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STRESS FACTORS OF NOVICE TEACHERS IN LOWER SECONDARY SCHOOL AND THE
POSSIBLE USE OF EDUCATIONAL TECHNOLOGY TO MITIGATE THESE STRESSORS IN
NOVICE TEACHERS' VIEW

MA thesis

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Abstract

Stress factors of novice teachers in lower secondary school and the possible use of educational technology to mitigate these stressors in novice teachers' view. There is a high attrition rate among novice teachers in Estonia. This research is a study of stress factors that impact novice teachers in their first two years of teaching in lower secondary school in Estonia. Its purpose is to determine how educational technology could mitigate these stressors. 10 novice teachers from different Estonian schools were accepted to participate in an online survey, and the insider-researcher's qualitative analysis of the data collected shows that high-stress factors are not necessarily motivating novice teachers to look towards educational technology to mitigate stressors in a work context. Also, in many cases, specific applications of educational technology that could help to mitigate the stress factors, in teaching work both at school and at home, simply do not exist yet and need to be created.

Keywords: novice teacher, lower secondary school, stress factor, stress mitigator, educational technology

Resümee

Põhikooli kolmanda astme alustavate õpetajate stressifaktorid ja haridustehnoloogia kasutusvõimalused nende stressifaktorite leevendamiseks tuginedes alustavate õpetajate arvamustele. Eesti alustavate õpetajate töölt lahkumise protsent on kõrge. Käesolev uurimustöö uurib Eesti alustavate õpetajate stressifaktoreid põhikooli kolmandas astmes kahel esimesel õppeaastal eesmärgiga teha kindlaks, kuidas haridustehnoloogia võiks leevendada neid stressifaktoreid. 10 alustavat õpetajat Eesti eri koolidest kaasati osalema veebiküsitluses ning saadud andmete kvalitatiivne analüüs siseringi-uuriija poolt näitab, et kõrge stressi faktorid ei motiveeri alustavaid õpetajaid tingimata pöörduma haridustehnoloogia poole, selleks et otsida lahendusi stressifaktorite leevendamiseks töökontekstis. Samuti pole paljudel juhtudel spetsiifilisi haridustehnoloogilisi rakendusi, mis võiksid aidata leevendada stressifaktoreid õpetajatöös nii koolis kui kodus, lihtsalt veel olemas ja neid tuleb luua.

Võtmesõnad: alustav õpetaja, põhikooli kolmas aste, stressifaktor, stressi leevendaja, haridustehnoloogia

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Introduction

The teaching profession is among the most stressful occupations in the job market. According to different reports, it is continuously in the top 15-25 most stressful jobs; Zambas listed it in a Careeraddict article (2022) as number 21 of 30. Continuous stress at work often leads to different mental health problems, among which is burnout. Based on these factors, it should come as no surprise that attrition rates in teaching are so high. In Estonia, the attrition rate for novice teachers is 25% after two years (Rootalu, 2022). Also, teachers in the lower secondary school (grades 7, 8, and 9 in Estonian School System) typically left school after the first or second year more often than those working in the other educational levels (Rootalu, 2022).

After some preliminary research, it can be concluded that novice teachers leave school so often in the first two years because of the significant level of work-related stress on a daily basis. Therefore, in light of the latest statistics about novice teachers' high attrition percentages in Estonian schools, it seems right to investigate this situation further, with a research focus on stress factors in teaching work. However, it will also be helpful to investigate educational technology as a mitigator of these stressors with the aim of helping novice teachers who are in their first two years of teaching in lower secondary schools in Estonia. With the help of an online survey, a panel of novice teachers who are in their first two years of teaching in lower secondary school will be questioned and a qualitative analysis will be applied to the collected data to help to investigate deeper into the situation. As it happens, the author is an insider-researcher and belongs to the researched group of novice teachers. Therefore, in addition to the survey panel, in-depth insights will be given by the insider-researcher as a novice teacher.

The author of this paper wants to evaluate the current stress situation of novice teachers in their first years in the lower secondary schools in Estonia and find new ideas for how educational technology can assist in dealing with these stress factors from a novice teacher's perspective. Because the first in-service teaching years are the most demanding and stressful for novice teachers, it is crucial to work on this problem and find solutions for how to retain them by providing reasonable working conditions. It would be an added value to the educational system in general, and to novice teachers more specifically, if the proposed research aims of finding out how educational technology could mitigate novice teachers' stress factors at school could be achieved by the end of the research. The present research was conducted with a lot of hope that the findings will be useful in one way or another in the grand scheme of things.

Theoretical Overview

Attrition rates of novice teachers in schools in Estonia

Teachers are divided based on their experience into novice teachers and veteran teachers. In general, the first five years of teaching define someone as a novice teacher, and more than five years define a veteran teacher.

Often, turnover and attrition are used interchangeably. For the sake of clarity, in this research paper, the term “teacher attrition” refers to practicing teachers who choose to leave the profession each year for reasons other than retirement (Hanks et al., 2020).

The latest Statistics Estonia’s report on teachers in Estonia “Õpetajate elukaar aastatel 2015-2022” (Rootalu, 2022) shows statistical data analysis based on available data in the Estonian Education Info System (orig. EHIS), the Work Register (orig. TÖR), the Business Register for statistical purposes, and the Population Register for statistical purposes. To understand why this information is useful, it is worth first giving a quick overview of its research data.

Rootalu’s statistics show in Table 43 that novice teachers (all ages comprised), who were not registered as teachers in EHIS and TÖR in previous years, were more likely to leave school. The data registered in September 2019 shows that after the first and second year, 16% and 25% of them had left school, respectively. In age-specific statistics (Table 44), there is a differentiation between novice teachers according to their age group, and it is interesting to see that after the first year, it is not the group of under 30-year-olds whose attrition numbers are the highest, as the 50-59-year-olds’ attrition percentage is 21% versus 13% of the under 30-year-olds. However, it should not be forgotten that the majority of novice teachers are under 30 years old. After two years, the differences between the two aforementioned groups gets smaller – 26% for the under 30-year-olds and 25% for the 50-59-year-olds – and they are joined by the age group of 30-39-year-olds with 26%.

Another interesting result of Rootalu’s research (Table 9) is that when school education levels were taken into account, the teachers in the lower secondary school (grades 7, 8, and 9 in Estonian School System) left school after the first or the second year more often than those in the other school levels.

Also, it is interesting to note that Table 26 (Rootalu, 2022) shows that the biggest percentage of teachers who did not work as teachers in the previous year or were unemployed the previous year were teachers in the lower secondary school level (data of September 2021).

Novice teachers' work-related stress factors and their support system

Another study by the Center for Applied Anthropology of Estonia, “Õpetajate personauuring” (Kaljuvee et al., 2022), established standard teacher personas with their characteristics and their educational backgrounds. To no surprise, interviewed teachers implicitly pointed out the difficult aspects of a teaching position, such as extra working hours outside school, too little free time for personal life, tensions between teacher and parents, difficulty maintaining discipline in class, burnout, etc. It was also mentioned that a teacher should be a Superman, meaning a miracle human with superpowers.

That same research (Kaljuvee et al., 2022), which focused on the types of education and qualifications of teachers and also took into account former teachers, came up with 6 generalized teacher types. Of these, 2 teacher types are of interest because, at the time of interviews, teachers had less than one year to one year of teaching experience and they both were teaching teenagers – 5th-7th graders (math and ICT teacher) and 6th-8th graders (Estonian language and literature teacher).

The difficulties the novice math teacher (teacher type from the research of Kaljuvee et al., 2022) experienced were a big workload, maintaining discipline in class, coping with pupils with family problems, and too little support with study materials from colleagues. The same novice teacher guessed that discipline problems were probably due to the difficult age group. When reflecting upon teachers' education syllabus, the teacher was critical of the minimal focus on pedagogical theory during their BA math teacher studies. Instead, the main focus was on teaching the school subject of the teacher's specialization. Also, she stated there was a lack of teaching practicum, which would put a student in a real-life teaching situation and teach to deal with problems that arise while teaching. The novice teacher was suggesting that, ideally, there could be a mentor from the university to act as a supporting force during a practicum. Finally, the teacher mentioned the lack of theory for teaching pupils with special needs. The teacher left school after working there only for one year in parallel with the last year of BA studies.

The Estonian language and literature teacher (teacher type from the research of Kaljuvee et al., 2022) who was teaching for the first year at school in parallel with her last year of MA teaching studies criticised that the practicum they were offered in the syllabus did not have a strong practical value and was not empowering. The teacher also said that as a class teacher in charge of general well-being, she felt that she was lacking theory on the teacher's role and management of the class as well as communication with parents. From a

work perspective, the novice teacher acknowledged that it takes a lot of time to prepare for classes, as she must prepare everything from scratch, and correcting pupils' tests takes a considerable amount of time, even more so if she wants to write personal feedback. All this takes up a huge part of her free time, and she spends almost all evenings working until midnight. And another negative aspect of teaching is that the compulsory school syllabus is immensely dense, and a teacher is responsible for making the pupils learn everything. In a closing statement, she states that she hopes she will not burn out because of the big workload. But she sees herself still working in a school system in five years' time.

If we compare the stress factors of novice teachers with all teachers referenced in another research paper (no distinction between novice teachers or experienced ones), they are mainly the same. Laur (2018) carried out a study among teachers in basic schools in Pärnu and Viljandi counties, and found that the main stress factors are long working hours (with 30% extra hours at home), working with students with special needs such as studying and behavioral difficulties within the same class with other students, complicated relations with students, management and colleagues, and parents, and the negative perception of the teaching profession in society.

Based on these aforementioned research findings from Laur (2018) and Kaljuvee et al., (2022) were constructed 7 stress factors that will be researched further with the present paper in the context of educational technology as a stress mitigator. In this research they will appear in the following order: teaching students with special educational needs (mostly ADHD), maintaining discipline in the classroom, relationship between teacher and students, relationship between teacher and colleagues, relationship between teacher and parents, pressure of making students understand the school subject, high workload – preparing lessons, correcting tests, writing feedback, etc.

What is being done to support novice teachers? There has been research done on the subject by Remmik et al. (2015). They show in their research, “Algajad õpetajad koolijuhi ja kolleegide toetusest esimestel tööaastatel”, that there are different support systems at schools in Estonia: headmasters, mentors, shared understandings, and induction year program, among others. But they also conceded that the efficacy of the named support systems could also be questioned. For instance, some novice teachers' mentors existed only on paper and did not offer any support, as they might have lacked mentor training or teaching experience. Furthermore, in the discussion of the research, it was suggested that novice teachers should start receiving support during their initial teacher education and through their first contact with the school.

There is an annual induction year program at the University of Tallinn and the University of Tartu, which was started in 2004 and is still going strong. Induction refers to a particular learning program that offers support to novice teachers, generally during their first years, to help with pedagogical skills and professional practices (Kwok et al., 2022).

According to the OECD report on the professional development of principals and teachers of 7-9 grades in Estonia, *Õpetajad ja koolijuhid elukestvate õppijatenä, I part (2018): The reduction of teaching hours, the general introduction and meetings by the school, and the guidance given by the principal or experienced teacher should be part of the "package" offered to each newcomer at each school. However, only 17% of our teachers said they had a chance to work with a reduced teaching load during the induction period. This could be one of the first supportive measures that a school could offer to a novice teacher at least in the first year.*

Although school principals consider mentoring to be important in supporting the performance of teachers and students, less than one-fifth of teachers said they have been assigned a mentor at school as a novice teacher. (p. 141)

If we look for examples in schools in foreign countries, then there have been attempts to strengthen the partnership between university faculties and school leaders (cross-institutional collaboration) with the aim of supporting novice teachers in their first-year efforts. As described by Behm Cross (2017), a teacher residency program – Collaboration and Reflection to Enhance Atlanta Teacher Effectiveness (CREATE) – was designed to smooth the transition from university training to schoolteacher position. The three-year program started at the university for pre-service teachers, followed by a co-teaching experience with another resident teacher during the first year at school and continued with teaching alone at school during the second year. One supportive incentive that caught attention in addition to co-teaching was mindfulness training, or Cognitively-Based Compassion Training (CBCT). Mindfulness training proved to match its expectations and following its success was offered to all teachers.

Digital transformation of education and how can educational technology help novice teachers

The COVID-19 pandemic initiated an extensive, sudden and dramatic digital transformation in the society. The pandemic forced us to take an extraordinary digital leap in the basic education of children as well. This required significant adjustments not only from children and their teachers, but also from their families, school administration and the entire society. Teachers and schools had to take the lead in this sudden, unexpected digital transformation of children's basic education, without being well prepared for it. (...) There are issues with technology access and use – both among adults and children involved – as well as with skills and competences needed to integrate the digital tools into learning and teaching practices in meaningful ways to gain benefits from them. (...) Some teachers have showed great resilience,

creativity and perseverance in responding to the challenging situation of the COVID-19, while others have struggled (Iivari, 2020; p.5).

There are generations of teachers who have worked for decades solely with books and paper. Now with the emergence of educational technology, teachers must rethink the instruction design they use in the classroom. They have to, firstly, learn to use educational technology and secondly learn to meaningfully implement educational technology in teaching and learning processes. The best way to remedy the situation, in the example of available research, is to change negative attitudes towards technology and have technology training to increase knowledge and offer technology support (Fernández-Batanero et al., 2021).

Fernández-Batanero et al. acknowledge that:

(...) using ICT now requires less (and different) technical knowledge and skill than it did 15 years ago. (...) as the use of ICT has become more ubiquitous and familiar over time, it is reasonable to assume that the nature of stress and anxiety may be changing. (...) ownership of and familiarity with ICT devices varies across geography as well as across time. For example, the difference between Finland and Nigeria is considerable in this regard (p.11).

And they also state that:

Technologies have transformed the manner in which individuals work since technologies are support tools—improving individuals’ working and personal activities and transforming them into more efficient people. Furthermore, the use of technology allows the freeing up of time for individuals such as teachers to carry out other activities, independent of their professions (p. 1).

The Estonian Education and Youth Board (HARNO), which is a governmental agency that deals with the implementation of Estonian education and youth policy, is helping to develop and support the creation of digital instructional material for Estonian teachers and pupils. For instance, they have endorsed the portal of digital instructional materials “e-koolikott.ee”, where e-materials for all levels of education (from kindergarten to vocational schools) and all taught subjects have been united. But this project has been closed recently and creating e-materials has been redirected to sisuloome.e-koolikott.ee. The creation of an e-database such as “eis.ekk.edu.ee/eis” (EIS - Eksamite Infosüsteem or Information System of Exams), where teachers can find e-exercises and e-tests, is another example of their initiatives to promote the development of digital instructional material. Both portals support the creation of e-materials by teachers. Masteryapp.eu is a project supported by the European Social Fund from 2020. It is an environment for creating study materials and there is a small choice of available materials for some subjects. Taskutark.ee has a nice collection of ready-made learning materials and tests for main subjects for up to the 6th grade and for the gymnasium. A small selection of materials for a number of subjects for students with special educational needs can be found at hev.edu.ee. Of course, in addition, there exists a multitude of web

applications provided by private developers. Such digital e-resources are in constant change, and there is an ongoing process of many applications being replaced by new ones.

Today's students in basic school belong to generation Z (born after 2000). They multitask, seek immediate information and their attention span is limited – the consequences of constant Internet use. Novice teachers who teach them belong to generation Z and to generation Y (born between 1981 and 1999), also known as millennials or digital natives, as technology is a natural part of their lives. (Division of generations is based on Lancaster & Stillman, 2002.) These generations have technical intelligence that enables them to use technology with ease. The younger the generation, the easier it becomes, as everyday life involves more and more different technological applications, and they are familiar with it from an early age. Furthermore, today's students have to keep up to date with technological progress so that when they enter the job market in the future, they will rise to the occasion.

As students in basic schools are skilled in using technology, why not use their aptitude for creating mutual understanding? Novice teachers belong also to the generations skilled in using technology, so it should not be a problem for them to learn to create and implement applications of educational technology for the benefit of students and teachers. In this way, educational technology could easily become a bridge of communication between novice teachers and students. There are already many digital educational tools available that should facilitate the endeavor. But with the advancement of technological progress and growing digitalization, there will be more facilitating educational technology available in the future.

As the attrition rate of novice teachers is high in the first two years of teaching, it is important to look into the stress factors of novice teachers during this time and find solutions how to help them. Hypothetically speaking, educational technology could perhaps be a solution for novice teachers. How exactly educational technology can help novice teachers in their stressful daily tasks is therefore a prime area for research.

With the present paper, the aim is first to validate the stress factors of novice teachers in their first two years of teaching in lower secondary schools in Estonia and then give a perception overview of the severity of these stress factors. This is followed by an investigation into educational technology as a possible mitigator of stressors from the perspective of novice teachers. The research questions (RQ for short form) are the following:

RQ1. What are the stress factors at school and how are they perceived by novice teachers who are teaching in their first two years in lower secondary schools in Estonia?

RQ2. How can educational technology help to mitigate the stress factors from the perspective of novice teachers?

Method

Background of the study

The author of this study is a novice teacher with one year of teaching experience and started to keep a logbook when she started working as an English teacher in Tartu Descartes' School in the school year 2022/2023. It is a basic school where children are taught in grades from 1st to 9th, and it is governed by a local municipality. In the school, there are just over 400 students. During the logbook-keeping months of September to December 2022, the author taught the English language to grades 7 and 8 (the age group was 13-to-15-old students).

The author noticed that the biggest changes in school life compared to the early 2000s (when the author was a BA student in a university and had a bit of teaching experience on the side) were new digital educational tools and digital class management systems as well as an ethnically more diverse student body. But in addition, the student body was presenting more challenging behaviour vis-à-vis an authority figure (as a teacher should be), and the author was unfamiliar with new patterns in students' motivational levels to participate in classwork and engage in homework.

The author complies with the same criteria as the participants in this research survey and, as such, is an insider-researcher with total participation (Blaikie, 2009). Therefore, the qualitative content analysis is given in this research paper simultaneously by a researcher and a researched novice teacher. In contrast to an outsider-researcher, an insider-researcher has a better understanding of the group being studied, but at the same time must be aware of a possible bias when collecting and analysing data (Smyth & Holian, 2008).

Sample

The theoretical review of the available research data showed that the highest attrition rates were among novice teachers during the first two years of teaching and they were often working in lower secondary school (Rootalu, 2022). The participants of this survey were chosen based on these criteria, and therefore a nonprobability sampling – more precisely purposive sampling – technique was applied. When people are chosen for research based on specific characteristics – in this context, participants were similar in job experience – it means that the purposive homogeneous sampling technique is applied (Etikan et al., 2015). So, there were precise conditions to be fulfilled for applicants to be accepted in the survey: a condition of being a novice teacher in the first two years of teaching and another condition of teaching any of the grades from 7th to 9th. These conditions were important because they reflect the

results of the author's preliminary literature review of the teachers' attrition situation in Estonia. Therefore, the author wanted to take under scrutiny the same slice of the population of novice teachers that fits inside the two-year time frame at the beginning of their careers and inside the descriptive work frame of the grades from 7th to 9th, so that this research could shed some light on this situation and maybe offer some suggestions for improvement. These conditions were expressly verified in the introductory part of the survey, which contained demographic questions. As a result, one of the participants was excluded from the research because of non-compliance with these conditions. First of all, the respondent was an assistant teacher, and secondly, he had more than two years of experience.

Emails with introductory information about the research and a link to the survey were sent out to 200 Estonian schools known to have middle school sections. It was the author's hope to get at least a 20% response rate. To ensure that participating novice teachers would fit in the category – teaching in their first or second year and giving classes to grades 7th-9th – the emails were sent to heads of studies and principals with the request to forward survey invitations to the novice teachers under scrutiny. Town and city schools with a more significant number of pupils were prioritized. Still, a small number of bigger county schools were included for variety, with the presumption that a novice teacher has stress even in schools with smaller class sizes because of the lack of experience in the teaching profession, and in these circumstances, novice teachers still qualified to participate in this survey. In the survey, the differentiation was not made between public schools, municipal schools, state schools, and private schools. Included were regular schools and schools for children with impairment and disabilities were excluded. In this survey, the term educational special needs is used mainly in reference to attention deficit hyperactivity disorder (ADHD). The survey was conducted in the Estonian language because the majority of teachers speak it in Estonian schools and because of the freedom of expression that communicating in their mother tongue offers, and it can be seen as a facilitating factor to express ideas about educational technology. Several bigger schools with Russian as a studying language were also included, as teachers are presumed to know how to speak Estonian. For the purpose of this research, the questions and the answers of the survey were translated by the author into English with the help of Google Translate to provide a reader of this research paper with good intelligibility and coherency of the details.

Out of the 200 schools where survey invitations were sent, 11 novice teachers agreed to participate in the survey, and 10 were accepted. Most of the participants were teachers in their second year of teaching. No distinction was made between novice teachers who were still

student-teachers in university while working in parallel at school and novice teachers having finished teacher studies in university. Most of the novice teachers were under 30 years old, and the minority of the novice teachers were over 30 years old. Half of the participants acknowledged that they are still learning to use educational technology and they do not have any propositions to make. So, the panel of 10 novice teachers could be considered to have fairly little knowledge concerning educational technology.

Participants were asked to provide their consent of voluntary participation in the survey right after a brief description of the goals of the survey. Every participant could take part in the survey only once. In addition to participating in the survey in writing, all participants were given the option of recording their answers in an audio file, which they could turn in to the researcher. Anonymity was also guaranteed in the introductory part of the survey.

The author of this research is an insider-researcher and in addition takes a role of a researched novice teacher when she adds her insights as a novice teacher to the perspective of 10 participant novice teachers in the survey panel.

Data collection

This study used an online survey as its primary research instrument, which was divided into three sections. In the introductory part, the novice teachers were briefly asked to give personal details about their age, gender, subject of teaching, years in service, as well as details concerning age groups taught and their school. The answer options were either given or were short one to two-word answers written by participants.

In Part I of the survey, respondents were asked to rate the stress factors on a 5-point scale, based on the Likert-type scale, because it is a widely used approach to scaling responses in survey research in social sciences. This section was important to establish whether stress factors that had been described in previous research papers (Laur, 2018; Kaljuvee et al., 2022) were still relevant and poignant.

In Part II, the novice teachers were invited to give insights into how they counter the same stress factors, which were validated and evaluated in the previous section, with the use of existing educational technology or imaginary educational technology. This was also where the participants were given an opportunity to share their teaching experience with educational technology that was helpful in mitigating stress factors. Participants could choose to write about their ideas of future educational technology that could be used as stress mitigators in the

teaching profession context. Part II consisted of open questions, which permitted the participants to describe their personal perceptions and reflections.

The survey was made with Google Forms, and it was open for access for 14 calendar days. A pilot test with one novice teacher, who works with the 7th to 9th graders at school, was run beforehand to ensure that the questions in the survey were clearly formulated and comprehensible. As a result, a specification of “mostly ADHD” was introduced in the survey questions to specify more clearly the special educational needs under investigation.

The introduction and Part I were designed to have a minimal cognitive impact on the participants, whereas Part II with open questions was meant to give participants an opportunity to reflect more deeply on the topic of educational technology as a resource of solutions. The overall design of the survey questions was to encourage personal interest and implication of the novice teachers and motivate them to share their views and ideas. Also, it should be mentioned that in the last question, the novice teachers were asked to evaluate their own contribution to the survey. This question was designed to give insight into novice teachers’ attitudes toward educational technology.

A survey was chosen as the instrument of data collection because of the reflective character of the questions in Part II of the survey, which concerned the application of educational technology. To get the best results from the thinking process of the participants, this research aimed to allow them to choose their preferred conditions and settings to answer the questions. In the survey instructions, it was explained to the participants that it was not essential to respond to all the questions in one go, but at the same time, they were reminded that answers could not be altered after the “Send” button was hit. It was also explained that the information inserted stayed anonymous, and the results of the survey were used only in a generalized form for scientific purposes. For the participants with a preference for speaking instead of writing, an option of recording an audio file with the responses to the survey was given.

For a better comprehension of the problematics of stressors, the insider-researcher of this paper provides her insights as a novice teacher in addition to the panel of novice teachers.

Both Estonian and English versions of the survey are given in Appendices 1 & 2.

Data analysis

The 7 stressor categories were formed using the existing research data results (Laur, 2018; Kaljuvee et al., 2022) preliminarily researched and detailed by the author in the theoretical overview, which is a directed approach to the content analysis (Hsieh & Shannon, 2005). This

approach contributed to answering the first half of the first research question (RQ1). The secondary data provided the current research with 7 stress factors, which were used to formulate the research questions in Part I & II of the survey. The questions in the introductory section ensured that participants belonged to the specific category of novice teachers under scrutiny: novice teachers in their first two years of teaching who were teaching grades 7th-9th.

The questions of Part I allowed participants to rate stress factors in the teaching profession, which were established with the literature review and were stated in the theoretical part of the present research paper. Part I of the survey was to ensure the relevance and perception of the stress factors by novice teachers and to contribute to answering the second half of the first research question (RQ1). Therefore, rating the severity of the stress factors was of paramount importance, yet it took up only a moment of participants' time. The analysis consisted of analysing the severity of stress factors as perceived by novice teachers and it was followed by insights given by the author as a novice teacher and an insider-researcher with total participation (Blaikie, 2009). Linear gauge charts were made using Microsoft Office Excel.

Next, the answers to Part II of the survey were analysed, which contributed to answering the second question of the research (RQ2). The questions of Part II came after the introductory part and Part I, which were easy to answer and were in a way warming up the participants' cognitive thinking. Inductive content analysis was applied to the participants' answers about educational technology as a stress mitigator and the author added her insights simultaneously as an insider-researcher and a novice teacher. Data tables and figures were made using Microsoft Office Excel.

Results

The following subchapters present the study results in two parts. Part I of the questionnaire is an evaluation of stress factors in school, and Part II focuses on the current use of educational technology and suggestions for new applications to mitigate the stress factors stated in Part I. After each result, the author added her personal comments from a novice teacher's perspective based on her personal experience and notes in the logbook. While these comments are purely subjective, they provide in-depth insight that makes them authentic and an added value to the qualitative analysis.

Part I: Novice teachers' rating of stress factors at school

Table 1. Overview of the average score of the stress factors at school given by 10 participants in the survey panel

Factor	Description	M	SD
1	Students with ADHD	4.1	0.8756
2	Discipline	3.7	0.9487
3	Relations with students	2.1	0.5676
4	Relations with colleagues	1.8	1.0328
5	Relations with parents	2.3	1.3375
6	Making subject understood	3.5	0.9718
7	High workload	3.5	0.9718

M – mean; SD – standard deviation; Scores of the stress: 1 – no stress; 5 – very stressful.

A quick overview of the scores given by participants to the questions of Part I can be seen in Table 1. These results summarize the perception of stress levels of certain tasks and aspects of teaching by novice teachers. Each question in this section was presented as a statement, which participants rated according to their perception of stress level on a 5-point scale with verbal estimations from “very little” to “very much”. Answers were converted to points from 1 (“very little”) to 5 (“very much”). The average scores from participants meant that the possible maximum score for any statement – in Table 1 marked as Factor – was a total of 5 points, which was an indicator of the highest stress levels.

At first glance, it is clear that some stress factors have significantly higher scores than others. The biggest difference in score is noticeable between Factor 1 and Factor 4, where the score of Factor 1 is more than twice the score of Factor 4. The results highlight a clear pattern in participants' answers to the survey: from all the 7 stress factors evaluated, the most stressful is teaching students with special educational needs (Factor 1) and the least stressful is relationship with colleague teachers (Factor 4).



Figure 1. Factor 1: Teaching students with special educational needs (mostly ADHD)

When looking in parallel at Table 1 and at Figure 1, it becomes evident that the majority of respondents find the stress factor of “Teaching students with special educational needs (mostly ADHD)” (Factor 1) above averagely stressful, and the minority find it averagely stressful. With a total score of 4.1, it is the highest score in Table 1, and it is clearly on the higher end of the linear gauge chart in Figure 1.

The author concurs with the ranking result and personally estimates this factor as stressful to the maximum degree. Students with special educational needs (ADHD) often display disruptive behavior in the classroom and require special support when studying. In one class, there can be many students of different levels of advancement who all need differentiated approaches, which is mentally challenging for a novice teacher. Encouraging and engaging all the students with different progress levels in the same class is mentally and physically challenging for a novice teacher.

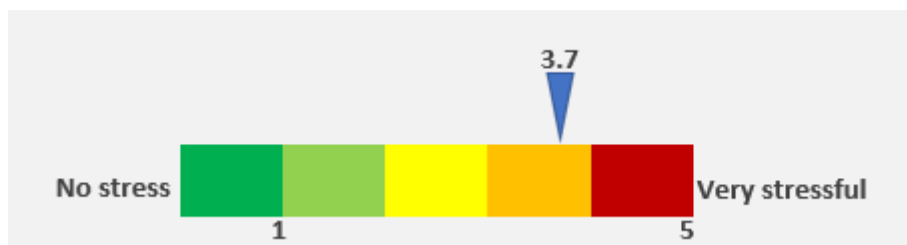


Figure 2. Factor 2: Maintaining discipline in the classroom

The second highest in the ranking (Table 1) is the stress factor of “Maintaining discipline in the classroom” (Factor 2), with a total of 3.7 points. It is situated well above the average level of stress, which would be in the yellow zone with about 2.5 points, and a bit below the red zone as indicated on the linear gauge chart (Figure 2).

The insider-researcher concurs once more with the survey’s ranking and, in comparison, gives maximum points to this stress factor. As a novice teacher, researcher admits that discipline in the classroom is an important aspect of teaching and that achieving disciplined behavior from students is a prerequisite to a healthy teaching and learning atmosphere. However, maintaining discipline in the classroom can prove to be a very different task from class to class. For example, some classes have many hyperactive students whose presence changes the dynamics and synergy of the whole class.

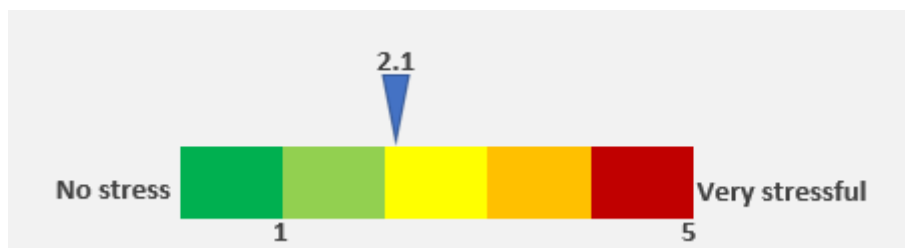


Figure 3. Factor 3: Relationship between teacher and students

The next factor in Table 1 is “Relationship between teacher and students” (Factor 3). With 2.1 points, it is the second lowest score after “Relationship between teacher and colleagues” (Factor 4). 10 respondents placed its stress level a little bit below the average level. In Figure 3, it sits comfortably on the lower end of the yellow zone on the linear gauge chart. From the low points attributed, it can naturally be assumed that relationships between the 10 novice teachers and their students are fairly close to low stress.

The insider-researcher’s personal experience as a novice teacher is that most of her energy in class is spent on maintaining discipline and teaching the subject. There is not much energy or time left to concentrate on building a relationship with each individual student.

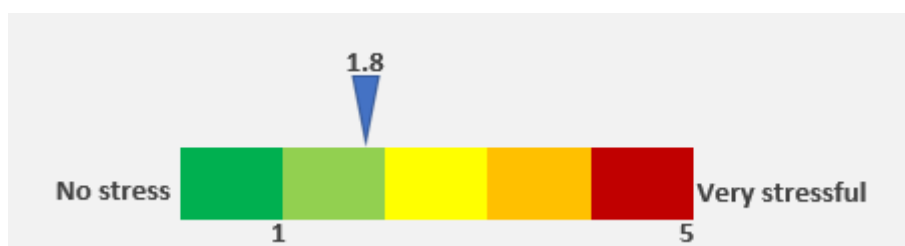


Figure 4. Factor 4: Relationship between teacher and colleagues

“Relationship between teacher and colleagues” (Factor 4) got the lowest points (1.8) for stress level (Table 1). It is the only stress factor out of seven under scrutiny that falls in the green zone of the linear gauge chart (Figure 4). It is on the higher end of the green zone, but still in the green. It is safe to say that relationship between a novice teacher and colleagues is fairly low stress.

The insider-researcher can agree with the low points attributed to the stress level. From her personal experience, she was too busy concentrating on her work obligations, meaning there was no time left for socializing with colleagues. The little time between lessons was spent planning and preparing lessons. In that respect, good relations with fellow teachers can come in handy, if a novice teacher can ask for some advice from experienced colleagues and they share study materials.

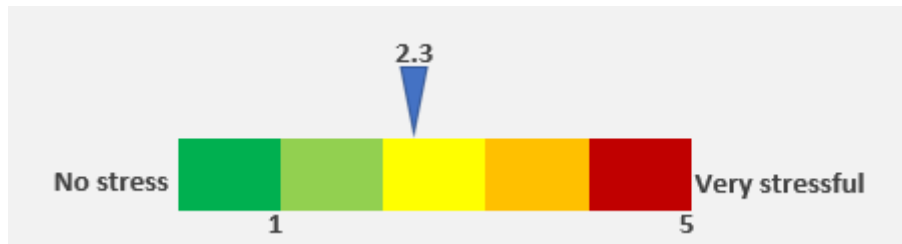


Figure 5. Factor 5: Relationship between teacher and parents

“Relationship between teacher and parents” (Factor 5) scored 2.3 points and so falls on the lower end of points in Table 1. On the linear gauge chart, the pointer is a little bit below average and on the lower end of the yellow zone (Figure 5). Factor 5 is an apparent question that can be treated on a case-by-case basis, just as the two previous factors (Factor 3 and Factor 4). So, it depends very much on each class and the students’ parents.

The insider-researcher’s personal observation is that in some cases, it does matter that a student gets a notification about misconduct that is entered in the digital class diary. In the following class, a student behaves in a more appropriate way. It is clear that some parents take an interest in their child’s conduct and take adequate action by talking to them at home. Positive support from parents is genuinely appreciated by a novice teacher. However, the results of the survey are clear, and a relationship with parents does not fall into the green zone.

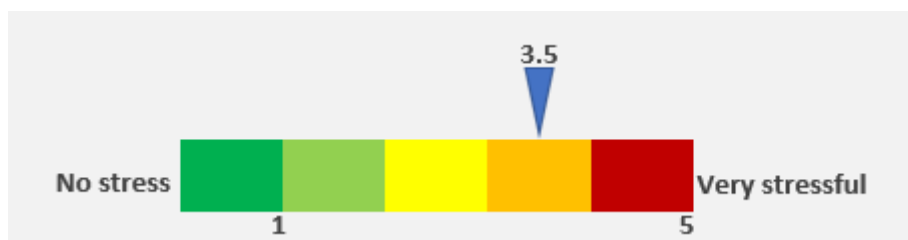


Figure 6. Factor 6: Pressure of making the subject clear to students

“Pressure of making the subject clear to students” (Factor 6) is ranked high by participants at 3.5 points (Table 1). It comes right after teaching ADHD students (4.1 points) and maintaining discipline (3.7 points). On the linear gauge chart of stress levels, the pointer places it in the middle of the orange zone (Figure 6).

In the insider-researcher’s opinion, the pressure of making the subject clear to students is logically linked to evaluations because, in the school system, the learning outcome is measured with assessment. If the results of evaluations are weak, then the problem is either a student who lacks the knowledge or a teacher who did not succeed in getting through to a student. In either case, and no matter the reasons behind, the aftermath rests on a teacher’s shoulders (e.g., tutoring hours after classes or teaching a student during a grade repetition).

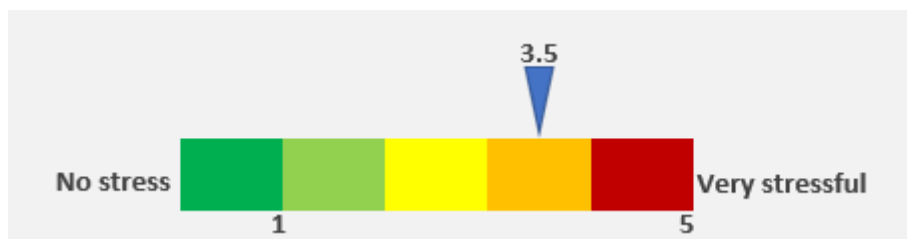


Figure 7. Factor 7: High workload – preparing lessons, correcting tests, writing feedback, etc.

“High workload – preparing lessons, correcting tests, writing feedback, etc.” (Factor 7) is ranked similarly to Factor 6 with 3.5 points, meaning they share joint-third place (Table 1). So, on the linear gauge chart, the pointer is situated in the exact same position as previously for Factor 6 – in the middle of the orange zone (Figure 7).

The insider-researcher acknowledges, there is no denying that a novice teacher has a lot on their plate. Considering the lack of teaching experience, preparing for classes, correcting tests, and writing feedback eats up many hours of a novice teacher’s life. Teaching is one of the professions where work is not over once a teacher has closed the door and left the school behind. A teacher continues to work at home in their free time. Teaching is a very interesting job and has many satisfying aspects to it, but if a novice teacher’s life is taken over by work and there is no free time left to recharge batteries, it becomes mentally and physically very challenging.

After surveying the panel of 10 novice teachers, it is clear from this small-scale survey that these 7 factors can be considered significant stress factors in a novice teacher’s schoolwork context. Thanks to the same survey, we can now distinguish the high-ranking stressors from the low-ranking stressors.

Part II: Mapping of educational technology in use by novice teachers and their propositions for new educational technology to mitigate stressors

We can now proceed with mapping existing educational technology that is useful in dealing with the 7 stress factors. Along with this, we will look at suggestions for future educational technology that could help to mitigate the stressors from the point of view of novice teachers. The author’s personal comments as a novice teacher are added.

Results here are given in the same order as the questions in Part II. The author translated the responses from Estonian to English with the help of Google Translate.

Table 2. Factor 1: Teaching students with special educational needs (mostly ADHD)

Existing applications in use	
Specified application	Functions
Kahoot, Quizziz, Liveworksheets	Multiple-choice answers, self-learning, self-testing (R2) Interactive (R4)
Google Arts & Culture	<i>(...) you can explore works of art, create your own art, go to museums, etc. (...). (R9)</i>
Unspecified/future applications for use	
Unspecified/future application	Functions
	<i>Gives models, drawings about the topic that students can use. (R1)</i>
	<i>Showing videos (demonstrating). (R2)</i>
	<i>An app with short, (...) well-thought-out tasks for each learning outcome and topic. (...) student can practice self-regulation skills, gets an experience of success (...). (R6)</i>
	<i>Students could have some tool for indicating without words what they need in the moment. For example, if he feels that he cannot sit still for a long time, he chooses a movement break or wants to change the learning activity. The teacher has a screen where he can see during the lesson what the students want and tries to follow the students' wishes. (R7)</i>
	<i>Can be written on the touch screen with a pen and the application will check its correctness. Also, the teacher can write the task on the screen and the app turns it into a printed version (...). (R10)</i>

2 respondents out of 10 responded “Don’t know” in answer to Question 1 of Part II. 1 respondent gave an explanation of why she would not use educational technology:

I would not use educational technology for children with special educational needs. I have observed among students that technical tools and applications are more distracting than conducive to learning. (R3)

It is observable that only 3 out of 10 respondents gave the names of existing applications, while 5 out of 10 respondents gave descriptions of unspecified/future applications that were fairly well detailed.

The insider-researcher discloses that for some students who lagged behind their peers, she suggested using Duolingo to build up their English vocabulary and have an easy level of practice. She did not have any special custom-built applications to use with students with special educational needs or ADHD. It would be helpful if there was a collection of learning materials on the Internet for all subjects and grades, which is specifically for them, so they can get their subject study instructions and exercises/activities in simplified language.

Table 3. Factor 2: Maintaining discipline in the classroom

Existing applications in use	
Specified application	Functions
Unspecified/future applications for use	
Unspecified/future application	Functions
	<i>A digital scoreboard/platform where well-behaved students can collect points and win prizes (R1)</i>
	<i>Classroom Timer (R2)</i>
	<i>(...) I would only use such an app that would accurately show the noise level of the class. (R3)</i>
	<i>Engaging a child with special needs (meaning ADHD) in their work restores the peace of the class. (For more see the previous Table.) (R6)</i>
	<i>Students could have some tool for indicating without words what they need at the moment (...). Such an IT solution would help maintain (...) discipline (...). (R7) (For more see the previous Table.)</i>

3 respondents replied “Don’t know” and 1 respondent replied, “Don’t imagine”. 1 respondent explained why she thought educational technology has a good influence on students’ behavior:

Using technology in the classroom always keeps students interested, so there is no problem with maintaining discipline. You just need to repeat the rules and dangers of the smartphone world. (R9).

The insider-researcher: In many cases, communications to parents in the school’s workflow management system do not have any effect, and students’ disorderly behavior stays the same throughout each class. There could be an electronic scoreboard that could show when students misbehave in class. As a penalty, misbehaving students could receive additional responsibilities: e.g., preparing something for the next lesson, a random poetry generator would spin a poem to be learned by heart, etc.

There exists a ready-made application where one can use an array of different class timers (*Online-stopwatch*).

Table 4. Factor 3: Relations between teacher and students

Existing applications in use	
Specified application	Functions
flippity. net	<i>I use it when it is necessary to divide children into groups, as well as when no one wants to be the "first" to be assessed in front of the class. (R2)</i>

Unspecified/future applications for use

Unspecified/future application	Functions
	<i>A common module to complete. (R1)</i>
	<i>An app where the teacher could ask one or more questions about students' mood, feelings, behaviors, etc. every day. (R4)</i>
	<i>Maybe some challenges to create a more common experience and bring teachers and students closer together to work on a common cause. (R5)</i>
	<i>The teacher can direct his energy and attention to the whole class, instead of focusing mainly on the child with special needs. (R6) (For more see Table 2.)</i>
	<i>Students could have some tool for indicating without words what they need at the moment (...). (For more see previous Table.) Such an IT solution would help maintain (...) relationship between the teacher and students. (R7)</i>

1 “Don’t know” reply.

I would not use educational technology because communication and mutual understanding are important in the relationship between teacher and students, which can only be achieved in face-to-face contact. (R3)

There is a lot of good feedback from the students when bringing such tools and especially technology into classes, so one can hope that the students will come to the next art lessons with much more enthusiasm. (R9)

It would rather make it weaker. It is difficult to communicate with the student when writing in mathematics. (R10)

The insider-researcher admits that practicing in-person communication is the best method for learning to communicate in an orderly way. However, educational technology can help with the learning processes. For instance, in order to calm the students, mindfulness exercises could take place at the beginning of the lesson. They could last for maybe five minutes. There could be such an app with soothing music. Another app could teach students the principles of decent and polite behavior, and students could also use it to evaluate themselves. Similarly, students should be reminded that they are in school for themselves and for their own good and that the teacher is there to teach them new and interesting things.

Table 5. Factor 4: Relations between teacher and colleagues

Existing applications in use	
Specified application	Functions
Zoom	<i>Using Zoom for meetings. (R2)</i>
Instagram, Facebook	<i>An app where teachers can post pictures, text (like Instagram or Facebook, but only for teachers). (R4)</i>

Google Arts & Culture	<i>This specific app can also be used in other lessons, such as history. It could also be used to make integration between subjects, and it gives the opportunity to communicate more with colleagues. (R9)</i>
Unspecified/future applications for use	
Unspecified/future application	Functions
	<i>Something that would allow quick and easy communication and keeping in touch with colleagues. There should also be practical added value, e.g., lesson plan information, room information, daily update on a specific set of classes, information on special events, etc. (R5)</i>
	<i>Exchange of experiences, easy sharing of good ideas and blunders even when there is no time to meet physically. (R6)</i>

1 “Don’t know” reply.

Don't know, no experience with bad relationships. (R1)

I would not use educational technology because communication and mutual understanding are important in the relationship between teacher and colleagues, which can only be achieved in face-to-face contact. (R3)

In my opinion, it is necessary to develop relationships between colleagues verbally, not with the help of educational technology. (R7)

It would rather make it weaker; direct contact with colleagues is important. (R10)

The insider-researcher agrees that the best way to develop relationships is with face-to-face contact. To establish good relationships, there could be more fun events with colleagues, such as team building, or maybe some applications with shared games or challenges where teachers with students compete with each other.

Technology can be without a doubt very helpful when used for sourcing and distributing information, and good information flow is necessary for effective communication between colleagues.

Table 6. Factor 5: Relations between teacher and parents

Existing applications in use	
Specified application	Functions
Stuudium, eKool	<i>Using Stuudium, eKool, (R2)</i>
Unspecified/future applications for use	
Unspecified/future application	Functions
	<i>Common goals/activities (module). (R1)</i>
	<i>Some kind of feedback app where you can communicate with a parent on an ongoing basis. (R4)</i>
	<i>It could be the same app as with colleagues, but a separate distribution there for parents. (R5) (For more see Table 5.)</i>

Increasing parental involvement. (R6)

Parents could sometimes use cameras in the classroom to see how their child behaves during class. (R7)

A parent could better monitor how and what their child does in class. (R10)

1 “Don’t know” reply.

I would not use educational technology because communication and mutual understanding are important in the relationship between teacher and parents, which can only be achieved in face-to-face contact. (R3)

If students are allowed to use a smart device at home, they can explore the app on their own, which is certainly a better option instead of, for example, sitting on TikTok. (R9)

The insider-researcher: It is an interesting idea that from time-to-time teachers could make live broadcasts of classes on the Internet, which parents could use to see how their children behave and what is happening in class. Of course, there would be ethical implications involved, and it might not be so straightforward legally. It would therefore be safer to make an application where teachers could directly communicate with parents and check that parents are monitoring their kids’ homework. It would be of great help to check whether parents are supporting studying from home.

Table 7. Factor 6: Making the subject clear to students

Existing applications in use	
Specified application	Functions
Stemy.com	<i>Stemy.com app for math. (R1)</i>
Youtube, Kahoot, Quizziz, Padlet, Canva, Smartzoos, etc. (R2)	
CashyGame	<i>In social studies, several applications have been created that help consolidate what was learned in class, such as CashyGame. (R3)</i>
Canva	<i>Such as Canva. (R4)</i>
Padlet, Google Drive, Mentimeter, Kahoot, Tera folder	<i>I have used for working together, mapping knowledge, e.g., Padlet, Google Drive, Mentimeter, Kahoot, Tera folder, etc. All functionalities in one environment would be more convenient. (R5)</i>
Google Arts & Culture	<i>(...) when learning art styles, artists and their works (...) (R9)</i>
Unspecified/future applications for use	
Unspecified/future application	Functions
	<i>(Continues from above) There could be a similar game about politics, where the student as a politician has to make decisions, run campaigns and state his opinion on various topics. In history, I use role-playing with the help of a short play or let students watch films specific to an era. (R3)</i>

1 “Don’t know” reply.

Diversity in teaching a subject is necessary and useful. (R6)

There are already many such apps or environments, it just takes time to create the material. (R7)

Students definitely learn better through the app than through me giving them a presentation, during which they just have to listen for 10-15 minutes. It also depends on the topic. For example, when learning art styles, artists, and their works, this app would be a better option, and they would probably remember the facts better. (R9)

It is difficult with mathematics. A good app or learning environment in mathematics means great preliminary preparation for the teacher. (R10)

In the insider-researcher’s view, there is a great choice of applications that have a collection of ready-made exercises and tests for specific subjects or for a broader range of subjects. However, any content present on these apps should be renewed regularly, and there needs to be a large database to give teachers the relevant variety in their lesson plans. It is important that a teacher would not have to take a lot of time preparing lessons. In addition, it would be very useful if there was a direct communication channel with students so they could contact the teacher directly if they do not understand a topic or need more explanations about something. There could be some kind of feedback application for students, where they would mark what is difficult and incomprehensible for them and needs additional teaching.

Table 8. Factor 7: High workload – preparing lessons, correcting tests, writing feedback, etc.

Existing applications in use	
Specified application	Functions
e-koolikott, Opiq	<i>e-koolikott – ready-made materials that can be customized. Opiq – e-textbooks. (R2)</i>
Unspecified/future applications for use	
Unspecified/future application	Functions
	<i>Help in the preparation of lessons, some kind of program where the slides are already available, and it is easy to link your topics there. (R1)</i>
	<i>Already existing lesson materials, plans, thematic videos, and other auxiliary materials for lesson preparation could be gathered in one place. (R5)</i>
	<i>Since the ability to write is an important skill, students must definitely do the work in handwriting, but sometimes work could also be done online; there could be some kind of environment for creating tests or ready-made tests, and this environment also could check them. To prepare the lessons, something like this could be created, where you could enter</i>

the subject of the lesson, and the class, and it would give a ready-made lesson according to my wishes. (R7)

3 “Don’t know” replies.

The use of systems, sites, and apps of existing technologies facilitates the teacher's preparations and diversifies the lesson. (R6)

I think that the need to prepare lessons is reduced in some respects, although before using the app you have to find out the specific options and topics that you want to cover in the lesson. As a novice teacher, I have had to prepare the teaching material for the lessons myself quite a lot, so that saves time. (R9)

An existing successful virtual learning environment makes it easier. However, it doesn't exist for everything, and it is extremely time-consuming to do it yourself. (R 10)

In the insider-researcher’s opinion, there could be databases of study materials centralized in one place, sorted by subjects, topics, and grades, where you could easily find study materials, exercises, class activities, etc. Having such a database would mean that the preparation of lessons would not take much time. To improve evaluation work, teachers could scan paper tests, and then a computer program would find errors. Mobile scanners exist already that could be used for this purpose. For feedback and comments, there could be an app where the teacher records their voice message, which the app would convert into written form if necessary.

In a very short time, ChatGPT has proved to be very resourceful. AI, or a conversational chatbot to be more precise, can, for example, easily and in no time help to select exercises and examples for topics that can be used in lesson preparation.

Recapitulation

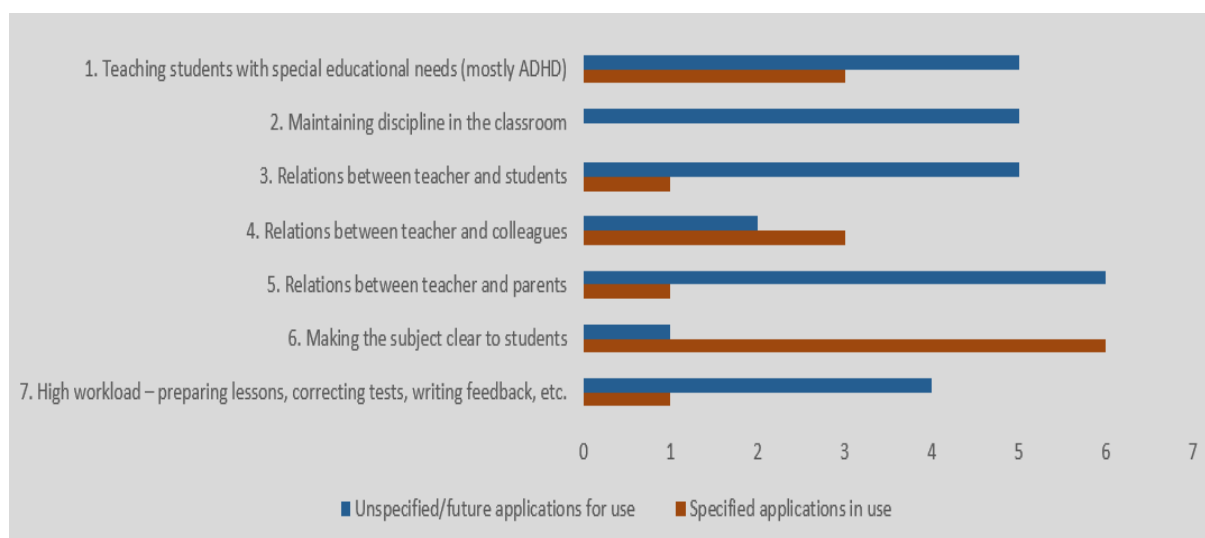


Figure 8. Number of replies per question

Figure 8 shows the number of replies per question. Using the graph, it is obvious that the most popular question regarding unspecified/future applications for use was “5. Relations between teacher and parents” – 6 replies. As to the biggest number of replies concerning specified applications in use, it was the question “6. Making the subject clear to students”, which also got 6 replies. The results show that there are already plenty of applications made for learning different subjects, but there are not so many specific applications made for information exchange and direct communication between a teacher and parents, and there looks to be a high demand for them. Also, it is interesting to note that in all questions there were specified and unspecified applications mentioned, except for “2. Maintaining discipline in the classroom”. It had a fairly high number of replies concerning unspecified/future applications for use – 5 replies – and no replies at all for specified applications in use. Hypothetically speaking, it might be that there are currently no applications that could be used for maintaining discipline in the classroom, and yet, there is an emphasized need for such applications.

Overall, there are a small number of replies per question. This can be indicative of a lack of knowledge in the field of educational technology to the point that respondent novice teachers did not know how to reply, even by suggesting hypothetical solutions. Also, there was some reluctance to involve educational technology in relation to some stressors in the teaching profession – mainly concerning relations between teacher and colleagues (although it was a low-stress factor), high workload, and maintaining discipline – all with 5 replies (a sum of specified and unspecified applications). This is unusual because high workload and maintaining discipline are both high-ranking stressors. It seems, therefore, that high-stress factors are not necessarily motivating novice teachers to look towards educational technology to mitigate stress in work context. It might also be an indication that novice teachers lack knowledge of the possibilities educational technology can offer. Alternatively, they might simply lack skills regarding how to best apply educational technology. And as there was not a very long list of applications given by all respondents throughout the survey, it could be an indication that novice teachers are not aware of all the applications that are available to them. Also, no one suggested using AI.

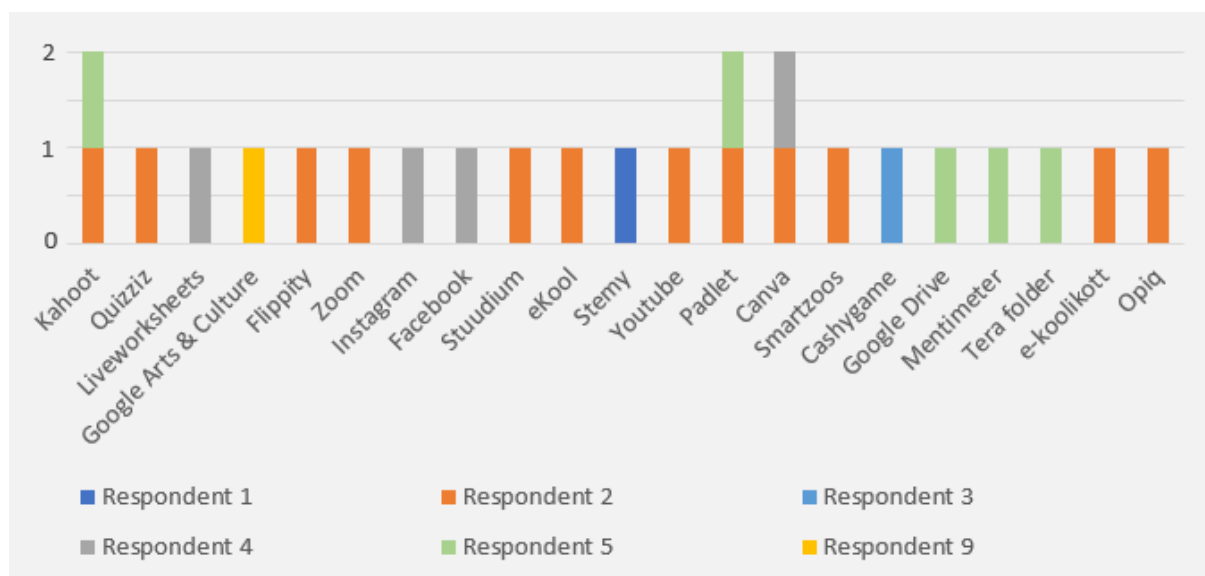


Figure 9. Applications mentioned by respondents

Figure 9 shows the range of mentioned applications by respondent novice teachers. It is interesting to note that only 6 out of 10 respondents named existing applications and, out of these 6, 3 respondents named only 1 application, whereas the remaining 3 respondents named at least 4 applications. It is possible that novice teachers do not rely so heavily on educational technology in preparation for their classes because of the extra time it takes to prepare digital materials, which was mentioned on a few occasions by some of the respondents. Also, it can depend on each novice teacher's natural inclination or skill with educational technology, which influences novice teachers' ability to apply the available technological solutions to different situations and aspects of the teaching profession.

Discussion

The aim of the current research was firstly to find out the stress factors for novice teachers during their first two years in lower secondary schools in Estonia, and get validation from novice teachers with their perception of the severity of these stress factors. Secondly, this study wanted to find out how educational technology could help to mitigate these stressors. The theoretical review at the beginning of this research consisted of reading available data about high attrition rates and stressors in the teaching profession. The data showed that the highest attrition rates were among novice teachers during first two years of teaching and also among teachers in the lower secondary school (Rootalu, 2022). With these two criteria the nonprobability sampling technique was used to narrow down the population of respondents and to choose people with specific characteristics for this research – the purposive sampling

technique was applied (Etikan et al., 2015). Further research showed that there are 7 major stress factors in school: teaching students with ADHD, maintaining discipline in class, high workload, making the subject clear to students, relations with parents, relations with students, and relations with colleagues (Laur, 2018; Kaljuvee et al., 2022) – given in order from the highest to the lowest ranking stress factor, which was established with the present research. The 7 stressor categories were formed using the results from previous research, which is a deductive or directed approach to content analysis (Hsieh & Shannon, 2005). This secondary data was then used to formulate the research questions in Part I & II of the questionnaire. It was distributed to volunteer respondents among novice teachers in their first two years in lower secondary school and the panel of 10 respondents confirmed on the stress scale (in Part I) the perceived severity of the 7 stress factors. Ranking allowed for a more precise division between low-ranking and high-ranking stressors.

If we compare the received rankings of 7 stress factors of the present research with the relative importance that was given to comparable stress factors in Laur's (2018) research, then we get the comparative data that is shown in Table 9 (Appendix 3). As already mentioned in the theoretical part of this research, the main stressors in teachers' work are mainly the same even if we try to differentiate between novice teachers and all teachers combined. If we compare the ranking of factors in Table 9, then the factors of the present research and Laur's research factors are only roughly comparable as the evaluation was done using different systems. In the present research, the stress factors were ranked using a scoring system from 1 (no stress) to 5 (very stressful), whereas in Laur's research teachers had to name 3 factors that cause stress, and percentages of stressors obtained show how many teachers percentually named these stress factors. By the way, in Laur's research there were altogether 10 stress factors, from which were taken only the 7 first for comparison purposes. Left out were personal reasons, number of pupils in class and noise in class. The biggest differences in importance should be mentioned: novice teachers find students with ADHD very stressful, in contrast to Laur's research where inclusive education gets only 9.10% mentions from all teachers surveyed. And also, management and colleagues factor in Laur's research gets 17.2% mentions (third highest in ranking) in contrast to relations with colleagues which gets the lowest ranking place in the present research. Therefore, some differences are notable in the attribution of importance to the stress factors by novice teachers and all teachers combined.

In Part II of the questionnaire, respondents were asked which existing or future applications they would use to mitigate stress factors in their everyday work situations – these were the same stressors that were previously confirmed in Part I. Respondents were given the

possibility to name either application(s) they use or describe an application that does not exist. So, in the latter case, where many descriptions of non-existent applications were given, it could be evidence of the need for more specific applications to mitigate the stress factors, such as in the case of relations between teacher and parents. In the case of maintaining discipline in the classroom, which is the second highest ranking stress factor, there were no existing applications mentioned and there were many future applications described – that could be also an indication of a need for discipline-specific technological applications. The case of a high workload, which is another high-stress factor, is also visibly in need of more applications that could help to mitigate the stress. Maybe, a future application of AI, similar to ChatGPT, will help to fill the void. In some cases, respondents did not see significant added value in the use of educational technology. It was the most noticeable in the stress category that concerned relations between teacher and colleagues, which was also the lowest-ranking stressor. Novice teachers seemed to visibly agree that educational technology is not necessarily the best option to nurture relationships between teacher and students as well as teacher and colleagues. Also, the invisible barrier of time is an obstacle that stands between novice teachers and educational technology. For example, in many novice teachers' views, it is too time-consuming to prepare study materials using educational technology.

Overall, there seems to be a lot of potential in the relationship between novice teachers and educational technology, as half of the respondents agreed that they are still learning to use educational technology that shows a visible interest in the matter, and a few were feeling confident in their knowledge of educational technology. Novice teachers who participated in the survey were readily responding to questions about the use of educational technology and they were more eager when they were describing their reflections about future educational technology in connection with tackling stress factors. It shows a certain interest in implementing educational technology for their own benefit.

It would be important to give the stress factors described in this research paper some thought and research further into the design of the applications that could be specifically directed to tackle the issues that are so difficult to handle from the novice teachers' perspective. More important would be to start to look for solutions concerning the high-ranking stress factors: teaching students with ADHD, maintaining discipline in class, high workload, and pressure of making the subject clear to students. It is only a hypothesis, but if programmers and software developers could work together with teachers to find the best solutions to alleviate these stress factors, and if they succeeded in creating applications that

really mitigated the work stress, then today's high attrition rates of novice teachers would plummet in no time.

Limitations of the current research mainly concern the limited sample. Because of the weak response to the survey invitation, there was only a small sample analysed in this research. As a result, it is impossible to make generalizations for the larger population of novice teachers in Estonia. Also, because of the small number of participants, it was not possible to go deeper into the analysis; for instance, novice teachers' skills and use of educational technology for mitigating stress factors depending on their subjects of specialisation. Neither was it possible to conduct a quantitative analysis for finding statistical significance of novice teachers' views.

The research findings could give some insight into novice teachers' stress factors and contribute to the discussions about how educational technology could be of assistance to novice teachers with the aim of mitigating stressors in the work conditions, both at school and at home. Programmers could, for example, concentrate on how to efficiently help novice teachers (and teachers in general) with the stressful aspects of teaching work that have been left out or have not yet been considered significant when deploying educational technology.

If similar research was to be conducted, then it would be advisable to include novice teachers with up to five years of teaching experience in a survey, thus getting a more substantial number of participants and a broader choice of opinions. It could also be helpful to include questions about whether novice teachers have considered quitting the profession; if yes, for what reasons, and on which conditions they would reconsider it. Another direction of interest could be the creative output of novice teachers' use of educational technology depending on their subjects of specialization. Further research could be recommended in the field of AI, more precisely on how a virtual assistant could meaningfully help a teacher to mitigate stressful work obligations, such as keeping students with ADHD engaged and happy, maintaining healthy discipline, and keeping the ever-present burden of the preparations for classes and assessing test results under control.

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Author's declaration

I hereby declare that I have written this thesis independently and that all contributions of other authors and supporters have been referenced. The thesis has been written in accordance with the requirements for graduation theses of the Institute of Education of the University of Tartu and is in compliance with good academic practices.

Kersti Steinwald

The 2nd of June 2023

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Appendix 1

Küsimustik alustavale õpetajale (kes õpetab koolis 1. – 2. aastat ja kelle õpilasteks on 7. – 9. klassi õpilased)

(Original questionnaire in Estonian)

Tere!

Kutsume Teid osalema Tartu Ülikooli uurimuses. Küsitluse eesmärgiks on välja selgitada alustava õpetaja hoiakuid ja teadmisi haridustehnoloogia kasutamise ja võimaluste kohta. Uuringu tulemusena saame infot selle kohta, kuidas parandada alustava õpetaja toetamist haridustehnoloogia abil.

Küsimustikule vastamine on vabatahtlik ja võtab aega ligikaudu 30 minutit.

Küsimustikku on võimalik täita mitmes jaos ja erinevatel päevadel, et selle täitmine ei kujuneks tüütuks kohustuseks, vaid meeldivaks vahelduseks. Peale nupule "Saada ära" vajutamist pole võimalik enam küsimustikku uuesti täita. Teil on õigus uurimuses osalemisest igal hetkel loobuda. Teie sisestatud informatsioon on anonüümne. Küsitluse tulemusi kasutatakse vaid üldistatud kujul teaduslikel eesmärkidel. Soovi korral võite pärast uurimuse avaldamist selle kohta läbiviijalt teavet saada.

Kui Te soovite kirjalikult vastamise asemel salvestada oma vastustega audiofail, siis on Teil võimalik seda teha. Palun saatke oma vastustega audiofail e-posti aadressile: (...)

Kui teil on küsitlusega seoses täiendavaid küsimusi, pöörduge palun uurimuse läbiviija poole.

Küsimustik on vastamiseks avatud kuni 28. aprillini.

Uurimuse läbiviija: Kersti Steinwald, Tartu Ülikooli haridustehnoloogia magistrant.

Vastutav uurija: Mario Mäeots, Tartu Ülikooli haridustehnoloogia kaasprofessor.

Uuringus osalemise nõusolek

Olen käesolevast uuringust teadlik ja kinnitan sellel kastil klõpsates oma vabatahtlikku nõusolekut selles uuringus osaleda.

Vastamiseks märkige iga küsimuse juures ära sobiv vastusevariant või kirjutage oma vastus selleks ette nähtud kohale. Esmalt küsime mõned küsimused Teie kohta.

a) Sugu

- naine
- mees

b) Vanus (aastates)

c) Kas õpetate linna- või maakoolis?

d) Mitmendat aastat Te koolis õpetate?

e) Mis eriala olete kõrgkoolis õppinud?

f) Milliseid õppeaineid Te koolis õpetate?

g) Milliseid klasse Te koolis õpetate?

h) Milliseid klasse on kõige raskem õpetada?

i) Mis põhjustel on neid klasse kõige raskem õpetada?

I Palun hinnake skaalal järgmisi väiteid:

1) Hariduslike erivajadustega (peamiselt ATH) õpilaste õpetamine tekitab lisastressi.

- Väga palju
- Palju
- Nii ja naa
- Vähe
- Väga vähe

2) Distsipliini hoidmine klassis põhjustab stressi.

3) Minu (kui õpetaja) ja õpilaste vahelised suhted tekitavad stressi.

4) Minu (kui õpetaja) ja kolleegide vahelised suhted tekitavad stressi.

5) Minu (kui õpetaja) ja lastevanemate vahelised suhted tekitavad stressi.

6) Õpilastele õppeaine selgeks tegemise surve tekitab stressi.

7) Suur töökoormus - tundide ettevalmistamine, kontrolltööde parandamine, tagasiside kirjutamine jms - tekitab stressi.

II Kujutage ette, et Teie võimuses on õpetaja töö haridustehnoloogia abil lihtsamaks muuta. Palun kirjeldage olemasoleva äpi või ka väljamõeldud äpi funktsiooni ja kuidas see Teid aitaks järgmistel juhtudel?

1) Hariduslike erivajadustega (peamiselt ATH) õpilaste õpetamine.

2) Distsipliini hoidmine klassis.

3) Õpetaja ja õpilaste vahelised suhted.

4) Õpetaja ja kolleegide vahelised suhted.

5) Õpetaja ja lastevanemate vahelised suhted.

6) Õpilastele õppeaine selgeks tegemine.

7) Suur töökoormus - tundide ettevalmistamine, kontrolltööde parandamine, tagasiside kirjutamine jms.

*) Tagasiside Teie panuse kohta.

- Mul on väga palju haridustehnoloogia kasutamise kogemusi ja mul on palju ettepanekuid jagada.
- Mul on haridustehnoloogia kasutamise kogemusi ja mul on mõned ettepanekud jagada.
- Ma alles õpin haridustehnoloogiat kasutama ja mul pole veel ettepanekuid jagada.
- Mul on vähe haridustehnoloogia kasutamise kogemusi ja praegu pole selle õppimiseks aega/tahtmist.
- Mul on väga vähe haridustehnoloogia kasutamise kogemusi ja pole tulevikuski kavatsust seda õppida.

Aitäh uuringus osalemise eest!

Kui Teil on täiendavaid kommentaare, siis olge lahke!

Appendix 2

Questionnaire for a novice teacher (who teaches at school in her/his first to second year and whose students are 7th – to 9th graders)

(Translated version from Estonian to English)

Hello!

We invite you to participate in a study from the University of Tartu. The purpose of the survey is to find out the attitudes and knowledge of novice teachers about the possibilities and use of technology. As a result of the research, we will acquire information about how to improve the support of novice teachers with the help of technology.

Answering the questionnaire is voluntary and takes approximately 30 minutes.

It is possible to fill out the questionnaire in several sections and on different days, so that filling it out does not become a tedious duty, but a pleasant change. You have the right to withdraw from the study at any time. The information you enter is anonymous. The results of the survey are used only in a generalized form for scientific purposes. If you wish, you can get information about the study from the researcher after it is published.

If you want to save an audio file with your answers instead of answering in writing, you can do so. Please send the audio file with your answers to the following email address: (...)

If you have any further questions regarding the survey, please contact the person conducting the survey. **The questionnaire is open for answers until the 28th of April.**

Researcher: Kersti Steinwald, MA student in Educational Technology, University of Tartu.

Responsible researcher: Mario Mäeots, Associate Professor of Educational Technology, University of Tartu.

By clicking this box, I confirm that I am informed about the above-mentioned study and confirm my voluntary consent to participate in this study.

To answer, mark the appropriate answer option next to each question or write your answer in the space provided. First, there are a few questions about you.

a) Sex

- female
- male

b) Age (in years)

c) Do you teach in an urban or rural school?

d) How many years have you been teaching at school?

e) What major did you study at university?

f) What subjects do you teach at school?

g) What classes (age ranges) do you teach at school?

h) Which classes (age ranges) are the most difficult to teach?

i) For what reasons are these classes (age ranges) the most difficult to teach?

I Please rate the following statements on the scale:

1) Teaching students with special educational needs (mostly ADHD) creates additional stress.

- Very much
- A lot
- Average
- A little
- Very little

2) Maintaining discipline in the classroom causes stress.

3) The relationship between me (as a teacher) and the students creates stress.

4) The relationship between me (as a teacher) and my colleagues causes stress.

5) The relationship between me (as a teacher) and parents causes stress.

6) The pressure of making students understand the school subject causes stress.

7) A high workload - preparing lessons, correcting tests, writing feedback, etc. - causes stress.

II) Imagine that it is in your power to make the teacher's job easier with the help of technology. Please describe the function of an existing app or a fictional app and how it would help you in the following cases.

1) Teaching students with special educational needs (mostly ADHD).

2) Maintaining discipline in the classroom.

3) Relations between teacher and students.

4) Relations between teacher and colleagues.

5) Relations between teacher and parents.

6) Making the subject clear to the students.

7) High workload - preparing lessons, correcting tests, writing feedback, etc.

*) Feedback about your contribution.

- I have a lot of experience using educational technology and have many suggestions to share.
- I have experience using educational technology and have some suggestions to share.
- I'm still learning how to use educational technology and don't have any suggestions to share yet.
- I have little experience using educational technology and currently don't have the time/will to learn it.
- I have very little experience using educational technology and have no intention of learning it in the future.

Thank you for participating in the survey!

If you have additional comments, please feel free to add them!

Appendix 3

Table 9

Table 9. Ranking of stress factors by novice teachers (present research) compared to relevant importance of stress factors given by all teachers combined in Laur's research (2018)

Ranking	Factor Description	M	Factor Description (Laur, 2018)	Relevant Importance
1	Students with ADHD	4.1	Work overload	25.50%
2	Discipline	3.7	Student bad behaviour	17.40%
3&4	Making subject understood	3.5	Management & colleagues	17.20%
3&4	High workload	3.5	Parents	14.30%
5	Relations with parents	2.3	Inclusive education	9.10%
6	Relations with students	2.1	Demands of society from teacher	6.50%
7	Relations with colleagues	1.8	Low salary	4.40%

M – mean; Scores of the stress: 1 – no stress; 5 – very stressful.

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