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STUDENTS' ATTITUDES TOWARDS TECHNOLOGY EDUCATION IN FINLAND, ESTONIA AND ICELAND

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ABSTRACT: This paper is based on a comparative study of craft and technology education curriculums and students' attitudes towards craft and technology in Finland, Estonia and Iceland. The study was undertaken by the Helsinki University, University of Tallinn and University of Iceland in the year 2012. Even though, the origins of craft education in Finland, Estonia and Iceland have many similarities, the Estonian and Icelandic national curriculum place greater emphasis on design and innovation, whereas the Finnish national curriculum focus on the development of students' personalities and gender issues. A quantitative survey was subsequently distributed to 493 school students in Finland, Estonia and Iceland. The questionnaire consisted of 14 questions, which aimed to ascertain students' attitudes towards craft and technology. The survey showed substantial differences in students' attitudes towards craft and technology education in the three countries. In addition, significant statistical differences were found between boys and girls. These differences may be explained by differences in the national curriculums and the different pedagogical traditions. However, these findings need to be examined further through research.

Key words: attitudes towards technology, technology education, handicraft, pedagogical traditions

INTRODUCTION

Technology is determined and guided by human emotions, motivations, values, and personal qualities. Thus the development of technology in society is dependent on citizens' attitudes towards technology, technological will to participate in and in humans' technological decisions. In this study we are trying to find out if there are differences in these attitudes between students in different countries.

The general aim of Finnish Craft and Technology education is to increase students' self-esteem by developing their skills through enjoyable craft activities; it also aims to increase students' understanding of the various manufacturing processes and the use of different materials in craft. Furthermore, the subject aims to encourage students to make their own decisions in designing, allowing them to assess their ideas and products. Students' practical work is product orientated and based on experimentation, in accordance with the development of their personality. The role of the teacher is to guide students' work in a systematic manner. They must encourage pupils' independence, the growth of their creative skills through problem-based learning and the development of technical literacy. Finnish handicraft traditions are also of importance throughout the whole curriculum

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(Framework Curriculum Guidelines, 2004). Analysing the Finnish curricula in a long term, a smooth development can be noted. However, the Finnish curriculum has chosen to focus on the development of students' personalities and gender equality rather than technological development.

Subjects taught in the domain of technology in Estonia enable students to acquire the mentality, ideals, and values inherent to the contemporary society. They learn to understand the options they have in solving tasks or creating new products; find and combine various environmentally sustainable techniques. In lessons, students study and analyse phenomena and situations, as well as use various sources of information, integrate creative thinking and manual activity. As a part of the study process, students generate ideas, plan, model, and prepare objects/products and learn how to present these. Students' initiative, entrepreneurial spirit, and creativity are supported and they learn to appreciate an economic and healthy life style. Learning takes place in a positive environment, where students' diligence and development are recognized in every way. Teaching develops their skills in working and cooperating, as well as their critical thinking and the ability to analyse and evaluate. (Ainevaldkond Tehnoloogia, 2011). In long term, the political situation in Estonia has considerably changed and thus there have been fundamental changes also in education, including the syllabi of craft and technology education. Nevertheless, the syllabi of the technological domain have been drawn up as a result of the developmental work in the last decades.

The present national curriculum for the subject of Craft in Iceland places an emphasis on individual-based learning. It also gives teachers the freedom to run an independent curriculum in school, which is based on the national curriculum. As in Finland, the subject is product based and students learn via traditional craft activities. Students' work is based on craft tradition rather than technology; however, innovation and idea generation are an important part of the Icelandic curriculum. There are also the aims of developing students' manual skills, instructing them in the manufacturing processes and training them to organise their own work. The national curriculum also incorporates outdoor education, working with green wood and sustainable design. When the national curriculum was revised in 2007, it was decided to minimise the technological part of the Design and Craft curriculum and the original Sloyd values were once again included in the curriculum. The curriculum moved away from the manufacturing process (i.e., mass production) and towards handicraft-based processes. However, innovation and idea generation are still an important part of the curriculum (Olafsson & Thorsteinsson, 2010).

As seen above, there are many similarities between the national curriculums in Finland, Estonia and Iceland; however there are also some differences. In the following sections, the authors will attempt to highlight these differences and will try to ascertain whether there are any differences in these three countries, with regards to students' attitudes towards craft and technology. The research questions were:

1. Are there differences in students' attitudes towards Craft and Technology in Finland, Estonia and Iceland
2. Are there differences in students' attitudes towards Craft and Technology between boys and girls?

METHODS

The aim of the empirical aspect of the research was to answer the question: Is there a difference in students' attitudes towards craft and technology in Finland, Estonia and Iceland? Dyrenfurth (1990) and Layton (1994) referred to attitudes to technology education using the concept of 'technological will'. According to these authors, technology is determined and guided by human emotions, motivation, values and personal qualities. Thus, the development of technology is dependent on the students' will to take part in lessons and on the impact of their technological decisions.

In order to evaluate students' attitudes towards craft and technology in Finland, Estonia and Iceland, a questionnaire was devised, consisting of 14 statements. For each Likert-type item, there were five options, from 'Strongly Disagree' (= 1) to 'Strongly Agree' (= 5). The questionnaire featured some questions about students' backgrounds, in addition to questions that attempted to gauge students' motivation and success, in terms of craft and technology education classes. The questionnaire was based on the PATT standards (Pupils Attitudes Towards Technology), which were designed and validated by Raat & de Vries (1986) and van de Velde (1992). Based on their work different factors were found: interest, role models, effects of technology, complexity of technology, school and technology, career plans. From this point of view the internal consistency of the questionnaire was relevant. 493 students from Finland, Estonia and Iceland took part in the survey. The age of the student-respondents was 11-13 years.

RESULTS

Some differences in students' attitudes towards craft and technology were found in the three countries. The average response in our Likert-style (1-5) questionnaire to all 14 items was among Finnish girls 3.37, Estonian girls 3.55 and Icelandic girls 3.67. Significant statistical difference was found between boys and girls, whereas the average response of boys was in Finland 3.78, Estonia 4.00 and in Iceland 3.87. Estonian boys had the most positive attitude towards technology, whereas the lowest attitude was found among Finnish girls. The difference between boys and girls was definitely the smallest in Iceland. The averages for each statement are listed in the table 1 below.

Table 1. Average (Mean) values for each statement, with regards to the measurement of students' attitudes towards craft and technology in Finland, Estonia and Iceland

Statement number		Mean FINLAND	Mean ESTONIA	Mean ICELAND
1. Is interested in engineering and the phenomena related to it	girls	3.45	3.32	3.55
	boys	4.30	4.40	4.40
2. Spends a lot of time with engineering-related hobby activities	girls	<u>2.71</u>	<u>2.02</u>	<u>2.82</u>
	boys	3.06	3.44	3.58
3. Newspapers, magazines, and articles from the field of engineering are interesting	girls	2.35	2.87	2.82
	boys	2.83	3.50	3.00
4. Understanding engineering-related phenomena will be beneficial in the future	girls	3.45	3.59	3.59
	boys	3.95	4.43	3.95
5. Understanding engineering-related phenomena requires a special wit	girls	3.55	3.50	3.16
	boys	3.60	4.16	3.70
6. Both boys and girls may understand engineering-related phenomena	girls	<u>4.62</u>	<u>4.42</u>	<u>4.82</u>
	boys	<u>4.29</u>	<u>4.22</u>	<u>4.60</u>
7. The mankind has rather benefited than sustained damage from the development of engineering	girls	3.85	3.89	3.98
	boys	4.25	4.29	4.23
8. In the future would like to choose a speciality or a profession related to engineering	girls	<u>2.40</u>	<u>2.40</u>	<u>2.55</u>
	boys	3.26	3.39	3.25
9. Parents have a lot of engineering-related hobbies	girls	2.98	2.61	3.07
	boys	3.09	2.96	2.88
10. The atmosphere in the Technology Education / Handicraft lessons is pleasant and inspiring	girls	3.56	4.32	4.07
	boys	4.24	4.11	4.03
11. Technology Education / Handicraft lessons considerably contribute to the development of manual skills	girls	3.85	<u>4.56</u>	<u>4.66</u>
	boys	<u>4.25</u>	<u>4.56</u>	<u>4.50</u>
12. Technology Education / Handicraft lessons develop logical thinking	girls	3.60	4.12	3.89
	boys	3.84	4.24	3.93
13. Has been successful in Technology Education / Handicraft s lessons	girls	3.49	3.99	4.55
	boys	3.80	3.93	4.25
14. Technology Education / Handicraft lessons will be beneficial in the future	girls	3.51	4.09	3.82
	boys	3.90	4.39	3.88
All 14 items	girls	3.37	3.55	3.67
	boys	3.78	4.00	3.87

The highest average values in the whole questionnaire were found in statement number:

- 6. Both boys and girls may understand engineering-related phenomena (Icelandic girls 4.82, Finnish girls 4.62, Icelandic boys 4.60).
- 11. Technology Education / Handicraft lessons considerably contribute to the development of manual skills (Icelandic boys 4.66, Estonian boys and girls 4.56, Icelandic girls 4.50).
- 1. Is interested in engineering and the phenomena related to it (Estonian and Icelandic boys 4.40, Finnish boys 4.30).
- 7. The mankind has rather benefited than sustained damage from the development of engineering (Estonian boys 4.29, Finnish boys 4.25, Icelandic boys 4.23).

The lowest values were in statement number:

- 8. In the future would like to choose a speciality or a profession related to engineering (Finnish and Estonian girls 2.40, Icelandic girls 2.55).
- 2. Spends a lot of time with engineering-related hobby activities (Estonian girls 2.02, Finnish girls 2.71, Icelandic girls 2.82).
- 3. Newspapers, magazines, and articles in the field of engineering are interesting (Finnish girls 2.35, Icelandic girls 2.82, Finnish boys 2.83,)

In addition, it was found a significant statistical difference ($p < 0.05$) between boys and girls in several items. Most remarkable differences between boys and girls were found in statement number:

- 1. Is interested in engineering and the phenomena related to it
- 8. In the future would like to choose a speciality or a profession related to engineering
- 2. Spends a lot of time with engineering-related hobby activities
- 3. Newspapers, magazines, and articles in the field of engineering are interesting
- 4. Understanding engineering-related phenomena will be beneficial in the future

CONCLUSIONS

Craft education in Finland, Estonia and Iceland originated over 140 years ago and was influenced by the Scandinavian sloyd pedagogy. In the beginning, the subjects largely focused on students copying artefacts, using a variety of handicraft tools: the purpose of this was to improve their' manual skills, rather than their thinking skills. Today, the focus is also on developing students' thinking skills, which enables them to work through various handicraft processes (from initial ideas to the final products). This work is based on the idea generation of students and is thus expected to increase their self-esteem and ingenuity.

Some differences in students' attitudes towards craft and technology were found in the three countries. Definitely, the smallest difference between boys and girls was found in Iceland. This finding corroborates with comparable results from Autio, Thorsteinsson and Olafsson (2012) which shows that Icelandic girls performed better attitudes than both Estonian and Finnish girls. Hence, Finnish and Estonian craft and technology education curriculum could also benefit from Icelandic system with two different subjects: art based textile education and innovation based technology education, compulsory for both boys and girls. This is an interesting finding as the Finnish curriculum has put large emphasis on gender equity since 1970, but still Finnish girls had the most negative attitude towards technology. Finnish girls seemed to be aware of the gender equity and their highly agree with the statement: both boys and girls may understand engineering-related phenomena. However, only a few girls are willing to challenge stereotypes about non-traditional careers for women, as it could be conducted from responses to the statement: in the future would like to choose a speciality or a profession related to engineering. In addition, only few girls seemed to have technological hobbies or had interest in technological articles. What's more in Finland the boys still want to choose technical craft studies and the girls' textiles. A practical solution to get both sexes to choose both subjects has not been found.

The Estonian boys' attitudes towards craft and technology were most positive. It indicates that the Estonian curriculum that includes two different craft subjects: the technologically based 'technology' and the art based 'handicraft and home economics is still a relatively suitable setup especially for boys. In addition, the innovation and technology part: technology in everyday life; design and technical drawing; materials and processing; home economics (study groups are exchanged); project works (girls and boys together) works fine for both boys and girls.

The critical side of the study is that the study group consisted only from 11-13 year-old students. Although students' attitudes are assumed to be rather stable during the school years (Arffman & Brunell, 1983; Bjerrum Nielsen & Rudberg, 1989), Autio, Thorsteinsson and Olafsson (2012) found that there was significant statistical difference between 11 and 13 year old Finnish girls in attitudes towards technology. Furthermore, no statistical difference was found between younger and older Finnish and Icelandic boys or between Icelandic younger and older girls.

Another critical point of the empirical part was the use of a relatively small sample of students. However, 493 students seemed to be enough as the results are consistent with previous studies (Autio, 1997; Autio, Thorsteinsson & Olafsson, 2012; Autio & Soobik, 2013). In addition, the questionnaire measures only students' attitude, not their absolute technological will which is shaped and guided by human emotions, motivation, values and personal qualities. The concept attitude is just a single one part of a larger concept, which is 'technological competence'. Attitude is a crucial part of the competence as it depends on technological knowledge and technological skills in real life situations.

The reasons behind the dissimilarities found between the three countries may be due to differences in the curriculums and in different pedagogical traditions. On the other hand, the political situation has considerably changed in Estonia and the motivation for further development seems to be ambitious also in education, including the syllabi of craft and technology education. However, further research is needed before the authors can reach their final conclusions.

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