Measuring attitudes towards three values that underlie sustainable development

Tomas Torbjörnsson, Lena Molin & Martin Karlberg

Freedom, equality, solidarity, tolerance, respect for nature and shared responsibility are, according to UN (2000), specific and fundamental values. According to Shepherd et al. (2009), there is a lack of knowledge about the nature of these sustainability values and more research on these values and how they can be measured are needed. The purpose of this article is to present results from a study that aims to develop more knowledge about young people's attitudes towards sustainability. The study focused on three of these fundamental values: respect for nature, solidarity and equality. The methodology was a questionnaire answered by 918 upper secondary students. A new scale was constructed to measure attitudes towards solidarity and equality. The results show significant differences related to gender, urban or rural living and upper secondary program attended. There is also a positive correlation between solidarity and willingness to preserve nature.

Keywords: survey, attitudes, values, respect for nature, solidarity, equality, education for sustainable development.

Introduction

Values linked to sustainable development have been formulated by the Earth Charter (2000), the World Summit on Sustainable Development (WSSD 2002) and the Global Scenario Group (Raskin et al. 2002). According to Antony Leiserowitz (2006), the fundamental

Tomas Torbjörnsson is a doctoral student at the Department of Education, Uppsala University, SE-750 02 Uppsala, Sweden. E-mail: tomas.torbjornsson@edu.uu.se
Lena Molin, PhD in Social and Economic Geography and Senior Lecturer in Didactics at the Department of Education, Uppsala University, SE-750 02 Uppsala, Sweden. E-mail: lena.molin@edu.uu.se
Martin Karlberg, PhD and Senior Lecturer in Didactics at the Department of Education, Uppsala University, SE-750 02 Sweden. E-mail: martin.karlberg@edu.uu.se

values necessary to achieve sustainable development are presented only in the Millennium Declaration (UN 2000). These key values are freedom, equality, solidarity, tolerance, respect for nature and shared responsibility. Policy documents from the UN and UNESCO, where sustainable development and education for sustainable development (ESD) are treated, stress the importance of changing people's values so that attitudes and behaviors can contribute to sustainable development. Local to global curriculums also emphasize the importance of developing ESD (Scott & Gough 2004), and several studies (Bonnett 2002, Crompton & Kasser 2009, Hay 2005, 2006) have highlighted the need for changes in attitudes to improve sustainable development. Leiserowitz et al. (2006) called for more research on how the different values, attitudes and actions related to sustainable development reinforce or contradict each other and on identifying groups that include various combinations of values, attitudes and actions. Despite their great importance, Dean Shepherd (2009) stated that little is known about to what extent the key values actually contribute to or hinder sustainable development.

The study reported in this article focuses on three of the key values underlying the UN Millennium Declaration: respect for nature, solidarity and equality. Respect for nature is related to the environmental dimension of sustainable development and is in the present study expressed by a combination of attitudes to the preservation and utilization of nature. The choice of solidarity and equality is based on their connection to the social and economic dimensions of sustainable development. We will also investigate whether solidarity contributes to equality or whether solidarity is a consequence of equality.

The purpose of this article is to present a new measurement tool designed to measure students' attitudes to solidarity and equality and to discuss the results of a study where this tool was used to develop more knowledge about the landscape of young people's attitudes. This study examines how students' attitudes to nature and to the environment are related to attitudes regarding responsibility for other people (solidarity) and resource allocation (equality). The study looks for correlations between attitudes towards these values and how different attitudes are distributed among Swedish upper secondary students based on gender, upper secondary program and urban or rural living.

The article is organized in four sections. The first section briefly reviews research on young peoples' attitudes towards sustainable development. The second section presents the measure instruments used in the study to measure students' attitudes towards three fundamental values that underlie sustainable development; respect for nature,

solidarity and equality. Section three presents the method and results of an empirical study, a web-based survey, answered by 918 students at six different upper secondary schools. The final section discusses some implications of these results.

Research review

During the 1980s and '90s, the SOM (Society Opinion Media) Institute carried out attitude surveys in which people aged 15–30 explained how important they considered 26 different values such as equality, solidarity and a clean world. From the results, Henric Oscarsson (2002, p. 8) concluded that the underlying values that govern human attitudes are stable and change slowly in Sweden. Another finding was that family socialization is less important than was expected. Only for eight of the 26 tested values were there statistically significant differences between groups according to socio-economic background. (Oscarsson 2002) also explained that an extension of the adolescent period had occurred, which means that young people are affected by secondary socialization over a longer period. This further means that level of education, as a predictor of attitudinal difference, tends to decline in strength when a higher proportion of young people acquire a higher education. However, there were large differences in attitudes between adolescents with different types of education. Equality was most highly valued by young people that studied humanities and social sciences. One reason was that these are female-dominated programs and women valued equality more than men did. Indeed, educational content seemed to play a larger role than did gender as a factor in explaining the strength of equality. There were clear gender differences in most of the different values. Equality was valued important for 74 percent of young women but only for 53 percent of men, while men valued technological development, wealth and power twice as high as women did (Oscarsson 2002, p. 82).

Helen Klöfver (1995) suggested that differences in adolescent's environmental commitment can be explained by variations in social life within the groups studied. Similar conclusions were drawn by Jan Carle (2000, p. 203) who stated that environmental concern seems to be related to views on other social issues in what might be called a solidarity dimension and an internationally oriented view dimension. Carle also showed that women prioritize environmental issues higher than do men. Although some differences in environmental attitudes could be linked to variables such as education, class, age and occupation, gender difference was the only social factor that had

a significant correlation with views on various environmental issues (Carle 2000, p. 207).

Leif Östman (2003) found that Swedish pupils generally have positive attitudes towards sustainable development and that there is also a greater interest in global environmental issues than in local ones. This conclusion was also supported by Maja Lundahl et al. (2006). Skolverket (2004) showed that girls are more empathetic as shown in the fundamental values of school curricula (see also Oscarsson 2005, p. 33). The fact that young people are worried about environmental problems does not necessarily mean that they feel bad. Maria Ojala (2007) found that a feeling of anxiety instead could be a driver for an engagement that leads to increased well-being. Birgitta Löwander and Anders Lange (2010) showed that pupils' tolerant and intolerant attitudes are clearly linked with socio-cultural and economic background. Pupils with highly educated and well-paid parents expressed more tolerant attitudes than did pupils from areas of high unemployment, low incomes and high proportions of immigrants. They also found clear differences related to gender and high school programs. Pupils in academic programs had more tolerant attitudes than did pupils in vocational programs, and girls showed significantly more positive attitudes towards vulnerable groups than did boys.

Green at fifteen (OECD-PISA 2009) is a sub-study of the 2006 PISA (OECD-PISA 2007) where environmental issues are specially studied. The results showed that Swedish pupils' attitudes differ clearly from the OECD average in some areas. The sense of responsibility for environmental problems is much lower among Swedish adolescents compared with the average. Meanwhile, Swedish adolescents are slightly more optimistic than the OECD average in terms of opportunities to solve environmental problems. Swedish pupils' awareness of complex environmental issues is below average in terms the consequences of deforestation, acid rain and development of GM crops, but slightly above the OECD in terms of their awareness of the problems related to nuclear waste and global warming. Gender differences in attitudes towards environmental issues were small. The general picture for OECD countries is that boys have a higher awareness of environmental issues and are slightly more optimistic about the possibilities of solving environmental problems, while girls feel more environmentally responsible. In Sweden, the gender gap is clearly higher than the OECD average in terms of the sense of responsibility for environmental problems. Girls feel more responsible than do boys.

In a Dutch study (Coertjens et al. 2010), nearly 5000 pupils taking part in PISA 2006 (OECD-PISA 2007) were analyzed. In addition to socio-economic differences, differences between environmental

education in schools were also analyzed. The study also made a distinction between environmental attitudes and awareness. An unexpected finding was that pupils in vocational programs, in spite of their lower environmental awareness, had more positive environmental attitudes than did pupils in science and engineering programs, even after controlling for gender and socio-cultural background. Because students in vocational programs in Flanders mainly come from homes with limited socio-economic opportunities, researchers saw students' environmental attitudes as proof of the successful adoption of Dutch vocational programs on sustainable housing, living and building. The relationship between environmental attitudes and vocational education has also been reported in Turkey. Ozgur Taskin (2009) found that pupils in vocational programs had less positive environmental attitudes compared with pupils on theoretical courses and suggested that this was because of the drastic decline in the quality of vocational training programs. This literature review has shown that in addition to gender, socio-economic and cultural factors the chosen field of education and its quality may help explain differences in environmental attitudes between groups.

Measure instruments

To measure students' attitudes, a questionnaire was constructed consisting of 28 statements of which the first 16 were inspired by Michael Wiseman and Franz Bogner's (2003) Model of Ecological Values (MEV), as modified by Bruce Johnson and Constantinos Manoli (2008) into The Environmental Questionnaire (TEQ) scale. The TEQ scale is a two-dimensional scale where biocentric and anthropocentric values are measured along two crossing orthogonal scales. The MEV and TEQ scales are evolutions of a previously used one-dimensional scale termed the New Ecological Paradigm (NEP) scale (Dunlap & Liere 1978, Dunlap et al. 2000), where respondents were placed along a continuum between biocentric and anthropocentric endpoints. Using the TEQ scale, the Model of Social Values (MSV) was constructed, where the values of solidarity and equality are measured along two intersecting scales.

Measuring environmental attitudes using the NEP scale

The NEP scale, originally created by Riley Dunlap and Kent Van Liere (1978), has since been developed further with questions adapted to sustainable development. The scale aims to measure the extent to which people subscribe to the NEP, which Dunlap contrasted with the Dominating Social Paradigm. NEP is a product of the environ-

mental consciousness that emerged in the US during the 1970s and is inspired from the Club of Rome report *The Limits of Growth* and the metaphor of the Earth as a spaceship – an oasis in the infinite space (Lundmark 2007).

Several studies have criticized the NEP scale. Scott and Willits (1994) pointed out the difficulty of predicting environmental behavior based on the attitudes respondents say they have. Roxanne Lalonde and Edgar Jackson (2002) argued that the NEP scale is based on oversimplified assumptions and fails to measure how deep-ecology beliefs affect people's attitudes. Kjetil Skogen (1999) and Carina Lundmark (2007) considered that the NEP scale does not capture system-critical starting points for environmentally friendly attitudes and that it is, therefore, difficult to distinguish ecocentric values from anthropocentric. One NEP scale statement is: "If things continue on their present course, we will soon experience a major ecological catastrophe". Lundmark (2007) pointed out that one can agree with this statement from both anthropocentric and ecocentric starting points and that the scale cannot distinguish between these conflicting views.

Measuring environmental attitudes using the TEQ scale

Wiseman and Bogner (2003) believed that one-dimensional scales can only cover limited aspects of the values that constitute a personality. To develop measurement methods one-dimensional "first-order factors"[1] need to be developed into two-dimensional scales to measure "higher-order factors"[2]. These authors apply this in the MEV scale, which assumes that an individual's ecological values are determined by both a biocentric dimension reflecting the view of nature protection and conservation (preservation), and an anthropocentric dimension reflecting the view of the exploitation of natural resources (utilization) (Wiseman & Bogner 2003, p. 787). The model, therefore, acknowledges a respondent to be placed in one of four fields instead of close to one or the other end of a continuum between anthropocentric and biocentric values. Respect for nature thus can be based on nature's intrinsic value, the human need for nature or a combination of these dimensions. The MEV scale (Bogner & Wiseman 1999) together with the NEP scale (Dunlap et al. 2000) amount to the TEQ scale developed by Johnson and Manoli (2008). This scale has 16 statements that have been translated into Swedish in the present study. The first nine statements measure attitudes towards preservation and statements 10–16 measure attitudes towards utilization.
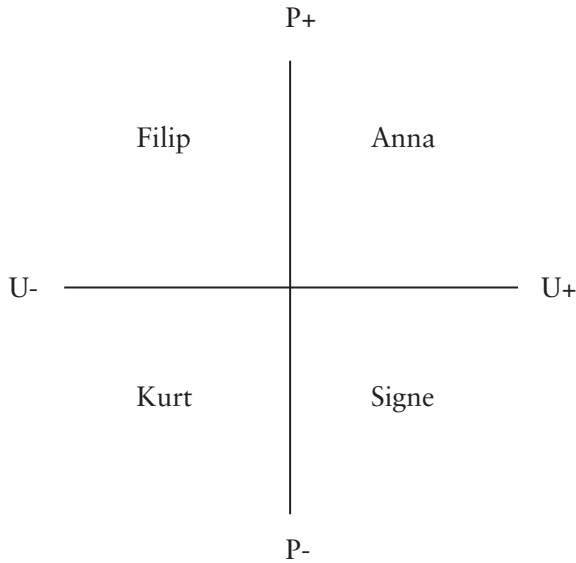
```
                              P+
                               │
                               │
            Filip              │         Anna
                               │
                               │
  U-  ──────────────────────────────────────────────  U+
                               │
                               │
            Kurt               │         Signe
                               │
                               │
                              P-
```

Figure 1. Basic positions of the two-dimensional TEQ scale. The vertical axis measures attitudes towards preservation; the horizontal axis measures attitudes to utilization. P + indicates positive attitudes towards preservation, while P – means negative attitudes. Positive attitudes to the utilization of nature place a respondent near the U + and negative attitudes, near U –.

Filip represents a typical "green" position with a strong desire to protect nature (P +) in combination with restraint in his utilization (U –). Anna combines a strong desire to protect the environment (P +) with the conviction that nature is meant to provide people with resources (U +). The apparent contradiction between these positions would be neutralized in the one-dimensional NEP scale and Anna would probably end up near the middle, indicating the erroneous conclusion that she has vague ideas about nature and the environment. Kurt's position rather signals a lack of interest in the problem area (U –, P –), while Signe belongs to the category that are indifferent about the protection of nature (P) and sees nature primarily as a source of raw materials for human needs (U).

To operationalize solidarity

Solidarity is often imprecise. It can be seen as something that draws its meaning from its context, or perhaps from a tradition that is considered too obvious to need to clarify (Liedman 1999, p. 24). Per Svensson (1998) distinguished between an abstract, formalized meaning and

personal empathy and identification. In the latter form, identification is the key to interpretation. Who has the ability to identify us? The tension between ability to include all or only a certain category is reflected in the survey questions, which are formulated with the aim of capturing two aspects of solidarity: who do I include that I am ready to help and who do I include that Sweden has a responsibility to help. An interpretation that the width of solidarity is determined by the extent of the group an individual can identify with is based on Richard Rorty (1989). According to him, solidarity is always directed against "one of us" and "us" cannot mean all of humanity (Rorty 1989, p. 191). He argues that morality is not an inherent universal human trait; it arises only in relation to the society we live in and Rorty does not see humanity as a moral entity. However, he says that the circle of those who we feel solidarity to can be widened. "We can work, through literature, metaphor and imagination, to increase our sensitivity to cruelty, thereby expanding the notion of we" (Festenstein & Thompson 2001, p. 191).

To operationalize equality

Equality is a difficult concept because it is often confused with justice. In the design of the survey questions, equality is defined as an economic distribution principle and not as a principle for gender justice. A complicating factor is that unequal distribution can be accepted from completely different points of departure according to how one connects justice to equality. The unequal distribution of income, as stated by John Rawls (1999), can then be seen as fair if the allocation means that even the most deprived benefit from it. High salaries to business leaders can then be justified if it not only means that they work harder to increase production but also that societal allocation mechanisms make sure the most deprived are better off than if managers had lower wages. Under this view, equality has no intrinsic value, and it is also possible to argue that inequality can lead to greater justice. A conflicting starting point to accept inequality is based on Robert Nozick (1974) who opposes all forms of welfare or income distribution policy and claims "retain justice", which means that what is legitimately acquired shall be kept even if it means that the most deprived come out even worse. On a one-dimensional scale from equality to inequality, an individual that advocates inequality as a means to a better deal for the poorest can end up in the company of an individual that advocates inequality as a goal of self-worth. The questionnaire is designed to simply measure how strongly respondents advocate an equal sharing, but when interpreting the results you cannot ignore the possibility that fairness also has been factored in by respondents.

S+

Anna   Filip

E- ————————————|———————————— E+

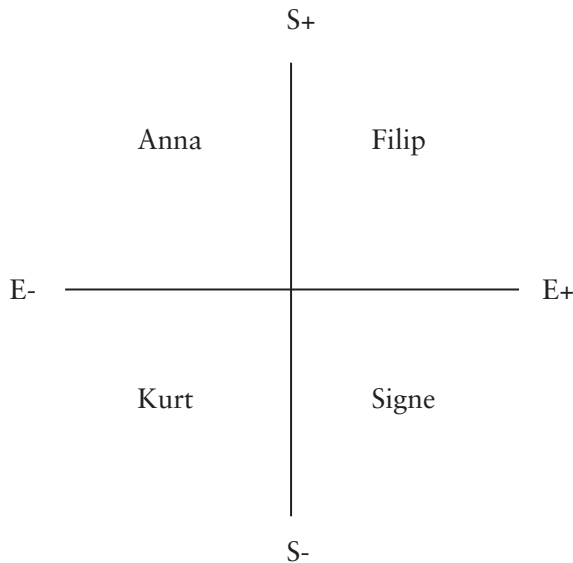Kurt   Signe

S-

Figure 2. Basic positions of the two-dimensional MSV scale. The vertical axis measures attitudes to solidarity and the horizontal measures attitudes to equality.

Anna is willing to show solidarity with people far beyond her own neighborhood (S +) while accepting large income gaps (E –) and seeing individual charity as a suitable form of assistance. Filip both advocates solidarity with a wide circle (S +) and an equal distribution of resources (E +). He also thinks that the state should have a generous state aid policy. Kurt thinks neither he nor Sweden has a responsibility to help people in other countries (S –) and think large income differences are good (E –). Signe advocates an equal distribution (E +) but is not willing to show solidarity with anyone other than those belonging to her inner circle (S).

The study

A web-based survey, directed to 1427 pupils in grade 1, aged 16, at six different upper secondary schools, was carried out at the end of 2009. The response rate was 64 percent (*N*=918). A third of the students were on social science or aesthetic programs, one-third were on scientific or technical programs and the last third were on vocational programs. A quarter of the students lived in rural municipalities and the other three-quarters in a major city. Respondents answered the questionnaire's 28 statements on a five-point rating scale (1 = *disagree*, 5 = *fully agree*). In

the questionnaire's first part, the students took a position on statements regarding preservation and protecting nature and the utilization of nature for human needs. This part of the questionnaire aimed to capture the power of biocentric and anthropocentric values. In the questionnaire's second part, students took sides about helping people at various distances and different ways to allocate income and resources between people. These statements measured how solidarity and equality were valued.

Table 1. The statements of the questionnaire

Biocentric values (B)
1. If I have extra money. I will give some to help protect nature.
2. I would help raise money to protect nature.
3. I try to tell others that nature is important.
4. To save energy in the winter, I make sure the heat in my room is not on too high.
5. I always turn off the light in my room when I don't need it anymore.
6. I try to save water by taking shorter showers or by turning off the water when I brush my teeth.
7. In the summer, I really enjoy seeing butterflies fly and hearing birds sing.
8. I really enjoy the possibility of moving freely in nature.
9. I feel good in the silence of nature.

Anthropocentric values (A)
10. People have the right to change nature.
11. I like a grass lawn more than a place where grass and flowers grow on their own.
12. To feed people, nature must be cleared to grow food.
13. Weeds should be killed because they take up space from plants we need.
14. Building new roads is so important that trees should be cut down.
15. Because mosquitoes live in marshes and swamps, it would be better to drain these and use them for farming.
16. People are supposed to rule over the rest of the nature.

Values of solidarity (S)
17. I can imagine donating money to help poor people in a country far from Sweden.
18. I can think of helping raising money for poor people in a country far from Sweden.
19. I am willing to donate $15 per month of my student grant if the money goes to building schools in Afghanistan.
20. I think it is more important to help people that live near me than people that live far away.
21. The best way is to let each country to solve its own problems.
22. We, who are living in Sweden, have a responsibility to help people in poorer countries.

Values of equality (E)
23. Large wage differences are good because they motivate people to work harder.
24. I believe that all workers should have approximately the same pay.
25. Differences between rich and poor are needed because this gives the poor something to fight for.
26. To share with others is important to me because it makes me feel good.
27. It is more important that all children in the world go to school than school meals are free for students in Sweden.
28. If I become rich or poor in the future depends on myself.

Measuring internal consistency

Cronbach's alpha (α) was used to statistically determine to what extent the different questions measured a latent phenomenon. Cronbach's alpha specifies the internal consistency of the subscales. A guideline is that internal consistency should be higher than .60 but not higher than .95 (Nunnally & Bernstein 1994, p. 265). Item 28 was deleted in the subscale concerning equality. The internal consistency of the subscale was .37 (α) before the deletion of item 28. Table 2 shows that the reliability was satisfactory for all subscales except the subscale concerning equality.

Table 2. The internal consistency of the subscales.

Value	Item	Internal consistency
Biocentrism	1–9	.85
Anthropocentrism	10–16	.75
Solidarity	17–22	.77
Equality	23–27	.49

Results

The answers in the questionnaire were dichotomized. Those that responded with 4 or 5 in the questionnaire were included in the group "agree". Attitudes are seen as an expression of the four underlying values biocentrism, anthropocentrism, solidarity and equality. Correlations and differences between the values were analyzed to provide a picture of how they were related to each other.

Differences between men and women

In the study, 451 men and 467 women were included. There were statistically significant differences between men and women in attitudes on all scales. Women had a more favorable attitude towards the preservation of nature (M = 3.11)[3] than did men (M = 2.77). This difference was statistically significant [$F(1,915)$ = 35.60, p < .01]. Women agreed to a higher degree than did men on all statements regarding the preservation of nature. The difference was most apparent for statements regarding the essential experiences of nature.

Men (M = 2.72) had a more favorable attitude towards the utilization of nature than did women (M = 2.43. This difference was statistically significant [$F(1,916)$ = 34.39, p < .01]. A clear minority of both genders agreed that *it is the intention that man controls nature* but men (18%) were three times more likely to agree than were women (6%). Women (M = 3.34) had a more favorable attitude towards solidarity compared with men (M = 2.73). Even this difference was statistically significant [$F(1,916)$ = 104.61, p < .01]. Statements measuring attitudes towards solidarity showed the most dramatic gender difference. The proportion of women that agreed with the six statements was between 12 and 32 percentage points higher. The greatest differences emerged on the statements concerning willingness to donate money and helping raise money for poor people in a country far from Sweden. Women were more than twice as likely to agree with these statements, which concerned the ac-

tion of solidarity at the individual level. Gender differences also emerged regarding solidarity at the social level, not requiring individual action. It was, for example, almost twice as likely that women (44%) agreed that Sweden has a responsibility to help people in poorer countries compared with men (26%). Finally, women (M = 3.49) had a more favorable attitude towards equality compared with men (M = 3.08). This difference was also statistically significant [$F(1,916)$ = 58.43, $p < .01$].

Differences between programs

There were statistically significant differences, depending on high school programs, in attitudes towards the importance of the preservation and utilization of nature as well as solidarity and equality [$F(28,887)$ = 5.13, $p < .01$]. There were 29 high school programs in the study so it was not useful to perform the 406 posttests necessary to examine the significant differences between any combinations of high school program. More than 20 of these analyses showed statistically significant differences only by chance. Therefore, high school programs were dichotomized into vocational programs (N = 249) and theoretical programs (N = 647). Social science programs, scientific programs, technical programs, economic programs and a few local programs, where the theoretical elements were obvious, constituted the theoretical programs. The vocational programs included the Hv, El, Li, HR, BF, Ip and Ha[4].

Possible differences in attitudes concerning solidarity, equality and utilization and the preservation of nature were calculated using ANOVA[5] with high school program as the independent variable and the scores of the subscales as the dependent variables. A comparison between students studying at various high school programs showed significant differences; however, they were not as obvious as the differences by gender. Students on vocational programs (M = 2.67) were less favorable about nature preservation than were students on theoretical programs (M = 3.06). This difference was statistically significant [$F(1,914)$ = 40.48, $p < .01$]. The differences regarding attitudes towards the utilization of nature were smaller and not statistically significant [$F(1,915)$ = 0.30, $p > .05$]. The students on vocational high school programs were only slightly more favorable about the utilization of nature (M = 2.60) than were students on theoretical programs (M = 2.57). Students on vocational programs had a less favorable attitude towards solidarity (M = 2.75) compared with students on theoretical programs (M = 3.17). This difference was statistically significant [$F(1,915)$ = 37.21, $p < 0.01$]. Students on theoretical programs, for example, had a more favorable attitude towards donating and raising money for poor people in a country far from Sweden. It was

also regarding these two statements that the greatest difference was found between students on science and technical programs on the one hand and social science and economic programs on the other.

Finally, there was a marginal difference between students on vocational high school programs (M = 3.30) and theoretical programs (M = 3.28) about attitudes to equality. This difference was not statistically significant [F (1,915) = 0.13, p > .05]. Every third vocational student agreed with the statement that *all that work should have approximately the same pay*, twice as many as among the students on theoretical programs. Differences in attitudes between students of vocational programs and theoretical programs were also obvious for the statement *it is more important that all children in the world get the opportunity to go to school than free meals for pupils in Sweden*. More than half of the students on theoretical programs agreed to this statement but only one third of the students on vocational programs did so. There were also significant differences between the students on different theoretical programs. Students on science and technical programs had a more favorable attitude towards saving energy compared with students on social science and economic programs. The strength of anthropocentric values differed little between theoretical and vocational programs. In theoretical programs, students on science and technical programs had more favorable attitudes towards the statements about the human right to change nature. The students on technical and scientific programs had, to a small degree, a more favorable attitude towards clearing weeds and draining wetlands.

Differences between urban and rural areas

The students in the study were grouped on the basis of their zip codes into the urban category (N = 647) or rural category (N = 162). A few students (N = 35) had a zip code that could not be added to any of these categories, and these were sorted out in this analysis. Students that lived in the city had a more favorable attitude towards nature preservation (M = 2.97) compared with students that lived in rural areas (M = 2.80). This difference was statistically significant [F(1,806) = 4.91, p < .05]. Students in the urban category also had a slightly more favorable attitude towards taking advantage of nature (M = 2.61) compared with students in the rural category (M = 2.52). This difference was not statistically significant [F(1,807) = 1.68 p > .05].

Greater differences emerged on values concerning solidarity. Students in the urban category generally had a more favorable attitude towards solidarity (M = 3.11) than did students in the rural category (M = 2.80).

The difference was statistically significant [$F(1,807) = 13.92$, $p < .001$]. Students in the rural category agreed to a lesser degree about statements related to donating and raising money for the poor and that Sweden had a responsibility to help people in poorer countries. The number of students that advocated large wage differences was six percentage points higher among students in rural areas. The proportion of rural students that were in favor of equal pay was 11 percentage points higher than among the students from the city. There were no significant differences in attitudes to equality. Students in rural areas ($M = 3.3$) had a more favorable attitude towards equality compared with students in the city ($M = 3.26$). The difference in attitude to equality, however, was not statistically significant [$F(1,807) = 2.30$, $p > .05$]. In conclusion, the students in the urban category had a more favorable attitude to preserve nature and to solidarity. As for the rest of the values, there were no statistically significant differences.
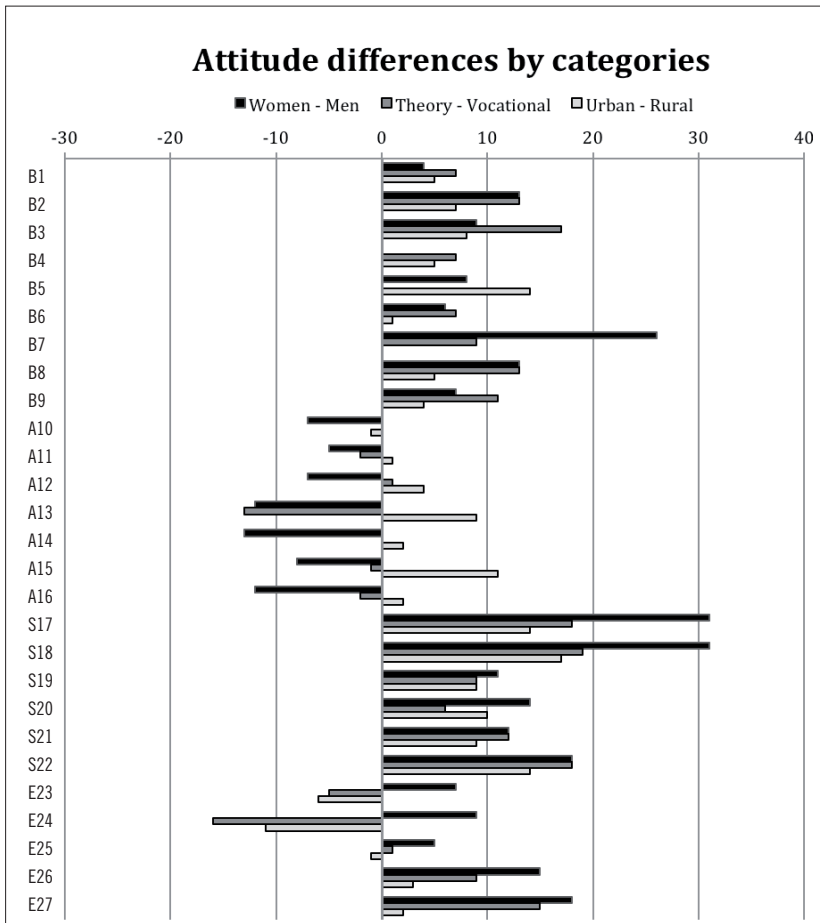

Figure 3. Attitude differences by categories.

Explanation: B1–B9 measures the strength of the biocentric score. A10–A16 measures the anthropocentric score. S17–S22 measures strength in solidarity and E23–E27 measures strength in equality. The black bars show the proportion of young women that agree minus the proportion of young men that agree with each statement. The dark grey bars show the percentage of pupils in theoretical programs that agree minus the percentage of pupils in vocational programs that agree. The light grey bars show the percentage of pupils from the city that agree minus the percentage of pupils from rural areas that agree. When the bars point to the right, it means that women/theory pupils/urban pupils agree to a greater extent than do men/vocational pupils/rural pupils. When the bars point to the left, it means that male/vocational pupils/ rural pupils agree to a greater extent than do women/theory pupils/ city pupils. Example: in statement B1, a four percent higher proportion of women than men agree. In statement A13, a 12 percent higher proportion of men than women agree. In statement B3, pupils from theoretical programs agree to a 17 percent higher extent than do pupils from vocational programs. Note that for questions 20, 21, 23 and 25 the bars are reversed since the statements are negatively formulated.

Correlations between values

Correlation coefficients about .10 are considered to be small, about .30 are considered to be medium, and about .50 are considered to be high (Cohen 1988, pp. 77–81). James Hemphill (2003) argues that the guidelines suggested by Cohen are too strict because only 3% of the correlations in a number of meta-analyses meet the criteria for high correlation. Hemphill (2003) concludes that "Empirical guidelines for interpreting the magnitude of correlation coefficients are, to some extent, artificial" (Hemphill 2003, p. 79). Considering the large sample size in this study, and considering the numerous correlation tests, we choose to follow the guidelines of Cohen (1988). The correlation between biocentric and anthropocentric values was negative ($r = -.15, p < .01$), which means that it is impossible to speak of a clear linear relationship between these values. The positive correlation between biocentric values and solidarity was contrariwise moderately positive ($r = .39, p < .01$). One example is that those that were willing to donate money to protect nature also largely said they were willing to donate money to poor people in a country far away from Sweden ($r = .47, p < .01$). The correlation between biocentric values and equality was moderately positive ($r = .29, p < .01$). Between anthropocentric and solidarity values the correlation was weak ($r = .09, p < .01$) as it was between anthropocentric values and gender ($r = -.05, p < .01$). The strongest correlation between two values was found between solidarity and equality ($r = .49, p < .01$).

Discussion

The main purpose of this article was to present a newly designed measuring tool to measure pupils' attitudes towards solidarity and equality and to discuss the results of a study where the tool was used to develop more knowledge about the landscape of young people's attitudes. Another purpose was to examine the relations between attitudes towards nature and fellow humans. Figure 3, which summarizes the results, shows that young women, pupils in theoretical programs and city residents are more likely to have positive attitudes towards the preservation of nature and also to show solidarity. Attitudes towards the utilization of nature do not exhibit the same regularity. Young men are most supportive, while there are only small differences between the programs and between town and country. The last group of questions shows that young women value equality higher than do men.

Before the results are discussed some methodological lessons learned during the study need to be highlighted. Respondents in the study were residents in two regions that have been affected by structural changes in fundamentally different ways over recent decades. Compared with national differences between major cities and rural municipalities, the two studied regions show greater differences in the educational attainment of the adult population, age composition, population growth and economic growth rate (SCB 2010). Sociological studies show that there are clear regional differences in, for example, how education programs are linked to the social groups that dominate a particular place (Broady & Börjesson 2008). Relations between the level of education in a society and environmental and social attitudes (Löwander & Lange 2010; Oscarsson 2002) are, therefore, a factor to be reckoned with in the further analysis of the results. With reference to the theory of how economic growth leads to an increase in post-material values (Inglehart 1977), there is also reason to believe that the economic disparities between urban and rural areas in the survey are reflected by differences in attitudes.

New insights have also been generated into the usefulness of the scales. The TEQ scale is based on the assumption that biocentric and anthropocentric values are two separate and not necessarily related components of an individual's worldview (Johnson & Manoli 2008). The findings support this assumption by showing a weak correlation between biocentric and anthropocentric values. The correlation between solidarity and equality is much stronger, implying that these values are more difficult to separate from each other and that the MSV scale may need further development to serve as an adequate supplement to the TEQ scale. Operationalizing the concept of solidarity was

satisfactory, while the operationalization of the concept of equality was shown to be incompletely tested. To raise the internal consistency of this subscale question number 28 was excluded. The above reservations concerning the selection of respondents, operationalization of equality and limitations in the TEQ scale must be taken into account before the generalization of the results.

The findings also raise new questions, one of which is how these clear gender differences can be explained. Similar but less marked gender differences have been referred to in previous studies (Carle 2000, OECD-PISA 2009, Oscarsson 2005). Referring to Anna-Lisa Lindén (1994), Carle suggested two dominant theories to explain gender differences in commitment to the environment. One explanation is based on the notion that the differences between men and women's attitudes to the environment can be traced back to the division of society into a production and a reproduction sphere and that women are more subject to the reproduction values with its closeness to life and thus also to future generations. The second explanation assumes that the gender gap occurs because of division of labor between men and women based on the gender–power relationship. Such ratios of male and female superiority and inferiority are expressed as gender differences and behavioral differences in the environmental issue. Young women's stronger environmental concern is consistent with previous studies (Carle 2000, Oscarsson 2005) but the impression from this study is that the gender difference is more obvious than it was in previous surveys. To consolidate or refute that impression, however, requires deeper analysis and more accurate comparisons, so a more developed discussion must wait.

The impact of educational content on pupils' attitudes towards the environment and fellow humans is also visible in this study. The study can confirm the assumptions (Carle 2000, Klöfver 1995) that commitment to the environment is often accompanied by involvement in other social issues, indicating a strong link between caring for nature and caring for other people. The strong correlation between biocentric values and solidarity is an expression of this. In addition, the results have contributed new knowledge by distinguishing biocentric and anthropocentric values as the basis for environmental attitudes. One conclusion is that the specialization of the program seems to be more important for the strength of biocentric and solidarity values than it is for the strength of anthropocentric values.

Wesley Schultz (Schultz 2000) found a positive correlation between caring for others (solidarity) and a concern for nature and interpreted care for nature as an extension of human empathy. This suggests that biospheric values and solidarity are closely related. The

question whether the other values connected to sustainable development contradict or reinforce each other draws attention to the need for the careful operationalization of these values before research starts. One example is that it should be obvious that the relationship between freedom and shared responsibility depends on the definition of freedom. A fruitful point of departure to examine the relations between different values is offered by Paul Stern and Thomas Dietz (1994) value-base theory. This theory explains environmental concern as related to egoistic, social-altruistic and biospheric value orientations and also to beliefs about the consequences of environmental changes for valued objects. Hence, the propensity to act environmentally friendlily or to show solidarity is determined by the degree to which individuals believe that there could be negative consequences for the value object (the individual himself, his fellow humans or the biosphere) that is most highly valued. According to Amartya Sen (2004), human values cannot be ranked because priorities are individual and depend on factors such as gender, sexuality, class and ethnicity, while Martha Nussbaum (2005), based on Aristotle, listed a number of important human values. Oscarsson (2002) highlighted the importance of education for socialization in a general way. An example from the Netherlands on how vocational education can be successfully developed to include environmental issues regarding future housing and construction was highlighted by Liese Coertjens et al. (2010). A challenging ESD education that develops pupils' abilities to respond to a changing future, regardless of their educational focus, needs role models but also theoretical and philosophical underpinnings that open up divergent thinking or what Gunnar Jonsson (2007) terms in Swedish "mångsynthet". What happens in the meeting between teacher and pupil, and which meanings and values these relationships give birth to, will then be in focus.

A well-established research field (Almers 2009, Gustafsson 2010, Lundegård 2007, Lundegård & Wickman 2007, Molin 2006, Svennbeck 2003, Öhman 2006, Östman 1995) can provide guidance when examining these questions and also for the implementation of the new Swedish curricula. Highlighting this issue can counter the risk that the differences between vocational and theoretical programs, regarding ESD, will be reinforced when the element of civic education is reduced for pupils in vocational programs. Education that opens up views beyond the horizon broadens pupils' fields of view and such education can also widen the category of those subject to the pupils' solidarity. For Rorty (1989), solidarity is "[…] a goal to be achieved […] not by inquiry but by imagination, the imaginative portability to see strange people as fellow sufferers… [solidarity] is created by increasing our

sensitivity to the particular details of the pain and humiliation of other, unfamiliar kind of people" (p. xvi). Such a developed sensitivity makes it more difficult to marginalize people that are different by thinking that "They do not feel it as we would" or "There must always be suffering, why not let them suffer?" Rorty believes that the capacity for solidarity means to view a stranger as one of us rather than one of them and that this ability is developed through socialization. "There is nothing deep inside each of us, no common nature, no built-in human solidarity, to use as a moral reference point" (Rorty 1989, p. 177). Thus, attitudes to solidarity are a question of learning, and Rorty sees the primary source of such learning in cultural expressions such as film and literature. The results from the survey showed that the circuit of "we" can be further widened and the curriculum does not raise any obstacles to go far beyond the neighborhood. Contrarily, the curriculum emphasise the importance to let the pupils "be able to see one's own reality in a global context in order to create international solidarity" (Skolverket 2010, p. 6). The fundamental values in the curriculum include "the equal value of all people […] and solidarity with the weak and vulnerable are all values that the school should represent and impart" (Skolverket 2010, p. 3). There is no geographical border specified within which the weak and vulnerable should benefit from solidarity. The new Education Act is even more unconditional in that respect: training must be designed in accordance with "equal dignity, equality and solidarity between people" (SFS2010:800 2010). This includes solidarity with all: no one mentioned, no one forgotten.

Notes

1. Psychological term. Individual factors that constitute a personality.
2. Psychological term. Summarizes individual personality determinants in categories such as introvert and extrovert.
3. The variation of Standard Deviation is between .72 and .97 for all mean values reported below.
4. Swedish abbreviations for vocational programs. Hv=Crafts, El=Electricians, Li=Food, HR= Hotel & Restaurant, BF= Childcare, Ip=Industry, Ha= Business
5. ANOVA=ANalysis Of VAriances between groups

References

Almers, Ellen. (2009): *Handlingskompetens för hållbar utveckling: Tre berättelser om vägen dit* [Action Competence for Sustainable Development: Three Stories About the Path Leading There]. Jönköping: Högskolan för lärande och kommunikation.

Bogner, Franz & Wiseman, Michael (1999): Toward measuring adolescent environmental perception. *European Psychologist, 4*(3), 139–151.

Bonnett, Michael (2002): Education for sustainability as a frame of mind. *Environmental Education Research*, *8*(1), 9–20.

Broady, Donald & Börjesson, Martin (2008): En social karta över gymnasieskolan. In Ulf P. Lundgren, ed: *Individ - samhälle - lärande*. Vetenskapsrådets rapportserie 2008:2. Stockholm: Vetenskapsrådet.

Carle, Jan (2000): *Opinion och aktion: en sociologisk studie av ungdomar och miljö* [Opinion and Action: A Sociological study on Youth and Environment]. Göteborg: Göteborg: Sociologiska institutionen, Göteborgs universitet.

Coertjens, Liese; Pauw, Jelle Boeve-de; De Maeyer, Sven & Van Petegem, Peter (2010): Do schools make a difference in their students' environmental attitudes and awareness? Evidence from PISA 2006. *International Journal of Science and Mathematics Education, 8*(3), 497–522.

Cohen, Jacob (1988): *Statistical Power Analysis for the Behavioral Sciences*. Hillsdale: L. Erlbaum Associates.

Crompton, Tom & Kasser, Tim (2009): *Meeting Environmental Challenges: The Role of Human Identity*. Godalming: Panda House.

Dunlap, Riley & Van Liere, Kent (1978): The New Environmental Paradigm. *Journal of Environmental Education, 9*(4), 10–19.

Dunlap, Riley; Van Liere, Kent; Mertig, Angela & Jones, Robert Emmet (2000): Measuring endorsement of the New Ecological Paradigm: A revised NEP scale. *Journal of Social Issues, 56*(3), 425–442.

Eagly, Alice H. & Chaiken, Shelly. (1993): *The Psychology of Attitudes*. Forth Worth: Harcourt Brac & Company.

Earthcharter (2000): *Values and Principles for a Sustainable Future*. The Earth Charter Initiative. Retrieved June 1, 2011 from http://www.earthcharterinaction.org/content/.

Festenstein, Matthew & Thompson, Simon (2001): *Richard Rorty: Critical Dialogues*. Cambridge: Polity.

Gustafsson, Barbro (2010): *Undersökningar av sociovetenskapliga samtal i naturvetenskaplig Utbildning* [Studies of Socioscientific Discussions in Science Education]. Växjö: Linnaeus University Press.

Hay, Robert (2005): Becoming ecosynchronous, part 1. The root causes of our unsustainable way of life. *Sustainable Development, 13*(5), 311–325.

Hay, Robert (2006): Becoming ecosynchronous, part 2. *Sustainable Development, 14*(1), 1–15.

Hemphill, James (2003): Interpreting the magnitude of correlation coefficients. *The American Psychologist, 58*(1), 78–79.

Inglehart, Ronald (1977): *The Silent Revolution: Changing Values and Political Styles Among Western Publics*. Princeton, N.J.: Princeton U.P.

Jagers, Sverker; Martinsson; Johan & Nilsson, Andreas (2009): *Kan vi påverka folks miljöattityder genom information? En analys av radiosatsningen "klimatfeber"* [Can we Affect People's Environmental Attitudes With Information? An Analysis of the Radio Program "Climate Fever"]. Stockholm: Regeringskansliet, Finansdepartementet.

Johnson, Bruce & Manoli, Constantinos (2008): Using Bogner and Wiseman's Model of Ecological Values to measure the impact of an earth education programme on children's environmental perceptions. *Environmental Education Research, 14*(2), 115–127.

Jonsson, Gunnar (2007): *Mångsynthet och mångfald: om lärarstudenters förståelse av och undervisning för hållbar utveckling* [Multiperspectives and Diversity: On Student Teachers Understanding of ESD]. Luleå: Institutionen för utbildningsvetenskap, Luleå tekniska universitet.

Klöfver, Helen (1995): *Miljömedvetande och livsstil bland organiserade ungdomar* [Environmental Attitudes among Organized Youth]. Linköping: Linköpings universitet.

Lalonde, Roxanne & Jackson, Edgar (2002): The New Environmental Paradigm scale: Has it outlived its usefullness. *The Journal of Environmental Education, 33*(4), 28–36.

Leiserowitz, Antony A; Kates, Robert & Parris, Thomas (2006): Sustainability values, attitudes and behaviours: A review of multinational and global trends. *Annual Review of Environment and Resources, 31*, 413–444.

Liedman, Sven-Erik (1999): *Att se sig själv i andra. Om solidaritet.* [To see Oneself in the Others. On Solidarity]. Viborg: Bonnierpocket.

Lindén, Anna-Lisa (1994): *Människa och miljö: om attityder, värderingar, livsstil och Livsform* [Man and Environment: On Attitudes, Values, Life Style and Way of Life]. Stockholm: Carlsson.

Lundahl, Maja; Olsson, Anders & Svensson, Ing-Marie (2006): *Geografikunskap i årskurs 9* [Geographical Knowledge in Ninth Grade]. Rapport från den nationella utvärderingen av grundskolan 2003 (NU03) Samhällsorienterande ämnen. Malmö: Lärarutbildningen, Malmö högskola.

Lundegård, Iann (2007): *På väg mot pluralism: elever i situerade samtal kring hållbar Utveckling* [Towards pluralism: Students in Situated Deliberations on Sustainable Development]. Stockholm: HLS Förlag.

Lundegård, Iann & Wickman, Per-Olof (2007): Conflicts of interest: an indispensable element of education for sustainable development. *Environmental Education Research, 13*(1), 2–15.

Lundmark, Carina (2007): The new ecological paradigm revisited: anchoring the NEP'scale in environmental ethics. *Environmental Education Research, 13*(3), 329–347.

Löwander, Birgitta & Lange, Anders (2010): *Den mångtydiga intoleransen. En studie av gymnasieungdomars attityder läsåret 2009/2010* [The Ambiguity Intolerance. A study of Upper Secondary Pupil's Attitudes]. Stockholm: Forum för levande historia.

Molin, Lena (2006): *Rum, frirum och moral: en studie av skolgeografins innehållsval* [Space, Curriculum Space and Morality: a Study on Content Selection in School Geography]. Uppsala: Department of Social and Economic Geography, Uppsala University.

Nozick, Robert (1974): *Anarchy, state, and Utopia*. Oxford: Blackwell.

Nunnally, Jum C. & Bernstein, Ira H. (1994): *Psychometric Theory*. New York: McGraw-Hill.

Nussbaum, Martha, ed. (2005): *Well-Being. Contracts and Capabilities*. Perth: API Network.

OECD-PISA (2007): *PISA 2006: Science competencies for tomorrow's world*. Volume 1, Analysis. Paris: OECD.

OECD-PISA (2009): *Green at fifteen? How 15-year-olds perform in environmental science and geoscience in PISA 2006*. Paris: OECD.

Ojala, Maria (2007): *Hope and Worry: Exploring Young People's Values, Emotions, and Behavior Regarding Global Environmental Problems*. Örebro Studies in Psychology 11. Örebro University.

Oscarsson, Henric (2002): Ungdomars värderingar. In Henric Oscarsson, ed: *Spår i framtiden* [Traces in the Future]. Göteborg: SOM-institutet, Göteborgs universitet.

Oscarsson, Vilgot (2005): *Elevers syn på globala förhållanden och framtiden*. [Pupil's Views on Global Issues and the Future]. Rapport från den nationella utvärderingen av grundskolan 2003 (NU03) - samhällsorienterande ämnen. Göteborg: Department of Education, University of Gothenburg.

Raskin, Paul; Banuri, Tariq; Gallopin, Gilberto; Gutman, Pablo; Hammond, Al; Kates, Robert & Swart, Robert (2002): *Great Transition; The Promise and Lure of the Times Ahead*. Boston: Stockholm Environment Institute, Global Scenario Group.

Rawls, John (1999): *En teori om rättvisa* [A Theory of Justice]. Göteborg: Daidalos.

Rorty, Richard (1989): *Contingency, Irony, and Solidarity*. Cambridge, New York: Cambridge University Press.

SCB (2010): *Statistikdatabasen* [Statistical database]. Örebro: SCB, www.scb.se.

Schultz, Wesley (2000): Empathizing with nature: The effects of perspective taking on concern for environmental issues. *Journal of Social issues, 56*(3), 391–406.

Schwartz, Shalom (1994): Are there universal aspects in the content and structure of values. *Journal of Social Issues, 50*(4), 19–45.

Scott, David & Willits, Fern (1994): Environmental attitudes and behavior: A Pennsylvania survey. *Environment and Behavior, 26*(2), 239–260.

Scott, William & Gough, Stephen (2004): *Key Issues in Sustainable Development and Learning: A Critical Review*. London: Routledge Falmer.

Sen, Amartya (2004): Capabilities. Lists and public reason: continuing the conversation. *Feminist Economics, 10*(3), 77–80.

SFS2010:800 (2010): Skollagen (2010:800): med Lagen om införande av skollagen (2010:801) [The Education act]. Stockholm: Norstedts juridik.

Shepherd, Dean; Kuskova, Valya & Patzelt, Holger (2009): Measuring the values that underlie sustainable development: The development of a valid scale. *Journal of Economic Psychology, 30*(2), 246–256.

Skogen, Kjetil (1999): Another look at culture and nature: how cultural patterns influence environmental orientation among Norwegian youth. *Acta Sociologica, 42*(3), 223–239.

Skolverket (2004): *Nationella utvärderingen av grundskolan 2003* [National Evaluation: Compulsory School]. Sammanfattande huvudrapport. Stockholm: Skolverket.

Skolverket (2010): *Läroplan för grundskolan, förskoleklassen och fritidshemmet*. [Curriculum for the Compulsory School System, the Preschool Class and the Leisure-time Centre]. Stockholm: Utbildningsdepartementet.

Stern, Paul & Dietz, Thomas (1994): The value basis of environmental concern. *Journal of Social Issues, 50*(3), 65–84.

Svennbeck, Margareta (2003): *Omsorg om naturen: om NO-utbildningens selektiva traditioner med fokus på miljöfostran och genus* [Care for Nature. About the Selective Traditions in Science Education, with a Focus on Environmental Education and Gender]. Acta Universitatis Upsaliensis. Uppsala: Uppsala Studies of Education, 104.

Svensson, Per (1998): Solidaritet. In T. Andersson & J. Gardell, eds: *Solidaritet – en antologi*. [Solidarity – An Anthology]. Göteborg: Trots allt.

Taskin, Ozgur (2009): The environmental attitudes of Turkish senior high school students in the context of postmaterialism and the New Environmental Paradigm. *International Journal of Science Education, 31*(4), 481–502.

UN (2000): *The United Nations Millennium Declaration*. New York: United Nations.

Wiseman, Michael & Bogner, Frans X. (2003): A higher-order model of ecological values and its relationship to personality. *Personality and Individual Differences, 34*(5), 783–794.

WSSD (2002): *Report of the World Summit on Sustainable Development*. CONF. 199/20 Johannesburg.

Öhman, Johan (2006): *Den etiska tendensen i utbildning för hållbar utveckling: meningsskapande i ett genomlevandeperspektiv* [The Ethical Tendency in Education for Sustainable Development. A Practical Understanding of Meaning-making]. Örebro: Örebro Studies of Education, 13.

Östman, Leif (1995): *Socialisation och mening: No-utbildning som politiskt och miljömoraliskt problem* [Socialisation and meaning. Science education as a political and environmental-ethical problem]. Acta Universitatis Upsaliensis. Uppsala: Uppsala Studies of Education, 61.

Östman, Leif (2003): *Erfarenhet och situation i handling: en rapport från projektet Lärande i naturvetenskap och teknik* [Experience and situation in action – a report from the project Learning in Science and Technology]. Uppsala: Department of Education, Uppsala University.