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TEACHERS' DIGITAL COMPETENCE: COMPARISON BETWEEN NORDIC AND BALTIC COUNTRIES

Bachelor's thesis

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Supervisor: Senior Lecturer Simona Ferraro, PhD

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ABSTRACT

This thesis aims to determine how digitally competent teachers are in the Baltic countries compared to the Nordic countries. To fulfil this thesis's purpose, the author summarizes the literature in the field and conducts the empirical analysis using 2018 data from the Teaching and Learning International Survey (TALIS). Since the dependent variable measures teachers' ability to support student learning through the use of digital technology (Not at all, to some extent, quite a bit, a lot), the ordered probit model is used to analyze the effects of teachers' demographic variables on digital competence. Independent variables are about teacher's demographic factors, such as age, gender, variables related to teachers academic and career, such as teachers work experience (in years), subject taught, and education level (ISCED level).

The theoretical and descriptive overview indicate that teachers from Nordic countries (Finland, Sweden, Norway) are more digitally competent than teachers from Baltic countries (Estonia, Latvia, Lithuania). The results from the empirical analysis show that technology included in teacher's formal education, more technology-related subject taught and higher ISCED level positively affect teacher's digital competence. In contrast, age had a negative effect on teacher's digital competence. Thus, the older the teacher, the less he or she can support student learning through the use of digital technology. Gender was a significant variable and had a negative effect in the Baltic countries but not in the Nordic countries. Nevertheless, only 15% of teachers in the Baltic sample were men, so it may be that men in the Baltic sample were relatively older or teaching subjects like physical education and languages.

Keywords: Teachers’ digital competence, ordered probit regression, technology, skills

INTRODUCTION

In the OECD report "The Definition and Selection of Key Competencies", competency is defined as "A competency is more than just knowledge and skills. It involves the ability to meet complex demands by drawing on and mobilizing psychosocial resources (including skills and attitudes) in a particular context. For example, the ability to communicate effectively is a competency that may draw on an individual's knowledge of language, practical Information Technology (IT) skills and attitudes towards those with whom he or she is communicating."(OECD, 2005, 4)

Digital competence, as defined by Romero-García et. al (2020), includes the safe, responsible, vital use of digital technology for learning, working, and social participation. It entails creating abilities to browse, analyze and manage information; interact and collaborate; create digital content; maintain safety; solve problems in formal, non-formal and informal learning contexts.

Digitalization and automation have affected work, life quality, socialization, entertainment more now than ever before. Digital competence is vital to handle and conquer challenges posed by digitalization (Ala-Mutka 2011). Artificial intelligence (AI), as term used to describe machines that perform cognitive functions, has the potential to automate manufacturing while also contributing to global challenges in health, transportation and the environment. (OECD 2019). While routine manual jobs will be automated, labor increase in non-routine tasks will increase. People must keep up with the changing digital world otherwise, they will be in non-demand in the labor market. Thus, as the workforce for routine work decreases, the demand for people working in IT and automation rises (Goldfarb, Tucker 2019).

In December 2019, the first cases of COVID-19 disease were found and after that, the world has changed (Sohrabi *et al.* 2020). COVID-19 has spread quickly and by March 2020, first cases were also discovered in Estonia as well in neighbouring countries. In the middle of March, all Baltic governments declared a quarantine (WHO...2021). Since then, digital knowledge has been even more vital. Working and learning have changed and society had to adapt quickly.

This paper aims to determine how digitally competent teachers are in the Baltic countries compared to the Nordic countries. This thesis hypothesizes that teachers in the Nordic countries are more digitally competent than in the Baltic countries. Two research questions are also explored in this thesis.

Research questions:

1. How do demographic factors affect teacher's digital competence?
2. In which subject are teachers more digitally competent?

To fulfil this thesis's purpose, the author summarizes the literature in the field and conducts the empirical analysis using 2018 data from the Teaching and Learning International Survey (TALIS). The analysis is performed in Gretl freeware. The author selects question from the Teaching and Learning International Survey (TALIS) that provides the best overview of teachers' digital competence. The author will use variables such as teacher's age, gender, level of education, years of teaching, and subject taught for demographic factors. The author will have two regression models: one regression model with data from Nordic countries and one regression model with data from Baltic countries. The sample covers individuals from Estonia, Latvia, Lithuania, Finland, Sweden and Norway.

The structure of the thesis is the following. In the first chapter, the author summarizes the theoretical background. This chapter gives an overview of the concept of digital competence, the impact of COVID-19 on education, an overview of teachers' digital competence, and more detail on digital competence in the Nordic and Baltic countries. Furthermore, the author highlights some previous empirical analyses that have studied teachers' digital competence. The second chapter presents an overview of the methodology, data and some descriptive statistics. In the third chapter, the author discusses the empirical results. Finally, the author concludes the thesis.

1. THEORETICAL OVERVIEW

1.1. Digital competence: How to be prepared for the future

In 2006, European Recommendation on Key Competences, Digital Competence was included as one of the eight key competencies for Lifelong Learning by the European Union. Ferrari (2012, 1) has said, "Digital Competence can be broadly defined as the confident, critical and creative use of Information and Communication Technology (ICT) to achieve goals related to work, employability, learning, leisure, inclusion and/or participation in society. Digital Competence is a transversal key competence, which enables acquiring other key competencies (e.g. language, mathematics, learning to learn, cultural awareness). It is related to many of the so-called 21st Century skills that should be acquired by all citizens, to ensure their active participation in society and the economy."

As of 30 March 2021, Estonia is leading in the number of COVID-19 cases with the cumulative number 8,085.2 confirmed cases per 100 000 inhabitants and Sweden is leading in the number of COVID-19 cases with the cumulative number 133.33 deaths per 100 000 inhabitants compared with other Baltic and Nordic countries. When comparing Baltic and Nordic countries, the most prosperous country in the fight against COVID-19 is Finland, with 1,397.87 confirmed cases per 100 000 and 15.23 deaths per 100 000 inhabitants (WHO...2021).

To slow the spread of COVID-19, most countries decided to switch to remote learning the education system. According to the United Nations Educational, Scientific and Cultural Oorganziation (UNESCO), 186 countries chose to close their educational institutions by the end of April 2020, impacting about 74% of learners on the planet. Many countries have re-opened schools in April/May 2020, while others have decided to stay closed for the whole academic year. Teachers are probably the most crucial component of the remote learning process. Teachers should learn how to communicate effectively online, teach only online so that all students are performing as well as in traditional schools and, keep student's motivation high. To succeed, it is crucial that teachers have adequate digital competencies and strenghten them, regardless of the teacher's age.

Digital competence could be enhanced through workshops and training courses, which should be improved regularly and continuously. Teachers should collaborate with other teachers to learn from each other and improve their digital skills and knowledge. Curriculum materials that would help teachers use digital tools and ways should be developed. (Di Pietro *et.al* 2020)

The COVID-19 pandemic has already had many adverse effects on education due to school closures, yet the damage will progress when the health pandemic develops into a global recession. School closings and remote learning will lead to a decline in educational attainments, depression, drop-out and, increased inequality. However, if countries act fast, they might reduce the negative impact of the pandemic by promoting lifelong learning. They could learn from this crisis and develop new and more advanced policies and practices to be more efficient and resilient education systems. (Worldbank 2020)

At the beginning of remote learning, most schools were not prepared to use digital platforms for teaching. Teachers had to quickly and creatively embrace different digital platforms and be competent enough to guide students through using the platform. However, after the initial euphoria, schools can develop systems and guides on using different digital tools to be more prepared in the future. One thing is sure, schools after this pandemic will be different. For example, it could be possible to determine the teacher's digital skills level. If schools could conclude that, they could develop their teachers’ and students’ digital skills and competence. (*Ibid.*)

1.2. Teachers’ digital competence

Young generations are already familiar with technology and different digital tools. They use them daily since early ages. While kids must have digital knowledge, it is also essential to understand which digital tools are helpful to them and to what extent digital tools should be used. Using digital tools in learning can increase students' motivation and their performance (Ferraro 2018). The use of technology in teaching can lead to excellent results in creativity and cooperation. Teachers, however, must constantly improve themselves and gain new knowledge for that to happen. (Caena, Redecker 2019)

Teachers are aware that education systems are behind the changes caused by the digital revolution. Educators might not be sure to what extent and how to use digital tools in education. They realize that students should be braced for digital society and provide them with the necessary skills to use the Internet responsibly, critically, and creatively to improve their social interaction. Thus, there is a consensus that digital skills are essential for life, careers and socialization. (*Ibid.*) While having the consensus that using ICT in learning is vital and the fact that many schools have good access to computers and technology, the pedagogical use of technology varies. (European Commission 2013)

The purpose of the study by Martin et al. (2020) was to discover how Spanish pre-service early childhood education teachers self-assess their digital competence. The data was collected using an electronic survey. The findings show a positive correlation between knowledge and the use of digital tools. Nevertheless, knowledge and attitudes towards using ICT did not have a positive correlation. Men rate their knowledge and use of ICT higher than women, who score higher in attitude.

According to a survey of Norwegian teachers, 22% of teachers use ICT tools daily, 60% of teachers at least once a month. As a reason for not using ICT, the participants of the study point out the low practicality of in-service training and state that they do not see a significant change in the results when using ICT tools in teaching, except that learners are more motivated to learn. (Wikan, Molster 2011) Furthermore, as the reason for not participating in in-service training, teachers have pointed out the following: the price of the training, information about the training was received too late, the employer did not give consent to participate in in-service training and no suitable replacement could be found for in-service training. It also turns out that teachers who value their skills and knowledge higher have more in-service training. (Juurmann 2015) The heads of educational institutions are enthusiastic about using ICT in teaching. However, many of them have not received in-service training to improve their skills in using ICT tools. Managers who have completed in-service training, on the other hand, have a very strong positive attitude toward the use of ICT in teaching. (Papaioannou, Charalambous, 2011)

In their study, Syvänen et al. (2016) found that the requirement to use ICT tools for educational purposes causes technological stress in teachers, particularly those with low digital competencies and a negative attitude toward ICT tools. Stress is primarily caused by situations where the technology used is too complex or changes rapidly. Furthermore, the lack of support from schools in the use of ICT tools also has a stressful effect.

Survey results from the 2018 Teaching and Learning International Study (TALIS) study show that using ICT was part of the initial training for 56% of the teachers and 43% of teachers felt well or very well prepared when they completed their initial training. Younger teachers were more likely to have experienced this training. The chances of enabling students to use ICT for their schoolwork were much higher for those who endured preparation for this use. Overall about 53% of teachers reported enabling students to use computers in 2018. The proportion is undoubtedly increasing, and teachers' education will play an important role in supporting this use and supporting innovative pedagogical approaches. (OECD 2018)

Hämäläinen *et al.* (2020) use two extensive surveys in their study, Programme for the International Assessment of Adult Competencies (PIAAC) and Teaching and Learning International Study (TALIS), to analyze and understand teaching professional's digital competence. They investigate the variations and relations between teacher's measured skills, self-reported attitudes towards technology, and knowledge concerning digital technologies. According to the study, the teacher's age, gender, and subject taught are important demographic indicators for digital competence. Younger teachers, for example, felt more capable of supporting student learning through ICT, whereas the older the teacher, the greater he/she rated the importance of investing in ICT. Moreover, females were more likely than males to rate ICT investment as necessary.

The purpose of the study by Lucas *et al.* (2021) was to assess a sample of Portuguese teacher's digital competence and investigate its relationship to personal and contextual factors. As a theoretical foundation, they used the DigCompEdu framework while for the empirical analysis, they developed a self-assessment tool to assess 1,074 in-service teachers. Although contextual factors such as infrastructure, access to technology, and facilitation closely linked to digital competence, personal factors appear to be the most important. As a result, there is a need for carefully planning the teachers' development towards different aspects of digital competence. The goal is to have teachers as experts in using digital technology to enhance their teaching competence and assess and facilitate student's digital competencies.

Instefjord and Munthe (2016) analyzed data from three questionnaire surveys conducted among teacher educators, mentor teachers and pre-service teachers, in Norway. The study's goal was to evaluate the integration of professional digital competence in initial teacher education programs. On a scale of 1-6 (6=strongly agree), 27.8% of pre-service selected option 2 and only 9% selected option 6 regarding the statement "Teachers at my university/college have taught me how to use digital tools". Additionally, most pre-service teachers disagreed with the statements "Teachers at my university/college are good role-models for the use of digital tools for teaching" and "I have developed a good understanding of the use of digital tools for administrative work in school".

Karaseva et al. (2017) investigated the relationship between in-service teacher achievement goal orientation and how teachers adopt new ICT skills and knowledge. They analyzed data from the interviews conducted among secondary school teachers in Estonia and Latvia. The sample consisted of 26 teachers, 16 from Latvia and 10 from Estonia. An hour-long interviews were conducted. The authors selected teachers of different ages, gender and subjects taught. The authors investigated how teachers use different digital tools in their practices using Butler's teacher achievement goal framework. Educators who pursued mastery goals believed that technology-modified teaching and learning practices enabled independent and in-depth learning. Teachers who had a mastery goal orientation reported that they were frequently involved in technology-related training. They were able to describe specific competencies that they intended to improve shortly.

1.3. Digital competence in Nordic countries

In 2017, the Swedish government affirmed changes in K-12 curricula to improve students' digital competence. The mission was to give kids an understanding of how digitalization impacts individuals and society. It was agreed that students should be enabled to expand their potential to utilize digital technology. Different syllabi changes were created, the most significant ones were in mathematics and technology. Programming is already introduced to kids in classes 1-3. (Berge 2017)

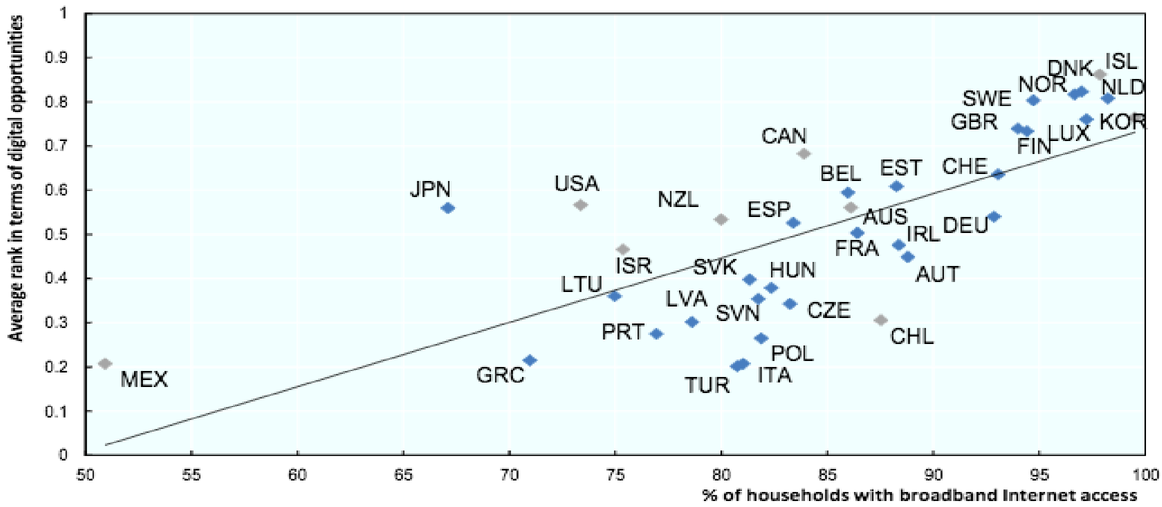

Figure 1. ICT access and digital opportunities
Source: OECD (2021) "How's life in the digital age"

As seen in the Figure 1, Nordic countries (Finland, Sweden and Norway) rank among the top countries for ICT access and use. Sweden also has the highest performance in the variety of Internet uses. Furthermore, people with advanced digital skills are the highest in the OECD, and as seen in Figure 2, 36% of 15-year-olds are extreme internet users. Extreme Internet use is common among children and students in the OECD countries. Averagely, 24% of 15-year-olds spend over 6 hours on the Internet on weekend days. (OECD 2021)

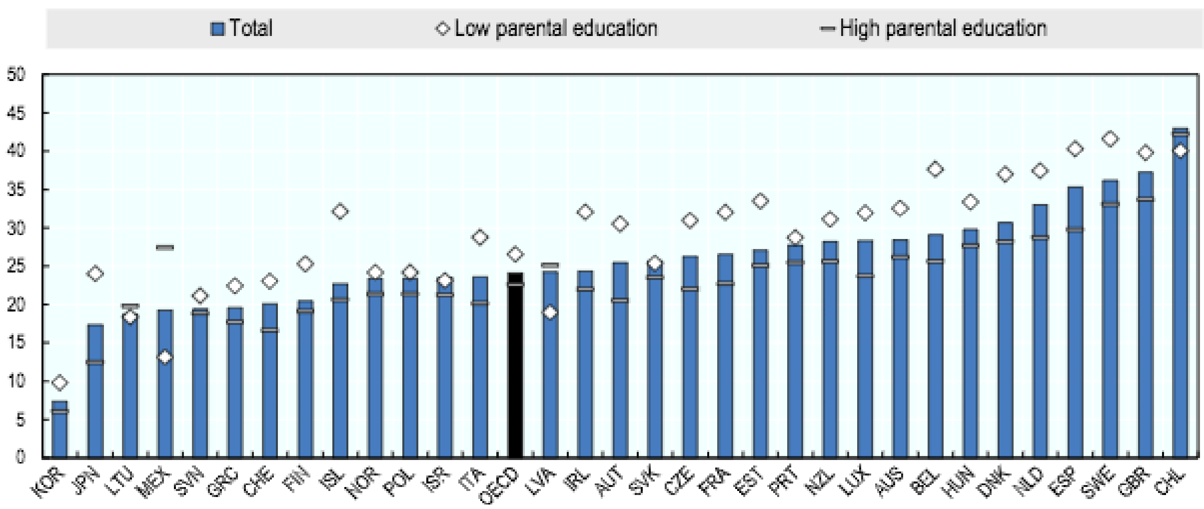

Figure 2. Extreme Internet use of children, 2015
Source: OECD (2021) "How's life in the digital age"

Norway ranks among the top countries in terms of ICT access and use (Figure 1), while also exhibiting very low Internet inequality. Young people in Norway rank below the OECD average in extreme internet use (Figure 2). Norwegians have excellent digital skills, with one of the smallest digital skills gaps in the OECD. Furthermore, Norwegians use e-government services at a rate of 84% and 37% have engaged in teleworking, the third highest rate in the OECD. (OECD 2021) In Norway, digital competence has been part of the K-12 education since 2006. It was given a status as a "basic skill". However, the syllabus has been criticized because there is not enough emphasis on algorithms, numbers, mathematics and technology. (Berge 2017)

In Finland, students are introduced to programming already in the first grade. *(Ibid.)* Kids in Finland rank below the OECD average for extreme internet use (Figure 2). Finland ranks among the top countries in terms of ICT access and use (Figure 1) and inequality of uses of the Internet is low. Jobs are not at risk due to digitalization; for example, information industries contribute 5.6% of employment. Finnish people use internet for many different purposes, for example job hunting, e-government services, health information but less for social networking. (OECD 2021)

1.4. Digital competence in Baltic countries

Estonian individuals have significant levels of Internet usage and access to it (Figure 1). E-government services and online health information are the two significant achievements that Estonia has accomplished during the last decades, with 99% of public services being online. For example, individuals can declare their taxes, check health information and vote online. (Taal 2018). As seen in Figure 3, Estonia has the lowest share of individuals who did not submit forms online to public authorities due to a lack of skills or knowledge in 2017. However, there is still much to improve. For example, Estonians have experienced more digital security incidents than the OECD average. Furthermore, as seen in Figure 4, teachers in Estonia have a higher need to develop their ICT skills than the OECD average. (OECD 2021)

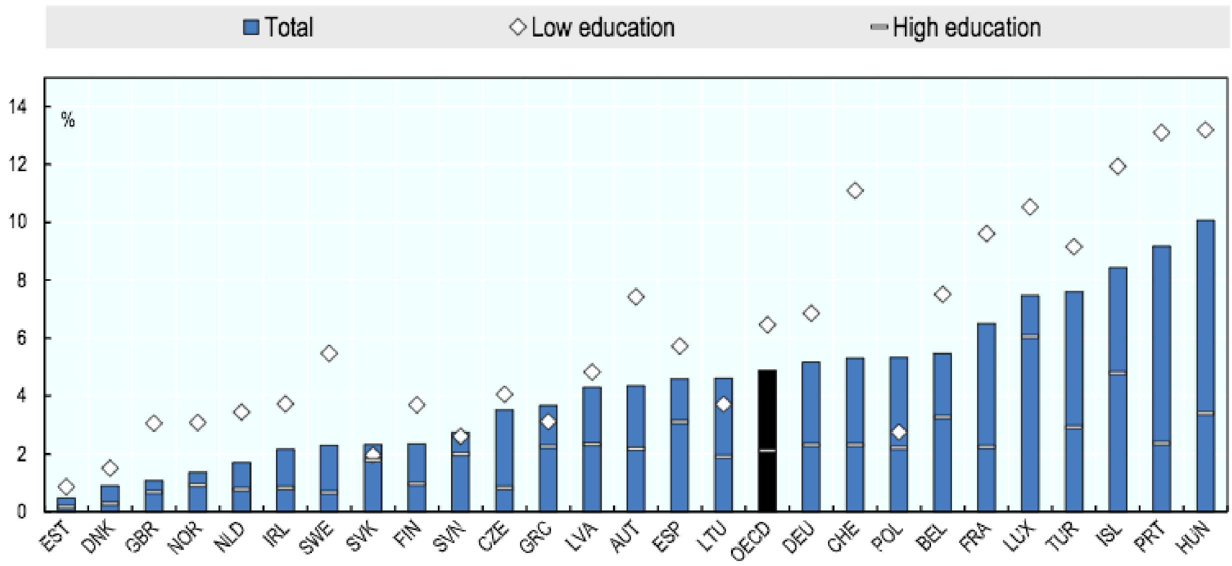

Figure 3. Share of persons who did not submit forms online due to lack of skills or knowledge in 2017
Source: OECD (2021) "How's life in the digital age"

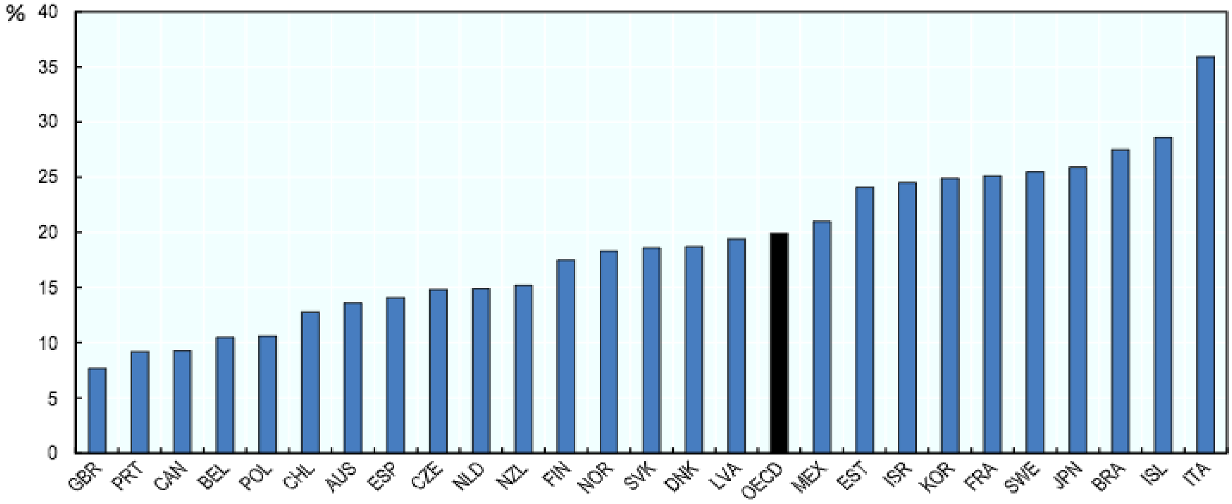

Figure 4. Share of educators who reported a high need to develop their ICT skills for teaching
Source: OECD (2021) "How's life in the digital age"

The situation in Latvia and Lithuania is slightly different and they lag behind Estonia. For example, over half of the Latvians lack basic digital skills. As seen in the Figure 3, Latvia and Lithuania had a higher share of people who did not submit forms online to public authorities due to lack of skills or knowledge than in Estonia, Finland, Sweden and Norway. Furthermore, Latvia has a deficit of ICT specialists, being in the last place with ICT specialists in employment in the European Union. (OECD 2021).

There are many jobs at risk of automation in Latvia as well in Lithuania. Moreover, Latvia is below average in the OECD countries regarding the limited digitalization degree. Both Latvia and Lithuania rank below OECD average regarding Internet access (Figure 1). As seen in the Figure 2, 24% of kids in Latvia are extreme internet users. Furthermore, excessive Internet use is more common among children with highly educated parents in Latvia and Lithuania and in some other countries such as Mexico and Chile, possibly reflecting an income effect (Figure 2). Finally, as seen in Figure 5, Lithuania ranks the first in children who experience cyberbullying. (OECD 2021)

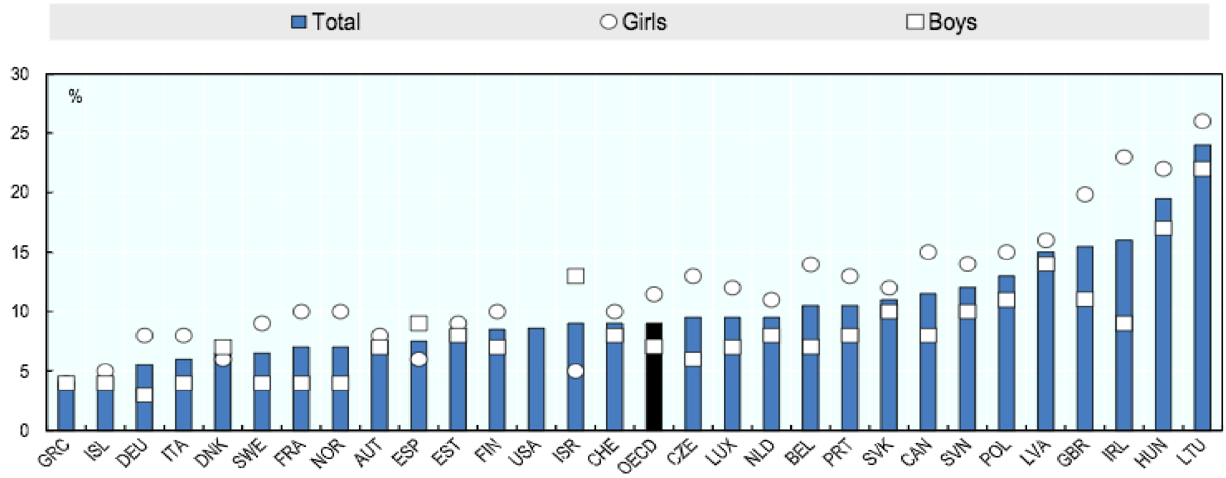

Figure 5. Kids experiencing cyberbullying, 2014 or latest available year
Source: OECD (2021) "How's life in the digital age"

2. METHODOLOGY AND DATA

2.1. Teaching and Learning International Survey

Teaching and Learning International Survey (TALIS) is a large-scale international survey conducted in OECD countries, partner countries and economies. The survey is conducted in schools where also PISA (Programme for International Student Assessment) is conducted, which forms a TALIS - PISA link. The survey is mainly administrated in lower secondary schools (ISCED 2) but where possible, also administrated in primary (ISCED 1) and upper secondary (ISCED 3). (OECD, 2018)

The survey is conducted every five years and there have been three cycles of the survey: the First Cycle taking place in 2008, the Second Cycle in 2013 and the Third Cycle in 2018. TALIS survey contains a vast amount of information about teachers, teaching conditions and learning environments. Furthermore, TALIS addresses policy areas about teacher's effectiveness, teacher's development and attracting and retaining teachers in the profession. *(Ibid.)*

The TALIS 2018 cycle is the program's third cycle. It has a more significant number of participants than before and it focuses on lower secondary education (ISCED 2). TALIS 2018 emphasizes collecting valuable information about teachers, their teaching conditions and learning environments. Its framework highlights problems and themes related to professional traits and pedagogical approaches. The framework also includes current policy and research interests in innovation, equity, and diversity. *(Ibid.)*

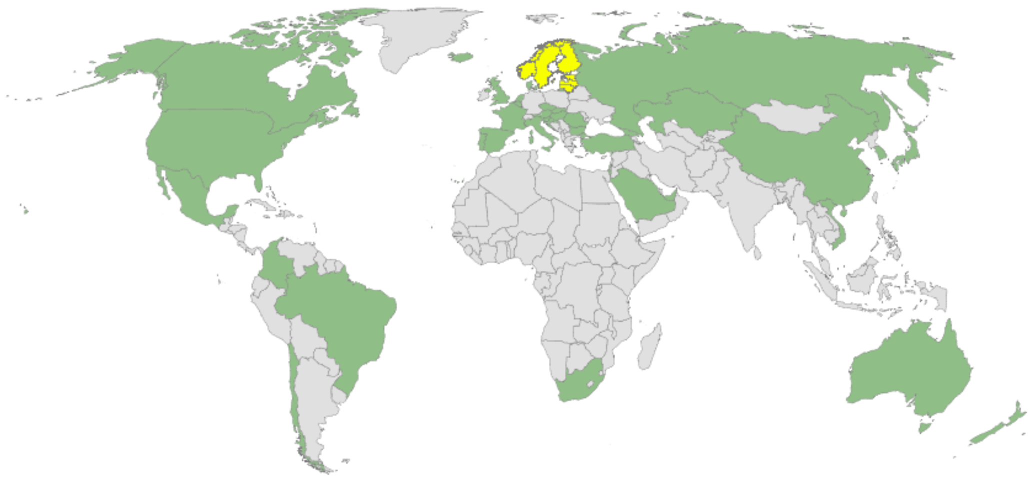

Figure 2. The map of countries who participated in TALIS 2018
Source: Created by author in excel based on information obtained from TALIS 2018

The Figure 2 presents the fourty eight countries participated in TALIS 2018 represented in green colour. The full list of all countries who participated in TALIS 2018 is in Appendix 1. The sample used in this analysis consists of six countries (Figure 2) represented in yellow colour (Estonia, Latvia, Lithuania, Finland, Sweden, Norway). *(Ibid.)*

2.2. Research design and methodology

In some cases, the alternatives can be ordered, for example, if the dependent variable measures opinions or rankings. (Heij *et al.* 2004, 474) Since the dependent variable measures teachers' ability to support student learning through the use of digital technology (Not at all, to some extent, quite a bit, a lot), the ordered probit model is used to analyze the effects of teacher's demographic variables on digital competence.

According to the Heij *et al.* (2004, 474), in the ordered probit model, the outcome y is related to the index function:

$$y^* = \beta_1 + x_1\beta_1 + x_2\beta_2 + \cdots + x_s\beta_s + u = x\beta + u \quad (1)$$

where
y^*=continuous latent quantity
independent variables $x_k, k = \{1, 2, \ldots, S\}$

The dependent variable is a choice of y from M alternatives that are logically sequential $(1, 2, \ldots, M)$. The discrete quantity y has some value if y^* is in a certain range ($\mu = cut\ point$):

$$y=\begin{cases} 1, if\ y^* < \mu_1 \\ 2, if\ \mu_1 < y^* < \mu_2 \\ M, if\ \mu_{M-1} < y^* \end{cases} \quad (2)$$

The probability that observation I will select alternative j is:

$$p_{ij} = P(y_i = j) = p\left(\mu_{j-1} < y_i^* \le \mu_j\right) = f\left(\mu_j - x_i\beta\right) - f\left(\mu_{j-1} - x_i\beta\right) \quad (3)$$

where

j=$\{1, 2, \dots, M\}$

$\mu = cut\ point$

While the dependent variable is ordered, then the author used ordered probit-regression analysis and for a better outcome of the study, the author also calculated the marginal effects of the probit model. The marginal effects show the one-unit change in the conditional mean of the dependent variable as the regressors or covariates change. Marginal effects in ordered response models:

$$\frac{\partial P[y_i=j]}{\partial x_i} = (f\left(\mu_{j-1} - x_i\beta\right) - f\left(\mu_j - x_i\beta\right))\beta \quad (4)$$

As $x_i\beta$increases, the index y_i^* increases, and thus the outcome of y_i tends to become larger. By the marginal effect expressed as a percentage, each unit increase in the independent variable increases or decreases the probability of selecting alternative j. *(Ibid.)*

The underlying TALIS names, labels and descriptions used in the analyses are in Table 1. The dependent variable (DEP_SUPPORT_ICT) shows how well the teacher can support their student learning through the use of digital technology. Independent variables are about teacher's demographic factors, such as age, gender, variables related to teacher's academic and career, such as teacher's work experience (in years), subject taught, and education level (ISCED level). The author chose the variable that measures to what extent the teacher is able to support student learning through the use of digital technology as a dependent variable since this indicator gives an idea of how confident and competent a teacher feels with digital technology.

Table 1. Underlying dependent variables names in TALIS and values used in analysis.

Name in TALIS	Name in model	Description	Question in TALIS
tt3g34m	DEP_SUPPORT_ICT	Not at all=1 To some extent=2 Quite a bit=3 A lot =4	To what extent you support student learning through the use of digital technology (computers, tablets, smart boards)?
tt3g01	GENDER	Male=1 Female=0	-
tt3g03	ISCED_L	ISCED 2011 Level 6 or more=1 Below ISCED 2011 Level 6=0	What is the highest level of formal education you have completed?
tt3g11b	EXP	Years and square years	How many years of work experience do you have, regardless of whether you worked full- time or part-time?
tt3g37	SUBJECT	Values from 1-11. The higher the number the more technology related subject is being taught. 11=technology	Into which subject category does this <target class> primarily fall?
tchagegr	AGE	50 or older=1 <50=0	Age
tt3g15g1	TECH	Yes=1 No=0	Technology - included in my formal education
tt3g54a	SALARY	Agree, strongly agree=1 Disagree, strongly disagree=0	I am satisfied with the salary I receive for my work.

Source: Created by the author based on data obtained from TALIS

2.3. Descriptive statistics

Initially, the sample data for Nordic countries consisted of 9,789 teachers and for Baltic countries 9,078 teachers. The author used listwise deletion for observations with missing data, which means that if a single value from observation was missing, the entire record was removed from the dataset. Descriptive statistics for Nordic countries are provided in Table 2 and descriptive statistics for the Baltic countries in Table 3. Tables contain the mean values, standard deviations and the minimum and maximum values.

Table 2. Descriptive statistics for Baltic countries

Variable	Average	Minimum	Maximum	Standard deviation
DEP_SUPPORT_ICT	2.86	1.00	4.00	0.81
Gender (1=male) (share)	0.15	0.00	1.00	0.36
ISCED Level	6.49	2.00	8.00	0.70
Work experience (years)	23.03	0.00	58.00	12.11
Age	45.22	25.00	60.00	10.30
Technology included in formal education (1=yes) (share)	0.27	0.00	1.00	0.44
Satisfied with salary	1.96	1.00	4.00	0.75
Subject (1=technology, mathematics, science) (share)	0.42	0.00	1.00	0.49

Source: Author's calculations in Excel based on data obtained from TALIS

Table 3. Descriptive statistics for Nordic countries

Variable	Average	Minimum	Maximum	Standard deviation
DEP_SUPPORT_ICT	2.84	1.00	4.00	0.81
Gender (1=male) (share)	0.34	0.00	1.00	0.47
ISCED Level	6.54	2.00	8.00	0.73
Work experience (years)	15.23	0.00	53.00	10.04
Age	40.59	25.00	60.00	10.40
Technology included in formal education (1=yes) (share)	0.17	0.00	1.00	0.38
Satisfied with salary	2.32	1.00	4.00	0.77
Subject (1=technology, mathematics, science) (share)	0.36	0.00	1.00	0.48

Source: Author's calculations in Excel based on data obtained from TALIS

The mean of the dependent variable, which shows to what extent teachers support student learning through the use of digital technology, is quite similar in both data samples. The maximum value of this indicator (four) is when the teacher supports student learning through the use of digital technology a lot. The independent variables differ more between the two sample sets. For example, the Nordic sample's share of men is much higher than in the Baltic sample. In the Nordic countries, approximately 34% of the total sample is men, while only approximately 15% are men in the Baltic countries.

In the Nordic countries, the average work experience of teachers is lower than in the Baltic countries. The average work experience in the Baltic sample is approximately 23 years, and the maximum is around 58 years. In the Nordic sample, the average work experience is approximately 15 years, and the maximum is approximately 53 years. Furthermore, teachers in the Nordic countries are on average younger than in the Baltic countries, with an average age of approximately 41 in the Nordic sample and 45 in the Baltic sample. In the TALIS survey, age could be determined by category (under 25, 25-29, 30-39, 40-49, 50-59). So because of that, the exact average age cannot be determined.

The highest ISCED (International Standard Classification of Education) level is eight (doctoral or equivalent level). ISCED level 6 is issued with bachelor's or equivalent level and ISCED level 7 is issued with masters or equivalent level. (UNESCO Institute for Statistics 2012) Average ISCED level in the Baltic sample is 6.49 and in the Nordic sample 6.54. Technology was included in formal education for 17% of teachers in Nordic countries and 27% for Baltic teachers. This might indicate that Baltic teachers are more digitally competent than Nordic teachers. The final independent variable, which shows how satisfied teachers are with their salary, is significantly higher in the Nordic sample. In the Nordic countries, the average of this variable is 2.32, while in the Baltic countries, it is 1.96. The highest value of this indicator, which is four, means that the teacher strongly agrees with the statement "I am satisfied with my salary." For the Nordic sample, approximately 36% of subjects taught were subjects related to technology and sciences, compared with the Baltic, where 42% of subjects were technology-related.

Descriptive percentages of the indicators are presented in Table 4. The aim of calculating the percentages of these indicators was to see how the proportions of these variables differed between the Nordic and Baltic countries and to see which variables are relevant. The author selected a sample of teachers who were able, a lot or quite a bit, to support their student learning through digital technology (answers three and four). Approximately 65% of Baltic and 74% of Nordic teachers felt that they could support student learning through ICT a lot or quite a bit. In Baltic countries, 87% were women, while in the Nordic sample, 69% were women. In both samples, most teachers had an ISCED level six or seven, although, in the Nordic countries, teachers with an ISCED level of seven had a higher share compared to the Baltic teachers. Over 95% of teachers from both samples, had more than ten years of work experience. Interestingly, for both samples, more than half of the teachers, who felt that they could support student learning through digital technology, were teachers who taught languages, arts, and physical education. For the Nordic countries, the share of teachers who taught languages, arts and physical education was 67%. This may be due to the fact that the majority of teachers in Nordic as well in Baltic countries were teachers of languages, arts, religion, and physical education.

Age is an important indicator of the ability to support student learning through the use of digital technology. It should be logical that younger teachers have more experience and confidence in using digital technologies. As stated previously, the average teacher is younger in the Nordic sample compared with the Baltic sample. From teachers who felt that they could support student learning through the use of digital technology, 73% were younger than 49 in the Nordic countries compared to the 48% in the Baltic countries. But since the exact age is not given in the survey, it is difficult to assess the exact impact that could be assessed if the exact ages were given.

Salary, age and gender might be connected to each other. In the Nordic countries, there are more male teachers, more younger teachers and more teachers who are satisfied with their salary. From teachers who can support their students through the use of digital technology, 21% of teachers in the Baltic and 47% of teachers in the Nordic countries were satisfied with their salary.

Table 4. Descriptive percentages of the indicators

Variable	BALTIC Can support student learning through the use of digital technology a lot or quite a bit (65% of total) (%)	NORDIC Can support student learning through the use of digital technology a lot or quite a bit (74% of total) (%)
Gender		
Male	13	31
Female	87	69
ISCED Level		
Below <ISCED 2011 Level 3>	0	0
<ISCED 2011 Level 3>	1	0
<ISCED 2011 Level 4>	0	0
<ISCED 2011 Level 5>	1	0
<ISCED 2011 Level 6>	42	36
<ISCED 2011 Level 7>	56	63
<ISCED 2011 Level 8>	1	1
Experience		
Less or equal to ten years	4	5

More than 10 years	96	95
Subject taught		
Arts, physical education, religion, languages, reading	52	67
Social studies, science, mathematics, technology	47	30
Other	2	3
Age		
49 and younger	48	73
50 and older	52	27
Technology - included in my formal education		
No	69	83
Yes	31	17
Salary		
Satisfied with the salary	21	47
Not satisfied with the salary	79	53

Source: Created by the author based on data obtained from TALIS

3. EMPIRICAL ANALYSIS

3.1. Baltic countries

The estimates for the Baltic sample ordered probit model are shown in Table 5. As seen in the Model 1, some regressors demonstrate remarkable significance while others exhibit less or no significance. The author made two models, second time insignificant variables were removed. The final model (Model 2) shows all variables, which were significant on a level of 0.05 or less. Salary variable, experience and experience squared were insignificant on a level 0.05 and were removed from the final model. Therefore, the final formula is the following:

$$y *= (-0.146) * Age - 0.197 * Gender + 0.053 * Subject + 0.233 * Tech + 0.212 * ISCED$$

(0.025) *(0.035)* *(0.004)* *(0.025)* *(0.078)*

where

y* - continuous latent quantity

Age - teacher's age ($50\ or\ older = 1, < 50 = 0$)

Gender - teacher's gender ($Male = 1$)

Subject - subject being taught ($Technology = 11$)

Tech - technology included in teacher's formal training ($Yes = 1$)

ISCED - teacher's ISCED level ($Level\ 6\ or\ more = 1$)

How well teachers feel about being able to support student learning through the use of digital technology, can be determined by calculating y^* value. Range is defined by *cut points*.

$$y = \begin{cases} 1\ (not\ at\ all), if\ y^* < -1.459 \\ 2\ (to\ some\ extent), if -1.459 < y^* < 0.086 \\ 3\ (quite\ a\ bit), if\ 0.086 < y^* < 1.221 \\ 4\ (a\ lot), if\ 1.221 < y^* \end{cases}$$

Table 5. Ordered probit models for Baltic countries

Variable	Model 1	Model 2
Age (1=50 and older)	-0.148***	−0.146***
	(0.033)	(0.025)
Gender (1=male)	-0.205***	−0.197***
	(0.035)	(0.035)
Salary (1=satisfied with the salary)	-0.054* (0.029)	-
Subject (1-11, 11=technology)	0.054***	0.053***
	(0.004)	(0.004)
Technology in formal education (1=yes)	0.222*** (0.029)	0.233*** (0.025)
Experience (years)	0.003	
	(0.004)	-
Experience_sq (years squared)	-0.001*	
	(8.22*10^{-5})	-
ISCED level (1=>ISCED level 6)	0.214*** (0.078)	0.212*** (0.078)
Cut 1	-1.486***	-1.459***
	(0.093)	(0.086)
Cut 2	0.063	0.086
	(0.091)	(0.083)
Cut 3	1.198***	1.221***
	(0.091)	(0.084)
Number of cases 'correctly predicted'	3,405 (42.8%)	3,411 (42.8%)
Likelihood ratio test	365.987	351.253
	(0.0000)	(0.0000)
p-value	0.299	0.240

Source: author's calculations using the open-source statistical package Gretl Notes: Statistical significance is indicated by asterisks as follows: *** statistically significant on a level of 0.01; ** statistically significant on a level of 0.05; * statistically significant on a level of 0.1.

If the estimation method is the maximum likelihood (ML) method, then the only necessary condition is to choose the correct distribution function. Then, the estimates obtained by the ML method are efficient, asymptotically effective and asymptotically normal (Heij *et al*, 2004, 52). This is shown by the "Test for normality of residual". Since the normality of residual $p - value = 0.240$ for the final model (Model 2), then this requirement is satisfied. The likelihood ratio test shows that the models are statistically significant. For both models approximately 42.8% of cases are correctly predicted.

The author also calculated the marginal effects of the ordered probit model. The marginal effects show the change in the conditional mean of the dependent variable on regressors or covariates change by one unit. Results are reported in Table 6.

Table 6. Average marginal effects after ordered probit regression

Variable	dp/dx (Group 1)	dp/dx (Group 2)	dp/dx (Group 3)	dp/dx (Group 4)
Age (1=50 and older)	0.013	0.066	-0.013	-0.066
Subject (1-11, 11=technology)	-0.003	-0.016	0.003	0.016
Technology in formal education (1=yes)	-0.012	-0.071	0.011	0.073
ISCED level (1=>ISCED level 6)	-0.016	-0.065	0.021	0.059
Gender (1=male)	0.014	0.061	-0.018	-0.057

Source: Compiled by the author using the open-source statistical package Gretl

Age is revealed to have a significantly negative effect on the dependent variable. When the teacher is 50 and older, the less likely he or she can support student learning through ICT. Marginal effects are in Table 6. Group 1 means that the option "Not at all" has been chosen, from the question "To what extent you support student learning through the use of digital technology (e.g., computers, tablets, smart boards)?". The positive marginal effect is between age and the Group 1, meaning that the older the teacher, the more likely he/she felt that they could not support student learning through the use of digital technology. That also applies to the second Group 2 ("To some extent"). The negative marginal effect is between age and Groups 3 and 4. This means that being 50 and older decreases the probability of being able to support student learning through the use of digital technology by 0.066 (Group 4).

Gender is also revealed to have a significantly negative effect on the dependent variable. When the teacher is a male individual, the less likely he can support student learning the through use of digital technology. Table 6 can be interpreted as showing that the one unit change in the gender variable increases the probability of not being able to support student learning through the use of digital technology by 0.014 (Group 1). The negative marginal effect is between gender and Groups 3 and 4. This means that being a male decreases the probability of being able to support student learning through the use of digital technology by 0.057 (Group 4).

The subject taught is revealed to have a significantly positive effect on the dependent variable. When the teacher is teaching a subject related to technology, mathematics, and science, the more likely he or she can support student learning through the use of digital technology. Marginal effects between the subject taught and Group 1 and 2 are negative. This means that teaching subjects like writing, arts, physical education decreases the probability of supporting student learning through the use of digital technology by 0.003 (Group 1). Marginal effects between subject taught and Group 3 and 4 are positive, meaning that the more technology-related subject is being taught, then the probability of supporting student learning through the use of digital tools increases by 0.016 (Group 4).

When technology was included in formal education, the more likely the teacher felt that they could support their student learning through the use of digital technology. Marginal effects between technology included in formal education and Group 1 and 2 are negative. When technology was not included in the teacher's formal education, they felt that they could not support their student learning through the use of digital tools. Marginal effects between technology included in formal education and Group 3 and 4 are positive. This means that having technology included in formal education increased the probability of supporting student learning through the use of digital technology by 0.073 (Group 4).

ISCED level variable is revealed to have a significantly positive effect on the dependent variable. When a teacher has bachelor's or master's degree, the more likely he or she is prepared to support student learning through the use of digital tools. Table 5 can be interpreted as showing that the one unit change in the ISCED variable increases the probability of being able to support student learning through the use of digital tools by 0.059 (Group 4). Teachers who have ISCED level lower than 6 increases the probability of not being able to support student learning through the use of digital technology by 0.016 (Group 1).

Subject taught, technology included in teacher's formal education and ISCED level had a significant positive effect. It is logical, since when the teacher has had previous technology trainings or has a higher ISCED level, then presumably he or she has better digital skills. Gender and age had a significant negative effect. Skills overall deteriorate with age and it is more difficult for older people to learn new skills. Gender has a surprisingly negative effect, because usually men are better at mathematics, technology and science. Nevertheless, only 15% of teachers in the Baltic sample were men, so it may be that the men in the Baltic sample were relatively older or teaching subjects like physical education and languages.

3.2. Nordic countries

Estimates of the Nordic sample ordered probit model are shown in Table 7. As seen in the Model 1, some regressors demonstrate remarkable significance while others exhibit less or no significance. The author made two models, for second model, insignificant variables were removed. The final model (Model 2) shows all variables, which were significant on a level of 0.05 or less. Gender, salary, experience and experience squared variables were insignificant and were removed from the final model. The final model:

$$y* = (-0.286) * Age + 0.042 * Subject + 0.089 * Tech + 0.163 * ISCED$$

(0.027) (0.005) (0.033) (0.072)

where

y* - continuous latent quantity

Age - teacher's age ($50\ or\ older = 1, < 50 = 0$)

Subject - subject being taught ($Technology = 11$)

Tech - technology included in teacher's formal training ($Yes = 1$)

ISCED - teacher's ISCED level ($Level\ 6\ or\ more = 1$)

How well teachers feel about being able to support student learning through the use of digital technology, can be determined by calculating y* value. Range is defined by *cut points*.

$$y = \begin{cases} 1\ (not\ at\ all), if\ y^* < -1.652 \\ 2\ (to\ some\ extent), if -1.652 < y^* < 0.007 \\ 3\ (quite\ a\ bit), if\ 0.007 < y^* < 1.095 \\ 4\ (a\ lot), if\ 1.095 < y^* \end{cases}$$

Table 7. Ordered probit models for Nordic countries

Variable	Model 1	Model 2
Age (1=50 and older)	-0.141***	-0.286***
	(0.035)	(0.027)
Gender (1=male)	-0.034	
	(0.027)	-
Salary (1=satisfied with the	-0.001	
salary, 0=not satisfied)	(0.025)	-
Subject (1-11, 11=technology)	0.043***	0.042***
	(0.005)	(0.005)
Technology in formal education	0.108***	0.089***
(1=yes)	(0.034)	(0.033)
Experience (years)	-0.008*	
	(0.004)	-
Excperience_sq (years squared)	$-8.589*10^{-5}$	
	(0.000)	-
ISCED level (1=>ISCED level 6)	0.189***	0.163**
	(0.189)	(0.072)
Cut 1	-1.748***	-1.652***
	(0.085)	(0.079)
Cut 2	-0.072	0.007
	(0.081)	(0.076)
Cut 3	1.017***	1.095***
	(0.082)	(0.076)
Number of cases 'correctly	3207	3217
predicted'	(42.2%)	(42.2%)
	285.518	281.275
Likelihood ratio test	(0.000)	(0.000)
p-value	0.131	0.130

Source: author's calculations using the open-source statistical package Gretl Notes: Statistical significance is indicated by asterisks as follows: *** statistically significant on a level of 0.01; ** statistically significant on a level of 0.05; * statistically significant on a level of 0.1.

If the estimation method is the maximum likelihood method, then the only necessary condition is to choose the correct distribution function. The normality of the residual p-value is 0.130, so this requirement is satisfied. The likelihood ratio test shows that the models are statistically significant. For both models, approximately 42.2% of cases are correctly predicted.

Age is revealed to have a significantly negative effect on the dependent variable. When the teacher is 50 and older, the less likely he or she can support student learning through the use of digital technology. Marginal effects are in Table 8. The positive marginal effect is between age and Group 1, meaning that the older the teacher, the more likely he/she felt that they could not support student learning through the use of digital technology. That also applies to the second Group 2 ("To some extent"). The negative marginal effect is between age and Groups 3 and 4. This means that being 50 and older decreases the probability of being able to support student learning through the use of digital tools by 0.083 (Group 4).

Subject taught is revealed to have a significantly positive effect on the dependent variable. In other words, when the teacher is teaching a subject that is related to technology, mathematics and science, the more likely he or she can support student learning through the use of digital technology. Marginal effects are in Table 8.

Table 8. Marginal effects of statistically significant variables

Variable	dp/dx (Group 1)	dp/dx (Group 2)	dp/dx (Group 3)	dp/dx (Group 4)
Age (1=50 and older)	0.017	0.092	-0.026	-0.083
Subject (1-11, 11=technology)	-0.002	-0.014	0.003	0.013
Technology in formal education (1=yes)	-0.005	-0.031	0.006	0.030
ISCED level (1=>ISCED level 6)	-0.010	-0.052	0.016	0.046

Source: author's calculations using the open-source statistical package Gretl

The marginal effects between the subject taught and Group 1 and 2 are negative. This means that teaching subjects like writing, arts, physical education decreases the probability of supporting student learning through the use of digital technology by 0.002 (Group 1). Marginal effects between subject taught and Group 3 and 4 are positive, meaning that the more technology-related subject is being taught, then the probability of supporting student learning through the use of digital technology by 0.013 (Group 4).

Technology included in formal education have a significantly positive effect on the dependent variable. Marginal effects between technology included in formal education and Group 1 and 2 are negative, meaning that when technology was not included in teacher's formal education, then he or she felt that they could not support their student learning through the use of digital technology. Marginal effects between technology included in formal education and Group 3 and 4 are positive. This means that having technology included in formal education, increased the probability of being able to support student learning through the use of digital technology by 0.030 (Group 4).

ISCED level variable is revealed to have a significantly positive effect on the dependent variable. When a teacher has a bachelor's or master's degree, the more likely he or she is prepared to support student learning through the use of digital tools. Table 8 can be interpreted as showing that the change in the ISCED variable increases the probability of being able to support student learning through the use of digital technology by 0.046 (Group 4). Teachers who have ISCED level lower than six increase the probability of not being able to support student learning through the use of digital technology by 0.010 (Group 1).

Subject taught, technology included in teacher's formal education and ISCED level had a significant positive effect, which is logical. When the teacher has had previous technology training or has a higher ISCED level, then presumably he or she has better digital skills. Age had a significant negative effect. Skills overall deteriorate with age and it is more difficult for older people to learn new skills. Gender and experience were not significant on a level 0.05 or less.

CONCLUSION

Nowadays, digital infrastructures (personal digital devices, school digital infrastructures, interoperable information systems, web services, cloud solutions, open data) and methodologies for its use create opportunities to learn quickly and improve learning quality. The use of digital technology contributes to productivity growth in the economy. Teaching and learning with the help of digital technology is more efficient and effective (Ministry of Education and Research 2014).

This thesis aims to determine how digitally competent teachers are in the Baltic countries compared to the Nordic countries. This thesis hypothesizes that teachers in Nordic countries are more digitally competent than in Baltic countries.

Two research questions are asked in this thesis:

1. How do demographic factors affect teachers' digital competence?
2. In which subject are teachers more digitally competent?

To fulfil this thesis's purpose, the author summarised the literature and conducted the empirical analysis using 2018 data from the Teaching and Learning International Survey (TALIS). To fulfil the purpose and find answers to the questions, two regression models were made: the first model consisted of three Baltic countries (Estonia, Latvia and Lithuania). The second model consisted of three Nordic countries (Finland, Sweden and Norway).

According to the OECD report "How's Life in the Digital Age?", Finland, Sweden and Norway rank among the top countries regarding ICT access and use. In contrast, Latvia and Lithuania rank below the OECD average regarding Internet access. On the other hand, Estonians have a large variety of different digital solutions and Estonia is well known for its digital revolutions. Nevertheless, according to the theoretical overview, teachers from Estonia are below the OECD average regarding digital competence.

The theoretical and descriptive overview indicate that teachers from the Nordic countries (Finland, Sweden, Norway) are more digitally competent than teachers from the Baltic countries (Estonia, Latvia, Lithuania). Approximately 65% of Baltic teachers compared with 74% of Nordic teachers felt that they could support student learning through the use of digital technology a lot or quite a bit, even though, in the Baltic countries, the share of teachers who taught technology-related subjects and had technology included in formal education, was higher than in the Nordic countries. There are more male teachers in the Nordic countries, more younger teachers with less experience and more teachers who are satisfied with their salary. Average ISCED level was similar in both data samples. It can be concluded that age, gender and salary satisfaction positively affect teachers' digital competence more than the subject taught and technology included in teacher's formal education.

Two regression models were made to answer the research questions. The author used probit-regression analysis. Age, subject taught, technology included in teacher's formal education and ISCED level were significant on a level of 0.05 or less for both data samples. Subject taught, technology included in teacher's formal education and ISCED level had a significant positive effect. Teachers who teach more technology-related subjects, such as mathematics, science, and technology, are more digitally competent. Also, teachers who have had previous technology trainings and/or who have a higher ISCED level are more digitally competent. Gender (1=male) was a significant variable and had a significant negative effect in the Baltic countries but not in the Nordic countries. Nevertheless, only 15% of teachers in the Baltic sample were men, so it may be that the men in the Baltic sample were relatively older or teaching subjects like physical education and languages. Age had a significant negative effect on both data samples, meaning older teachers are not as digitally competent as younger teachers. Skills overall deteriorate with age and it is more difficult for older people to learn new skills.

It can be concluded that younger people expect higher salaries and therefore, individuals from the Baltic countries do not find the job of a teacher as attractive as Nordic teachers. Moreover, it may seem to men that the salary a teacher receives in the Baltic countries is not enough, which is why there are fewer men in the Baltic countries than in the Nordic countries. Salary satisfaction is an important indicator, as a higher salary helps to motivate teachers to use new digital solutions, develop themselves and for young people to start a career as a teacher.

The purpose of this bachelor's thesis was achieved as the hypothesis was successfully confirmed and the two questions were answered. The author of this bachelor's thesis finds that further research should be done. The addition of new countries and some new variables that show teachers' digital skills and competence from the Teaching and Learning International Survey could be analysed in further research. Furthermore, the author could also include PISA results and analyse teachers digital competence using the TALIS-PISA link. Moreover, it would be interesting to include countries' average teacher salaries to see if there is a correlation between salaries and digital competence.

KOKKUVÕTE

ÕPETAJATE DIGIPÄDEVUS: VÕRDLUS BALTI RIIKIDE JA PÕHJAMAADE VAHEL

Klaudia Sarah Kaar

Õpetajate digipädevusel on oluline roll tänapäeva digitaliseeruvas maailmas. Digipädevuse olulisus suurenes veelgi enam COVID-19 viiruse põhjustatud pandeemia ajal, mil koolid jäid koduõppele ning koheselt oli vaja, et õpetajatel oleksid piisavad digitaalsed oskused ja teadmised, et oma õpilasi juhendada ja aidata.

Käesoleva töö eesmärgiks on välja selgitada, kui digitaalselt pädevad on Balti riikide õpetajad võrreldes Põhjamaade õpetajatega. Hüpoteesiks püstitati, et Põhjamaade õpetajad on digitaalselt pädevamad kui Baltimaade õpetajad.

Käesolevas bakalaureusetöös on püstitatud kaks uurimisküsimust:

1. Kuidas mõjutavad demograafilised näitajad õpetajate digipädevust?

2. Millistes ainetes on õpetajad digitaalselt pädevamad?

Lõputöö eesmärgi saavutamiseks uuritakse varasemat kirjandust ning viiakse läbi empiiriline analüüs kasutades 2018. aasta TALIS andmeid. Eesmärgi täitmiseks ja uurimisküsimustele vastuste leidmiseks tehakse kaks regressioonimudelit: esimene mudel koosneb kolme Balti riigi (Eesti, Läti ja Leedu) andmetest. Teine mudel koosneb Põhjamaade (Soome, Rootsi ja Norra) andmetest.

OECD aruande *"How's life in the digital age?"* kohaselt on Soomes, Rootsis ja Norras IKT kättesaadavus ja kasutamine esikohal. Seevastu Läti ja Leedu jäävad Internetiühenduse osas alla OECD keskmise. Samas on eestlastel palju erinevaid digilahendusi ja Eesti on tuntud oma digitaalsete revolutsioonide poolest. Sellegipoolest on teoreetilise ülevaate kohaselt Eesti õpetajate digipädevus OECD keskmisest kehvem.

Hüpotees, et Põhjamaade õpetajad on digitaalselt pädevamad kui Balti riikide õpetajad, leidis kinnitust. Teoreetilisest ja kirjeldavast ülevaatest selgus, et Põhjamaade (Soome, Rootsi, Norra) õpetajad on digitaalselt pädevamad kui Balti riikide (Eesti, Läti, Leedu) õpetajad. Ligikaudu 65% Baltikumi õpetajatest, võrreldes 74% Põhjamaade õpetajatega, tundsid, et nad suudavad palju või üsna palju toetada õppimist digitaalsete vahendite kaudu. Baltimaades on osakaaluliselt rohkem tehnoloogiaga setoud ainete õpetajaid ning õpetajaid, kes on varasemalt läbinud tehnoloogiaga seotud koolitudi. Põhjamaades on rohkem meesõpetajaid, rohkem noori õpetajaid ning rohkem õpetajaid, kes on rahul oma palgaga. Seega võib järeldada, et vanus, sugu ning palgaga rahulolu mõjutavad positiivselt rohkem õpetajate digipädevust kui aine, mida õpetatakse ning varasema tehnoloogia õppe või koolituse olemasolu.

Uurimisküsimustele vastuste leidmiseks koostas autor kaks regressioonimudelit. Autor kasutas *probit*-regressioonanalüüsi. Vanus, õpetatav aine, õpetaja varasemas hariduses sisalduv tehnoloogia õpe ning ISCED tase olid mõlema andmevalimi puhul olulised tasemel 0,05 või vähem. Õpetatav aine, õpetaja varasemas hariduses sisalduv tehnoloogia õpe ja ISCED tase olid statistiliselt olulise positiivse mõjuga. Õpetajad, kes õpetavad aineid, mis on tehnoloogiaga seotud, näiteks matemaatika, loodusteadused ja tehnoloogia, on digitaalselt pädevamad, kui õpetajad, kes õpetavad humanitaaraineid ning kehalist kasvatust. Samuti on digitaalselt pädevamad need õpetajad, kes on varasemalt osalenud tehnoloogiaga seotud koolitustel ja / või kellel on kõrgem ISCED tase. Sugu (1 = mees) oli statistiliselt oluline muutuja ja avaldas märkimisväärset negatiivset mõju Balti riikides, kuid mitte Põhjamaades. Samas oli ainult 15% Baltimaade valimis olnud õpetajatest mehed, seega võib olla, et Balti riikides olid mehed pigem vanemad või/ja õpetasid humanitaaraineid ja kehalist kasvatust. Vanus oli mõlemas andmekogumis statistiliselt oluline ning avaldas negatiivset mõju. See tähendab, et vanemad õpetajad pole digitaalselt nii pädevad kui nooremad õpetajad. Oskused halvenevad vanusega ja tihti on vanematel inimestel uusi oskusi raskem õppida kui noortel inimestel.

Võib järeldada, et nooremad inimesed ootavad kõrgemat palka ja seetõttu ei peeta Baltikumis õpetajate tööd nii atraktiivseks kui Põhjamaades. Sama saab järeldada ka meeste kohta. Palk on oluline vahend motiveerimaks töötajaid arenema ja uusi lahendusi katsetama ning noori inimesi motiveerima õpetaja karjääriga alustama.

Käesoleva bakalaureusetöö eesmärk saavutati, kuna hüpotees kinnitati edukalt ning vastati ka kahele uurimisküsimusele. Selle bakalaureusetöö autor leiab, et tuleks teha täiendavaid uuringuid. Riikide lisamine ning TALIS küsitlusest veel mõne küsimuse lisamine võib välja tuua uusi järeldusi. Samuti oleks huvitav kaasata PISA tulemused ja analüüsida õpetajate digipädevust, kasutades TALIS-PISA vahelist seost. Ka riikide keskmiste õpetajate palkade lisamine oleks huvitav.

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APPENDICES

Appendix 1. Countries who participated in TALIS 2018

Countries	
Argentina (Buenos Aires)	Latvia
Finland	Sweden
Norway	Colombia
Australia	Lithuania
France	Turkey
Portugal	Croatia
Austria	Malta
Georgia	United Arab Emirates
Romania	Czech Republic
Belgium (Flemish and French Communities)	Mexico
Hungary	United Kingdom
Russian Federation	Denmark
Brazil	Netherlands
Iceland	United States
Saudi Arabia	Estonia
Bulgaria	New Zealand
Israel	Viet Nam
Singapore	Italy
Canada (Alberta)	Slovak Republic
Slovenia	Chile
China (People's Republic of) (Shanghai)	Japan
Chinese Taipei	Kazakhstan
Spain	South Africa
Cyprus	Korea

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