themselves, but where the YMP content and the global classroom online were sup-

plied by the programme. Implementation links for team collaboration had not been provided by the platform. We may thus characterise this critical knowledge capability as consisting of the pupils' own initiative – once they had identified the need to organise cooperation themselves – to optimise their learning by making an agreement to plan and share work tasks between themselves. Through self–determination, each pupil in the small local team carried out tasks individually, and then sent it to the others to read and comment on. This was appreciated as a constructive way to support fellow pupils. Everyone in the team got indications about what they needed to reconsider within their learning activity, thanks to the others' feedback, and additional suggestions on what to submit further to the answer. Afterwards, the assignments were jointly published in the global classroom, on behalf of the three pupils of the team.

> /…/ then we started with writing all the assignments together, but then we agreed that /…/ to do one task each, and then send it to the others, so they could read it through and have opinions…, which was a really much better way, because then you got to help your mates and you got to know yourself what you had to keep in mind. [pupil, secondary school]

Several teachers had the impression experienced that their pupils' language skills were in particular well developed, which was confirmed when they got feedback from pupils in another country.

> /…/ well our pupils were really thrilled when they saw that they had got /…/ a comment on what they had achieved /…/ from South America /…/ they realised that the English of our pupils was far better, because it was pretty weak, theirs, that is, the response they got. So they were probably partly pleased that they had received attention, but they thought that the answer was rather lacking in substance. [teacher, secondary school]

II. Experiences of changes that did not lead to educational development supporting GLSD, related to examples of critical knowledge capabilities felt to be necessary

a) Changes that did not give rise to educational development

Many different kinds of changes occurred in the course of the YMP programme. However certain of the changes that were effected were experienced as not generating forms of educational development which would support GLSD.

Some pupils explained that compared to the sorts of interaction that they had experience of from various online fora and similar platforms, they found the interactivity in the YMP poorly developed, since it was hard to get attention online for new contributions. Pupils thought this was less satisfying. This appeared as a critical feature within the intended initial steps of the implementation, in connection with changes in educating for SD.

> /…/ generally concerning the flow of information between us, pupils, and between teachers on this site. The point was that you should be able to talk with people, then, from other continents and different teachers, and exchange ideas and thought and things, but it felt that due to low activity, and due to difficult navigation on the webpage it was difficult to get to the occasions when you could talk about it. Because it felt like that was sort of the thought behind the whole project, but it felt like you did not get to take part of it as much as you would have liked to. So I suppose that was what I missed the most, to communicate. [pupil, secondary school]

The YMP content online was experienced as important, since it provided a common foundation for knowledge formation. At the same time, the learning process lacked interaction, and responses from other pupils, tutors, or mentors were not frequent enough. The global classroom (i.e. the platform online) did not generate focus on important aspects, or automatically support good communication. Whenever something happened in the global classroom, this was not visible for all the pupils. Unless they actively sought feedback, they would hardly recognise the occasional comments that they might have received.

Some teachers pointed out that the YMP content was not always sufficiently anchored in the pupils' individual knowledge formation. Instead, certain pupils just presented an answer rather hastily in the global classroom, without deeper reflection.

> Of what quality are the learning competences in the YMP, when the teaching has to rely and depends mainly on the responsibility taken by the pupil him/herself? [teacher, secondary school]

> ... they had motivation. On the other hand, I would have liked to see them work maybe a bit deeper, and there they need more close contact, so that you actually meet /…/ and check what does the assignment involve, what are the opportunities? And it would be nice to have sort of more pupils there then, who can reason with each other and give each other support. [teacher, secondary school]

> /…/ make it into a course led by a teacher, you have the material, but provide time for reflection and discussion and that you really read through what the pupils from other countries describe, and say yes, why is it like this and how do we think about it that you really can use it for global thinking in a totally different way than it is now, because now you answer dutifully, and you barely can summon the interest to read what you have answered. [teacher, secondary school]

Some teachers concluded that certain pupils chose a shortcut, and did not appear to prioritise going through the background material that was meant to be used in their learning process.

b) Examples of critical knowledge capabilities identified as needed

To be prepared

Some pupils expressed how some of the changes they experienced did not lead to educational development, in the sense of a common GL process. So, even though a global classroom had been designed for the pupils' studies, it was not functioning adequately. Common global learning processes had not been identified in advance. The critical knowledge capability needed in this respect, is that all the pupils must be well prepared, and have a clear idea of what is expected of them concerning collaboration activities.

> /…/ well you were supposed to provide feedback to others on this webpage also, but it didn't feel like everyone was equally serious … there were only a couple who gave feedback … And we tried providing feedback to others also, but it had to be as much as we had time for. [pupil, secondary school]

One pupil explained that the lack of communication was what that pupil missed most in the online platform that was used. A general readiness for education of the kind needed in GLSD was also lacking.

> /…/ we browsed around quite a lot and there were not a lot of groups at all who had done all the assignments … it's a pity, because of course you wanted to read what the others had written, but then there was nothing to read. [pupil, secondary school]

Pupils expected feedback on their assignments. They wanted to read comments written specifically for them, but found nothing to read. They had been looking forward to meeting online with other pupils and teachers, to discuss and chat, but online discussions did not take place to the extent that the pupils had anticipated. Response is needed

from other pupils, tutors, or mentors; otherwise there is no scope for pupils to interact. This was not only caused by the platform's design, however. The problem partly arose from the time lag between the various groups working with each particular assignment on the YMP, meaning that groups were not focused on the same topics at the same time, or during the same period. Different starting dates and an individual pace of progression reduced opportunities for mutual feedback.

Another problem which was commented on was that the local teachers did not provide clear and detailed information, before or during the initial steps of the course. The teachers had not introduced the YMP in a confident manner, since they did not appear to know themselves what expectations they would be facing. Teachers were also unsure about how their own professional role was engaged, in relation to the YMP.

Both pupils and teachers identified a need for initiative, with respect to planning, arranging and getting meetings to function.

> /…/ it would have been good both on a spontaneous level and a more well so to speak that you have planned it, and it would be great if the teachers knew about it and that they would write when a meeting takes place, and what one will be speaking about there and that you are very welcome to come and join it. But also that pupils who feel that they are maybe writing about a certain module and feel that they want to exchange a word or two with others who maybe can write on some forum that "well, those who want to talk with me at this time are very welcome to come in, because I would need a bit of feedback on this subject" or "I don't really know what I am going to write or what their point is". [pupil, secondary school]

The teachers further needed the competence to show pupils how to navigate on the web site of the online course. One of the pupils complained that it was almost impossible to find the actual global classroom that the pupil belonged to, and wanted to access. It could take up to 15 minutes to identify its location, which was not satisfactory. According to one pupil, the web site design was especially something which the YMP providers had to improve for the future.

> /…/ the links, actually. I didn't even know they existed. So it was probably mainly on my own, well really I feel that the website that YMP had was extremely difficult to navigate in … I was unable to find them or know that they existed, since it was difficult to find. If you wanted to enter a particular classroom you sometimes had to click around for fifteen minutes before you found it, it was sort of really difficult. [pupil, secondary school]

To act in a transdisciplinary manner

Some teachers experienced that they were challenged locally during different stages of the course. Due to a lack of transdisciplinary knowledge capabilities, many teachers had to rely on some colleague, who normally would be teaching other subjects. They needed colleagues to be supportive and give "guest lectures" to pupils participating in the YMP. For example, economic issues were not well grasped by some teachers, who instead had disciplinary competence in subjects such as Biology, Ecology, Civics and Social Science, IT, or English. The ability to work in a transdisciplinary manner was thus identified as a critical capability by teachers.

> Distribute teaching hours so that a teacher of social sciences and a teacher of natural sciences who share the course /…/ sort of take turns supervising and that you then see with different eyes /…/ well it opens endless opportunities to help the pupils see that there are many different sides to the same problem. [teacher, secondary school]

> /…/ the programme is /…/ very transdisciplinary /…/ So actually it shouldn't be teachers of natural sciences in there exclusively, but it should be a couple of different teachers in this project /…/ so that it gets really really good, because then you get all the perspectives. [headmaster, secondary school]

To lead for holistic understanding

Among both headmasters and teachers, it was felt that the "frameworks for all of us to work it out together", must be recognised and developed. Headmasters require the capability to support teachers in locally developing the education which is provided.

> /…/ there are loads of pedagogues and pupils who are aware of the importance of sustainable development and have understanding, that is not the problem. Instead, the problem is "so how do we work together with it, within the frame of the school?" And I can feel that at this school, people do not have a clear idea how to go about that, the question has not been critically examined. [headmaster, secondary school]

A critical capability for anyone, as a headmaster pointed out, is that you are expected to take a role as pedagogical leader in the school. For one of the headmasters, this means the ability to raise the crucial questions, such as seeing holistically when teaching, at various meetings, including the disciplinary subject matter conferences, as well as simply talking frequently with teachers to stress that this is a central issue.

A further critical capability identified as necessary for headmasters, is to prepare the teachers for the big overarching questions of SD. According to one headmaster, it is important to avoid drawing too heavily upon the contradicting opinions among the individual teachers. Rather, one has to weave together the understanding of a sort of training competence, with perspectives from different disciplines, and the subject matter knowledge which is actually needed. Nobody questions that these disciplines – in connection with the skills that each of them represent, seen from the point of view of various subject matters – have to be handled in a transdisciplinary manner. Finding ways to conduct the work at school, and lead the initiating steps towards an implementation in this direction, is a challenge. Nevertheless, choosing varying ways to accomplish this offers a great deal of rewarding opportunities, according to one headmaster. Despite the challenges involved, this headmaster stressed that it was feasible for a headmaster to lead the school towards more holistic understanding.

Discussion

In this investigation, certain examples of knowledge capabilities were identified by participants as critical for GLSD. These capabilities need to be acquired and developed locally, to support the type of learning required in the field. Some of the critical knowledge capabilities had been experienced as developed in the course of the YMP, while others were felt to be lacking. Brunold (2005) contends that global learning requires new values, giving up the aim of reaching the "right" or the "most appropriate" answer, based on a logical interpretation of natural balance. The character of knowledge has changed over recent years, which makes it increasingly problematic to seek to "accumulate" knowledge additively. On the road map towards GLSD, this central aspect is also pointed out by Hansson (2000), linked to a change towards working on developing "knowledge to act", instead of viewing "knowledge as possession".

David Kronlid (2009) claims in his educational research that "learning takes place in spaces of capabilities, in expanded spaces of beings and doings" (Kronlid 2009, p. 34). According to Kronlid, that means in different concrete ways, shared global problems systematically improve learning conditions, when the learners' spaces for developing capabilities are enriched.

Critical knowledge capabilities

According to the theory of knowledge capabilites (Bowden & Marton 1998, Bowden 2004, Booth & Anderberg 2005), the criteria presented by Bowden (p. 40) as number 1) "to work out what are the key aspects

to be dealt with in each new situation" and number 5) "to have the ability to follow through and complete the task or solve the problem, either alone or with others", have been of particular interest in this investigation. The critical knowledge capabilities described in the results are to be seen as examples of these two criteria. Results can also be compared with Hansson (2000): "Peirce and Bateson stress the relationship between theory and practice, combining holism, relationship and perception" (p. 143). *Abduction* was for Charles Peirce (1934) important in develop understanding of complexities, and the concept could be used as the logical basis for relational thinking, and for a holistic way of reasoning. Through an abductive activity, the awareness of the complexity of the world around us is maintained, and the opportunity for deeper understanding might increase. Knowledge is to be judged for its purpose in relation to action, according to Peirce. Through a process of verification, what is believable and what is to be rejected could be decided, while avoiding over–simplification and maintaining complexity. The pupils very often lack the ability to make a deductive step, or to test an idea through abduction. This could be remediated by introducing pupils to more qualified ways of reasoning in collaborative settings (Bateson 1972, Hansson 2000, 2004, Hansson & Nordén 2005, Sund & Wickman 2008, Hansson 2000). Meetings and discussions with teachers are important occasions for learning the deductive step, according to Noel Gough (1987).

Knowledge capability development enhances democratic action

The findings of the present study have been developed on the basis of the theory of knowledge capabilities and shows the meaning of knowledge capabilities for GL, in relation to a global–local context. These can be compared to the findings of Finn Mogensen & Karsten Schnack (2010), who discuss the expanding use of the notion of "competence", referring to new (and potentially useful) critical–constructive educational conceptions of the "action competence" approach. This has also been central in the study by Almers (2009). Depending on teachers´ action competence, ESD could turn out to be a pluralistic activity (Öhman & Östman 2008), enhancing the outcome of students' awareness and ability to interact with others holding diverse standpoints.

The role of democracy in education and sustainable development has been analysed by Johan Öhman (2008) and Leif Östman (2003). For democracy to function, young people should feel that they are heard, whenever they contribute to society in a respectful way, as citizens

(Östman 2003). By being confirmed at school – and in society – young people can see themselves as a part of the common efforts towards sustainability (SOU 2004, Öhman 2008). In view of changing conditions which impact any efforts towards sustainability, also globally, democratic skills can be considered as a form of "action competence" for SD, including actions on both an individual and a structural level. At the same time, we observe the need for tools, to reach a deeper knowledge formation process, and to grasp the complexity of sustainability issues, in a global learning space. Several of the critical knowledge capabilities found in this investigation can also to some extent be regarded as democratic skills, particularly "to take command" and "to collaborate in team". Understanding collaboratively is a form of learning that evolves in a *process perspective*. Additionally, this creates the foundation for well–developed competence to *act democratically*. With GLSD, both necessary skills and a deeper understanding of the content could be gained locally, via GL activities in global–local settings.

One of the critical knowledge capabilities described as needed was "to act in a transdisciplinary manner". There are several benefits to transdisciplinary approaches, according to Björn Vikström (2009). Transdisciplinary knowledge formation takes place *in* society. It does not have the intention of being produced *for s*ociety, but develops in collaboration with the actors who are involved in whatever sphere is being investigated (Almers 2009). Transdisciplinary research is also conducted when there is interaction between science and other fields of society (Bruun et al. 2005). This means that the individual actors in society are included as a part of the process, and the research is contextualised. In fact, the YMP initiative is characterised more by the perceived needs of society, than by academic competences which are typical of the university (Booth et al. 2007). In this perspective, the researcher does not occupy the position of an "expert" who proposes solutions, but rather functions as a participant, sharing experiences with the actors involved in the transdisciplinary research process (Hillbur 2004, Vikström 2009). There is a reason for stepping outside the disciplines – and not getting stuck in approaches that are merely multidisciplinary or interdisciplinary – in particular when researching and working with sustainability issues. Rather than maintaining the perspectives of individual disciplines as a point of departure, the centre of attention instead is placed in the problems that we strive to solve. Various perspectives, the perception of the problem, as well as possible solutions, all change and develop in the process of investigation. The approach which was adopted when designing the YMP was shaped by the vision of bringing secondary school pupils into the presence of authentic disciplinary practices, in order to broaden the reach of

research on SD from university, and bring it out to society (Booth et al. 2007). According to Vikström (2009, p. 6), when focusing on how to apply transdisciplinary research in practice, close exchange with the actors concerned by the research results is desirable, though not an absolute condition.

Teacher teamwork has the potential of supplying transdisciplinary knowledge formation locally, since despite their aspirations, teachers frequently experience that they do not individually have full capability to cover the knowledge field of SD. Teachers from a variety of disciplines, teaching different subject matter, might collaborate as professional teacher teams locally. Collaboration could allow them to collectively attain a kind of transdisciplinary capability, as supplementary steps to promote GLSD. A transdisciplinary approach when teaching subject matter of various disciplines would further add to developing a holistic perspective in SD knowledge formation. Above all, it could lay the foundation for an interest in advancing a form of competence to act.

Further research is recommended, concerning the teachers' role, their thinking and ways to support pupils' learning in connection with GLSD. This involves the question of how to conduct and implement more self–directed learning in a global–local context. Also, more knowledge is needed concerning the challenges of handling transdisciplinary teaching, and the specific capabilities teachers require, to meet these new complex fields of learning.

Note

1. Secondary schools include both compulsory schools and upper secondary schools in this study.

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III

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Learning in Global Settings: developing transitions for meaning-making

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ABSTRACT

Global teaching and learning for sustainable development reaches from the classroom to the world outside, and is therefore a particularly interesting setting for practicing transitions skills. The article suggests a number of features perceived as crucial in developing young people's capability to act in a changing world and under circumstances that are difficult to predict. The suggestions are based on an empirical study of the Lund Calling project, which aimed at implementing a web-based international programme for teaching preventive environmental strategies in Swedish secondary schools. The article first touches on some of the conditions in Sweden that particularly impact young people's transition to adulthood. Related research in sustainability education is also briefly outlined. Knowledge capability theory is used to discuss results from the empirical study of the Lund Calling project, where interviews were conducted with secondary school students, teachers and headmasters. Based on these interviews, features that appear to be particularly relevant as transition skills in global learning for sustainable development include transdisciplinary action, democratic collaborative action, as well as self-directed and independent initiative. The article concludes that young people today cannot, as in earlier periods of history, base their actions entirely on the traditions of the family or community. Instead, they also need to learn to form their own communities, capable of acting on both local and global levels. Education here plays an important role, to develop necessary transition skills that enable young people to be prepared for a rapidly changing and uncertain world.

Introduction

Since the 1960s, educational structures in Sweden have been geared to support lifelong learning, and minimise the reproduction of social inequalities. Adult education has been encouraged, alternating studies and work, as well as reducing thresholds between theoretical and practical programmes (Boström, Boudard & Siminou, 2001). Study grants and benefits allowed young people in Sweden to rapidly become financially independent from their families. Growing up in Sweden is often conceptualised as establishing an identity (becoming a member of a group), and varying degrees of detachment from the adolescent's childhood environment. Since the role of family is limited, discussions on transition have tended to consider issues of identity formation and social reproduction relating to place, ethnicity or

language (Quist & Svendsen, 2010; Bäckman, 2009). We can thus discern connections between the notions of growing up, becoming financially independent, and individualism (cf. Beck & Beck-Gernsheim, 2002; Hofstede, 2001).

In Sweden, as elsewhere, the purpose of education has had to change in recent decades. Whereas it was seen primarily as a means of transmitting known ways of dealing with familiar problems, today it has to equip young people for an uncertain future. In this paper we re-conceptualise transition as gaining increased competence to act in various arenas. For example to interact productively with young people from different backgrounds, to understand complex issues in a rapidly changing world, to deal with change and uncertainty, and to take action for sustainability, locally and globally. In this sense, transition to adulthood involves passing from merely learning about the problems society is facing, to being capable of working proactively towards solutions.

Drawing on a study of a global web-based course on preventive environmental strategies (hereafter known as 'Lund Calling', this paper considers education from the perspective of learning 'knowledge capabilities' which, it argues, young people will need for informed and effective action in various arenas, locally and globally.

The paper begins with an overview of the social conditions in Sweden impacting on young people's transitions to adulthood and a summary of current conceptualisations of transition. These are followed by a review of the research on environmental and sustainability education. Knowledge capability theory is then discussed in the context of preparing young people for situations that cannot be defined in advance and provides the conceptual framework for the empirical study on Lund Calling which explores transition skills in relation to a wide range of knowledge capabilities developed in educational settings designed to integrate values, attitudes, capabilities and knowledge in a holistic manner.

Passage to adulthood in Sweden

Sweden has long occupied a particular position in Europe, with respect to its unique educational system, and an advanced form of welfare state that has served as a model for projects elsewhere (Dewan, 2011; Freeman, Topel & Swedenborg, 1997). Particularities of the educational and welfare systems shape the conditions for reaching adulthood, and also profoundly influence conceptualisations of identity and transition. Rather than any one specific aspect in itself, it is the combination of various factors which contributes to creating a unique climate.

From an educational perspective, Sweden has been characterised by fluidity and lifelong learning. Unlike most other European countries, there was no tight separation between practical and theoretical paths of study at secondary levels (Boström, Boudard & Siminou, 2001). All paths of study gave access to higher education, and if a particular required subject was lacking, a well-developed system of adult education made that comparatively easy to rectify. The course of study through life was therefore not marked by clearly separated cycles or decisions which would definitely determine an individual's future profession. Alternating

work and studies all through life was encouraged. Vocational programmes in Sweden had a stronger theoretical component than is often the case, while in higher education, theoretical who found the means to meet practical perspectives were considered to complement each other. Collaboration between educational institutions and the surrounding society was promoted (Boström, Boudard & Siminou, 2001). Historically, Sweden has also had a strong tradition of popular education resulting in an emphasis on reflection and self-directed learning. Not centrally defined by the school programmes, the lifelong learning process was seen to be managed by the individual, and the varying needs for additional training or knowledge in the course of his or her working life. At the same time, democracy was viewed as participatory, rather than merely representative, and training young people for active participation in a democratic society has been a central notion in the national school curriculum (Östman, 1995). This is expressed in the opening chapter of the previous Swedish national curriculum for non-compulsory school (Lpf94), stipulating that:

> It is not in itself sufficient that education imparts knowledge of fundamental democratic values. It must also be carried out using democratic working methods and develop the pupils' ability and willingness to take personal responsibility and participate actively in civic life.

In Sweden, teaching skills for democracy has also been seen as a particularly important dimension of environmental sustainability education so that young people are able to see themselves as part of a common effort (SOU, 2004; Öhman, 2008). Although the education system has recently witnessed a number of changes, and the participatory aspect of Swedish democracy is in some measure less emphasised, it still continues to have an impact.

Young people in Sweden have benefited from exceptional financial autonomy. Unemployment has been relatively low, and the insurance system allowed them to get by between jobs. Past policies favoured affordable apartments for rent, rather than for sale. Additionally, housing benefits helped bridge the gap when incomes were low. Expensive insurance was not been needed, since public health services are free, while public transport has allowed physical mobility for all. Education – including higher education – has not been financed by fees and a well-developed system of study grants aimed to ensure that approximately half the population would eventually pursue their studies at tertiary levels. At the same time, thanks to various social services, parents did not have to rely on the help of their children to take care of younger siblings, disabled relatives or failing grandparents. After finishing upper secondary school, and even before, young people have therefore been free to leave home and set up their own households, reflecting Swedish family values (see Hofstede, 2001).

On the other hand, while several factors have worked in the direction of individual autonomy, the complexities of modern society simultaneously entails increasing reliance on experts and institutions that fall outside the control of the individual. Young people have to spend an ever longer period of their lives training to be able to participate in working life and other arenas of society. Even this training does not necessarily equip them to grasp the complex issues that characterise our societies, or enable them to act adequately (see Giddens, 1990). Additionally, the world that young people grow up in is not merely constituted by their immediate local and

national environment. Globalisation reaches deeply into our everyday lives. Exposure to a flood of information and impressions, news from all parts of the planet, searching for knowledge on the internet, and networking through social media are conspicuous parts of youth culture today (Mediappro, 2006). Global identification rather than national identification, is by many young people felt to be more rewarding for identifying transculturally (Quist & Svendsen, 2010). Space-time compression and virtual realities increasingly affect basic conditions for education.

This is why we here propose a conceptualisation of transition to adulthood as gaining the competence to act locally and globally in a changing world, and to form the communities of learning and action necessary for this purpose.

Conceptualisation of transition

Students´ experiences of learning for an unknown future (Johansson, Kopciwicz & Dahlgren, 2008), makes the transition process challenging, from being a student to becoming an adult looking for jobs, and entering working life. The study by Johansson, Kopciwicz & Dahlgren found that Swedish students generally expressed more positive views of their future compared with Polish students. Nevertheless, they also expressed concerns about how well their knowledge and skills matched demands in the labour market. For instance, students wondered what a reliable 'door-opener' to the labour market might look like. Jungert (2009) stresses that generic skills are more valuable than subject-related knowledge in the job search process, accompanied by self-reliance, flexibility and adaptability.

With increasing unemployment among young people, concerns about employability are growing. Nevertheless, at an individual level, the passage from adolescence to adulthood in Sweden has not been primarily defined by questions related to the material survival of the adolescent or the family. The exceptional material independence from which Swedish youth benefited has led to corresponding independence and social mobility in the choice of profession, place of residence, choice of partner or 'lifestyle'. So while transition in Sweden, as elsewhere, involves a redefinition of roles and emotions connected to a process of individuation at a psychological level, material independence has not been an equally central issue as elsewhere (cf. Ahier & Moore, 1999). Indeed, for more than half a century, one of the guiding principles in the establishment of Swedish social institutions has been to enable social mobility, and avoid the reproduction of class structures.

As a result, theoretical conceptualisations of transition in Scandinavia generally, and Sweden more particularly, do not focus on the reproduction of class, but rather consider cultural or linguistic aspects. It is for instance argued that in the ethnically mixed areas of the larger cities, ethnicity and linguistic varieties play an important role for young people constructing social meaning. 'Belonging' relates to particular parts of town or neighbourhoods, as well as to a larger transcultural global context (Quist & Svendsen, 2010). Bäckman (2009) also stresses the importance of the area young people grow up in, and feelings of belonging related to a neighbourhood. She describes how young people use creatively elements from their

ethnic or social heritage to actively construct their own identities. But belonging is not only linked to a particular urban district or suburb. Quist and Svendsen observe that global and local meanings interconnect, and while some meanings are specifically local, other social meanings of ethnicity depend on both global and local factors, and are 'transportable' (Quist & Svendsen, p. xxii).

Identity formation among young people with various ethnic backgrounds has received considerable attention in Sweden, contributing to a picture of society as a patchwork of specific groups and subcultures. However, not only do institutions and structures work in favour of individual autonomy in relation to family; similar mechanisms affect the individual's relationship to communities or ethnic groups. This does not necessarily reduce young people's needs for social belonging and recognition, nor the associated impacts on mental health if these are absent. Nevertheless, when the individual no longer depends on his or her community for material survival, adherence to cultural codes and values loses its function as a fundamental condition for survival. The adolescent becomes freer to define his or her identity, as an individual (the 'do-it-yourself' biography, see Hitzler & Honer, 1994), rather than in terms of belonging to traditional communities. In many respects, patterns in Sweden correspond quite closely to the individualised society described in *Individualization: Institutionalized Individualism and its Social and Political Consequences* (Beck & Beck-Gernsheim, 2002).

In general, young people in Sweden are thus seen as being autonomous individuals, free to choose their own identity and life-course. Prevalent conceptualisations of transition have certain limitations, however. Röpke (1999) argues that contemporary ways of constructing identities largely revolve around patterns of consumption, rather than expressing young people's personal visions for the future. Also, recent research suggests that social and technological changes such as access to digital media do not automatically have an emancipating effect. For instance, Danielsson (2010) observes that while young men from privileged backgrounds engage in digital practices which they perceive as valued in society, young men from less privileged backgrounds tend to use the media in manners that are socially devalued. Likewise, structural factors influence how various groups are affected by change, and the choices that are open to them with respect to mobility. The fact that urban youth is able to relate to or identify with certain globalised aspects in youth culture, does not mean that all benefit from the same chances on global labour markets (cf. Ball, Maguire & Macrae, 2000). Social and technological changes are opening unequal horizons. In other words, today young people's cultural, class and ethnic backgrounds are not necessarily reproduced in their traditional forms, they instead are susceptible to hybridised forms of global youth culture, positions and opportunities which continue to be unequally distributed. Although, for instance, access to higher education in Sweden was facilitated by the reforms of the 1960s and 1970s, a gap in recruitment and completion rates can still be noticed at tertiary levels, while the 2009 PISA results for 15 year olds (www.oecd.org) suggest that this gap is again widening. Despite the relatively egalitarian character of Swedish society, young people do not have equal opportunities to consciously shape their identities, or become 'pilots' in

their own lives (Côté, 1996). School remains a conservative force in this respect (Bourdieu & Passeron, 1990), unless special efforts are made to foster empowerment.

The competence to act in a changing world

While societal developments have affected traditional ways of reaching adulthood, far-reaching changes have also led to complex and challenging problems at both regional and global levels, requiring urgent action. Since the Brundtland report (Brundtland, 1987), education for sustainable development has rapidly evolved, and also been the object of research and educational reflection. In this section, we summarise aspects of the field, focusing on global learning.

Sund and Wickman (2008) observe that the individual teacher not only requires knowledge of the subject matter, but also has to adapt to learning situations in a flexible way. They link education for sustainable development to the abilities required for open-ended learning. A central role of learning is to enable the learners to develop their ability to set the agenda for learning themselves (Sund and Wickman p. 160), which is also an important dimension of self-directed learning (Booth & Anderberg, 2005). A similar type of ability is put forward by Rauch and Steiner (2006, p. 124), who argue that 'learning aims at acquiring a reflective ability to shape the world', rather than adopting a centrally proposed set of action patterns uncritically'. Education would therefore need to consider both self-development and self-determination of individuals in interaction with others, resulting in 'the ability to contribute in a reflective and responsible manner to the developing of society for a sustainable future' (Sund and Wickman, p. 124). Communities of learners would reflect in shared settings, identifying options for action. This type of learning involves a dimension of training for democracy. A similar view on Global Learning for Sustainable Development (GLSD) is proposed by Anderberg, Nordén and Hansson (2009), who focus the potential of shaping part-to-whole relationships between process and content in the communities of learners, collaborating in a web-based global classroom. Using global classrooms to discuss and reflect on complex problems additionally has the potential to support the development of intercultural and transdisciplinary capabilities.

Öhman and Östman (2008) stress that students need *the ability to interact with others* with diverging ideas and opinions, while Kronlid (2009) argues that 'learning takes place in spaces of capabilities, in expanded spaces of beings and doings' (Kronlid, p. 34). In different concrete ways, shared global problems systematically improve learning conditions, when the learners' spaces for developing capabilities are enriched through contacts with other young people across the world. Bruun Jensen and Schnack (1994) maintain that *action competence* can be developed by using situations involving conflicting interests as a starting point. Mogensen and Schnack (2010) further expand the traditional notion of competence, and focus on more critical-constructive conceptions of action competence. Almers (2009) has described a form of youth action competence developed through informal learning, and contacts outside the traditional classroom.

Another aspect of sustainability education is working with sufficiently *complex cases and authentic material* (Ideland & Malmberg, 2010). When school systems do not sufficiently address issues young people feel are urgent, or when school does not invest enough attention to teaching skills which are relevant in this respect, pupils may become estranged and lose motivation. Real cases presented as authentic dilemmas in society instead have the potential to motivate and engage students learning socio-scientific issues (Aikenhead, 2006, 2007 ; Oscarsson, Jidesjö, Karlsson & Strömdahl, 2009). According to Ekborg, Ideland and Malmberg (2009), school must offer students opportunities to develop skills and competence to take part in the official debate concerning authentic and contemporary challenges. To gain competence in taking informed decisions, students need training in cost-benefit analyses, judging risks, and taking a stand. They also need to develop knowledge-based opinions concerning dilemmas in contemporary society. They should be able to convince others about the way they think socio-scientific issues should be handled at different levels, whether individually, locally, nationally or globally. The competence to act and awareness of oneself as a decision-maker, actor in relevant citizenship issues, are qualities that can be developed at school, by critical examination of authentic everyday cases. Such students gain a higher level of commitment; rather than simply consuming knowledge, they learn how to produce knowledge. Thereby, relevant and authentic knowledge formation occurs, from a socio-scientific perspective of citizenship and developed literacy (Aikenhead, 2006; Ekborg, Ideland & Malmberg, 2009).

In sustainability education, it is seen as essential that students are offered opportunities to develop *knowledge capabilities* (Bowden 2004), that allow them to deal with complex and entirely new situations. In this respect, students also require deductive thinking skills (Sund & Wickman, 2008). But reasoning cannot be trained as a 'skill' detached from context. A study by Nordén and Anderberg (2011) suggests that knowledge capabilities are important, because capabilities are developed and related to the particular content and problem upon which it is focused (Nordén & Anderberg, 2010). In other words, knowledge capabilities cannot be seen as a matter of acquiring a set of isolated abilities or skills. This distinguishes the notion of *capabilities* from the idea of competencies, since the latter are taught in terms of solving defined issues in predicted situations. It is therefore not possible to develop knowledge capability in oversimplified problem-solving situations.

Sustainability education reaches from the classroom to the world outside, and can therefore serve as a bridge for transition, as well as an opportunity to develop and practice key capabilities. Rather than considering subject matter as knowledge per se, in this article, relevance for action is emphasised. It is further contended that diverse and complex forms of capabilities are needed to address equally complex issues.

Knowledge capability theory

The question of learning for an unknown future has been discussed from a phenomenograpic perspective on learning (Marton, 1981; Svensson, 1997). This is a relational perspective

which describes qualitatively different conceptions (ways of experiencing) parts of the world from the learner's point of view. Knowledge is seen as *relational*, i.e. knowing is a relation between the knower and what is known, and learning is a change in that relation. The theory of knowledge capabilities (Bowden & Marton, 1998; Bowden 2004) has been developed from phenomenography. The theory focuses how to prepare learners to act in new situations, but such capabilities are at the same time acquired through interaction with current knowledge. Knowledge capabilities cannot be described based on what professionals would do in a given situation at the time of studies, or what would be considered as good practice at that time. Capability needs to be seen as more than the reproduction of a pre-defined set of behaviours. In their coming professional lives, learners will face a wide variety of complex situations with an unsure future, and whose particularities cannot be predicted. Appropriate action for each situation cannot be described in advance. Learners thus have to learn how to focus on critical aspects of professional situations (Bowden & Marton, 1998), understanding both how to discern and attend to the relevant aspects of a particular situation. Importantly, the kind of understanding that is practised in known situations needs to engage the learner in active and conscious reflection, employing a wide span of resources, so that the learner is better prepared to meet situations that are not known in advance. This constitutes

> /…/a far more holistic capability than those commonly defined in competency–based approaches. Moreover, such holistic capabilities represent the links between disciplinary knowledge and professional skills. They are the transformation of the eyes through which the professional world is seen. (Bowden & Marton 1998, p. 12)

Bowden (2004, p. 40) describes knowledge capability as the ability to:

1. work out what are the key aspects to be dealt with in each new situation
2. relate those aspects to the knowledge already acquired and/or to knowledge the graduate knows how to access;
3. determine what the underlying task or problem in that situation might be;
4. design a process or solution to deal with the situation; and then
5. have the ability to follow through and complete the task or solve the problem, either alone or with others.

Bowden's list of capabilities can be compared with Knowles (1975), who in his discussion of self-directed learning pointed to the ability to use knowledge for practical problem-solving in real life situations, and the ability to independently determine the problem in a situation as characteristic of the adult learner. In the analysis of data from the Lund Calling study, presented below, the aim was to make use of knowledge capability theory as an underlying framework.

The Lund Calling study

Findings from the investigation conducted in 2008-2009 in connection with the Lund Calling pilot project have previously been presented in a report (Nordén & Anderberg, 2010), and an article in *Utbildning & Demokrati* (Education and Democracy) (Nordén & Anderberg, 2011).

For further details concerning the design and scope of the study, we refer to these publications. Lund Calling made use of a course developed in the Young Masters Programme (YMP), organised by the International Institute of Industrial Environmental Economics (IIIEE) at Lund University (www.goymp.org/). The IIIEE is devoted to the study of preventive environmental strategies, and offers a masters programme, as well as doctoral studies and research in the field of sustainable development. The Young Masters Programme (YMP) is directed to students at secondary schools, and aims at introducing sustainability studies in schools around the world, where youth from different countries and cultures work with a common content in an interactive and problem-oriented manner. Learning takes place in an extended virtual classroom across the globe (10,000 students in 120 countries since the inception in 1999). The programme notably includes creating and implementing a local project for sustainability. Based on their experiences participating in the programme, thousands of young people across the world have since the commencement of the YMP taken concrete steps towards action, locally and globally. Although the programme specifically concerns preventive environmental strategies, like many forms of sustainability education, the YMP can be understood as teaching knowledge capabilities, preparing young people to act in an uncertain future. We shall argue that taking these steps from the known to the unknown, and widening their horizon of action from the local to the global, are core skills that young people need in their transition to adulthood today.

The Lund Calling project started with a pilot project initiated in the municipality of Lund in 2008, which aimed to offer secondary pupils the opportunity to study the YMP within the framework of their regular studies. The overall aim was to contribute to preparing pupils and teachers to act for sustainable development, in both local and global. In particular, the project had the ambition to connect local and global levels, showing our interdependence and training participants to reflect and reach viable conclusions transculturally. The pilot project covered pupils from year 8 at the compulsory level, to the end of upper secondary school, in six schools which had been selected by the municipality. The objective was to develop a model course, which could subsequently be used in all the schools of the municipality. A research project was conducted alongside the educational pilot project, aiming to investigate how pupils, teachers and head teachers experienced the project. This research providing a means to support the implementation processes. Qualitative interviews were conducted with pupils, teachers and head teachers, and a phenomenographic method was used for the analysis (Marton, 1981; Svensson, 1997). The aim of phenomenographic analysis looks for similarities and differences in the individual experiences and groups these into categories (Marton 1981). One part of the investigation focused experiences of critical capabilities of acting globally. The result of this investigation is reported in the study by Nordén & Anderberg (2011).

Findings of the Research

In the investigation, certain examples of knowledge capabilities were identified by participants as critical for Global Learning for Sustainable Development (GLSD). Changes

that were experienced by the participants as contributing to improved learning, and various forms of educational development, were distinguished from experiences of changes that did not lead to such development. These experiences were then related to knowledge capabilities that were included in the programme and considered necessary to support GLSD, but which were insufficiently developed in the programme.

Knowledge capabilities gained

Take command and collaborate in a team were critical knowledge capabilities experienced as developed during the course:

Take command. Pupils experienced that they had the competence to work more independently without the attendance of a teacher, and study on their own online. This is a form of critical knowledge capability that can also be interpreted as the responsibility taken by individual pupils, using a potential for competence building, through global learning activities relating to sustainable development. It seems that these pupils experienced the role of the teacher as a collaborating partner. By taking part in global activities during the YMP, the pupils developed their capacity to manage work independently.

Collaborate in a team. The critical knowledge capability, in this respect, was the ability to see that the complex content needed to be handled collaboratively. Experiencing this process resulted in the pupils themselves independently arranging for new alternative learning management strategies, with supported knowledge formation among themselves while networking. A characteristic of this critical knowledge capability consisted of the pupils' own initiative – once they had identified the need to organise cooperation themselves – to optimise their learning by making an agreement to plan and share work tasks between themselves. Through self–determination, each pupil in the small local team carried out tasks individually, and then sent it to the others to read and comment on.

Knowledge capabilities needed

Certain of the changes that were achieved during the implementation of the YMP were not perceived to generate forms of educational development *needed* to support Global Learning for Sustainable Development (GLSD). There were: be prepared, act in a transdisciplinary manner and lead others towards a holistic understanding.

Be prepared. Participating students, teachers and head teachers pointed out changes needed to lead to educational development, in the sense of a common global learning process. Though a global classroom had been designed for the pupils' studies, in practice, the YMP platform did not entirely meet participants' expectations of collaboration and interaction. Interaction between groups from different countries was also hampered by different starting dates and different paces in working with the tasks on the platform. It was felt that more satisfactory processes would have been achieved if participants had been better prepared, with a clear idea of what was expected of them concerning collaboration activities.

Act in a transdisciplinary manner. Some teachers had to depend on colleagues, who had complementary disciplinary competence in various subject matters. The ability to work in a transdisciplinary manner was thus identified as a critical capability.

Lead others towards a holistic understanding. The head teachers perceived the ability to be a pedagogical leader in the school as critical for educational development, to raise the crucial questions which would stimulate teachers to adopt a more holistic perspective in their teaching practice.

Transition skills

Considering the critical knowledge capabilities which the participants described, the following features appear to be particularly relevant as transition skills in global learning for sustainable development: transdisciplinary action; democratic collaborative action; self-directed learning and independent initiative.

Transdisciplinary action

Transdisciplinary approaches (Vikström, 2009) entail several benefits that go beyond the separate disciplines that may be involved. Such knowledge formation develops in actual practice, in collaboration with the actors involved, whatever sphere is investigated (Almers, 2009). Teaching subject matter of various disciplines with a transdisciplinary approach further develops a holistic perspective (Laurillard, 2002; Nordén, 2006) in knowledge formation for sustainable development, and thereby lays a foundation for a form of capability to act. Rather than considering isolated aspects of an issue, taking into account the larger picture, reflecting on causal relationships and how the various elements interrelate are all essential in finding adequate solutions.

Democratic collaborative action

Some aspects of two of the critical knowledge capabilities described can also to some extent be regarded as democratic skills (cf. Öhman, 2008), particularly *To take command* and *To collaborate in a team* (Nordén & Anderberg, 2011)**.** Understanding collaboratively is a form of learning that evolves in a *process perspective*. The process of organising teamwork, debating issues and reaching decisions creates the foundation for a capability to *act democratically*. In the course, such processes take place within the individual teams of pupils, at their local schools, and on the course platform, in discussions with other groups. They therefore additionally involve a dimension of transcultural dialogue and sharing concerns across national borders, building transcultural capabilities and widening the action horizon of the participants. Teacher teamwork and collaboration collectively within the YMP platform also allow attaining a kind of transdisciplinary capability in promoting global learning for sustainable development. Practising teamwork can further be seen as a prerequisite for the transdisciplinary capabilities mentioned above, since communicating and mobilising resources from diverse professions, disciplines or cultures all involve collaboration. This dimension of the course was stressed by all: dealing with tasks individually would not have

been possible. Collaboration and multi-voiced dialogue made the process meaningful. For example:

> It would not have been possible to manage this on one's own, so it is good that one can cooperate /…/ and discuss so that one can include several opinions. (Pupil)

> If you want influence, you have to talk with each other, you need a dialogue of course. (Pupil)

Teachers and head teachers expressed similar views:

> It is very much a question of getting functioning pupil influence , both on an informal and on a formal basis, so that /…/ both adults and pupils don't just learn about democracy and influence, but instead work with it all the time. (Head teacher)

> … to be able to cooperate as much as possible. Among teachers and teachers and pupils to attain. … more than just basic knowledge, some kind of competence for action for the future. (Head teacher)

If participants had seen the tasks as something they should manage individually, it would have constituted an unreasonable workload for the average student (Jungert, 2009). Approaching the tasks individually would have compromised participants' possibilities to reflect upon the learning activities and to learn in depth.

Self-directed learning and independent initiative

The pupils were largely expected to manage their studies independently in the frame of the course, working in small teams, in dialogue with other teams around the world. One head teacher described the course in the following terms.

> The YMP material is quite amazing and I also think the manner of working is good: you read and then you work, using your own local area as a point of departure, and then you have your room where you meet others, who have done the same tasks but in their own parts of the world /…/ the opportunities for our pupils are of course to create networks in other parts of the world and discuss issues that concern young people wherever you live in the world. [head teacher]

Although several pupils found this form of studies challenging, they also described how it forced them to organise themselves, and make decisions without instructions from a teacher.

Discussion

Limitation and potential in developing knowledge capabilities

The YMP provided a platform with material that the teams of pupils were expected to work with independently in the course, with very little guidance from their teachers. This was commented upon both in positive and negative terms. The positive effect was that pupils trained, organised and appraised their work themselves, gaining confidence and taking the initiative. At the same time, several pupils expressed frustration at the lack of teacher scaffolding and feedback. Teachers were impressed at how well the pupils were able to manage this situation.

> I am incredibly impressed by them /…/ that they still can /…/ comment on the contributions of others /…/ they felt it was extremely exciting /…/ the pupils I had were out chatting with the entire world. (Teacher)

The transition students' perception in adopting an adaptive or a cooperative approach, probably focuses more on developing generic skills such as problem-solving, planning and being able to master heavy workloads (Jungert, 2009). In line with Jungert, it can be assumed that how students' perceive their study conditions, and their opportunities to influence these, will interact with their motivation, self-efficacy, approaches to studying, and eventually the transition to work (Jungert, 2009). Moreover, the tasks included in the YMP offered scope to go well beyond simply working in teams with a predefined problem. The complexity of the issues allowed multiple approaches, and different ways of conceptualising causal relationships or what comprised underlying problems.. More importantly, working with a concrete project locally allowed the groups to decide themselves what their task would be (cf. Brookfield, 1993).

Pupils commented positively on the possibility for interaction with groups from other countries, but in practice this did not always work as well as anticipated. Differences in language, but also different paces of work hampered communication. Additionally, teachers felt that with insufficient input from them, there was a risk that pupils simply discussed issues they already knew well and felt comfortable with, rather than probing deeper into unfamiliar questions or expanding their knowledge. One teacher expressed that only certain students were capable of taking this initiative.

> You see pupils who will be able to manage this, and maybe sort of want to get more challenges than the others have. Those are the ones I think should devote themselves to this. (Teacher)

There is thus the risk that weaker students are particularly disadvantaged by lack of teacher scaffolding. Peirce (1934) and Bateson (1972) stress the relationship between theory and practice, combining holism, relationship and perception (Hansson 2000). *Abduction* was for (Peirce 1934) important in develop understanding of complexities, and the concept could be used as the logical basis for relational thinking, and for a holistic way of reasoning. Through an abductive activity, the awareness of the complexity of the world around us is maintained, and the opportunity for deeper understanding might increase. Knowledge is to be judged for its purpose in relation to action, according to Peirce. Through a process of verification, what is believable and what is to be rejected can be decided, while avoiding over–simplification and maintaining complexity. Various investigations of pupils' reasoning in the YMP have shown that the pupils very often lack the ability to be inductive, or to test an idea through deduction. This could be remedied by introducing pupils to more qualified ways of reasoning in collaborative settings (Bateson, 1972; Hansson, 2000, 2004; Hansson & Nordén 2005; Sund & Wickman, 2008).

As well as more stringent reasoning skills, developing the capability for in-depth self-directed learning, and learning how to identify one's own 'blind spots' – areas that are left unconsidered since they are ignored in the first place – seems to be a central educational challenge. Self-directed learning assigns a crucial role to the learner in selecting and

assessing learning materials (Loyens, Magda & Rikers, 2008). The term self-regulated learning has also been used to cover the diverse processes of goal-setting, metacognition and self-assessment, and the concept is related to the field of problem-based learning The learner learns in the course of solving problems, by being in charge of planning, monitoring and evaluating, and comes to develop his or her own strategies to deal with these various aspects (Loyens, Magda & Rikers, 2008). An additional step in the direction of self-directedness is not only working on pre-defined problems, within a given frame, but individually and collaboratively contributing to formulating what the problems are and which perspectives to apply. Negotiating the tasks at hand in turn relates to skills involved in democratic processes.

Self-directed learning (Brookfield, 2009) does not necessarily mean highly individualised learning, carried out in isolation. As the Lund Calling project shows, it can also work in group-learning settings. According to Brookfield (2009), research suggests that often self-directed learners consult diverse peers by moving in and out of learning networks. The learner takes command and decides whether to contact external resources, or maybe choose to be under the control of an expert, depending on the learner's appraisal of the situation. Brookfield (2009, p. 2615), referring to Knowles (1975), argues that 'adult learners universally are under the character of being judged to demonstrate an increasing predisposition to self-directedness, as they cross the threshold of adulthood'.

A tension can thus be observed between self-direction and the teachers' perspective that scaffolding or more stringent reasoning are needed. A second line of tension was seen in the interviews, between the pupils' personal engagement and wish to work with issues that they felt were highly meaningful within the YMP, and the necessity to focus on subjects that gave them better marks on their regular courses. It can therefore be discussed to what extent existing structures were adapted to the type of learning involved in the YMP. Teachers expressed the concern that they had a restricted scope of action, due to the mandatory character of the subject matter and the boundaries between disciplines defined by syllabuses and the national curriculum.

> There are loads of teachers and pupils who are aware of the importance of sustainable development and have understanding. That's not the problem. The problem is: how do we work together concerning these issues within the frame of the school? And I can feel that at this school, people do not have a clear idea how to go about that, the question has not been critically examined. [head teacher]

The main results from the Lund Calling pilot project thus suggest that the implementation of the course supported the development of collaborative capabilities as well as allowing many pupils to develop initiative and self-direction. These can be seen as important capabilities on the path to autonomous action and adulthood. However, other pupils needed additional teacher scaffolding, better preparation, and a more interactive platform. Teachers expressed the concern that with insufficient teacher intervention and poorly developed reasoning skills, knowledge formation remained shallow. Although the profoundly transdisciplinary nature of required action was perceived, existing structures were not seen as conducive to this type of learning. Despite such limitations, through the programme, pupils and teachers developed their capability for networking and communicating with pupils and teachers in other countries

(Nordén & Anderberg, 2011), an important condition for action in an increasingly globalised society. Thus, it serves as a course in transition skills that moves the learner from existing to new and unknown learning and doing. The course widens participants' horizons of action, by forming an extended global learning space, in which a common content takes on first a local meaning, and then gradually becomes more global (Hansson & Nordén 2007). To understand the issues involved, the wide local knowledge emanating from the students' diverse backgrounds combines with the global common content of the course. A transition is powered through the synergy of the course materials, the transcultural discussions and the students' own life-experiences, together constituting a rich and dynamic context for learning. The students in the YMP consider that by using the tools offered and constructed through the course, they became more aware of sustainability, and they have improved their skills of analysis (Hansson & Nordén 2007).

Conclusions

In this article, we have explored the acquisition of transition skills for action, which young people need to become responsible and capable adults in a rapidly changing and uncertain world. In educational contexts, this involves, among other aspects, maturing from forms of learning that rely heavily on teacher scaffolding, and progressing to more self-directed and independent learning modes. However, while individual initiative in appraising various phases of the learning process is important, central qualities are also teamwork and transcultural communication. Sustainability education plays an important role in this respect, supporting democratic collaborative action, self-directed learning and independent initiative.

This can be contrasted with a notion of adulthood that amounts to simply acquiring the financial autonomy needed to create an individual lifestyle, consuming products and services offered on the market (Röpke, 1999).

As Hitzler & Honer, (1994) point out, in a changing world, there are no ready-made recipes for success.

> People's daily life-world is fragmented in a multitude of decision-making situations, for which (not despite, but as a consequence of the wide range of available offers) there are no longer any reliable 'recipes'. For each individual there arises a claim but also an obligation to an (more or less) 'own' life. (Hitzler & Honer, 1994, p. 308, our translation)

This is not only the case at an individual level, but also for society as a whole. Existing social institutions are not adapted to the challenges of the world today, and will necessarily tend to lag behind. To respond more effectively, Beck and Beck-Gernsheim (2002) have proposed the internet as a forum for self-active culture, where new forms of alliances and communities can emerge. Young people today cannot, as in earlier periods of history, base their actions entirely on the traditions of the family or community they were born into, nor can they simply rely on institutions (cf. Giddens, 1990). Instead, they need to learn to form their own communities, capable of reflecting and deliberating, organising for concerted and appropriate action, locally and globally. But the passage to adulthood also requires recognition and

respect. Young people need to feel that they are heard, when they contribute to society (Östman, 2003; Nordén & Anderberg, 2010).

Here, school can play an important role, empowering students by helping them develop necessary knowledge capabilities, but also by providing fora for expression and deliberation. Since changing conditions impact on any efforts towards sustainability, democratic skills can be considered as a form of action competence for sustainable development. This includes actions both on an individual and an institutional level, as well as shared responsibilities: promoting concrete global action, and promoting sustainability learning in a global context (Anderberg, Nordén & Hansson, 2009).

Studying how people manage to deal with the stress of traumatic events, Antonovsky (1987) identified what he called 'sense of coherence'. This comprised comprehensibility, manageability, and meaningfulness. In educational terms, this can be related to knowledge, allowing us to understand the world around us, capabilities to act in constructive ways, and values that give meaning to our existence. Students on the YMP have emphasized the urgency of transcending existing obstacles to action. They express the belief that online learning should not be a copy of school teaching - it has to be developed on its own way. Reaching sustainability, according to the students, demands a 'new philosophy' and 'helping new thinking' (Hansson & Nordén 2007). If transition entails the need to cope with new challenges, empowerment to take action gives young people the means to deal with the stress of change, in their own lives as well as in society.

Increased awareness of worldwide events, a flood of information that is not always easy to structure, multicultural society, and social connections through the internet, are all important aspects of growing up today. Knowledge formation takes place in a variety of settings, outside the traditional classroom (Booth et al, 2007). Concerning sustainability issues, learners therefore need to 'learn how to learn', in both global and local settings. According to Hansson (2000), knowledge should not be seen as a possession, which can be additively accumulated, and she instead proposes the 'knowledge to act'.

Focusing on the knowledge capabilities that underpin young people's ability to take action allows us to move beyond some of the limitations of current conceptualisations of transition. This also has implications for education. In most discussions, young people's passage to adulthood primarily focuses on identity. Various studies present a picture of growing up that includes both changes in the direction of individualisation and disembeddedness (Bäckman, 2009), as well as continued structural inequalities (Danielsson, 2010). Hizler and Honer (1994) and others have observed that when individuals are disembedded from their backgrounds, reality tends to become fragmented and lack coherence. Young people have difficulties finding viable channels for concerted social action. Instead they invest their energy searching for identities that can provide a sense of belonging and acceptance, making them easy victims of consumerism (Röpke, 1999). Inversely, passively reproducing traditional values of family, class or community, leads to the reproduction of social inequalities. But whether the individual is seen as disembedded, or as coming from a particular background, the educational response is mainly attempting to provide equal opportunities for all, which

generally amounts to adapting to the labour market as it stands today. Ultimately, this favours uncritical flexibility, and training young people in generic skills which match the expectations of potential employers. Learner attitudes tend to be reactive, rather than pro-active.

In the present article, instead of examining the collective or individual dimensions of transition, a view has been proposed that focuses on empowering young people to act. Sustainability education is about learning to understand the complex forces which shape our world, and finding ways to cooperate across national boundaries for a better future. Working consciously for knowledge capabilities (Bowden, 2004), using a transdisciplinary and transcultural cultural approach (Hansson & Nordén 2007), means that any type of identity and experience can be used as a resource. Diversity is seen as an asset, since it widens the range of perspectives that can be considered. Values are discussed and reflected on, rather than being taken for granted. In such learning and teaching contexts, sharing the same identity or culture is no longer a condition for collaboration. Finally, knowledge, skills and attitudes cannot be considered separately: a holistic view of education is required (Hansson, 2000), including reflection on values and responsibility for the society in which we live (Öhman, 2008).

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IV

Transdisciplinary Teaching for Global Learning of Sustainable Development in a Whole School Project

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Abstract

The study investigates the transdisciplinary teaching of education for sustainable development (ESD) with a global dimension at an upper secondary school in Sweden. The purpose was to analyse and describe variations in how nine teachers in different subject matters experienced collaborative teaching in the context of a whole school educational development project. A total of 27 semi-structured interviews were conducted and analysed using phenomenographic and contextual analysis. Two main approaches to transdisciplinary teaching were identified among the teachers: one where they contributed but struggled with transdisciplinarity, and the other where teachers displayed ownership and were able to reconceptualise the project as a whole. Overall, teachers worked in the project with deep-level processing for learning ESD in an integrated manner in the transdisciplinary framework. However, they experienced tensions between their resources and capabilities, and the challenges they faced in the project.

Keywords:
Transdisciplinary; Teaching Approaches; Deep Approaches to Learning; Global Learning; Whole Curriculum; Knowledge Capability; Education for Sustainable Development (ESD)

Introduction

The present study investigates teachers' experiences of teaching for sustainable development at an upper secondary school within the framework of a whole school educational development project over the year (2010/2011) in a Swedish municipality. Phenomenographic method was used to capture variation in the interview data. Teachers' experiences were analysed from the angle of transdisciplinarity in the global–local learning setting which they had organised.

The question of transdisciplinary approaches to teaching (Entwistle 2009) ESD stems from theoretical discussions about learning, content and activities needed to develop appropriate knowledge and capabilities (Kleiber 2001; Steiner and Posch 2006; Sund and Wickman 2008; Vikström 2009; Bowden 2004), as well as drawing on practical considerations related to how teaching subject knowledge and teachers' professional competence is structured today. Considering the increasingly complex issues that students address, it has been argued that a shift towards transdisciplinary teaching in subject-integrated teacher teams is called for (Scholz and Marks 2001; Yueh and Barker 2011; Nordén, Avery, and Anderberg 2012). The discussion on transdisciplinarity also draws on experiences of teaching ESD in a variety of contexts (see for instance Paige, Lloyd and Chartres 2008; Hoare et al. 2008).

In many educational settings, based on the overall organisation of the various subject studies, SD is presented as a 'topic', for teachers to handle individually from their own subject specialist perspective. In Sweden for instance, the national curriculum for the upper secondary school (National Agency for Education 2011) presents SD both as a topic and as an overarching aim. While it is stated in the curriculum that students should also have the opportunity to experience transdisciplinary teaching, goal achievement is based on individual marks that students obtain in the separate subjects. There is thus a tension between overarching aims and mechanisms of accountability. It has consequently been argued that approaches that facilitate teachers' and students' transdisciplinary understanding need to be investigated, prioritising more competence-driven ways to incorporate ESD into curricula (Rost 2004; Meehan and Thomas 2006; Anderberg, Nordén, and Hansson 2009; Bursjöö 2014). At the same time, working with transdisciplinarity can meet with resistance, since it challenges the knowledge fragmentation that is built into traditional disciplinary teaching, and brings complexity to classroom practices. Moving into a world of supercomplexity, organizing understanding in one´s own way becomes crucial, as students need knowledge that is firmly rooted and easy to use (Nordén, Avery and Anderberg 2012). A disposition to develop an integrative form of understanding – even during new unforeseeable circumstances – are needed for pulling together several threads of knowledge, so that students can weave them in their own way of thinking about a topic.

Notably, in transdisciplinary contexts, content and teaching forms are not established in advance, making it possible for students to develop critical knowledge capability (Bowden 2004; Nordén and Anderberg 2011). Knowledge capability goes beyond simply holding a

competence for acting in a defined and foreseeable situation that can be practiced in advance. Instead, knowledge capabilities allow students to take adequate decisions in the future, as new situations occur and demand action-taking.

Advanced ways of approaching sustainability issues additionally comprise a global dimension. Awareness of interrelationships at a global scale leads to a changing focus in ESD from human-nature relations (and nature ethics) to human-human relations (and human ethics) (Sund 2015). The research field 'global learning for sustainable development' (GLSD) has emerged through transdisciplinary reflection on how to combine and approach solutions to sustainability challenges, and learning about complexities through interaction, globally and locally (Brunold 2005; Stevenson 2007; Nordén and Anderberg 2011). By enhancing the ability to handle and deal with global processes (Rost 2004), involving critical thinking, skills and values, GLSD includes objectives fostering students to become responsible citizens (Scheunpflug and Asbrant 2006; Stevenson 2007; Anderberg, Nordén, and Hansson 2009; Nordén, Avery, and Anderberg 2012). An approach that from the outset integrates the global dimension of the issues thereby also addresses the challenge of teaching about complexities (Sund 2015), with considerations of local situations, and diverse values or cultures. Importantly, working with the global dimension in teaching ESD allows students to better understand conflicts of interest underlying different suggestions for dealing with sustainability issues (McKenzie 2009; Biesta 2009; Abrahamsson 2011; Yueh and Barker 2011; Öhman and Öhman 2012; Gough 2012).

Many phenomenographic studies have concerned higher education. However, student-focused perspectives on teaching are also relevant for upper-secondary levels (Biggs 1991). Entwistle (2009) has synthesised conclusions from the past four decades of research in this area. Importantly, studies on a meaningful understanding (Entwistle 2009) known as a *deep approach* to learning consider the students' own motivations and the students' intention to understand ideas and seek meanings. A relationship can be found between teachers' attentiveness to student perceptions and opportunities for students to follow their own intentions in learning. Trigwell, Prosser and Waterhouse (1999) suggest that students were more likely to have deeper approaches to learning with higher quality learning outcomes, if their teachers used conceptual change and student-focused approaches to teaching, while surface approaches to learning with lower quality learning outcome appeared among students, whose teachers used information transfer and teacher-focused approaches. Prosser, Martin

and Trigwell (2007) additionally found that student-focused perspectives on teaching are associated with more complex and research-based understanding. Particularly in ESD, it is crucial to achieve such qualities of understanding (cf. Jucker 2002; Meehan and Thomas 2006; Tilbury 2010; Wals and Kieft 2010; Howie and Bagnall 2012).

Working with ESD is thus a highly challenging and complex task for teachers, in order to devise learning activities and support structures for students that involve these various dimensions. Despite their aspirations to achieve ESD learning goals expressed in the national curriculum, teacher teams frequently experience that they do not as individuals have full capability to cover the complex knowledge field (Palmer 1998; Hansson 2000; Reid and Petocz 2006; Rauch and Steiner 2006; Yueh and Barker 2011; Öhman and Öhman 2012). Teachers therefore need to work with their own professional development, exchanging experiences and knowledge simultaneously (Trigwell, Prosser, Martin and Ramsden 2005; Steiner and Posch 2006; Prosser, Martin, and Trigwell 2007; Sund, 2014; Bursjöö 2014). This also involves coping with challenges of their own inner reorientation, and developing extended external teaching forms corresponding to transdisciplinary learning processes (Scholz and Marks 2001; Hoare et al. 2008; McKenzie 2009; Sund 2014).

Method

Context of the study

The study investigated teachers' reflections about their experiences of teaching in the context of the educational development project "Educational group: City Planning and Sustainable Development" at a Swedish upper secondary school. The intention from the teachers´ point of view with developing the ESD project course was to create educational innovation based on the students' abilities (Merkel 2013), within the framework of the Swedish national curriculum. The students' concrete task was to plan a new attractive fictional neighbourhood in their city from sustainable perspectives, considering implementation of environmental, economic, and social science perspectives, aesthetic factors, health and lifestyle (outdoor activities and good living conditions), as well as a comparative global perspective.

The initiative originally emanated from the headmasters at the school who offered their teachers the opportunity to work with an educational development project. A number of

teachers were interested in this proposal and conceived the City Planning and Sustainable Development project. The educational development project was planned, carried out and evaluated by the teachers themselves during 2010/2011. The development work took place in a group consisting of nine teachers with competences in different disciplines (Biology, Chemistry, Physics, Geography, Social Science, English, Swedish, Physical Education and Health, and Psychology). Ten teachers initially wanted to create this project, but the mathematics teacher did not feel able to contribute and did not start. The other teachers all carried through. The three headmasters at the school were supportive throughout the process, and wanted the project to be considered in the future as a whole curriculum project (cf. Entwistle 2009) that could later be disseminated and recognised on a national level. The teachers in the educational development group had the ambition to work with a wider outlook than separate single courses might generate. Additionally, the teachers highlighted the importance of inducing student abilities such as creativity, independence and responsibility, communication, self-esteem and self-confidence, reflection and analysis, entrepreneurship and digital literacy (Merkel 2013). The ambition was expressed to implement a teaching approach involving a global dimension, and where the students were counted as developers and were included in the learning team (Wals 2006; Lundholm 2011).

Before this project, the teachers had not had much experience of developing transdisciplinary teaching with a global dimension. Relating the local project to global concerns allowed teachers to challenge taken-for-granted assumptions in the local context. Integrating a global dimension and connecting it to concrete instances of local practices also made it possible to raise awareness about complex systemic and structural interrelationships at a planetary level, pointing to the global effects of local decisions.

Data collecting

No selection was made among participating teachers and interviews were conducted with all the nine teachers working with the project on three occasions (before, in the middle of, and after the educational development project), resulting in a total of 27 interviews. The teachers were interviewed individually at the school using semi-structured questions during approximately 45 minutes on each occasion. Interviews were recorded and transcribed. Headmasters at the school had contacted the researcher and let her know about the planned project. The researcher did not take part in the group's meetings, and the analysis is entirely

based on interviews.

The aim of the questions was to stimulate the participants' own reflections over their experiences seen as a meta-level (Theman 1983; Anderberg et al. 2008). Questions in the interview guide primarily concerned teachers' approaches to teaching and the role of the teacher for student learning of ESD with a global dimension. Additional questions concerned how teachers experienced their teaching in relation to their students' learning, dialogicity and cooperation between teachers.

Data analysis

A phenomenographic method (Marton and Booth 1997; Svensson, 2004) was used to analyse the interview material. A phenomenographic method gives priority to analysing the experiences of the teachers at two levels, the individual level and the collective level. The individual interviews were analysed first to find qualitatively different ways to experience (Marton and Booth, 1997). After that, similarities and differences of ways to experience were grouped in a collective level. An individual teacher might have contributed experiences to more than one category, while each category may be constituted from several teachers. This means that the analysis aimed to abstract from the data a number of qualitatively distinct categories of description, and that the different kinds of experience presented below in categories of description do not correspond to particular teachers.

The phenomenon focused upon in this study is the way teachers experience their teaching in relation to other teachers in the common transdisciplinary GLSD educational development project at their school. The interview transcripts were read thoroughly several times as a whole. Passages concerning transdisciplinary teaching were identified, thereafter grouped and regrouped until a clear picture emerged of qualitatively different ways of experiencing transdisciplinary teaching of ESD (Trigwell, Prosser, and Ginns 2005; Åkerlind 2005).

The outcomes presented below follow standard phenomenographic practice (Marton and Booth 1997; Svensson 2004). They comprise a set of two overarching categories of description as well five subcategories, with brief descriptions of key aspects of the experiences expressed by the teachers (Marton and Booth 1997). The grouping into categories was established on the basis of similarities and differences found between the individual interview segments.

Results

Two overarching categories of description corresponding to different teaching approaches were found in the data: "Contributing: Assist and Take Part", and "Ownership: Possess and Reconceptualise".

Figures 1(a) and 1(b) were drawn by the author (Birgitta Nordén) to illustrate the two different transdisciplinary teaching approaches of GLSD as interpreted in connection to the data analysis. Figure 1(a) visualises category 1 as additive and subject-based. Subject matters or disciplines are experienced as part sectors of GLSD, undergoing a spiral process of a mutually growing disciplinary exchange of conceptualising knowledge formation. Figure 1(b) visualises category 2 as phenomenon-based combined with holistic and transformational strategies (not static). The subject matters are experienced as interconnected perspectives on the same larger global–local phenomena, pedagogically conceptualised within GLSD, which formed the foundation for the transdisciplinary teaching experience.

Figure 1(a). *Category 1: Additive and subject-based. Subject matters or disciplines are experienced as separate parts sectors of GLSD, undergoing a spiral process of a mutually growing disciplinary exchange of conceptualising knowledge formation.*

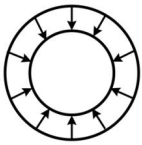

Figure 1(b). *Category 2: Phenomenon-based combined with holistic and transformational strategies (not static). The subject matters are experienced as interconnected perspectives on the same larger global–local phenomena, pedagogically conceptualised within GLSD, which formed the foundation for the transdisciplinary teaching experience.*

The categories contain five different sub-categories (see Table 1), and are illustrated in the following by quotations.

Table 1. *Transdisciplinary Teaching Approaches for Global Learning of Sustainable Development in a whole school project*

TEACHING APPROACHES	CATEGORY 1: CONTRIBUTING - assist and take part			CATEGORY 2: OWNERSHIP - possess and reconceptualise	
SUB-CATEGPRIES	SUB-CATEGORY I: DISHEARTENED	SUB-CATEGORY II: SUPPORTIVE	SUB-CATEGORY III: COMPLEMENTING	SUB-CATEGORY IV: DECISIVE	SUB-CATEGORY V: MULTI-DIMENSIONAL
	LESS POSITIVE TAKE PART PERCEIVING COL-LABORATION AS INTERFERENCE OFFERING ADVICE TRANSDICISPLINARITY SEEN AS CRITICAL BUT DIFFICULT	FAIRLY POSITIVE WORK IN COMMON GIVING ENCOURAGEMENT AGREE ON DIRECTION SUBJECTS OF GLSD INCLUDED	FAIRLY APPROVING COLLABORATING TAKE ON CHALLENGES ASSUMING COMPLEMENTARY FUNCTIONS MAPPING KNOWLEDGE WITHIN THE SUBJECT DOMAIN TO BROADEN UNDERSTANDING STARTING A PEDAGOGIC PROCESS	ADEQUATE PREVIOUS KNOWLEDGE AND SKILLS EXPLAINING WHAT IS REQUIRED AND SETTING THE SCENE CLEAR IDEAS, KNOW-HOW HAVING INFLUENCE AND CONVINCING OTHERS CONSOLIDATING STUDENT LEARNING BY PROVIDING POSSIBILITIES TO DEVELOP PERSONAL UNDERSTANDING	SUFFICIENT SKILLS TO TAKE ON NEW TASKS BOLSTERING CONFIDENCE HAVING THE POWER TO INDUCE ACTION AND BELIEF BOTH GROUP DISCUSSIONS AND INDIVIDUAL REFLECTION ENCOURAGED DEEPENING UNDERSTANDING CHANGING DIRECTION FLEXIBLITY AND MOBILITY IN DIFFERENT CONTEXTS ENSURING THE ADEQUACY OF THE KNOWLEDGE AND UNDERSTANDING PERSUASIVE, CONGRUENT AND COMPREHENSIVE

Category 1: ***Contributing – Teaching as Assisting and Taking Part***

Within this category, tensions appear in teaching commitment, assistance and attendance. Experiences placed in this main category expressed a concern, and did not fully contribute to the group's discussions or in dealing with the teaching of an undefined complex GLSD. Primarily, 'assisted' teaching experienced in the project showed that the capacity and teaching competence in the subject matters were not fully made use of. Borders were recognized between different subject matters, which appeared to safeguard characteristics for traditional teaching on disciplinary basis (cf. Fig 1(a)).

Compared to experiences placed in main category 2 experiences placed in this category concerned teaching that was not conducted for the specific purpose of being a part of transdisciplinary projects, or on how transdisciplinarity related to ESD, but there was nevertheless an openness to connect to other subjects. These connections had some differences which is grouped into the three subcategories; disheartened, supportive and complementing.

Sub-categories I-III: Subject Matters Experienced as Separate Parts

I. Disheartened teaching

This teaching sub-category was characterized by subject matters experienced as separate sectors of the whole (Fig. 1(a)). Teachers sometimes felt that they were intruding into other teachers' areas of expertise when they tried to teach transdisciplinarily. Problems occurred concerning the interpretation of various subject matter identities and the core context of different subject matters.

Inter-teacher collaboration within the ESD project was described by these teachers as if an "ESD torch" was taken from one teacher, representing a given subject matter, and thereafter passed on to the next. Before handing the task over to another teacher to take over, interpret and add on, each teacher involved was contributing with their subject specialist perspective to the common ESD project. Challenges occurred, in particular, when a colleague in another subject was felt to be giving priority to their own subject matter content. Mistrust was experienced due to assumptions of a kind of freeloader mentality among representatives of the

different disciplines.

Problems evolved as the goals of the individual subject matters had to be identified. It was experienced as a critical procedure, carried out together with colleagues in the educational group.

> Challenging, if not the same goals in different forms of student work are evaluated, eventually the relevance is not seen. Talk with colleagues about transdisciplinary teaching and what do we want to achieve with the transdisciplinary teaching project? Compare course content! How integrate and earn efficiency in our work, and how create possibilities for all in common? Prove that every teacher participates in the transdisciplinary teaching project. (11.1)

There was a wish to be efficient, act responsibly and conserve the available resources. According to the Swedish national syllabus for each subject, certain learning goals existed for the individual subjects. Preparing for transdisciplinary teaching covering the same goals of the subject matters was therefore an additional challenge.

Passages in this category expressed a sub-category where the teachers experienced that they were less confident of achieving the goals they had set. This discomfort was also due to teachers' sense that they were responsible for the students' motivation and rights to learn, as well as students' rights to get fair grading.

II. Supportive teaching

Passages placed in this category expressed that it demands great effort to achieve a sort of transdisciplinary teaching approach, but it was not considered a 'mission impossible'. Transdisciplinary teaching was perceived as an elevating work process of value for the teachers' professional development process.

> The transdisciplinary teaching was a synchronization and integration of the new syllabus (Gy11), ICT and a didactic idea. Thanks to well established relationship between teacher and students, and that they knew one another it was possible to develop the ESD project. (6:3)

The supportive teaching sub-category was experienced as influential in directing subject matters towards transdisciplinary approaches. It was experienced as a positive contribution for

framing GLSD. However, teachers experienced a certain fear of failure in their joint ESD project, besides some individual frustration. Teachers saw transdisciplinary work as desirable, but not as intrinsically connected to global-local action for sustainability and the phenomena they were teaching about.

III. Complementing teaching

A consensual contract between certain teachers seemed to develop within this teaching sub-category, which was characterized by teaching efforts that aimed at complementing other teachers' activities. Although challenges with teaching ESD learning objectives were experienced, teachers of the various subjects comprised in the educational development group also saw the advantages of collaboration.

Mutual cooperation raised awareness of the importance of collegial exchange and support. Such exchanges were experienced as rewarding and promoting transdisciplinary teaching, in a sort of symbiotic working process. The interest in changing towards a transdisciplinary approach was combined with reflection on implications of various strategies for student learning:

> Teachers have to look around and find other platforms being less in the teaching role and more in a tutoring role, maybe not thinking too much of mediating for science knowledge formation. To be creative is easy for students, but how to delimit, give priorities, and focus within the project frames? The teacher is needed, to assist as a supervisor since the students do not have experience and cannot easily judge what to do. For them to manage the project work, the teacher must be available and facilitate the process to a greater extent. (11:3)

The teachers felt that further development of transdisciplinary teaching and learning of different subject traditions (social science and the natural sciences) raised awareness among both teachers and students about complexity, and promoted holism (Hansson 2000; Sund 2015). The teachers expressed a concern with thinking alternatively and developing towards transdisciplinarity. At the same time, a potential to overcome tensions within ESD appeared through the process of moving from a subject-based focus on teaching, to a framework-based approach focusing on the overall learning and teaching situation.

Stress or fear of failure concerning the joint ESD project were more rarely expressed by these

teachers, and they also expressed confidence in the value of teaching ESD in a transdisciplinary manner.

Category 2: ***Ownership – Teaching as Possessing and Reconceptualising***

Expressions of experiences placed in this category pointed to individual teachers' personal driving force. A student focus via GLSD was at the core, experienced as a rich and coherent understanding of transdisciplinary subject matters. Teachers expressed reflections on the global dimension, emphasizing that sustainability problems affect the whole world and the planet is facing a common challenge. Considering the whole, including the global dimension, rather than just isolated parts (disciplinary or local) led to a realization among these teachers of the significance of holistic thinking.

> Transdisciplinary teaching simply shows how life works - it is not fragmented in specific subjects. (5:3)

Characteristic for this category was that the involved disciplines' subject matters were all 'boiled down' and became integral parts of a common teaching process (cf. Fig 1(b)).

> The presence of consistency and consensus are emphasized as important for professional teaching. Recommend less of formalities, more discussions among teachers ahead of starting transdisciplinary teaching of global learning and sustainable development, and in particular talking through what to consider about the role of teachers, the view on students, and the learning process. Consensus among teachers is everything. (12:3)

The focus on transdisciplinary teaching was here perceived as necessary in ESD, and not merely desirable. In this approach, teachers aimed to use transdisciplinary teaching to make students understand their own role in efforts towards sustainability. Teachers felt that this helped students think more critically and scientifically, as well as gaining a better understanding of ESD by orientating, evoking interest and consolidating development of personal understanding.

Sub-categories IV-V: Subject Matters in a Transdisciplinary Framework

IV. Decisive teaching

Experiences placed in this subcategory give examples of feeling that transdisciplinary teaching is a natural method to apply. Teachers' familiarity with transdisciplinary ways of working and sufficient know-how made them perceive transdisciplinarity as trustworthy. They were confident that they understood how to guide their students to become knowledgeable and acquire powerful skills, and could make them understand the reasons for teaching ESD transdisciplinarily.

In the course of the project, gradually greater responsibility was developed and taken by the students, while teachers provided hesitant students with tools to move forward.

> Teachers and students start - on their own, but also together - with something that is completely new to them. Students must feel free - to dare - many things are demanded: cooperation and critical project analysis thinking. Teachers think this adds so much more to education and to the students´ learning. (11:2)

Before the educational development project started, some of the teachers expressed a fear of lacking practical experience and training in transdisciplinary teaching. Working with the challenge, however, these teachers realized that they did have sufficient knowledge and skills and dared take command, convinced of their capability to guide students with no prior experience of transdisciplinary school project collaboration. Thus both teachers and students gained confidence through their experience as the project progressed.

V. Multi-dimensional teaching

Descriptions placed in this subcategory expressed how teachers managed to take the initiative to encourage and involve their colleagues for the benefit of all. Interview passages expressed a belief that the project was worthwhile, and trust that they would be able to find adequate ways of doing something that went beyond what they had been accustomed to doing in their usual roles as teachers of their respective subject matters. Characteristic was to take on and be an active part of projects demanding educational development, though it could mean risk-taking. Interview passages categorised under this sub-category expressed how teachers dared to shift position, and step outside their professional comfort zone concerning subject matter expertise knowledge. Teachers saw advantages in collaborating within the project group and

to get support from their colleagues in finding ways to teach transdisciplinarily. If needed, a change occurred in directions that were in harmony with the goals of the teacher team as a whole.

This approach expressed the belief in a learning process - also for their students - of moving from a subject-oriented focus towards a more integrated framework, and also expressed confidence in their own ability to work with transdisciplinary teaching.

Coming to the decisions about how to best carrying out the teaching, thinking about the inner logic of the subjects, and its pedagogy stemmed from fundamental beliefs about rigorous teaching at a level appropriate for the students. Their role as teachers was seen as intimately connected with the selection and organisation of course content offered to the students. Teachers saw themselves as conveying feelings and creating a supportive learning ethos, to arouse interest.

Complexity and changes were not perceived as threatening. Provided that sufficient time was available, transdisciplinary teaching was perceived as feasible.

> The students could gain so much more from transdisciplinary teaching than subject-based lessons; learning cooperation, compromising, collaboration, listening – mutually fertilizing each other's ideas, give courage to go further with their ideas. Fruitful exchange of ideas could contribute to students´ development of knowledge in group psychology, which makes them dare to drive their group work forward. (12:3)

This teaching sub-category showed a strong motivation, and ‘hope for success’.

However, the freedom experienced by some teachers to come up with a new idea or concept could be experienced as demanding for other teachers and team members, who involuntarily might have to follow the new idea of the team. Also, teachers who took initiatives experienced that they had to convince their students about the advantages through persuasive reasoning and arguments to develop alternative ways of learning. Thus the success of the more innovative approach depended on already established teaching and learning traditions at the school.

> Transdisciplinary teaching is a threat for weaker students, since it is hard to come to understand SD. With transdisciplinary teaching, it is no longer so obvious what to learn

> and the transdisciplinary teaching is not clearly structured… the students who understand how to operate within transdisciplinary teaching may gain momentum and reach as far as they wish. Still, transdisciplinary teaching demands much more from students. The students need to commit themselves, they need to have driving forces of their own - it is not about getting everything served on a platter. The weaker need support. (5:1)

Discussion

Overall, compared to other studies (Scheunpflug 2011; Öhman and Öhman 2012; Sund 2014; Sund 2015), the teachers´ approaches in their subject matters suggest relatively high levels of motivation, volition and competence for ESD. Nevertheless, the degree of inter-teacher collaboration required to carry out this project was experienced as challenging by the participating teachers. Diverging perceptions of the central concepts and principles of ESD affected conditions for transdisciplinary teaching, as well as the different perceptions of their own role in the project. Differences in the teachers' fundamental pedagogical stance with respect to issues such as student- or teacher-centred approaches, affected the dynamics of the collaboration and their ability to engage the students in the processes. While certain experiences of teaching as described during the interviews expressed a capacity to proactively take initiatives and drive the further development of the project, other experiences of teaching described more insecurity. Nevertheless, the more reactive teaching approach of assisting and taking part still showed potentials in contributing to the overall processes in contexts where development is initiated and driven by others.

Carrying out the project and addressing the challenges that arose in its course demanded specific teaching tools, knowledge and skills. Becoming a more aware and more capable teacher can be achieved through various reflective problematisation processes for furthering teaching competences (see for instance Booth and Anderberg 2005). However, from the point of view of theoretical contributions to educational development of the kind investigated in this study, general insights concerning ESD do not appear to provide conceptual tools that adequately support collaborative processes or transdisciplinary reconceptualisations of subject matter. New insights and competences could therefore be gained by deliberatively searching for a theoretical framework that better corresponds to transdisciplinary teaching of ESD.

The sense of initiative and 'ownership' displayed by some of the teachers was coupled with

an intrinsic interest in the issues at stake, as well as awareness of their own learning processes. Teachers and students who were motivated by the intrinsic interest of the subject matter (Entwistle et al.1979) were not passive learners. Instead, they actively helped one another to explore and develop suitable ways to approach the teaching and learning tasks (Prosser, Martin, and Trigwell 2007).

This dimension of teaching and learning ESD can be related to what has here been called the 'decisive' teaching sub-category, which is characterized by teachers being both convincing and convinced of the benefits of their approach. The sub-category is based on teachers possessing sufficient knowledge and teaching skills. As in the multi-dimensional teaching sub-category, the consistent engagement in their professional development processes indicates the presence of critical knowledge capability (Bowden 2004; Nordén and Anderberg 2011).

Enabling students to visualise the main aspects of a topic within a tightly organised whole is an ambition that is consistent with deep approaches to learning and teaching (Yueh and Barker 2011; Marton 1976). These approaches involve ways of thinking about the effects of teaching on learning across subject areas and guiding practices according to the inner logic of a subject matter and its pedagogy (Entwistle 2009). Achieving a holistic quality can be linked to a focus on critical features, where the teachers stressed the interconnections that exist within a topic, and directed efforts towards students' further understanding (cf. Entwistle 2009).What has here been called a 'multi-dimensional' approach meant that teachers dared to move on from traditional lecturing to a more contemporary context, characterized by intuition-driven, flexible, and didactically diverse teaching situations (Uljens 1997; McKenzie 2009).

Despite the teachers' commitment, certain interview passages expressed a feeling of assisting, rather than 'owning' the project (Category 1), associated with a lack of confidence in their own abilities. These reflections pointed to problems finding productive ways of collaborating, and also tended to be more oriented towards subject-based teacher-led pedagogies. Collaboration was conceived more as a matter of coordinating efforts, than jointly creating new forms. Finally, in these passages students tended to be viewed as recipients of teaching rather than as partners in a shared project.

The study thus points to connections between the pedagogical stance and the teachers' understanding of sustainability issues. Regardless of the teachers' generally positive stance

and commitment to working for sustainability, a divide between two fundamental approaches could be observed. A holistic understanding of sustainability issues as consisting of interconnectedness 'in the world' was coupled to seeing transdisciplinary teaching as natural, and viewing colleagues and students as part of a joint endeavour. By contrast, teachers who saw their own role as primarily transmitting the subject knowledge they had expertise of, also tended to feel that their students should receive the entire content of the curriculum, as learning objectives in the different subjects. Feeling the responsibility of achieving the subject specific aims of the curriculum thus placed them in a dilemma of conflicting prioritisation. They struggled more with the transdisciplinary teaching project, and tended to focus more on sustainability as domains of expertise rather than as a situation in the world.

Results from this study could be compared with the four forms of motivation put forward by Entwistle et al. (1979). Extrinsic motivation in the outcomes of the project was thus observed to be associated with fear of failure. This could be seen in those cases where the teachers did not have a personal understanding of key sustainability issues or where the teacher believed that their responsibility lay in fulfilling the formal requirements of the syllabus.

This has here been called the 'supportive and the complementing' teaching sub-categories among teachers who saw their role as assisting the project, rather than driving it (Category 1). In the interview material, there were also teaching sub-categories which could be understood as expressing a genuine interest in sustainability issues. *Intrinsic interest* included meaning assimilation (Entwistle et al. 1979), and has here been observed in descriptions made by teachers grouped in the 'decisive' teaching sub-category among teachers who exhibited ownership of the project (Category 2).

What Entwistle et al. have called *intrinsic/self-esteem motivation* is characterised as motivation linked to achievement, and depends on the maintenance of self-esteem (Entwistle et al.1979). This form of motivation has here been labelled 'hope for success', and was associated with the 'multi-dimensional' teaching sub-category, with opportunities and challenges in category 2. Within the context of transdisciplinary teaching for GLSD, all these forms of motivation enable contributions to educational development in various ways (Corno and Kanfer 1993).

Finally, what has here been qualified as the ‘disheartened’ teaching sub-category within Category 1 could be associated with the fourth type of motivation described by Entwistle, the *idle and unmotivated*. It could be interpreted as a disillusioned sub-category that also represents absence of a conscious approach (Entwistle et al. 1979), lack of will-power or volition (Corno and Kanfer 1993; Scheunplug 2011). In other words, it is both a matter of having available resources and strategies to deal with challenges that do arise, and a matter of understanding the point of the efforts. For many teachers, teaching of ESD is unfamiliar and difficult to grasp.

Conclusions

The study has investigated variations in ways of experiencing how transdisciplinary teaching was conducted in the course of an educational development project. The whole teaching-learning environment relies on the extended responsibility of a group of teachers planning and organizing their collaborative education and development project. The educational development project ‘City Planning and Sustainable Development’ was highly complex, involving local and global dimensions (Norden 2008), as well as supposing transdisciplinary work, creativity and collaboration. The local dimension of students learning required knowledge of local everyday acting, taking a stance, and institutional regulations, laws and other important aspects of designing a city plan. At the same time, students needed to keep in mind complex interrelationships between local and global phenomena, and consider the wider impacts of decisions taken locally.

Central in the results was the experience of teaching ESD as a "how" rather than a "what", in particular with respect to Global Learning for Sustainable Development (GLSD). The teachers in the project were thereby challenged to change towards a transdisciplinary teaching approach that provided important synergies and complementary pedagogical qualities in relation to education for sustainable development. Transdisciplinarity was called for to the extent that ESD was in this project not merely a limited outcome prescribed in the syllabus of an individual subject (cf Hoare et al. 2008). Instead, it involved students thinking creatively and working collectively on a large project. Importantly, the project had time to develop over an extended period, which allowed progressive refinement of the collaborative forms that were required to work with this specific context for learning and teaching.

Results point to an interrelationship between teachers' feeling of 'ownership' of the project (Category 2) and their ability to reconceptualise strategies and practices. When teachers expressed ownership of the project, subject matter was experienced in a transdisciplinary framework from the outset. By contrast, when teachers saw their role as contributing, following or assisting in the project (Category 1) they appeared to be more easily overwhelmed by the difficulties.

Based upon the experiences from this educational development project, it can be argued that at the outset of any project, there is likely to be a variation among the teachers in motivation, engagement and understanding of the issues at stake. As a consequence, there will be interaction between different stances and different perceptions of teachers' roles. Additionally, such perceptions will evolve over time, as a function of inter-teacher dynamics, and also as a function of how well equipped teachers are to meet the expectations placed on the project. Here, it is particularly important to consider that, just as for student learning processes, teacher learning processes need to be rooted in meaningfulness. Throughout a project, teachers have to see the point in what they are doing. They need to have a sense of what they are striving to achieve, and why. They need power of using their will, because without conscious volition (Corno and Kanfer 1993) intentional efforts will not be taken towards reconceptualisation. This does not only apply to the overall general purpose of a project, but also to the details of its pedagogical implementation in practice.

The teachers' or students' intention to understand may not always lead to a deep level of understanding in practice (Meehan and Thomas 2006). *Deep-level process*ing (Entwistle 2009) can be experienced as challenging. From this perspective, results can be interpreted as showing the need for a sufficient basis of critical knowledge capabilities among all teachers involved, enabling them to organise teaching in ways that could support a deep-level approach to learning (Scheunpflug 2011). Before taking on a project of this kind, a certain prior awareness of the significance of transdisciplinarity in Global Learning for Sustainable Development is likely to affect the project outcomes. Nevertheless, the more reactive teaching approach of assisting and taking part may still have the potential of contributing in contexts where development is initiated and driven by others. While considerable focus has been placed until now on finding critical learning aims in sustainability education, equal attention

needs to be devoted to critical aspects of what could be called Global Teaching for Sustainable Development, in view of establishing a research knowledge base that can inform teaching practices.

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The thesis builds on a series of studies on transdisciplinary teaching and deep approaches to learning on environmental and sustainability issues in global–local contexts. This research focuses on the global dimension in education and teaching towards sustainability, and in particular, how the implementation process interacts locally with a global context. Current research interests further include emerging challenges to education in transnational contexts and implications for sustainability education pedagogy.

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