Gender-differences in Self-efficacy ICT related to various ICT-user profiles in Finland and Norway. How do self-efficacy, gender and ICT-user profiles relate to findings from PISA 2006

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A B S T R A C T

In this paper, we explored the relationship between self-efficacy, Information and Communication Technology (ICT) user profiles, and gender. Self-efficacy is an important theoretical and empirical concept to identify and describe how students perceive their own ability to solve a task. ICT user profiles were developed as an empirical framework to identify and categorize students based on how frequent they use ICT. In this paper, we have chosen six ICT user profiles in order to distinguish between leisure activities and school activities. Each ICT user-profile was computed by combining two dimensions (frequency of ICT use for leisure purposes and frequency of ICT use for school purposes). We tried to identify how students' perception of their ability to solve a task is related to both their gender and how frequently they use ICT. The results showed that student's self-efficacy varied between the ICT user profiles. The findings showed how an increased level of self-efficacy in ICT High-level tasks is related to both an increased level of leisure use and with an increased level of educational use. Further, our findings provided evidence in support of positive relationships (for both males and the females) between Self-efficacy in ICT and the ICT user profiles.

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1. Introduction

The objectives of this article is to explore data from the 2006 Programme for International Student Assessment (PISA) Information and Communication Technology (ICT) survey to a) identify the relationship between self-efficacy in ICT and ICT user profiles (among students in Norway and Finland), b) compare self-efficacy in ICT among students in Norway and Finland within various user profiles, and c) examine whether there are gender-differences within the user profiles in Norway and Finland.

The Nordic countries[1] are recognized as welfare states with stable economies with a strong focus on education as a means of economic growth. A common perspective is the equity issue, which involves the principles of equal access to education for everyone and inclusive education. Moreover, the gender equality issue has been flagged as central in the Nordic countries, which has also influenced their educational policies. However, in spite of these similarities within education, the Nordic countries perform quite differently in international comparative assessment studies related to education. The most widely recognized assessment study in this field is PISA. PISA is a triennial survey of knowledge and skills in Science, Mathematics, and reading of 15-year-olds, organized by the OECD together with its participating countries.

In 2006, PISA had a certain focus on Science.[2] Finland was the highest performing country on the PISA science assessment. Sweden and Denmark scored in line with the OECD average of science performance. As for Iceland and Norway, the situation was quite different; both countries performed below the OECD average. Moreover, the ranking situation between the Nordic countries appeared similar when being assessed in mathematics and reading in PISA 2006 (OECD, 2007). Interestingly, in spite of these remarkable variations in performance across

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[1] Denmark, the Faroe Islands, Greenland, Finland, Åland, Iceland, Norway and Sweden. The Faroe Islands and Greenland are both part of the kingdom of Denmark, and Åland is part of the republic of Finland.
[2] PISA change scope on what to be to particularly assessed; in 2009, reading represents the central objective.

the Nordic countries, they had two things in common. Firstly, school differences only played a minor part in the performance variation. This might indicate that there appeared to be consistency among schools within each country's education systems. Secondly, across the Nordic countries, boys and girls performed differently, but the only in two out of the three fields that were assessed. This meant that males outperformed females in math, whereas the opposite was the situation in reading. As for science, males and females showed no differences in average science performance.

In 2006, PISA also ran an additional survey mapping the use of ICT (the PISA ICT 2006). ICT includes various technical devices and tools for information and communication. In the additional study run by PISA, ICT mainly included various uses of PCs (like programming, down-loading music and films, gaming, etc.), including access and use of Internet. This approach towards the ICT-abbreviation is also the point of departure in the present text. All participating countries in the main PISA survey were invited to join, and the majority did, including the Nordic countries (CERI and OECD, 2010). The main objective was to map the situation on 15-year-olds' self-reports on ICT use, in terms of time spent on ICT, preferences towards various activities and software, as well as confidence towards performance in various ICT related activities. While the notion of confidence varies across differing academic approaches, this article will mainly focus on what can be understood as a narrower approach—namely, self-efficacy. Self-efficacy towards ICT represents a concept to understand and analyse confidence in one's own performance; this will be further elaborated throughout the article.

Bearing this in mind, the PISA ICT 2006 asked students how well they could perform 14 different ICT tasks. There were four possible answers (*yes, I can do this very well by myself; I can do this with help from someone; I know what it means, but I cannot do it; and I don't know what this means*) (CERI and OECD, 2010). The questions identified two broad groups of tasks: Self-efficacy Internet tasks and self-efficacy high-level tasks.

Results from this survey showed that in the Nordic countries, Norwegian students were the most confident in doing Internet tasks. Among all 39 participating countries (25 OECD countries and 14 partner countries involved in the ranking), Norway was among the four top countries that reported that at least 90% of students as confident on the 6 Internet tasks.[3] Sweden, Denmark, and Iceland were placed as the 7th, 9th and 12th, respectively, whereas Finland turned out to be the lowest of the five Nordic countries, ranked 13th.

As for performing high-level tasks on a computer, students were less confident across all participating countries. Again, students from Norway, together with five other countries,[4] reported to be more confident in performing high-level tasks on a computer, compared with the rest of the participating countries. Iceland took the 12th position in the ranking, Denmark the 15th, Sweden the17th, and Finland was as far back as the18th (CERI and OECD, 2010). However, all Nordic countries were above the OECD average on both Internet tasks and high-level tasks. On average, males reported more self-efficacy in ICT than females did, in all Nordic countries.

As shown, the Nordic countries performed quite differently in the main PISA 2006 study compared to the additional PISA and ICT 2006 study. Whereas Finland was the best performing country in science, Norway was below the OECD average. However, the opposite was found when comparing students' self-efficacy in Internet tasks and self-efficacy in high-level tasks; Norway was among the first five countries that reported positively on confidence. Finland was far below, and the last of the Nordic countries in the rankings.

It has been stated that our knowledge society needs skills in technology and ICT, in addition to academic knowledge. However, as shown above, there are differences among the Nordic countries; none of these countries ranks well in both academic skills and ICT. Students in Finland are top performers in science as well as in other academic skills assessed in PISA 2006, but they report low confidence towards ICT when compared to the other Nordic countries. As a contrast to Finland, Norwegian students perform below the OECD average in academic skills but are ranked as one of the five countries with the highest confidence in use of ICT.

Bearing the above data in mind, this article aims to investigate the variations of students' patterns of use and attitudes towards ICT more deeply. This is regarded as central to understanding the differences among the Nordic countries, and to finding out how confidence relates to the use of ICT. Another objective is to further investigate all the possible nuances in the picture drawn above.

In order to do so, we developed a set of profiles designed to identify different uses of and attitudes towards ICT.[5] We would also elaborate on whether gender represents an issue in terms of understanding self-confidence in ICT, with a particular focus on Finland and Norway. Following this, the objective of this article is to explore the following research questions:

* How is self-efficacy in ICT (high-level and Internet tasks) reported by males and females in Norway and Finland?
* If we analyse Self-efficacy in ICT (high-level and Internet tasks) in six distinct ICT-user profiles:
  - Are there any differences or similarities between students in Norway and Finland?
  - If so, what would be the gender dimension in this?

In order to answer these questions, the following sections will provide a brief presentation on some relevant contexts. Firstly, the empirical evidence on the students' actual access to and use of ICT resources are elaborated. Secondly, the notion *self-efficacy* is introduced, in order to map the situation of the use of Internet and in High-level ICT tasks within each of the profiles. The methodological approaches are then introduced, followed by a presentation of our approach in order to delve deeper into the variations of youngsters' use. Different groups of students are to be identified within six distinct user profiles, and how these profiles may relate differently to gender is analysed.

2. Access and use

The notion of *access* to ICT started out as a way of mapping the availability of physical and technical ICT resources to all citizens or groups of people. This way, it was defined as a concept of different groups of people that "had" or "had not" access to ICT. However, during the years, the understanding of access has become far more complex and new dimensions have been added, which relate the context or conditions in

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[3] The three others were Canada, Korea and Netherlands (CERI and OECD, 2010).

[4] Australia, Austria, Canada, Netherlands, Portugal and partner country Liechtenstein (ibid).

[5] These profiles were first presented in CERI and OECD, 2010, and are been further elaborated in the present text.