The Impact of Digital Technologies on Adolescents' Learning Motivation in Latvia

Kristine Sile
Business Administration Department, Turiba University
Graudu 68, Riga, LV-1058, Latvia
E-mail address: kristine.sile@turiba.lv
ORCID: https://orcid.org/0009-0002-7688-9558

Daina Vasilevska
Business Administration Department, Turiba University
Graudu 68, Riga, LV-1058, Latvia
E-mail address: daina.vasilevska@turiba.lv
ORCID: https://orcid.org/0000-0002-0674-8218

ABSTRACT

Aim. The study aims to investigate the impact of digital technologies on adolescents' learning motivation in Latvia, focusing on usage patterns, perceived benefits and drawbacks, and the role of teachers' digital competence.

Methods. A quantitative cross-sectional survey was analysed was conducted in May 2025 with 477 students in grades 4–9 from Latvian general education schools. Data was collected via a 20-item questionnaire including dichotomous, multiple-choice, Likert-scale items, and open-ended questions. Quantitative data using descriptive statistics (percentages, distributions), while qualitative suggestions was thematically summarised.

Results. Digital technologies significantly enhance motivation, with 86.6% of students enjoying device-based learning and 85.1% having used artificial intelligence (AI) tools. Key benefits include increased engagement (19.3%), autonomy (16.9%), and easier comprehension (16.8%), while drawbacks involve eye strain (22.1%), internet disruptions (21.8%), and distractions (15.4%). Teachers' digital skills were rated positively by 55.8%, though 53% believe improvements are needed.

Conclusions. The positive impact of digital technologies on learning motivation depends on teachers' skills and the balanced, pedagogically grounded integration of technologies.

Practical application. Findings inform policy on teacher training, infrastructure investment, and digital well-being measures in Latvian schools, supporting School2030 initiatives.

Cognitive value. This is one of the first large-scale empirical studies in Latvia specifically examining adolescents' perspectives on digital motivation in the post-COVID period, providing Baltic regional insights and student-driven recommendations for evidence-based digital education strategies.
Keywords: adolescents, digital competence, digital learning motivation, educational technologies

Introduction

In recent years, the integration of digital technologies in education has profoundly transformed learning environments, particularly in the Baltic region. Following the COVID-19 pandemic, Latvian schools have rapidly expanded the use of digital tools, which now play a central role in shaping students' engagement and motivation. As digital learning becomes a structural component of education policy supported by initiatives such as Skola2030 (School2030), understanding how these technologies influence adolescents' learning motivation is essential for sustainable pedagogical development.

International research increasingly highlights the dual nature of digital integration in education. A 2022 study at Riga Technical University demonstrated that interactive digital tools enhance learning outcomes and motivation through personalised learning and collaboration, emphasising their relevance within the Baltic context, which bridges traditional learning limitations (Nordregio, 2024; Petrovica et al., 2022). Similarly, the Organisation for Economic Co-operation and Development (OECD, 2025) reported that motivation improves when technology use aligns with clear pedagogical goals, although issues such as digital distractions and inequality remain prevalent in the region.

Complementing these findings, the United Nations Educational, Scientific and Cultural Organization (UNESCO) Global Education Monitoring Report (2023) stressed that technologies should function as supportive instruments for teachers rather than substitutes, highlighting the importance of teacher training and balanced technology use to prevent attention-related challenges. Moreover, a synthesis of fifteen studies, Tech & Teens (Smahel et al., 2025), showed that digital interactivity fosters adolescents' learning motivation and engagement, yet excessive exposure may contribute to dependence and decreased well-being, a concern particularly relevant in Latvia and Estonia.

From a regional policy perspective, the Nordregio Report (2024) identified persistent digital divides between urban and rural areas in the Nordic and Baltic countries. It called for more evidence-based research on how digital inclusion and teacher competence shape students' motivation and engagement with learning technologies.

Despite these insights, empirical data focusing specifically on Latvian adolescents remain limited. Therefore, this study seeks to fill that gap by examining how adolescents in Latvia perceive the benefits and drawbacks of digital technologies in learn-

ing, and how teachers' digital competence influences motivational outcomes. By situating the findings within both local and regional contexts, this research contributes to the broader discourse on evidence-based digital education strategies in the Baltics.

In Latvia, recent reforms such as the competency-based education initiative School2030 (Skola2030; School2030, 2022) emphasise competency-based education and the development of digital competencies. These efforts align with national strategies such as *Digitālās transformācijas pamatnostādnes 2021.–2027. gadam* [Digital Transformation Guidelines 2021–2027], which prioritise infrastructure enhancements and teacher training. Despite these advancements, studies indicate that many Latvian teachers lack confidence and skills in effectively using technologies in teaching (It Izglītības fonds, 2025). Moreover, while adolescents in Latvia actively engage with digital tools in daily life, their digital literacy and critical thinking skills require further improvement. International comparisons, such as the International Computer and Information Literacy Study (ICILS) 2023, highlight that while Estonia leads in student digital competence and infrastructure, Latvia and Lithuania face ongoing challenges in teacher skill development and equitable access to technology (Dauksiene et al., 2021; Usca et al., 2021).

This study represents the first large-scale empirical investigation in Latvia that specifically examines how digital technologies influence adolescents' learning motivation, based on a nationally representative sample of 477 students from grades 4–9 across multiple regions. In the context of Latvia's rapid digital transformation, such research is essential for developing evidence-based educational policies that address the country's specific challenges, including regional differences in digital access, varying levels of teacher preparedness, and the growing presence of artificial intelligence (AI) tools in learning environments. By revealing both the advantages, such as increased engagement, autonomy, and enriched learning experiences, and the disadvantages, including eye strain, diminished concentration, and susceptibility to digital distractions, this study provides valuable insights that can support equitable and effective technology integration in schools.

Considering these considerations, the present research aims to explore the impact of digital technologies on adolescents' learning motivation in Latvia by analysing how students use digital tools for educational purposes, identifying the perceived benefits and difficulties associated with digital learning, and examining students' views on their teachers' ability to integrate digital technologies into the teaching–learning process.

Literature Review

In recent years, digital technologies in educational settings have increasingly shifted the landscape of teaching and learning, particularly for adolescents. Tools such as online learning platforms, interactive applications, gamified tasks, and collaborative digital

environments are now widely available. Against the framework of self-determination theory (SDT), which posits that satisfying the basic psychological needs of autonomy, competence, and relatedness leads to greater intrinsic motivation and self-regulated engagement (Deci & Ryan, 2000; Haleem et al.,2022; Topping, 2022; Chiu, 2022), in these studies examines how digital technologies can be leveraged to support these needs among adolescents, how personalised and interactive learning methods play a role in enhancing engagement and academic performance, and what challenges and opportunities exist in integrating digital technologies in educational systems such as in Latvia.

The need for autonomy refers to the experience of volition and choice in one's activities. Digital learning environments afford several potential pathways to support autonomy. For example, digital platforms can allow students to proceed at their own rate, choose among different tasks or paths, and monitor their own progress. Empirical work supports this proposition: in a latent growth-curve analysis of a science enrichment online programme, adolescents in an online condition showed greater growth in autonomy-need satisfaction compared to in-person formats (Topping et al., 2022; Deemer et al., 2023). Similarly, a recent conceptual model argues that digital tools support autonomy (and competence) by providing adaptive pathways and self-regulatory scaffolding (Salikhova et al., 2020; Stalmach et al., 2025).

However, the autonomous potential of digital learning is not automatic: design matters. For instance, in an action-research study of an online mathematics course, while competence and relatedness improved, the quantitative results for autonomy were ambiguous, perhaps because autonomy-design components were conflated with competence components (Shank et al., 2025). Moreover, reviews of social media use suggest that while digital settings can support autonomy, they may also undermine it (e.g., through external pressures or constant supervision). A systematic scoping review of adolescents' social media use found that 43 % of studies addressed autonomy, and that autonomy can be both supported and thwarted in digital contexts (Livingstone et al., 2007; West et al., 2024; Smahel et al., 2025).

In the Latvian context, where platforms such as EduPage and Mykoob enable learners to access materials, submit assignments, and monitor progress, the digital environment may offer autonomy-enhancing opportunities. However, disparities in access (urban vs. rural schools) and teacher facilitation may limit these benefits. Here, designing for genuine student choice, rather than merely allowing students to "click through," is critical. The need for competence refers to feeling capable of achieving desired outcomes and mastering tasks. Digital technologies can offer significant affordances here: adaptive learning systems, immediate feedback mechanisms (quizzes, self-checks), branching pathways, and analytics that help learners identify gaps and advance accordingly. The systematic reviews by Lize Alberts et al. (2024) and Nailya R. Salikhova et al. (2020) described how digital learning, viewed through self-determination theory, illuminates the role of feedback, scaffolding, and tailored tasks in promoting competence. Meta-analytical evidence shows that gamification elements

can enhance perceived autonomy and relatedness but have a smaller or more variable effect on competence. In a recent meta-analysis of gamified learning, while autonomy and relatedness were positively influenced, competence showed minimal impact (Li et al., 2024). An action-research study in a secondary mathematics online unit found that design components strongly affecting competence (e.g., prior-knowledge sections, scaffolding, check buttons) contributed to improved motivation; yet autonomy was less clearly impacted (Shank et al., 2025). Thus, while digital tools hold promise for competence support, it is crucial that tasks are pitched at the right level, that feedback is timely and meaningful, and that students are supported to interpret feedback as competence-building rather than as evaluation. In Latvia, teacher training and the pedagogically grounded integration of adaptive, scaffolded tools will be essential to ensure that digital technologies translate into genuine competence enhancement rather than mere novelty. The need for relatedness concerns feeling connected to and accepted by others. In digital environments, relatedness may be supported through online collaborative tools, discussion forums, peer feedback, virtual group work, and blended-learning social interfaces. A study of online learning engagement found that teacher support enhanced autonomy, competence, and relatedness, which in turn drove engagement, with autonomy having the strongest influence (He et al., 2025).

Likewise, the conceptual model by Anna Stalmach and colleagues (Stalmach et al., 2025) found relatedness can be fostered by digital tools when they provide social connection, which supports emotion regulation and belonging. However, digital relatedness can also be thwarted - the same technology may isolate or lead to superficial interactions. The social media review found that relatedness was supported in 79 % of studies, but the dual potential to undermine it was also noted (West et al.,2024).

In the Latvian context, national policy documents (Digitālās transformācijas pamatnostādnes 2021.–2027. gadam; School2030) stress digital competence and infrastructure improvement. However, country-specific reports show that although adolescents use digital devices regularly, their digital literacy and critical thinking remain areas for improvement (OECD, 2021). In this regard, the global literature suggests that digital tools must not replace teachers but supplement them, supporting pedagogy rather than driving it (West et al., 2024). For Latvia, the convergence of digital transformation policy, the increasing use of digital platforms in schools, and the motivational potential of digital technologies suggest fertile ground for improvement. Yet, as the literature underscores, the mere presence of digital tools is insufficient: design, pedagogy, teacher skill, equitable access, and ongoing evaluation all matter critically.

Methodology

The empirical study consisted of an anonymous survey conducted in May 2025, with 477 students from grades 4–9 in Latvian general education schools. *The sample includ-*

ed 63.7% girls and 36.3% boys, representing more than ten cities and municipalities including Riga (20.7%), Kandava (15.9%), Sabile (13.4%), Mazsalaca (13.4%), Kuldiga (9.8%), Valmiera (8.5%), Dobele (7.3%), Ventspils (6.1%), and Jurmala (4.9%).

The distribution of the surveyed places of residence shows that the majority of students come from different regions of Latvia, ensuring a diversity of different experiences. Students from more than ten different cities and regions participated in the survey. The remaining populated areas each account for 2–4%, which together make up a significant spread, but the survey included students from schools in many regions. The wide geographical coverage indicates that the survey reflects the opinions of students from both urban and rural regions

School types: 63.9% primary schools, 31.0% secondary schools, 5.1% gymnasium. This is consistent with the fact that the range of grades covered by the survey mainly includes respondents who are in primary school. The dominance of primary school in the sample structure means that the findings are particularly representative of the experiences of these students.

Grade distribution: grade 7 (24.3%), grade 6 (21.8%), grade 5 (14.9%), grade 9 (14.7%), grade 8 (13.0%), grade 4 (11.3%). Approximately 600 questionnaires were distributed, the response rate to the survey was approximately 80%, which is considered sufficient to obtain a representative insight into trends in this age group.

This sample provides broad regional coverage and a concentration in the preadolescent/adolescent age group (approx. 11–15 years), which allows analysis focused on this critical development period. The sample was selected using convenience sampling. The survey was attended by students who were sent a link and who voluntarily chose to participate. Data collection was carried out using an online questionnaire (Google Forms), distributed in cooperation with schools and teachers. The survey was completed anonymously, in compliance with personal data protection regulations. Data collection took place in the spring of 2025, and the survey lasted approximately three weeks.

The main question of this study is how the use of digital technologies affects the learning motivation of students in grades 4–9 in Latvia. How digital learning tools, environments and teachers promote students' autonomy, sense of competence and sense of belonging (according to SDT), as well as to determine students' attitudes towards digital learning. The study is a quantitative, cross-sectional design study, in which student questionnaire responses were collected over a single period. Data was collected using an online survey designed to assess students' experiences and attitudes towards the digital learning process. The questionnaire contained 20 items covering device usage habits, attitudes towards digital learning, perceived benefits and drawbacks, evaluations of teacher digital skills, and suggestions for improvement. The questionnaire was structured using both closed (Likert scales, multiple-choice questions) and open-ended questions to provide both quantitative and qualitative insights.

Data processing was carried out by combining all questionnaire pages into a single data table structured by question blocks.

The survey was structured in the following thematic blocks:

- Demographic data – gender, class, type of school, city.
- Digital technology usage habits – types of devices, frequency of use.
- Motivation for learning in a digital environment – students' feelings, likes and dislikes towards digital learning, assessment of teachers' digital skills.
- Aspects of self-determination theory – questions reflecting a sense of autonomy, competence and belonging.
- Suggestions and ideas for improvement – students' suggestions for improving digital learning.

Each block contained 3 to 5 questions, and some questions included the option to provide a free-form answer. Data was analysed using Microsoft Excel (MS Excel) and Statistical Package for the Social Sciences (SPSS) statistical analysis tools. Descriptive statistics (frequencies, percentages, and mean values) were used to characterise students and assess their attitudes; cross-tabulation analysis was used to determine the relationships between students' gender, class, frequency of use of digital technologies, and level of motivation; and thematic content analysis was applied to open-ended responses.

Percentages reported for single-choice items were recalculated based on the full sample (N = 477) and are presented to one decimal place. Minor deviations from 100% may occur because of rounding. For multiple-response items and coded open-ended responses, percentages represent the share of respondents mentioning each category; therefore, totals are not expected to equal 100%.

Limitations: the study was conducted within the context of the Latvian education system. The article examines the results within the broader context of the Baltic region. The authors acknowledge that the empirical data focused specifically on Latvian adolescents. This limits the ability to directly generalise the results to other national or cultural contexts.

Results

This section summarises the results of a survey on adolescents' digital technology usage habits in the learning process, perceived benefits and drawbacks, and students' views on teachers' digital skills.

Most students (86.0%) indicated that they use digital devices very regularly for learning purposes. More than half of the respondents (57.7%) use a computer, tablet or smartphone for learning every day. Another 28.3% do so several times a week. Only 13.4% of respondents admitted that they rarely use technology for learning, and only 0.6% stated that they never use it. These results clearly show that digital devices have become an everyday part of the learning process for most students. More than eight out of ten students use technology at least several times a week, indicating a high level of integration of digital tools in learning (Table 1).

Table 1
Frequency and Types of Use of Digital Technologies by Students

Question	Main results (%, top categories)
How often do you use digital technologies for studying?	every day – 57.7 % several times a week – 28.3% rarely – 13.4 % never – 0.6 %
Which devices do you use most often for studying?	smartphone – 40.0% computer – 45.1% tablet – 8.0% interactive whiteboard – 6.1% calculators – 1.0%

Source. Own research.

The survey identified that computers and smartphones are the main devices used by students for learning purposes. Computers were indicated as the primary learning device by 45.1% of respondents, followed by smartphones at 40.0%. Tablets are used by 8.0% of students, interactive whiteboards by 6.1%, and calculators by 1.0%. This data reflects both the availability of devices and students' convenience habits - computers are often suitable for more serious work (e.g. writing, programming), while smartphones provide operational access to information and communication. The relatively low use of tablets and interactive whiteboards may be explained by limited availability or by the fact that some schools do not yet offer tablets as a learning tool. Smartphones and computers are the dominant devices used in learning. The prevalence of mobile devices shows that digital learning increasingly occurs through personal portable technology.

Motivation and Attitudes towards Digital Learning *(Key variables)*

This section forms the core of the analysis, directly examining the impact of digital technologies on students' motivation and attitudes towards learning (Table 2). The results reveal a predominantly positive perception: 86.6% of respondents stated that they enjoy learning with a computer, tablet, smartphone, or other digital device, while only 13.4% reported that they do not. This strong preference indicates that, for most students, digital learning is perceived as interesting and satisfying. The motivational power of technology appears to stem from interactive and multimedia content, immediate feedback, and the possibility of progressing at one's own pace — factors that often generate greater engagement than traditional methods. Nevertheless, the 13.4% who do not enjoy this form of learning (approximately one in seven students) may face barriers ranging from limited access to devices, technical difficulties, or simply a preference for non-digital approaches.

Table 2

Motivation, Attitudes, and Preferences in Using Digital Technologies

Question	Main results (%)
Do you like learning with digital devices?	Yes – 86.6% No – 13.4%
How do you feel when learning in a digital environment? (1–5 scale)	5 (very good) – 25.6% 4 (good) – 34.4% 3 (neutral) – 34.0% 1–2 (low) – 6.1%
Which learning methods do you consider most effective? (multiple answers possible)	Digital/interactive activities – 69.2% Group work – 63.7% Traditional (textbook/lecture) – 31.4% Online lectures – 23.1%
Would you like to use digital technologies more often at school?	Yes – 62.5% Partially – 31.3% No – 5.1% Other / not specified – 1.1%

Source. Own research.

Although the overall attitude towards digital learning environments is positive, students' ratings of how they feel in such settings reveal important nuances. On a 5-point scale ranging from 1 (very bad) to 5 (very good), the largest groups chose 4 (good) — 34.4% — and 3 (neutral) — 34.0% — followed by 5 (very good) at 25.6%. Only 1.7% rated their experience as 1 (very bad) and 4.4% as 2, giving a combined low-score proportion of 6.1%. In total, 60% of students (those selecting 4 or 5) feel comfortable or very comfortable in digital learning environments, and the median response is close to 4, confirming a generally positive emotional and physical experience. The small group reporting low comfort may be affected by factors such as technical problems, screen fatigue, excessive distractions, or difficulties with self-discipline when working online.

In terms of perceived effectiveness, interactive games and digitally supported activities were ranked highest, chosen by 69.2% of respondents. This finding aligns with students' earlier expressed desire for gamification elements and visually rich content. Technology-enhanced group projects came a close second (63.7%), highlighting the value students place on collaboration and hands-on tasks that digital tools can facilitate (shared documents, joint programming, virtual experiments, etc.). Traditional textbook-based teaching and classroom lectures were considered effective by only 31.4% of respondents, and purely transmissive online lectures lagged further behind at 23.1%. These results clearly show that students favour active, participatory methods in which technology supports play, visualisation, and social interaction rather than serving merely as a one-way information-delivery channel.

Finally, intention is strongly positive: 62.5% of students would like digital technologies to be used more frequently in school, while another 31.3% answered "partially" (i.e., they are open to greater use in certain subjects or situations). Only 5.1%

explicitly stated they would not want more technology, while a very small remainder selected another or unspecified response option. In total, approximately 94% of respondents are either enthusiastic or open to expanding the role of digital tools in their education — a figure that reflects the digital-native orientation of today's youth and their expectation of a modern, technology-rich school experience. Importantly, the open-ended reasons provided for wanting more digital learning centre almost entirely on intrinsic motivation ("it's more interesting", "it's fun", "I like working with technology") rather than external pressures or obligations behavioural.

In summary, the data paint a clear picture: the overwhelming majority of students find digital learning enjoyable, feel good while engaging with it, perceive interactive and collaborative digital methods as the most effective, and actively wish to incorporate more technology into their school routine for reasons rooted in interest and pleasure. At the same time, a consistent minority of 6–14% (depending on the indicator) remains less enthusiastic or experiences discomfort, signalling that schools should continue to offer varied approaches and ensure equitable access and support for all learners.

Perception of Benefits and Barriers *(Influencing Factors)*

This section explores the specific reasons behind students' high motivation for digital learning, as well as the obstacles that can reduce or even undermine that motivation. By identifying the most appreciated advantages and the most frequently reported drawbacks, we gain a clearer picture of how digital technologies act as both facilitators and potential inhibitors of engagement and learning.

When asked what they like most about learning with digital technologies (*What do you like most about learning with digital technologies?),* students highlighted a mix of practical, motivational, and cognitive advantages (Table 3).

For the multiple-response and coded open-ended items in Tables 2 and 3, percentages show the proportion of respondents mentioning each category; accordingly, the totals do not add up to 100%.

Table 3

Benefits of Digital Learning

Question	Main results (%, top categories)
What do you like most about learning with digital technologies?	Less handwriting/typing instead – 21.7% Content is more interesting (videos, interactivity) – 19.5% Can learn independently, at my own pace and time – 17.1% Easier to understand the material (visuals, simulations, instant explanations) – 17% Faster access and submission of tasks – 15% Video and gamification elements – 9.7%

Question	Main results (%, top categories)
Do digital technologies help you understand study material better?	Yes – 74.3% No – 11.6% Partially / Not sure – 14.1%
Do digital technologies help or hinder concentration during studies?	Help me focus – 40.7% No effect – 28.1% Distract me – 9.2% Don't know – 22.0%

Source. Own research.

The most frequently cited benefit was highly practical: 21.5% of responses pointed to reduced handwriting and the ability to complete and submit work digitally. Closely behind, 19.3% appreciated that digital content is simply *more interesting* thanks to videos, animations, and interactive elements. A similar proportion emphasised *autonomy and flexibility* (16.9% – "I can learn independently, whenever and at my own pace") and *improved comprehension* (16.8% – "it's easier to understand the material thanks to visuals, simulations, and immediate online explanations"). Speed and efficiency were also valued (14.8%), followed by the appeal of gamification and video elements (9.6%). These results confirm that digital tools primarily boost *intrinsic motivation* through greater engagement, personal control, and cognitive support.

A direct question about comprehension (*Do digital technologies help you understand study material better?*) reinforced this view: 74.3% of students agreed that digital technologies help them understand study material better, with only 11.6% disagreeing and 14.1% remaining uncertain. This strong majority perception of cognitive benefit is a powerful driver of positive attitudes and willingness to use technology in school.

At the same time, students were very aware of the downsides of digital learning (*What do you like least about learning with digital technologies?*). The two most common complaints were almost tied:

- Eye strain and physical discomfort from prolonged screen time – 22.1%;
- Unreliable internet connections or technical glitches – 21.8%.

Attention-related challenges formed the next cluster:

- It is easier to get distracted (social media, games, notifications) – 15.4%;
- It is harder to stay focused on the actual task – 14.4%.

A significant group also missed human interaction and guidance:

- Lack of direct teacher presence and immediate support – 11.8%;
- Difficulty understanding tasks or instructions in the digital environment – 11.0%.

Only 1.4% of students said they disliked nothing at all, showing that virtually everyone experiences at least some drawbacks.

Responses to the question (*What do you like least about learning with digital technologies?*) on concentration were mixed but revealing: 40.7% reported that digital tools help them focus (e.g., through interactive tasks or organisational apps), 28.1% noticed no effect, 9.2% felt distracted by the technology itself, and 22.0% were unsure. This distribution highlights strong individual differences in self-regulation skills and the critical role of task design.

Students associate digital learning with greater interest, autonomy, speed, and most importantly deeper understanding of the material. These perceived benefits explain much of the high motivation documented earlier. However, the advantages come with non-trivial costs: physical strain, technical instability, and serious risks to attention and concentration. Eye strain and internet problems alone affect more than 40% of students, while distraction and focus difficulties concern roughly 30%. These barriers are not marginal; they directly counteract the motivational gains for a substantial portion of the sample. The findings underline the need for a balanced, ergonomically aware, and pedagogically thoughtful approach: schools must continue expanding meaningful interactive content while simultaneously addressing health issues (screen-time limits, breaks, proper lighting), ensuring reliable infrastructure, distraction-management strategies, and maintaining sufficient teacher presence and scaffolding in digital environments. Only by minimising these barriers can the full motivational and cognitive potential of digital technologies be realised.

Teachers' Digital Competence and Students' Suggestions for Improvement

Students evaluated their teachers' ability to use digital technologies in teaching relatively positively. Overall, 55.8% rated teachers' digital skills as good (43.6%) or very good (12.2%), meaning that more than half of respondents consider their teachers competent users of technology. Another 38.4% gave an average rating, indicating that teachers' skills are seen as acceptable but not outstanding. Only a small minority assessed teachers' competence negatively: 4.0% as poor and 1.8% as very poor. Thus, roughly 6% of students believe their teachers clearly lack the necessary digital skills. These results show general satisfaction, although differences likely exist between schools, subjects, or teachers' age groups. The findings align with recent studies in which educators themselves reported a need for further development in digital pedagogy (It Izglītības fonds, 2025).

At the same time, 53.0% of students believe teachers could improve the way they use digital technologies in lessons, while 41.1% answered "I don't know" and only 5.9% said "no". This distribution reflects a constructive rather than critical attitude: more than half see room for enhancement, and the large "don't know" group suggests many students sense untapped potential but lack specific ideas or experience to judge precisely (Table 4).

Table 4

Teachers' Digital Competence and Improvement Suggestions

Question	Main results (%, top categories)
How do you evaluate teachers' ability to use digital technologies in teaching?	Very good – 12.2% Good – 43.6% Average – 38.4% Poor – 4.0% Very poor – 1.8%
Do you think teachers could improve the way they use digital technologies?	Yes – 53.0% I don't know – 41.1%. No – 5.9%

Source. Own research.

When explicitly asked for suggestions (*What ideas do you have to make digital learning more interesting?),* students offered practical and motivation-oriented ideas:

- Incorporate more videos and animations (31.4%);
- Provide shorter, clearer tasks (21.9%);
- Offer greater choice of learning formats or paths (18.7%);
- Increase online collaboration opportunities (14.2%);
- Add more educational games and gamification elements (13.9%).

These ideas consistently emphasise interactivity, visual richness, clarity, autonomy, and variety — exactly the elements shown earlier to drive motivation and engagement. Only 0.4% of students had no suggestions or offered highly specific ideas not covered in the list.

In summary, students view their teachers as reasonably competent but see clear room for pedagogical improvement, especially through richer multimedia, clearer tasks, and more student choice. These findings underscore the importance of continuous teacher professional development, thoughtful integration of artificial intelligence (AI), and a balanced digital strategy that addresses both the opportunities, and the legitimate concerns raised by young learners themselves.

Expectations for the Future Role of Digital Technologies

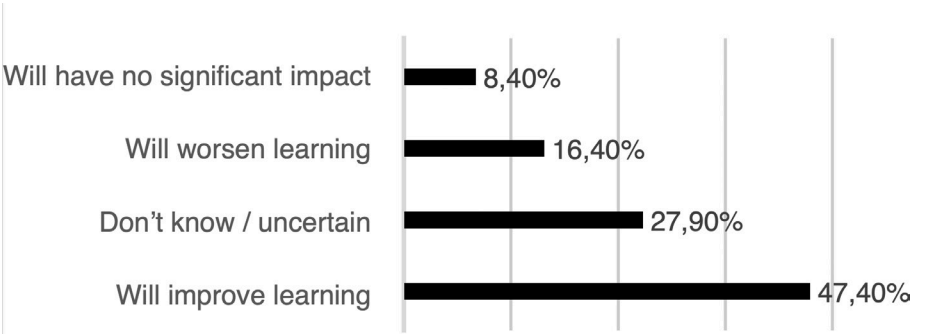
The survey revealed that artificial intelligence has already become a normal part of students' learning toolkit. An impressive 85.1% of respondents reported having used artificial intelligence (AI)-powered tools (ChatGPT, Grammarly, Duolingo, Photomath, etc.) for study purposes, while only 14.9% said they had not. Students commonly mentioned using Grammarly for writing improvement, Duolingo for language practice, and ChatGPT for explaining difficult concepts, generating ideas, summarising texts, or debugging code. This extremely high adoption rate confirms that today's students

actively seek out and integrate the latest technologies into their learning without waiting for institutional permission. The result also highlights an urgent need for schools to develop clear policies on academic integrity and to teach critical evaluation of artificial intelligence (AI)-generated content.

The students themselves are cautiously optimistic about the long-term role of technology in education. Almost half believe that digital technologies will improve learning in the future by making it more efficient, interesting, personalised, or accessible. However, a significant 27.9% answered "I don't know", reflecting uncertainty about how technological development will unfold. A quarter of respondents expressed reservations: 16.4% fear that technology may worsen the learning process (citing risks such as excessive screen time, superficial knowledge, reduced social interaction, or over-dependence), and 8.4% expect little meaningful change (Figure 1).

Figure 1

Expected Impact of Technology on Learning in the Future



Source. Own research.

According to the survey, students are actively integrating advanced technologies into their learning activities, often regardless of school recommendations. This simultaneously highlights the urgent need for educational institutions to develop academic integrity policies and teach students to critically evaluate artificial intelligence (AI)-based results. Students are cautiously optimistic about the future. While enthusiasm is generally prevalent, it is tempered by significant uncertainty and concern, highlighting the need for a thoughtful and balanced implementation of future digital and artificial intelligence (AI)-based educational tools.

Discussion

The results of the study confirm that digital technologies are an important motivational factor in the learning process of adolescents. Most students (almost 87%) indicate that they enjoy learning with digital devices, and approximately 60% feel comfortable

in a digital environment. This is consistent with the finding expressed in international studies that technologies can increase student engagement and interest, if their use is pedagogically well thought out (Deci & Ryan, 2000; Haleem, 2022; He, 2025). Interactive learning tools and the opportunity to work at one's own pace promote autonomy, which has a positive impact on intrinsic motivation. The survey data shows that students particularly value gaming and practical activities, which is also consistent with the conclusions of other authors about the positive effect of gaming (game-based learning) on motivation (Ertan & Kocadere, 2022; Li et al., 2024; Wang & Tahir, 2020). At the same time, the results also highlight significant challenges in digital teaching. Students often cited eye strain (22%) and internet connection problems (21.8%) as the main problems, as well as the risk of distraction (15.4%). Similar problems have been recorded elsewhere in the Baltics, for example, in Estonia, where researchers indicate the need to balance digital and traditional teaching methods to prevent overload and difficulty concentrating (Seema et al., 2023). Organisation for Economic Co-operation and Development (OECD) data also warns that excessive and thoughtless use of technology can negatively affect learning outcomes if it is not integrated with a clear pedagogical goal (OECD, 2019). The study shows that ~9% of students admit that technology rather bothers them, and ~14% feel uncomfortable in the digital environment. These groups, although in the minority, indicate that one approach does not fit all. Teachers should consider individual differences while digital tools help some people focus and learn independently, they can cause difficulties for others.

Teachers' digital skills turned out to be one of the most important factors that can affect the success of using technology in the learning process. Although most students rate their teachers positively (approximately 56% "good" or "very good"), around 6% of respondents indicate that teachers lack digital skills. The data confirms the latest Latvian studies on teachers' digital competences, which concluded that some teachers themselves feel insufficiently prepared to work with information technology (IT) tools and organise digital learning processes (It Izglītības fonds, 2025). Students' suggestions to use more videos, interactive tasks - are largely based on the assumption that teachers need to acquire these skills and apply great creativity to implement these solutions. Therefore, professional development of teachers in the field of information technology (IT) is critically important to meet the growing expectations of students and to leverage the full potential of technology. This is supported by research: a systematic review found that high-quality teacher professional development programmes characterised by ongoing support, collaboration, and tailored learning significantly improve teachers' digital instructional integration and confidence in using technology (Amemasor et al., 2025).

The study also provides an interesting Baltic-wide perspective. In Latvia, students are mostly optimistic about the impact of technology and want to use it more, but a significant proportion admit to uncertainty about the future. The Estonian experience shows that long-term investments in infrastructure and teacher training bear fruit – Estonian students are among the most skilled users of digital technologies in the world

(International Association for the Evaluation of Educational Achievement [IEA], 2023). Latvia is still lagging in this regard as indicated by International Computer and Information Literacy Study (ICILS) 2023 data. We need to strengthen both the material and technical base (especially in the regions) and provide methodological support to teachers. Policy documents provide for digital transformation measures, and our study confirms their relevance - students themselves want more digital innovations and higher-quality online learning opportunities.

It is also important to remember the aspects of security and ethics. The United Nations Children's Fund (UNICEF, 2017) and the EU Kids Online studies by Daniel Smahel and colleagues (Smahel et al., 2025) draw attention to the need to strengthen students' critical thinking, media literacy, and awareness of online safety as screen time and internet use increase in education. Our survey results indirectly indicate that students who report difficulty concentrating or a lack of teacher presence may be facing challenges in self-management in the digital environment. Therefore, schools should pay attention not only to technical and content provision, but also to the development of digital culture: how to use technology purposefully, safely, and in moderation.

Overall, the study confirms that digital technologies have a positive impact on adolescents' motivation and engagement in learning, but this impact is not automatic. It depends on a few prerequisites: teacher skills and attitudes, the quality of infrastructure, the suitability of teaching content and the individual characteristics of students. The digital generation is ready and eager to learn with new tools, but the education system must be able to support this enthusiasm with smart, evidence-based implementation of digital technologies.

Conclusions

The findings on students' usage patterns, perceived benefits, and challenges of digital technologies provide important guidance for shaping effective digital learning strategies in Latvian schools. The study indicates that digital tools are already a meaningful part of students' everyday learning experience: 86.6% of students enjoy learning with digital devices, and 85.1% have used artificial intelligence (AI)-powered tools in their studies. This widespread adoption shows that students not only accept but also expect technology-supported learning. Consequently, schools should build on this readiness by ensuring access to diverse, pedagogically meaningful digital tools that correspond to learners' needs.

Students emphasised that digital technologies increase their engagement (19.3%), foster autonomy (16.9%), and support comprehension (16.8%). These benefits align with self-determination theory (SDT), demonstrating that well-designed digital environments can reinforce motivation by providing interactive, visually rich, and personalised learning experiences. Therefore, digital learning design should deliberately support students' psychological needs for competence, autonomy, and relatedness.

At the same time, students reported several notable drawbacks, including eye strain (22.1%), unstable internet connections (21.8%), and difficulties with concentration due to distractions (15.4%). Technical issues, device problems, and limited teacher guidance can further reduce the effectiveness of digital learning. To mitigate these risks, schools must strengthen digital well-being practices, improve technological infrastructure, and help students develop self-regulation strategies.

Teachers' digital competence is another crucial factor. Although students generally view teachers as capable users of digital tools, there remains a need for continuous professional development to promote more innovative and pedagogically grounded technology integration. Strengthening teachers' skills will allow technology to be used not simply as an add-on but as a genuine driver of motivation, analytical thinking, and active learning.

Within the broader Baltic context, Latvia continues to develop its digital education capacity but still lags behind Estonia, particularly in terms of infrastructure quality and teacher training. Reducing these disparities requires long-term, consistent investment to ensure that all regions and schools have equitable access to modern technologies. Aligning digital initiatives with national reforms such as School2030 and the country's digital transformation strategy will help ensure that technology enhances learning outcomes rather than serving as an end.

To advance these aims, the study highlights several key recommendations:

- expand teacher training in digital pedagogy;
- improve infrastructure, especially outside the capital;
- promote healthy digital habits to support student well-being;
- develop high-quality, accessible digital learning materials, including for learners with special needs;
- foster collaboration with Baltic partners to exchange effective practices and accelerate innovation.

Given the rapid development of digital technologies and the growing presence of artificial intelligence in education, a central question for future research emerges: How does the pedagogically informed integration of digital technologies and artificial intelligence (AI) influence student motivation and digital well-being in Latvian schools, considering regional differences and teachers' professional competencies?

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