Environmental Issues in the Media – Students' Perceptions in the Three Nordic-Baltic Countries

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Abstract

The media, as a source of information, is supposed to have a significant role in effecting people's environmental knowledge and attitudes. The purpose of this study was to find students' perceptions of environmental issues as presented in the media and how students in Finland, Lithuania and Sweden used these media sources in the matters related to environmental issues. The most important source of environmental knowledge was found to be the Internet, followed by newspapers, television, school and education. In their own lives, students discussed environmental issues every day and, to some extent, in social media, discussion forums and blogs. In Finland, newspapers represented the most important source of environmental knowledge; in Lithuania, environmental organisations were the most prevalent, and, in Sweden, it was in a school or educational context. Based on these results, it was concluded that, in order to reach both genders of students in different countries and to more greatly benefit from all sources of information, a variety of media should be used in education for sustainability.
Keywords: higher education, sources of environmental knowledge, educational use of media, environmental issues

Introduction

In the rapidly changing information-based media society, media literacy is becoming increasingly important. Media literacy can be defined as the ability to create meaning from verbal and visual symbols; to choose, question and criticise the information created. It is a skill, a process and a way of thinking (Hansen, 2010; Nurminen, 2001). Much of what most people hear about various issues, such as the greenhouse effect, global warming, ozone depletion, water and air pollution and environmental threats, is likely to come from the media (Esa, 2010; Khalid, 2003). Nurminen (2001) states that the interpretation of media is culturally bound and depends on what individuals have previously experienced.

The mass media range from entertainment to the news media, spanning television, films, books, flyers, newspapers, magazines, radio and the Internet. It can also include publishers, editors, journalists and others who produce, interpret and disseminate information through these tools (Boykoff, 2009). In the 1970s and 1980s, television was the main source of information for both the general public as well as for pupils (Fortner & Lyon, 1985; Ostman & Parker, 1986). This continued up into 2000s (Lewis, 2008). The new media such as the Internet, for instance, have changed students' culture in relation to information. For Finns under 35, for instance, the Internet is nowadays the most followed news channel (Finnish Communications Regulatory Authority [FICORA], 2011).

With relation to social media, for instance, about 15% of American young adults (ages 12–29) are bloggers; adults of 18 upwards use Twitter, but teenagers (aged 12–17) do not use it in large numbers. Facebook has taken over as the social network of choice, and 73% of adult profile owners use it (Lenhart, Pursell, Smith, & Zickuhr, 2010). However, American university students anticipated that in the future, less of their news and information would be gathered from social networking and more from traditional news sources (Lewis, 2008).

There are a number of studies that attempt to explain the characteristics of young peoples' environmental knowledge in relation to the effect of the media (Rickinson, 2001). Differences between students' environmental knowledge are often discussed in terms of the differences in media coverage in varying geographical places. Misunderstandings, evident in students' thinking about environmental issues, are commonly attributed to the nature of media-provided information. Although studies have tended to focus mostly on secondary school pupils, there are also studies on primary school children (Rickinson, 2001). Relatively few studies (Kukkonen, Kärkkäinen, & Keinonen, 2012) have discussed the sources of environmental knowledge among higher education students.

The aim of this study is to analyse university students' use of media as a source of environmental knowledge. There has been little discussion about students' use of media in their studies, particularly in the context of education for sustainability. This being the case, we particularly focused on these questions and concentrated on university students from three different countries. Our goal is to identify from which the media the students primarily obtained information concerning environmental issues and how they used it in learning and teaching.

The following research questions guided this study:
1. *What media do students use to get information about environmental issues?*
2. *How do students use the Internet in discussion about environmental issues?*

3.   *How do students use the media in education in relation to environmental issues?*
4.   *How important do students perceive environmental information obtained from the media to be in relation to their own perception of environmental issues?*
5.   *What kind of similarities and differences can be found between the Nordic-Baltic countries?*
6.   *What kind of similarities and differences can be found between female and male students considering their use and perceptions of the media in relation to environmental issues?*

Sources of Environmental Knowledge

Environmental knowledge most frequently comes from the media (Asunta, 2003; Boykoff, 2009; Lee, 2008). Television and radio were found to be the main sources of information for Finnish pupils aged 12–15; next in priority were the science teachers, newspapers and magazines, parents, other pupils and the Internet. After these sources came movies, friends, conservation organisations, Greenpeace or World Wide Fund for Nature (WWF), municipalities and consumer organisations. In regard to environmental problems, most Finnish pupils had more trust in the information they got from television than from what their science teachers had told them. They also seemed to have more trust in newspapers and the Internet as knowledge sources than did the German pupils. 10% of Finnish pupils and 7.6% of the German pupils taking part in the research gained their information about environmental issues through the Internet. Importantly, as the role of the Internet has grown, the role of television, radio, newspapers and parents, has noticeably diminished. The older the pupils are, the more meaning the Internet has for them (Asunta, 2003).

The most popular form of media among young Hungarian people aged 13–17 was found to be television and the Internet (Katona, Kárász, & Leskó, 2008). Predictably, films on nature and documentaries were not as popular as music TV, serials and cartoons. Significantly, however, when students were asked what they thought about environmentally related programmes on television, about a third of the students thought that there should be more of them. However, the printed media on environmental issues such as local and international nature journals were not popular at all. Only a few students said that they read these, and most of them did not even know they existed. While most students thought that the media did affect their environmental awareness, they did not know whether the effect was positive or negative (Katona et al., 2008).

Recently, Finnish university students' main sources of information about environmental issues were found to be television, newspapers and the Internet; the role of these was about the same (Kukkonen et al., 2012). Television was also the college students' major source of information on environmental news concerning local, national and global environmental problems (Lee, 2008). The Internet was the second one, and daily newspapers and government sources were the students' least used sources. In relation to local and national issues, the third source was family and friends, although, concerning global issues, multiple sources were used (Lacy, Riffe, & Varouhakis, 2007; Lee, 2008).

The growth of the Internet may well be reshaping patterns of media use. At the global level, respondents who used the Internet were most likely to use television news as an additional environmental news source (Lacy et al., 2007). Riffe and Reimold (2008) referred to the increasingly potential role for the Internet to serve as an environ-

mental news source, especially for young people, as well as for environmental news on a national and international scale. The Internet was more frequently cited as being the most useful environmental news source for the youngest respondents (18–24 year-olds). However, based on their study, Riffe and Reimold (2008) also agreed that, even in the Internet Age, newspapers are significant for delivering more localised environmental news and information; television is still the primary news source for young people.

Media in Education for Sustainability

In education for sustainability, the media have been used in several ways. Newspaper articles have been published on environmental issues, and these have been used in schools, although newspapers do not appear as a particularly attractive resource because they are typically printed in black and white (Jarman & McClune, 2004). Nature documentaries with pictures, sounds, sources and information about natural environments are more attractive and have been used to enhance environmental sensitivity (Barbas, Paraskevopoulos, & Stamou, 2009; Bahk, 2010). The non-verbal, less conventional documentary is more effective in the development of environmental knowledge and feelings, but equally effective in changing attitudes and beliefs as those that are verbal and 'traditional' (Barbas et al., 2009). Harness and Drossman (2011) reported on a filmmaking project in which students produced two short documentary films: one on recycling and the other one on water conservation. The project promoted students' awareness of environmental issues and increased their environmental literacy. In the case of television, there is a clear differentiation between the direct effects on pro-environmental behaviour of factual-based, versus fictional-based television use, factual-based television use being a significant positive predictor of the criterion variable (Holbert, Kwak, & Shah, 2003). According to Shanahan, Morgan and Stenbjerre (1997), there is essentially no bivariate relationship between television viewing and perceptions of specific threats to the environment such as industrial air pollution or greenhouse effect.

Video presentations have widely been used to facilitate sustainable behaviour, especially in the context of conservation. Regarding the orangutan, Pearson, Dorrian and Litchfield (2011) used visual media to increase knowledge, attitudes and conservation behaviour amongst university students. Using knowledge-based and emotive educational presentation available through the Internet, they found some change in students' behaviour. Conversely, the film "Sharkwater" attempted to negotiate many different problems encountered in the effort to raise an appropriate awareness of environmental issues and to stimulate active engagement in the solution of problems (Hughes, 2011). The employment of video podcasts was also used to support learning and teaching about exotic ecosystems. As the students were able to watch video podcasts as often and whenever they wanted, they preferred to watch podcasts at home and make notes at the same time (Hill & Nelson, 2011). In the undergraduate field course, Roberts (2011) found that the video diary technique was more successful in capturing the development of students' sustainability-related learning than written reflective accounts.

Perhaps, the most well-known film concerning environmental issues is entitled "An Inconvenient Truth". Several countries have even proposed using the film as an educational tool in school classrooms (Nolan, 2010). Watching this film increases knowledge about the causes of global warming, concern for the environment and willingness to

reduce greenhouse gases. This willingness to take action immediately following movie viewing does not, however, necessarily translate into action later (Nolan, 2010). The cinema/movie has also been used as a part of a larger community communication project regarding conservation of the wolf (Bizerril, Soares, & Santos, 2011). With rural communities, using a traveling cinema as an educational tool presented a number of very positive results, the main one being its ability to bring people together, and the whole process involved an increase in affectivity and knowledge. The educational potential of photographs has been studied, and it has been suggested that a discursive use of photographs could be used for conservation purposes (Farnsworth, 2011).

Today, the Net Generation's learning needs demand that educators find innovative ways to teach. Arnold (2011) states that this Net Generation often prefer autonomy when shaping learning experiences, along with the flourish of collaborative learning, the value of online education and enjoying investigative learning that requires extracting information from many sources, in addition to embracing technological innovation, readily asserting opinions, easily using the network and rejecting delayed gratification. In higher education, blogging, online journalism, in which individuals record their learning process on a webpage, has been used in several contexts (Ellison & Wu, 2008; Halic, Lee, Paulus, & Spence, 2010; Kukkonen, Kärkkäinen, Valtonen, & Keinonen, 2011). Facebook has been used as a forum for stories and discussion about news concerning post climate change and using information taken from other websites (Robelia, Greenhow, & Burton, 2011). According to Robelia et al. (2011), people using this social networking application demonstrate an above-average knowledge of climate change science as well as self-reported environmental behaviour that increases during young people's involvement with the Facebook application.

Method

Participants

The participants were comprised of 429 students from three different countries: Finland (n=307), Lithuania (n=59) and Sweden (n=63). The main group of students were pre-service teachers (55.7% of the whole sample), and 75.1% of the participants were female (Table 1). 31.9% of the students were less than 22 years old, 29.6% were aged 22–24, 11.4% were aged 25–26 and 26.6% were over 26 years. Almost half of the students (46.9%) had grown up in rural areas, 24.9% – in a small town (under 50,000 inhabitants), 14% – in a medium sized city (50,000–100,000 inhabitants) and 14.2% – in big cities (over 100,000 inhabitants).

Table 1
Students (n=429) and Their Study Programmes

Study Programme	Gender					
	Male		Female		Subtotal	
	Count	n (%)	Count	n (%)	Count	n (%)
Teacher Programmes	51	48	253	79	304	71
Other Programmes (Social Science, Engineering, Forest Science)	56	52	69	21	125	29
Subtotal	107	100	322	100	429	100

Data Collection

This study is both quantitative and qualitative in nature. Data was collected through an internet-based or paper questionnaire that contained a total of 21 questions. This involved both multiple choice and open-ended questions. In 2010, a pilot study of 63 students was made; the questionnaire was tested and subsequently reformed for use in this study.

The questionnaire began by asking for demographic information; namely, the university, study programme, gender, age, how many years of studies and where the participants had grown up. The English questionnaire, which had been developed by the researchers, was translated into the three different languages (Finnish, Lithuanian and Swedish). The Swedish version was used both in Sweden and in the Swedish speaking area in Finland; the rest of the Finnish participants answered using the Finnish version of the internet-based questionnaire. Data was collected from three different Finnish universities and from one university in Sweden and Lithuania, respectively. Lithuanian pre-service teachers were able to answer the questionnaire in a computer classroom. In one of the Finnish universities, students were given the opportunity to answer the questionnaire during the lectures. It took 15 to 30 minutes for students to fill in the questionnaire. Data collection took place in the winter of 2012. In this paper, we report the findings related to 7 of the questions, and the questions are shown in Table 2.

All the participants in the study were informed about the study; the participation was voluntary, and the questionnaires were completely anonymously. The empirical data was available only for the researchers on the project.

Table 2
The Seven Questions Asked and Reported in This Study and the Multiple-Choice Alternatives

No	Question	Response form and alternatives
1	2	3
1	Have you used information from the media for environmental issues in school or educational courses?	Examples
2	Where do you get information about environmental issues from?	Newspapers; the Internet; radio; television (including the Internet-television); journals/magazines; books; information pamphlets; political parties; friends; family; school; environmental organisations etc.
3	Write the names of the three types of media you most often use, when you get information about environmental issues.	Open answer
4	Do you discuss environmental issues?	Every day; once a week; once a month; seldom or never; in real life; on social media; on a blog; on a discussion forum etc.
5	If you discuss environmental issues in social media, which environmentally related topics do you discuss?	Environmental problems; sustainable lifestyle issues; technology and environment; man-nature relationship etc.

Sequel to Table 2.

1	2	3
6	How important is the information you get from the media for your own perception of the environmental issues mentioned in the preceding question?	Open answer
7	What kind of source do you find the most reliable as far as information about environmental issues is concerned?	Newspapers; the Internet; radio; television (including the Internet-television); journals/magazines; books; information pamphlets; political parties; friends; family; school; environmental organisations etc.

Analysis

The analysis focused on the ranking of the most important sources used by the students relating to environmental issues as well as the students' educational use of media. Due to the nature of the variables, the chi-square test was used. A scheme for coding the open answers was data-based, developed by one research institute and refined by the others. The result was a manual for constructing categories from the open answers, and each answer was read through by at least two researchers to ensure reliability in the interpretation and coding. An exception was made concerning the Lithuanian responses as only one researcher understood this language.

Results

In the following chapters, the descriptive statistics and frequencies will be shown to present how students generally used the media and how they used it in education. A comparison between countries, females and males will also be shown.

Forms of Media Used by Students to Get Information about Environmental Issues

Students' most important source of environmental knowledge was the Internet, and newspapers, including the web versions of them, were sources of secondary importance (Figure 1). The next most important sources were television, including the Internet-television, school education and journals. The role of blogs, Facebook, Twitter and emailing lists was very insignificant in terms of priority. However, according to the students, as a source of information, the Internet was five times more important than books.

In the open questions, when students were asked to name the three types of media they most often used to acquire information about environmental issues, the students most frequently named newspapers as one (Figure 2), followed by television and the Internet; Wikipedia was mentioned in particular. The radio and social media (including blogs and other forms of media) were also chosen to be among the three most used sources of information, even though they were low in priority compared to other sources of information.
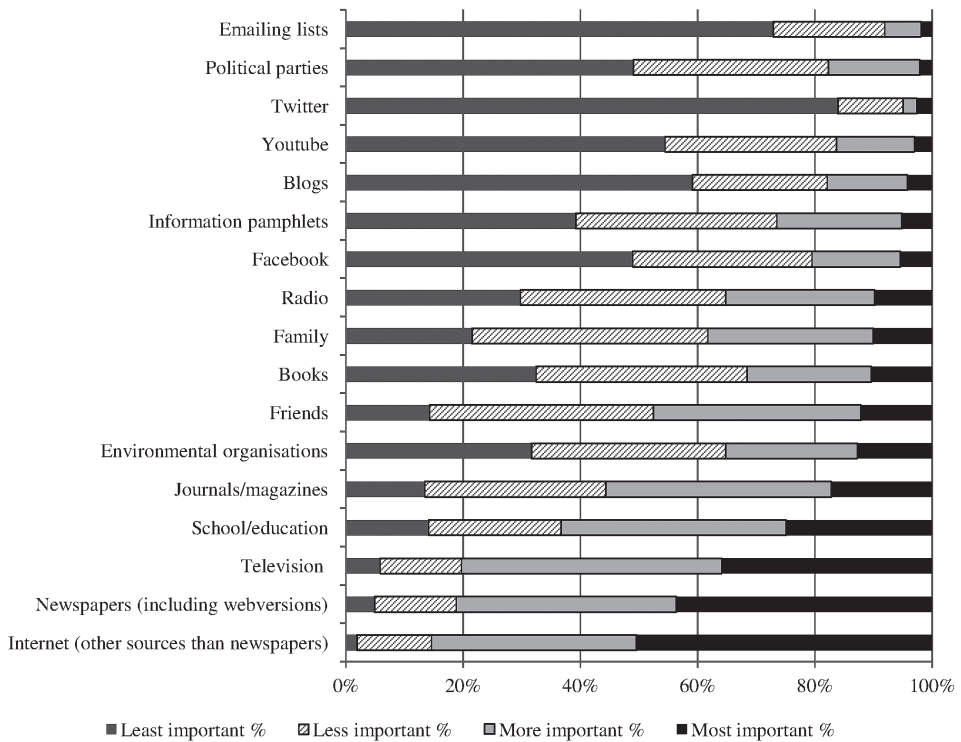
Figure 1. Most important sources of environmental information, as perceived by the students (n=423)
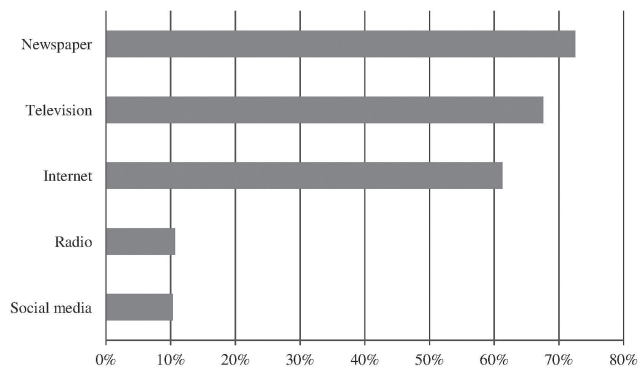

Figure 2. Most often used sources of environmental information, as perceived by the students (n=429)

Environmental Related Issues Discussed by Students on the Internet

Some of the students (8.2%) discussed environmental issues every day, mainly 'in real life' (Figure 3). Even though the role of social media was small in terms of being a source of environmental knowledge, some students (1.2%) conversed on environmental issues every day, also 'in social media'. A few students brought up environmental issues

once a week 'in discussion forums' and 'blogs' whilst almost all the students at times discussed environmental issues 'in real life', but fewer – on the Internet forums.
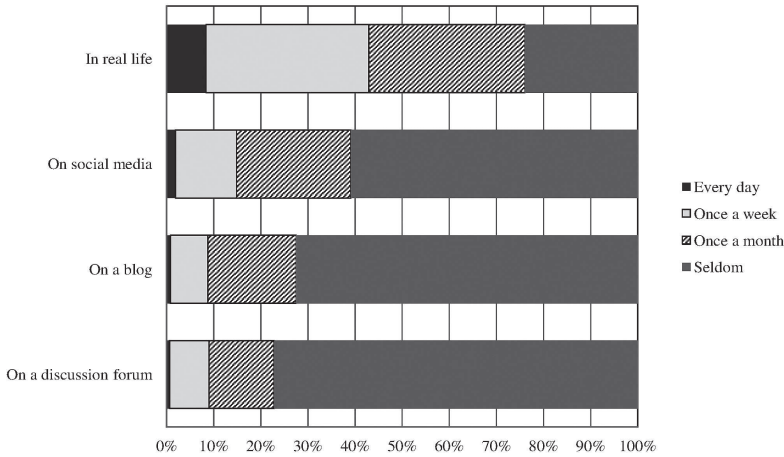

Figure 3. Frequency of students' (n=429) discussions on environmental issues in four different forums

In social media, students talked a lot with their friends about 'sustainable lifestyle' issues (61.5 %), 'environmental problems' (61.3%), 'man-nature relationship' (58.2%) and 'technology and environment' issues (53.4%) (Figure 4). Only a few of the students discussed these issues openly on the Internet, and the vast majority of students did not discuss these issues in social media at all.
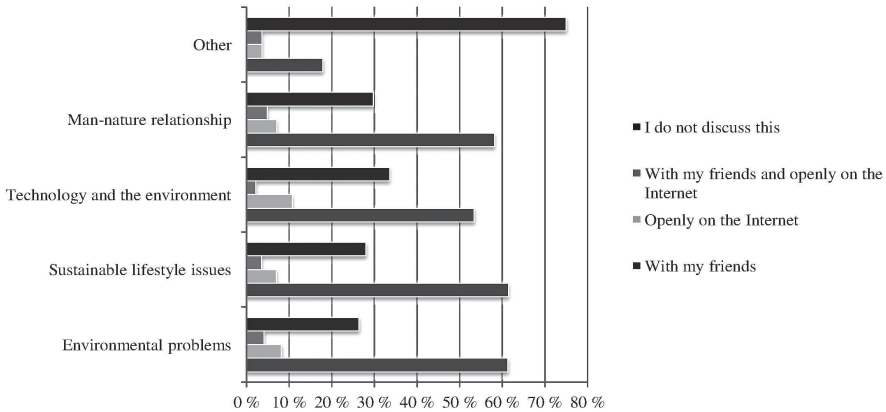
Figure 4. Environmental issues discussed by students (n=429) in social media

Students' Educational Use of Media in Relation to Environmental Issues

Of all the students, either in school or in study courses in higher education, 55% had used the media as a source of environmental knowledge. In their answers to the open-ended question, students described in a multifaceted way where and how they used information from the media in relation to environmental issues. The purposes of

students' use of media in relation to environmental issues were categorised and shown in Table 3. 'Frequency' expresses how many of the students who answered this open-ended question described the use of media in the category at stake.

Table 3
The Ways or Purposes the Students (n=177) Used the Media in Relation to Environmental Issues

Category	Description of the Category	Frequency	Excerpt
Media	Students informed how they had got information or used the media.	43.5%	*All my knowledge is, in some way, based on the media, mainly on the series "Avara luonto" and different non-fiction books.* *Articles in newspapers are beneficial, for example, about environmental history and teacher training.*
Assignment or some theme	Students mentioned an assignment or a theme.	20.3%	*Assignment in chemistry: pollutants resulting from home and the environment* *The source has been found on the Internet.*
Course	Students named the course in which they had used the media.	6.2%	*On a biology course, we had a task to collect information.* *There was also environmental news.*
Interest or information	Students expressed that the media has aroused their interest or provided additional information.	5.6%	*Large-scale natural catastrophes, such as tsunamis. For the first time, I have found out about them through the media. After that, I have clarified the theory related to them.* *I take some part of the information from the media though there are issues not mentioned by the media at all.*
Teacher training	Students mentioned training.	2.8%	*I became familiar with arguments about climate change, and it was related to lessons that I have given during teacher training.*
Qualifi- cation	Bachelor's or a master's thesis	2.3%	*I am preparing my master's thesis on environmental issues, and, being related to this, I have also considered the coverage of these issues in the media.* *My major subject is environmental policy and law, and therefore I frequently use information from the media in my studies.*
Critical thinking	Students expressed criticism or critical thinking concerning the media.	1.7%	*It is important to keep in mind that there is a lot of inaccurate information on the Internet. Rumours spread faster than the truth.* *I am very critical, and I continue to search for information until I am sure that the information is reliable.*

Students used the media in a multifaceted way; they considered that, although the media are a source of information, the information provided should be critically evaluated. For some students, the media aroused interest in environmental issues or motivated them to search for more information about the issues under consideration. Students mentioned several forms of media: newspapers, documents, non-fiction books, Internet, blogs, Youtube as well as several higher education study courses in which the media were used in relation to environmental issues.

Students' Perceptions of the Influence of Media

In the open-ended question, students were asked how important they considered information obtained from the media to be in relation to their own perception of environmental issues. In their answers to this question, students described the role of media and its influence. The answers were grouped into six categories (Table 4): information, motivation, criticism, positive effect, negative effect and modification of views. The media mainly provided information for students, but it also got them to think about environmental issues, pointing out that the information which is gathered though the media should be considered critically.

Table 4
The Importance of Environmental Information in the Media Regarding Students' (n=212) Own Perceptions

Category	Frequency	%	Excerpts
1	2	3	4
Information	70	33.0	*It provides the most recent information, for example, concerning the development of science and technology.* *You get facts and good arguments through the media.*
Motivation	48	22.6	*The media partly provides information that is political/distorted. I familiarise myself with the issue on my own and through several sources.* *The media contributes and calls attention to current environmental problems. Because of that, the media plays an important role in making us discuss environmental issues.*
Criticism	45	21.2	*Information from the media should be considered critically. The media often only point out negative issues. There is seldom anything constructive about what everyone of us could do for the issue.* *I often trust (believe) what is written in the media, but not always. It depends on what the subject is about.*

1	2	3	4
Effect on action	20	9.4	*Information allows me to consider the consequences of my own actions. In some way, my actions have an influence all around the world, and observing this effect without the media would be impossible. The information I have got has opened my eyes and has made me think about my own lifestyle.*
Affects negatively or does not affect at all	16	7.5	*Rather little, the media is used to increase and colour the issues.* *Not very important, we have the right to think what we want to think about different things.* *The media often exaggerate everything.*
Creates/affects propaganda, perceptions or views	13	6.1	*Through the information acquired from the media, I construct my conception of the issue, thus it influences me totally.* *The influence of media on my own conceptions is rather big, because I daily read either newsletters or their versions on the web. Even though I always read critically, the media is able to make me believe the validity or harmfulness of the issue.* *Important. Through the media, you form your opinion.*

Through the prioritising of given forms of media, students were further asked to assess the reliability of the sources of information in the context of environmental issues (Figure 5).
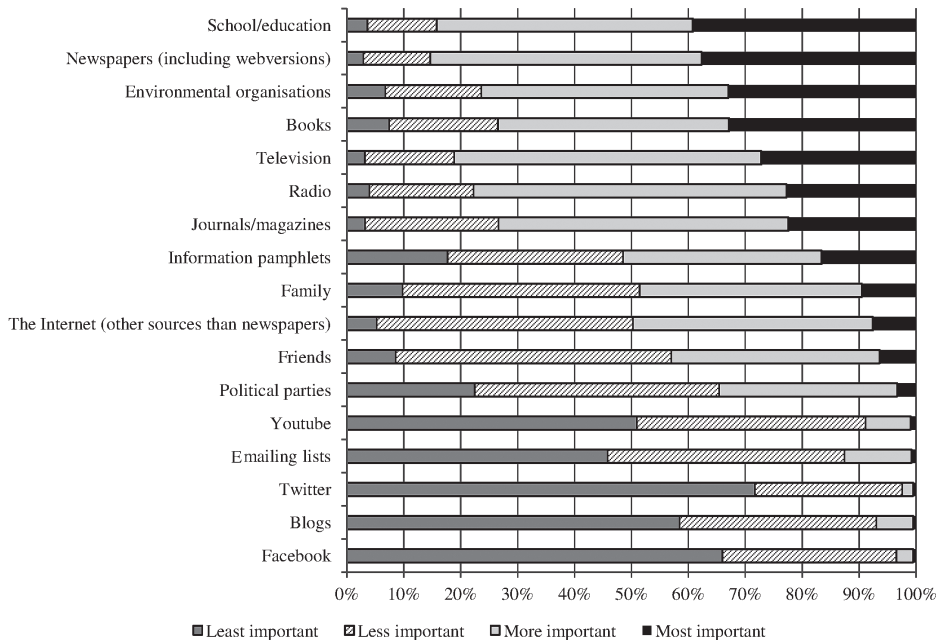

Figure 5. Reliability of different media as perceived by the students (n=429)

Students perceived school/education to be the most reliable source of information concerning environmental issues. The next most important in terms of reliability were newspapers, environmental organisations, books, television, radio, journals and pamphlets. According to the students, although family and friends were not reliable sources of environmental knowledge, the least reliable were Internet forums: Youtube, emailing lists, blogs, Facebook and Twitter.

Differences and Similarities between Countries

In Finland, newspapers (including web-versions) were perceived as being a more important source of information about environmental issues than in Lithuania and Sweden (Table 5). The Swedish students perceived newspapers as being slightly more important than the Lithuanian students.

Table 5

Newspapers as a Source of Information, as Perceived by the Students (n=426) in the Three Countries

$\chi2=12.867$; df=6; p=0.045			Country			
			Finland	Lithuania	Sweden	Total
Newspapers	Least important	Count	10	7	4	21
		% within country	3.3%	11.9%	6.6%	4.9%
	Less important	Count	43	6	10	59
		% within country	14.1%	10.2%	16.4%	13.8%
	More important	Count	109	24	27	160
		% within country	35.6%	40.7%	44.3%	37.6%
	Most important	Count	144	22	20	186
		% within country	47.1%	37.3%	32.8%	43.7%
	Total	Count	306	59	61	426
		% within country	100.0%	100.0%	100.0%	100.0%

Furthermore, radio was considered to be a more important source of environmental knowledge in Lithuania (22.0%) than both in Finland (5.9%) and Sweden (17.5%) ($\chi2=31.614$; df=6, p=0.000) (Table 6). Likewise, information pamphlets, the Internet forums, family and environmental organisations, were statistically significant in terms of more important sources of information in Lithuania than in Finland and Sweden. The roles of radio and school/education were important in Sweden, as was the case in Finland where, after newspapers, the second most important source of information was school/education.

Table 7 presents the reliability of newspapers as a source of information, as perceived by students in the three countries. 42% of the Finnish students perceived newspapers as being the most reliable source of information about environmental issues, and, in all countries, newspapers were considered to be fairly reliable.

Table 6
Information Sources Ranked according to Their Importance by the Students (n=429) in the Three Countries

Media (most important)	Finland	Lithuania	Sweden	χ2 (df=6, p<0.05)
Newspapers	47.1	37.3	32.8	12.867
Radio	5.9	22.0	17.5	36.614
Information pamphlets	2.6	17.2	6.7	31.928
Blogs	2.9	11.9	3.3	44.186
Facebook	2.9	13.6	10.0	18.485
Twitter	1.3	10.2	1.7	57.830
Emailing lists	0.7	6.8	3.3	27.381
Youtube	1.3	12.1	3.3	44.587
Political parties	1.0	5.2	5.0	15.622
Family	7.8	18.6	13.1	29.280
School/education	20.9	33.9	36.9	18.271
Environmental organisations	5.6	45.8	16.9	82.308

Table 7
Reliability of Newspapers as Information Sources, as Perceived by the Students (n=382) in the Three Countries

(χ2=29.526; df=6; p=0.000)		Country			
		Finland	Lithuania	Sweden	Total
Least important	Count	5	1	5	11
	% within country	1.6%	6.2%	8.5%	2.9%
Less important	Count	27	5	13	45
	% within country	8.8%	31.2%	22.0%	11.8%
More important	Count	146	8	28	182
	% within country	47.6%	50.0%	47.5%	47.6%
Most important	Count	129	2	13	144
	% within country	42.0%	12.5%	22.0%	37.7%
Total	Count	307	16	59	382
	% within country	100.0%	100.0%	100.0%	100.0%

(Row group label on left margin: Newspapers)

Table 8 presents the differences found in students' perceptions of reliability: television is slightly more reliable in Sweden than in Finland, but less reliable in Lithuania; journals/magazines are more reliable in Lithuania than in other countries; information pamphlets are not reliable in Sweden, but more reliable in other countries; blogs and emailing lists are more reliable in Lithuania than in Finland, completely unreliable in Sweden; political parties are the most reliable in Sweden, less reliable in Lithuania; friends are more reliable in Sweden than in other countries; family is the most reliable in Sweden; environmental organisations are more reliable in Lithuania, less reliable in Finland.

Table 8
Reliability of Information Sources, as Perceived by the Students (n=382) in the Three Countries

Media (most important as far as reliability is concerned)	Finland	Lithuania	Sweden	χ2 (df=6, p<0.05)
Newspapers	42.0	12.5	22.0	29.526
Television (including the Internet-television)	27.1	17.6	30.5	17.578
Journals/magazines	22.7	29.4	19.0	17.672
Information pamphlets	18.7	17.6	5.3	37.734
Blogs	0.3	5.9	0.0	23.199
Emailing lists	0.3	6.2	0.0	28.668
Political parties	3.0	1.7	6.9	30.799
Friends	5.0	6.8	13.6	14.171
Family	6.6	13.6	20.7	24.166
Environmental organisations	25.2	64.3	43.1	40.435

Importance of Sources of Information as Valued by Males and Females

Newspapers were the most important source of information for 45.3% of females and 38.7% of males and the least important source of information for 3.4% females and 3.4% males (χ2=9.950; df=3; p=0.019) (Table 9).

Table 9
Importance of Newspapers as a Source of Information for Males and Females

(χ2=9.950; df=3; p=0.019)		Gender		
		Male	Female	Total
Least important	Count	10	11	21
	% within gender	9.4%	3.4%	4.9%
Less important	Count	20	39	59
	% within gender	18.9%	12.2%	13.8%
More important	Count	35	125	160
	% within gender	33.0%	39.1%	37.6%
Most important	Count	41	145	186
	% within gender	38.7%	45.3%	43.7%
Total	Count	106	320	426
	% within gender	100.0%	100.0%	100.0%

In comparison with the male students, the female students placed more importance on all sources of information (Table 10).

Here too, in comparison with the male students, the female students perceived newspapers as being a more reliable source of information, however, according to the scale used, not the most reliable (Table 11).

Table 10
Importance of Media for Both Genders (n=429) as an Environmental Information Source of Environmental Issues

Media	Male	Female	χ2 (df=3; p<0.05)
Newspapers	38.7	45.3	9.950
Journals/magazines	9.4	19.8	17.297
Blogs	0.9	5.3	8.960
E-mailings lists	0.9	2.2	8.929
Friends	3.7	15.0	17.367
Family	4.7	11.9	10.031
School/education	17.9	27.3	18.123
Environmental organisations	7.6	14.5	13.006

Table 11
Reliability of Newspapers as an Environmental Information Source, as Perceived by the Students (n=429)

(χ2=20.030; df=3; p=0.000)		Gender		
		Male	Female	Total
Newspapers	Least important			
	Count	8	3	11
	% within gender	7.8%	1.1%	2.9%
	Less important			
	Count	19	26	45
	% within gender	18.4%	9.3%	11.8%
	More important			
	Count	46	136	182
	% within gender	44.7%	48.7%	47.6%
	Most important			
	Count	30	114	144
	% within gender	29.1%	40.9%	37.7%
	Total			
	Count	103	279	382
	% within gender	100.0%	100.0%	100.0%

There were also differences between the genders when perceiving the reliability of other sources of information (Table 12). The Internet was perceived to be more reliable by males rather than by females, but female students perceived the other media to be more reliable, ranking the media according to its reliability as follows: school/education, newspapers, environmental organisations, books, journals/magazines, radio, the Internet, political parties, emailing lists. Males ranked the media as follows: newspapers, school/education, books, radio, TV, journals/magazines, Internet, political parties. Emailing lists were not perceived as being reliable at all.

Table 12
Reliability of the Sources of Environmental Information Ranked according to Gender
(n=429)

Media	Male	Female	χ^2 (df=3; p<0.05)
Newspapers	29.1	40.9	20.030
Internet (other sources than newspapers)	10.7	6.5	9.813
Radio	17.5	24.7	10.927
Television (including the Internet-television)	14.6	31.9	31.613
Journals/magazines	11.9	26.3	21.654
Books	24.5	36.0	8.165
Emailing lists	0.0	1.1	8.023
Political parties	1.9	3.8	16.442
School/education	27.2	43.2	25.209
Environmental organisations	14.7	39.0	44.951

Discussion and Implications

The main purpose of this study was to describe how university students in three different countries use the media in relation to environmental issues. The results from the multiple-choice questions demonstrated that the Finnish, Lithuanian and Swedish students valued the Internet as being the most important source of environmental knowledge, followed by newspapers, television, school/education and journals. The importance of the Internet was higher than previously found among younger learners (Asunta, 2003) and university students (Kukkonen et al., 2012). Also, in the open-ended question and in accordance with most of the studies carried out in the 20th century (Asunta, 2003; Boykoff, 2009; Lee, 2008; Oztas & Kalipci, 2009; Riffe & Reimold, 2008), the Internet was named as one of the three main sources of information. The most often used sources of information to obtain environmental knowledge were, however, newspapers, whereas school/education was perceived to be the most reliable source of environmental knowledge. Television has already been an important source of environmental knowledge for a long time, but the role of the Internet has increased in the 20th century (FICORA, 2010). The Internet has increased potential as a source of environmental news, especially among young people (Lacy et al., 2007; Riffe & Reimold, 2008). Although five years ago, young adults had anticipated that, in the future, they would get less information from social networking and more from traditional news sources (Lewis, 2008), this study did not confirm that prediction. However, it confirmed the significance of newspapers and the importance of television in the present Internet Age.

There were also differences between the three countries. The Finnish students preferred newspapers as being the most important source of environmental knowledge, the Swedish students – school and education, whereas the Lithuanian students also named other sources, including Facebook, Twitter and YouTube. This may be due to the interpretation of media which, according to Nurminen (2001), is culturally bound and dependent on what the individual has previously experienced. Although there were some differences between the perceptions of the Finnish and Swedish students, they were more similar to each other when compared with the Lithuanian students. Like people in general (Esa, 2010; Khalid, 2003), the students seemed to gain a lot of environmental knowledge

from the media; its use in education is facilitated by the fact that, in the three countries, information and communication technology is integrated into all school subjects.

Some of the students reported daily discussions on environmental issues, mainly in everyday situations, but, also, to some extent, in social media, discussion forums and blogs. In social media, they talked with their friends about sustainable lifestyle issues, environmental problems, man-nature relationship, technology and environmental issues. Although in this study discussion in social media played a minor role, it should be critically considered by educators as a future source of environmental knowledge for students, at least in terms of being an activator of interest in environmental issues. It has been stated that the Internet can be used in education for sustainability to promote awareness, knowledge and actions (Hill & Nelson, 2011; Hughes, 2011). Social networking through blogging, for instance, has been seen as a new way of changing students' environmental sensibility (Arnold 2011) and, to some extent, their understanding of environmental issues (Ellison & Wu, 2008; Halic et al., 2010; Kukkonen et al., 2011). Facebook has also been a powerful tool to promote environmentally responsible behaviour and learning about practical environmental issues (Robelia et al., 2011). Students' environmental awareness and action competence (Chawla & Flanders Cushing, 2007; Mogensen & Schnack, 2010) could be further developed by integrating different kinds of media use in outdoor education, i.e. real-life projects. Whether these forms of media are applicable for future use in higher education for sustainability are to be evaluated later.

More than half of the students used information from the media in relation to environmental issues, either in school or particularly during study courses in higher education. The media were considered to be a general source of environmental knowledge, but one that demands critical approval. The use of newspapers in different ways could also be beneficial in environmental education, including critical thinking (Jarman & McClune, 2004). Students highlighted knowledge gained from television programmes, confirming previous findings concerning the use of visual media in education (Bizerril et al., 2011; Pearson et al., 2011), and some also mentioned examples of the positive effects of media (Holbert et al., 2003). One interesting point was that students described a lot of university study courses in which they had used environmental knowledge which was acquired from the media. In contrast to the previous results, this indicates that environmental issues actually have been considered in university education, particularly in teacher education (Hofman, 2012). Nowadays, active teachers create their own blogs as well as those used by the class, and the use of Facebook has become a popular tool in formal education. The Internet sources provide additional learning material, both for general school education as well as for higher education.

Regarding gender preferences, in comparison to males, females considered newspapers to be more important and reliable sources of information, whereas males perceived the Internet to be more reliable than females. The cultural context may have had an effect on the answers. As in most comparative research, the data may have been affected by small differences in the three languages used, the two differing methods of gathering data (online versus face-to-face) or the differing number of participants from the three countries.

The Finnish students perceived newspapers to be the most reliable source of information about environmental issues. The least reliable sources were the Internet forums, such as YouTube, emailing lists, blogs, Facebook and Twitter. According to

these findings, social media should not be used in the future, at least not as the only source of environmental knowledge, because there are no ways to secure the reliability of information. Newspapers may continue to maintain their reputation of reliability among university students, and the students must continue to rely on their own critical thinking abilities in relation to all sources of information.

As an implication for education, it can be concluded that different forms of media should be used concerning environmental issues in order to attain the benefits from all sources of information and to reach both genders. Furthermore, the Internet could be a powerful tool to reach students and motivate them to learn through the use of blogs and discussion forums. It is necessary, however, to teach students to critically analyse information obtained from the Internet.

Conclusions

This research increased our understanding of how students use the media and the role of media in education for sustainability. The Finnish, Lithuanian and Swedish students valued the Internet as being an important source of environmental knowledge. Although they also used newspapers as a source of environmental knowledge, school/education was perceived to be the most reliable source. The differences between the three countries were also apparent: the Finnish students expressed a preference as for newspapers, Swedish students – for school/education, whereas Lithuanian students also valued social media. Female students considered newspapers to be a more important and reliable source of information, and, unlike males, they considered the Internet to be less reliable.

Some of the students discussed environmental issues daily, mainly in everyday situations and, also, to some extent, in social media, discussion forums and blogs. During study courses in higher education, students used a variety of media to search for information about environmental issues.

The media as a source of environmental knowledge play a significant role in the three Nordic-Baltic students' lives. Information gained from various sources of information was used in their studies. Based on this research, it could be concluded that different forms of media should be used to obtain environmental knowledge in order to attain the benefits from all sources of information and to reach both genders. Furthermore, the Internet could be a powerful tool to reach students and motivate them to learn through the use of blogs and discussion forums. It is necessary, however, to teach students to critically analyse information obtained from the Internet.

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