Personality Predictors of the Attitude to the Digitalization of Education among Russian Students

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The empirical study explores students' attitudes towards digital educational technologies and the digitalization of the education system as a whole. The survey, conducted between January and April 2022, shortly after the end of the lockdown, involved students from Russian universities aged from 18 to 38 (M=22,23; SD=3,17; N=132; 76% — female). The "Attitude towards Digitalization" questionnaire (D.V. Kashirsky, A.S. Ocheretin) and the Big Five Inventory (BFI-2-S, K. Soto, O. John) were used. The results of the survey revealed the extent to which students mastered the skills necessary for studying in a digital environment and whether these skills influenced their academic success. The study also examined the effect of the digitalization of education on the quality of education and identified the most effective learning formats as reported by respondents. Multiple regression analyses identified personality traits (Big Five factors) that underlie students' attitudes towards the digitalization of education. The results can be used to individualize the educational process at universities when implementing various educational technologies.

Keywords: digital technologies; digitalization of education; attitude towards digitalization; Big Five factors; university students.

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Представлены результаты эмпирического исследования личностных особенностей студентов с различным отношением к цифровым образовательным технологиям и цифровизации системы образования. В опросе, проведенном в январе-апреле 2022 года после окончания локдауна, приняли участие студенты российских вузов в возрасте от 18 до 38 лет (M=22,23; SD=3,17; N=132; 76% девушек). Использованы анкета «Отношение к цифровизации» (Д.В. Каширский, А.С. Очеретин); тест «Большая пятерка» (BFI-2-S) (К. Сото, О. Джон). На основе результатов анкетирования определено наличие у студентов навыков работы в цифровой среде, а также влияние степени их сформированности на успешность обучения. Выявлены представления студентов о зависимости качества образования от его цифровизации и о недостатках применения цифровых технологий, определены наиболее эффективные форматы обучения с точки зрения студентов. С помощью процедур множественного регрессионного анализа выявлены личностные предпосылки (факторы Большой пятерки), лежащие в основе отношения студентов к цифровизации российского образования. Полученные результаты могут быть использованы для индивидуализации учебного процесса в вузе при реализации различных образовательных технологий.

Ключевые слова: цифровые технологии; цифровизация образования; отношение к цифровизации; факторы Большой пятерки; студенты вуза.

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Introduction

In Russia's social and economic development strategy until 2024 and beyond to 2035, the country's leadership has outlined a course towards building a digital economy, where the digitalization of education plays a crucial role. The authors of the book *"Challenges and Prospects of Digital Transformation in Education"*, published by the HSE under the editorial leadership of A.Y. Uvarov and I.D. Frumin, had posed the question: how should education be transformed so that it becomes not just a state obligation, but a driving force for the country's social and economic development? A special emphasis in the book is placed on the process of digitally renewing education; the authors believe that it will play a key role in the upcoming digital transformation. The authors point out that the digital economy requires every learner (not just the top performers) to possess the skills needed in XXI century (such as critical thinking, the ability to self-learn, and the capacity to effectively utilize digital tools, resources, and services in their daily work) and to creatively (beyond standard templates) apply their knowledge in a rapidly evolving digital environment, as well as to manage their own learning process [21].

Over the past few years, the gradual and systematic introduction of digital educational technologies (DET) into the Russian education system has been taking place. This process was significantly accelerated due to the COVID-19 pandemic, when Russian universities began operating in a remote format, since carrying out educational activities would have been impossible without the use of DET. The experience of large-scale application of DET during the lockdown period provided an opportunity to assess the advantages, disadvantages, and risks of using digital technologies in education. It became clear that the effectiveness of education using modern DET depends not only on the quality of the technologies themselves but on the individual characteristics of the users and their attitudes toward DET [15; 35] as well. Therefore, examining the links between students' attitudes toward DET and their personal characteristics becomes particularly relevant.

Ideological Foundations and Risk Assessment of the Digital Transformation of Society. The ideological foundations of digital transformation as a necessary stage in the change of the modern world order are presented in Klaus Schwab's work *"The Fourth Industrial Revolution"*. The author assumes that the world stands on the threshold of a new technological revolution that promises to transform the society and the global world as a whole, to transform all the mankind. In terms of scale, scope, and complexity, this phenomenon is unparalleled in all of human history. The Fourth Industrial Revolution is based on digital transformation and combines a variety of technologies, leading to unprecedented paradigm shifts in the economy, business, society, and within each individual. It changes not only *what* and *how* we do things, but also *who* we are. It is noteworthy that the importance of digitalization is justified primarily not as a technological transformation of the world but as a shift in the way of living, carrying out activities, and communicating and, most importantly, as a change of the individual themselves—their mental structures and inner world. Schwab refers to digitalization as to disruptive innovation, designed to carry out a revolutionary shift in the consciousness and activities of individuals, leading to the transformation of their customary way of life and work, as well as that of society and the global world as a whole. A crucial role in the transformation of the modern world is assigned to education.

The idea of the widespread use of digital technologies raises certain concerns.

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In particular, in his book, Klaus Schwab presents research results indicating a link between the digitalization of education and a 40% decline in empathy levels among college students as compared with those who studied two or three decades ago [25]. In the same vein, Konrath and colleagues reported that a significant part of this decline occurred after the year 2000 [32]. Sherry Turkle also points to a decrease in societal empathy [38]. Turkle emphasizes that digital technologies harm three pillars of humanity: solitude which allows for reflection, friendship which implies empathy, and social life that involves mentorship, family, and education. According to her data, 44% of teenagers are never away from the internet, even during sports or meals with family or friends. This has led her to conclusion that entire generation of people who find it extremely challenging to listen to others, maintain eye contact, and understand non-verbal cues or empathize may soon emerge. In addition, numerous sociologists' and psychologists' empirical studies have established the influence of the digitalization of education on the decline in empathy [32; 38], reflection, and the quality of social interaction between people [15; 17; 38].

Several studies indicate the impact of internet engagement on cognitive development. For instance, Nicholas Carr [29] argues that the more time one spends in the digital space, the more his or her cognitive abilities decline due to reduced attention control. The internet significantly reshapes our perception of reality by fostering the only superficial understanding. As "skimming" becomes the dominant reading method, people lose the ability to read books deeply and to truly engage with their content. Thus, the author concludes that we may lose our "humanity" in this way. These concerns are supported by recent research findings, which point to the role of information and communication technologies (ICT) in diminishing cognitive abilities and fostering fragmented thinking in schoolchildren [3]. For example, the research made by E.V. Bakhadova [3] showed that adolescents with a high level of internet addiction exhibited fragmented thinking: their mental agility was coupled with reduced attention span, leading to difficulties in maintaining focus during long tasks. Superficial and inflexible perception resulted in an inability to deeply analyze information and perceive the world as a whole. Students with fragmented thinking demonstrated lower academic motivation, leading to academic difficulties. Bakhadova points out that fragmented thinking hinders the full development of students' personalities as develops spontaneously, whereas conceptual and theoretical thinking is being developed through systematic learning [3].

Analysis of Research on Students' and Teachers' Attitudes Toward the Implementation of Digital Educational Technologies (DET). In recent years, a significant number of studies analyzing the results of implementation of digital ICT in education [6; 17; 22] have been conducted. Some of them were based on the experience of digital ICT use in educational process during the COVID-19 pandemic [1; 5; 12; 13]. Several studies focused on examining the attitudes of teachers [11; 12; 20] and students [9; 13; 16; 35] toward the use of remote technologies in educational practice. It is important to note the contradictory nature of the research results. For instance, some studies [27; 39] revealed that more than a half of the students expressed a positive attitude toward the use of ICT in education. The other group of studies found out that the majority of students showed a cautious attitude toward remote, digital learning formats, preferring traditional or blended learning forms [14]. The differences in students' attitudes toward the digitalization of education were explained by various factors, including the

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accessibility of digital equipment and the experience of its use [26]. It was also noted that students' attitude toward digitalization vary depending on respondents' socio-demographic characteristics, such as country, field of study, year of study, familiarity with digital technologies, and the timing of the survey (whether it was conducted at the beginning of the lockdown or after a significant period of time following it) [35].

Studies aimed at examining students' and teachers' evaluations of the negative and positive aspects of digitalization are particularly interesting. It has been shown that, on one hand, students noted the time saved on commuting to and from the university [1; 12], the simplification of the educational process, and improved communication between students and teachers [39]. On the other hand, they mentioned passive learning, the lack of feedback from instructors [14; 39], and insufficient interpersonal communication and social interaction [1; 18].

When discussing the drawbacks of distance learning as one of the forms of implementing of digital educational technologies (DET), some authors point out that this format does not take into account the individual characteristics of students, their personal development levels, or how each student perceives information [16]. In this regard, studies analyzing the personal traits of students who prefer certain learning formats or the use of various ICTs are of a special interest. These include research on the connection between basic values and engagement in using ICT [20], the relationship of attitudes toward distance learning with academic disengagement and emotional burnout [14], motivation, identity styles, and Big Five personality traits [4; 35], as well as the studies examining the link of students' thinking patterns and Big Five traits with academic performance in distance learning [2]. Some studies on the connection between students' personality traits and attitudes toward distance learning and DET (in general) revealed a positive correlation of acceptance of digitalization in education with extraversion [4; 35], agreeableness, and openness [4; 36]. In a study with Taiwanese students [27], conscientiousness positively, and neuroticism negatively, predicted attitudes toward the effectiveness of online learning for them.

The aforementioned studies assessing the relationship between Big Five traits and attitudes toward specific online courses, viewed students' personality traits as predictors of their overall attitude toward DET, however, the particular forms or technologies of academic work were not specified there. Also, there is a lack of empirical data in the literature regarding the risks and benefits of learning through DET. In addition, while discussing DET, authors often did not examine them in their entirety, but artificially narrow the scope to distance learning formats.

The purpose of the present empirical study was to identify the personal prerequisites influencing students' attitudes towards various aspects of the digitalization of education.

The following ***objectives*** were addressed:

— to determine students' attitudes towards the digitalization of Russian education;

— to identify the personality traits of students with different attitudes towards the digital technologies used in Russian education.

The main ***research questions*** addressed in this study are:

RQ1: What digital skills are the most developed among students, and how do these skills impact students' academic success?

RQ2: How do students perceive the relationship between the implementation of digital technologies in education and changes in its quality?

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RQ3: What learning formats do students consider the most effective, depending on the extent of digital technology usage in education?

RQ4: What personal dispositions underlie students' attitudes toward digitalization and their preferences for certain educational formats?

Procedure and participants. The survey was conducted between January and April 2022, immediately after the lockdown, using the Google Forms platform. The study, which was voluntary, involved 132 students of Russian universities who had experienced distance learning during COVID-19. They were studying social sciences and humanities for 1— 6 years. The participants' ages ranged from 18 to 38 years (M=22.23 SD=3.17; Md=22; 76% were female).

Measures and data analysis. Two questionnaires were used in the study. The "Attitude towards Digitalization" questionnaire (D.V. Kashirsky, A.S. Ocheretin, 2022) was utilized to reveal different aspects of the students' opinion on digitalization of education. Students responded to each statement using a 4-point scale from 1(strongly disagree) to 4 (strongly agree) about: a) students' digital skills; b) the extent to which these skills influence academic success; c) the dependence of education quality on its digitalization; d) the drawbacks of applying digital technologies; e) the most effective learning formats. The Big Five Inventory-2/Short form of the Big Five Inventory-2 (BFI-2-S, K. Soto, O. John, 2017) was used to assess the five dimensions of personality.

The normality of the distribution of quantitative indicators was assessed using skewness and kurtosis criteria. Pearson Correlation Analysis and Multiple Regression Analysis using backward elimination method (MRA, Backward method) were performed to examine the relationship between personal dispositions and attitudes toward digitalization as well as between personal dispositions and preferences for certain educational formats.

Data processing was carried out using the JASP 0.17.2.1 software. The database with the research results is presented in the MSUPE RusPsyData repository [7].

Results

Students' attitudes towards the digitalization of education. Figures 1—4 and Table 1 in the Appendix present the results of the students' assessments of digitalization based on their responds to the questionnaire by D.V. Kashirsky and A.S. Ocheretin. According to Figure 1, the most developed students' digital skills were as follows: working on online simulators, taking tests (e.g., using Google Forms and similar tools), and posting materials on the internet (especially using cloud technologies). Less frequently, students utilized electronic libraries and databases, as well as were engaged in collaborative online activities.

The Fig. 2 presents the results of students' assessments of the influence of their specific digital skills on the effectiveness of learning. According to students, the most significant skills for academic success include proficiency in using various online simulators, active utilization of electronic educational content, and well-developed skills in organizing and storing educational and extracurricular outcomes on different platforms. The lowest rating in terms of significance was given to online testing.

According to Table 1 in the Appendix, which reflects the distribution of responses to the question about the impact of digitalization on the education quality, approximately 41% of students believe that the use of digital technologies significantly lowers education quality. By contrast, 38% of respondents hold the opposite view. Almost 8% were unable to clearly express their position, and about 13% noted that the impact
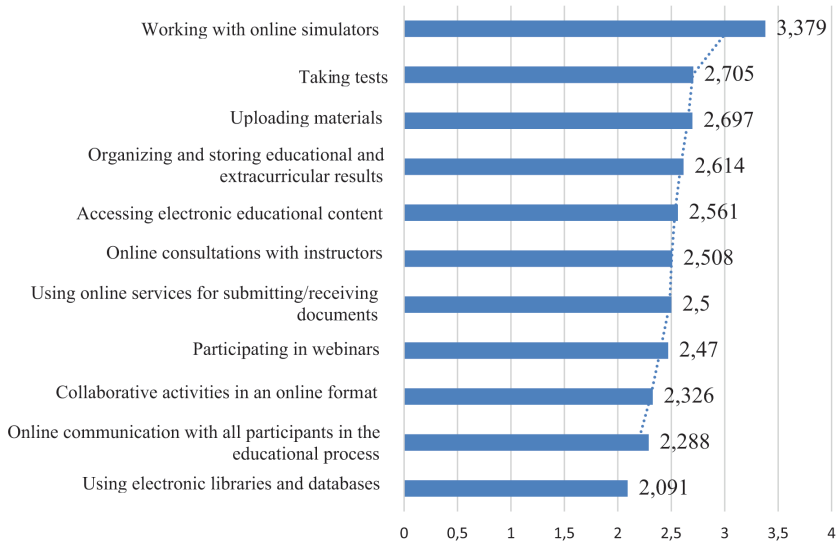
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Working with online simulators — 3,379
Taking tests — 2,705
Uploading materials — 2,697
Organizing and storing educational and extracurricular results — 2,614
Accessing electronic educational content — 2,561
Online consultations with instructors — 2,508
Using online services for submitting/receiving documents — 2,5
Participating in webinars — 2,47
Collaborative activities in an online format — 2,326
Online communication with all participants in the educational process — 2,288
Using electronic libraries and databases — 2,091

Fig. 1. Students' self-assessment of their digital skills

Working with online simulators — 3,121
Accessing electronic educational content — 2,409
Organizing and storing educational and extracurricular results — 2,409
Participating in webinars — 2,379
Online consultations with instructors — 2,364
Using electronic libraries and databases — 2,311
Online communication with all participants in the educational process — 2,303
Collaborative activities in an online format — 2,227
Uploading materials (electronic storage devices, cloud technologies and etc.) — 2,205
Using online services for submitting/receiving documents — 2,106
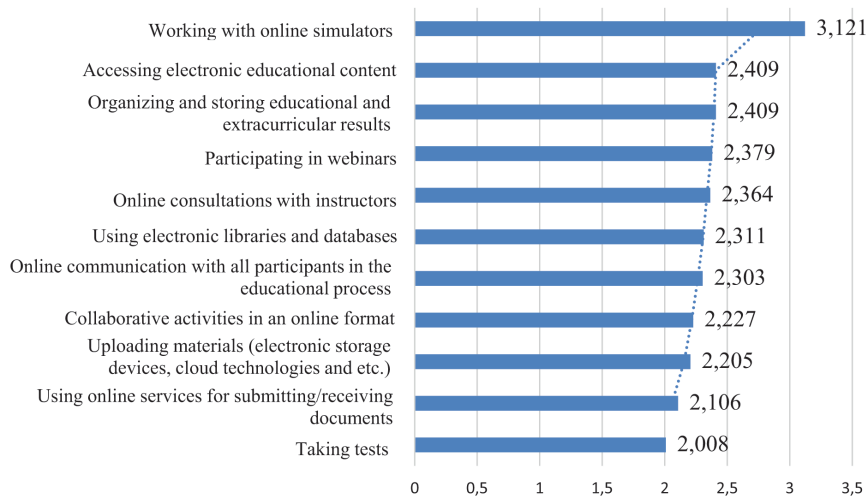Taking tests — 2,008

Fig. 2. Students' assessment of the impact of their skills on learning effectiveness

of digitalization on education quality cannot be assessed as either positive or negative.

Students' opinions concerning the role of digital technologies in the change of education quality are graphically represented in Fig. 3. As shown, the primary disadvantage of digitalization, as perceived by students, is a decline in the quality of studying some particular subjects and in the quality of education as a whole, as well as in the effectiveness of practical training of university graduates. According to the respondents' opinion, the introduction of digital technologies has negatively affected the quality of

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lecture courses and a reduction in the time of live communication with classmates and teachers as well, but to a lesser extent.

Next, we aimed to reveal predictors of the decline in education quality on the whole (see the line 2 in the list of digitalization drawbacks, Fig. 3) from the list of the specific adverse consequences of digital technologies implementing in the educational process (see the lines 3—11 in the list, Fig. 3). For this purpose, MRA was performed as the following assumptions were met: the independent and dependent variables in the analysis had normal distributions (the skewness and kurtosis values were between –1 and +1 each), each predictor was statistically significantly linearly related to the dependent variable, while the independent variables did not correlate. As a result of 8 iterations, MRA yielded a regression model (Model 1), which was recognized as statistically valid (R=0,723; Adj R^2=0,523; F=34,826; p≤0,001). According to MRA data, the main predictors of the decline in education quality, as reported by students, are the following: reduction of time to live interaction with peers, increased

demands for information originality, decreased quality of educational resources, and a decline in students' practical training quality (Table 2 in the Appendix).

It is worth noting that several factors did not have a significant impact on the overall decline in education quality due to the introduction of digital technologies into the learning process. They are as follows: changes in the quality of lecture courses, reduced communication with instructors, changes in student engagement in the learning process, and the overall workload. However, each of these causes separately (as shown earlier) was considered by respondents to be a negative consequence of digitalization.

The results presented in Fig. 4 provide insight into which learning format students find most effective, depending on the extent of digital technology use. The most effective format, according to them, combines digital technologies with direct in-person interaction between instructors and students in a classroom setting. The preferred approach would involve delivering lectures online while holding seminars via direct
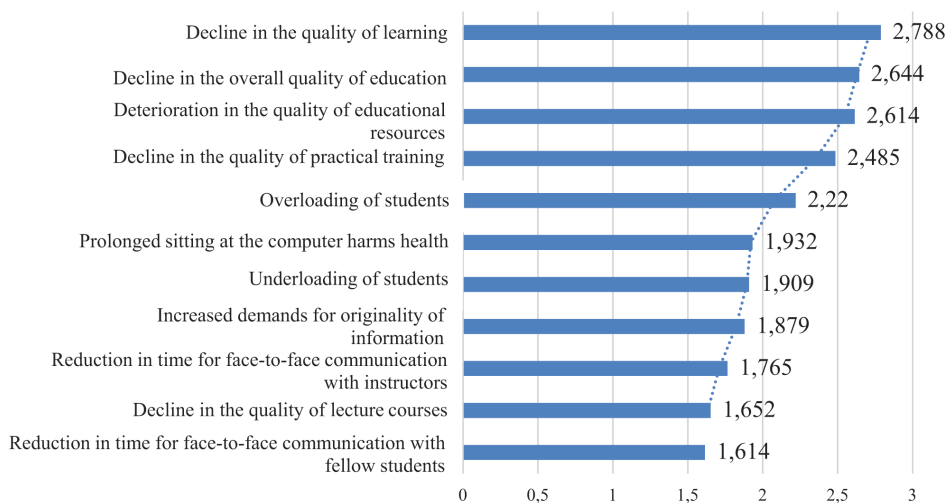

Fig. 3. Students' assessment of the main drawbacks of digitalization

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student-instructor interaction. The traditional in-person learning format, supplemented with digital tools and methods as auxiliary means, was also rated highly by the respondents. On the other hand, fully online formats, including those that involve personal consultations with the instructor if needed, received the lowest ratings from students.

Personal Traits of Students with Different Attitudes Toward Digitalization in Education. To assess the contribution of Big Five factors to students' evaluations of the role of digital technologies in education, Multiple Regression Analysis (MRA) was used. It is worth noting that the conditions for applying MRA, as described above, were met in this case as well. Out of 11 regression models, where the dependent variables were the drawbacks of digitalization in the educational process (as listed in Figure 3), only three models had statistically significant multiple correlation coefficients and could therefore be meaningfully interpreted (models 2—4, Table 3, Appendix). According to MRA, the most significant predictors of the overall assessment of decreased education quality are conscientiousness ($\beta=0,249$; $t=2,713$; $p\leq0,008$) and neuroticism ($\beta=0,198$; $t=2,159$; $p\leq0,033$). Conscientiousness also appeared to be the most powerful predictor of the assessment of digital learning formats as detrimental to health due to significant time spent working on the computer ($\beta=0,294$; $t=3,502$; $p\leq0,001$), while agreeableness was the strongest predictor of assessing digital formats as reducing students' academic workload ($\beta=0,204$; $t=2,377$; $p\leq0,019$).

Using MRA, we also examined whether the development of skills in the digital environment is determined by Big Five factors. For this purpose, 11 regression models were constructed, where the students' ratings of 11 digital technology skills mentioned above (Figure 1) were used as dependent variables. According to the calculations, two final models were statistically sound (models 5 and 6, Table 3, Appendix). In these models, the dependent variables were: the successful forming of skills of using electronic educational content and skills of working with electronic libraries. According to MRA, openness to experience ($\beta=0,279$; $t=3,167$; $p\leq0,002$) underlies the former, while low neuroticism ($\beta=-0,204$; $t=-2,394$; $p\leq0,018$) underpins the latter. Thus, low openness to new experiences and high neuroticism were found to be predictors of poor development of these skills.

To identify how the subjective usefulness of certain virtual space skills is related to Big
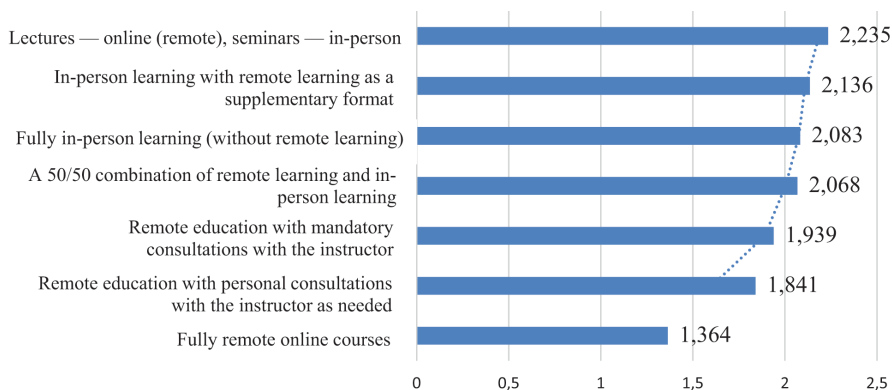
Learning format	Value
Lectures — online (remote), seminars — in-person	2,235
In-person learning with remote learning as a supplementary format	2,136
Fully in-person learning (without remote learning)	2,083
A 50/50 combination of remote learning and in-person learning	2,068
Remote education with mandatory consultations with the instructor	1,939
Remote education with personal consultations with the instructor as needed	1,841
Fully remote online courses	1,364

Fig. 4. Students' assessment of the most effective learning format

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Five traits, 11 regression models were built, of which only one was statistically justified (model 7, Table 3, Appendix). According to MRA, conscientiousness ($\beta=0,295$; $t=3,168$; $p\leq0,002$) and neuroticism ($\beta=0,204$; $t=2,185$; $p\leq0,031$) positively predict high evaluation of the usefulness of the skill of organizing and storing educational and extracurricular activities' products.

Lastly, regression models were constructed to assess the relationship between the Big Five personality traits and preferences for specific learning formats, varying in the balance between distance and traditional forms. However, none of the final models proved to be statistically suitable for meaningful interpretation. Introducing into analysis of the other predictors, such as age, year of study, and a form of education, alongside the Big Five factors, in order to evaluate their influence on attitudes toward digital educational technologies (DET), did not resulted in models worth considering from a statistical validity perspective.

Discussion

The conducted study was aimed to answer the four research questions posed at the beginning.

The first research question was as follows: which digital skills are the most developed among students, and how do they influence academic success?

The study revealed that students' skills in working within digital learning environments are fairly well developed. Students are most proficient in using online learning tools (using software systems to assess knowledge, skills, and abilities; repetitive test exercises, etc.), uploading materials to the internet (using cloud technologies like Yandex Disk), and completing online tests (Google Forms, etc.). Students are less proficient in working with electronic libraries and databases, as well as in collaborating with classmates via an online format.

According to the survey participants, the most significant factors influencing their learning effectiveness are the following: working with online learning tools, having access to electronic educational content, and possessing well-developed skills in organizing and storing the products of educational or extracurricular activities on various media. Completing online tests has the least impact on learning effectiveness. It is worth noting that in some cases, students gave negative feedback on this form of digital technology in education; this happened possibly due to the significant increase in testing caused by the rise of online learning in recent years.

The second research question was aimed to identify the impact of digitalization on education quality as a whole and students' assessments of the drawbacks of digital technologies currently used in education.

It was found that, according to most students (40.9%), digital technologies have a negative impact on the quality of education. Slightly fewer number of students (37.8%) noted the positive role digitalization in learning and education. A small number of respondents (8%) were unable to clearly express their position, while 13% noted that this impact could not be evaluated as either positive or negative. Our data partially align with the findings of Nevryuyev and colleagues' [14] research, where the largest group of students noted the negative role of online education compared to traditional learning.

The main drawback of digitalization, according to students, is the decline in the quality of mastering the content of certain subjects and the in overall education received, as well as in the level of practical training for future graduates. According to students' point of view, introduction of digital technologies has a less negative effect on the quality of lecture courses and live interaction with peers and instructors.

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When analyzing the relationship between the decline in overall education quality and the other negative consequences of digitalization, we found that the primary factors of the decline include reduced live interaction time with peers, increased demands for the originality of information (a predictor entered the regression equation with a negative sign), decreased quality of educational resources, and lowered quality of practical training. These results met our expectations, since the online learning, due to its mediated nature, reduces the opportunities for direct academic collaboration, which is essential for successful learning. Also, these findings are consistent with the other studies indicating the limitations of online education in high-quality practical training [9; 22]. According to the students, the increased demands for the originality of information in recent years are an important condition for improving education quality, and digital technologies like the Antiplagiat system are helpful in this regard. However, this finding contradicts the opinion of some authors who argue that the Antiplagiat system lacks 100% objectivity in assessing originality, and that the extreme demands embedded in the system "not only fail to encourage independence but also force students to abandon any attempts to demonstrate it, discouraging them from even picking up a book." Additionally, there are widespread cases of students bypassing the Antiplagiat system by using relevant internet services. In our view, the current system for assessing originality fulfills its intended tasks by filtering out non-original texts. However, a downside is that it may mistakenly identify original texts as non-original due to its built-in algorithms.

The answer to **the third** research question regarding the most effective learning formats for students can be formulated as follows. Students consider the most effective formats for learning (in order of diminishing importance) to be: 1) remote lectures with in-person seminars; 2) face-to-face learning as the primary format with online learning as a supplementary format; 3) learning without using any online components; 4) a roughly equal combination of online and in-person learning (50/50). The lowest ratings were given to fully online formats, including those which offer personal consultations with instructors if needed. These results are similar to those obtained in the other research conducted with only Moscow students and noted that students tend to prefer a blended format over a fully online one.

It should be noticed that remote learning formats in our study were more attractive to students who combined work and studies at university, compared to non-working students. However, even this group preferred traditional (in-person) or blended (with online elements) formats over fully online learning. These findings are consistent with the results of the study conducted by Sorokova with students from MSUPE, enrolled in programs at different levels [18]. This, presumably, reflects general trends in the attitudes toward digital technologies among working students.

The fourth research question was aimed to identify the personality dispositions (Big Five factors) underlying students' attitudes toward digitalization and their preferences for various educational formats.

The research results showed that the Big Five traits predict students' success in acquiring digital skills, as well as their attitudes toward certain aspects of the digitalization of Russian education. Openness to experience predictably leads to the successful acquisition of skills related to working with electronic educational resources and their active usage in academic activities. Meanwhile, no connection was found between openness to experience and negative evaluations of digitalization in the educational process. We explain this by the fact that openness to experience is as-

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sociated with a willingness to embrace new approaches and practices with interest and enthusiasm [33], including those related to digitalization.

Neuroticism negatively affects the formation of skills for working with electronic libraries and contributes to a negative assessment of the role of digitalization in education as diminishing the quality of the learning process. These findings are in line with our expectations, since it has been previously established that more anxious and sensitive individuals, characterized by emotional instability, are more likely to become nervous in difficult and unfamiliar situations and tend to fall into depression [37]. Typically, they possess an external locus of control and low self-regulation [34], which prevent them from easy and quick handling of academic tasks, require additional efforts, and thus, form a pronounced negative attitude toward the cause of their difficulties— the introduction of new digital tools and learning formats. At the same time, neuroticism positively predicts high appreciation of the benefit of organizing academic content in digital space. This is because organizing and structuring material by individuals with high neuroticism leads to their self-confidence, which helps to reduce anxiety and emotional tension.

Conscientiousness, like neuroticism, serves as a predictor of a negative evaluation of the role of digitalization in the educational process and impacts to the belief that the digital format of learning harms one's health due to prolonged computer work. These findings are partially in concordance with the results of an experimental study by Dutch researchers [30], who found that, under the conditions of a forced shift to remote work, extraversion and conscientiousness—traits traditionally associated with success in work—were linked to unfavorable outcomes, such as low productivity and engagement, dissatisfaction with work, and emotional burnout. It appears that conscientious individuals experienced these challenges due to their tendency to thoroughly complete even the most difficult tasks. The new conditions and formats that disrupted their usual workflow, thus inevitably led to physical and emotional overload. Thereby, it can be assumed that students with high levels of neuroticism and conscientiousness faced the greatest difficulties during the abrupt transition to digital learning. Additionally, conscientiousness, like neuroticism, positively predicts the benefit of the skill of organizing educational content for academic success. In other words, having qualities like punctuality, consistency, the ability to follow a set algorithm, act according to a model, and, in some cases, pedantry, form the basis for successful application of digital skills, particularly the skill of organizing of educational materials. This trait can be effectively utilized by educators in the educating process.

Agreeableness proved to be the strongest predictor of viewing the digital format as reducing the workload for students. This fact can be interpreted in two ways. On one hand, the subjectively perceived insufficient workload of students in this group may be associated with good self-control, which is a characteristic of people with high levels of agreeableness [31], and is an important factor of success in distance learning [12]. On the other hand, the subjective feeling of reduced academic workload may indicate a decrease in student engagement in the learning process, which is often noted as accompanying the transition to distance learning [21; 22]. In our opinion, this finding requires further investigation.

It should also be noted that expected correlation between extraversion and the high rating of the lack of social interaction in distance learning was not found. Based on the data obtained, most students, regardless of their personality traits, suffered from the lack of communication during the lockdown.

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The conducted study has limitations. The first limitation is the imbalance in the gender composition of the sample, with male students accounting for less than one-third of all respondents. The second limitation applies to the fact that the overwhelming majority of respondents experienced the use of digital technologies in education for the first time during the crisis caused by the spread of the coronavirus, which led to a forced "leap" in distance learning. Not all necessary conditions were created for distance learning, which could have caused negative emotions and anxiety among students, influencing their rejection of the new educational format. Therefore, future research should focus on studying the relationship between students' personality traits and their attitudes toward the digitalization of education implemented in a more gradual, evolutionary way, rather than under emergency conditions of a sudden transition to distance learning.

Conclusion

Introduction of digital technologies into education during the spread of COVID-19 had ambiguous and not always predictable consequences. It turned out that factors which in traditional learning formats contributed to academic success (conscientiousness) and those that, on the contrary, hindered it (neuroticism) could, under the new conditions, both become unfavorable for students' psychological and physical health, decreasing academic performance. At the same time, it appeared that high neuroticism could aid in mastering educational content through the systematic organization of learning materials.

Digital technologies are an essential part of our everyday life, it is difficult (though still possible) to imagine our life without them. However, they should be viewed not as a final goal but as a tool to ease human activities where it is necessary and appropriate. Definitely, digital technologies in education have proven their worth. Various internet-based learning platforms, cloud technologies, and modern online communication tools, which can facilitate individual and group work with colleagues and students, represent important resources for enhancing the quality of education.

The conducted research makes it possible to draw a conclusion that there exists personal predisposition towards digitalization of education among students of Russian universities. The obtained results can be used to individualize the educational process at the university when implementing various educational technologies. However, one should be aware that the digital educational environment is a means of the development of the personality itself. In some cases, it can facilitate student's activity in the educational process, in others it can lead to overload and be stressful, especially for students with pronounced conscientiousness and neuroticism.

It seems that the optimal condition for the interaction between the learner and the digital educational environment, leading to true personal development, is neither the "simplification" of activities nor their unjustified "complication," which leads to overload. Instead, it is the way of organization of learning where the student performs a volitional action that includes both an element of internal freedom (realizing meaning) and overcoming obstacles as a resolution of internal contradictions, challenges, and complexities. Personal development occurs when a person, acting out of internal necessity, rises above the situation and above the former self. This is what should not be forgotten in the age of digital gadgets and technologies, since now more than ever, it is crucial to think about the individuals, to remember their fate and purpose both as a biological specie and as cultural and spiritual beings, possessing a personality with free individuality, having senses and values that they realize and defend while shaping their existence in the world of people, as well as in material and virtual world.

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Appendix

Table 1

Students' perceptions of the impact of digitalization on the quality of education

Responses	Number of students (%)
Does not have a significant impact	12,879
Reduces the quality of education	40,909
Slightly improves the quality of education	21,212
Significantly improves the quality of education	16,667
Difficult to assess the impact of digitalization on the quality of education	7,576
Missing values	0,758

Table 2

Evaluation of the significance of regression coefficients (Model 1)

Predictors	β	t	p
Reduction in face-to-face communication with peers	0,218	3,486	0,001
Increased demands for originality of information	−0,200	—2,977	0,003
Deterioration in the quality of educational resources	0,661	9,545	0,001
Decline in the quality of practical training	0,218	3,352	0,001

Note. Dependent variable: decline in education quality, β — standardized regression coefficient, t — Student's t-statistic, p — level of significance.

Table 3

Evaluation of the quality of regression models (Models 2—7)

Model Number	Dependent Variable	R	Adj R²	F	p
2	Evaluation of overall education quality as diminished	0,254	0,050	4,435	0,014
3	Health deterioration due to prolonged computer use	0,294	0,079	4,700	0,004
4	Low engagement in the educational process	0,204	0,034	5,649	0,019
5	Development of skills in using electronic educational content	0,280	0,064	5,497	0,005
6	Development of skills in working with electronic libraries	0,257	0,051	4,553	0,018
7	Usefulness of skills of systematizing educational content in electronic form	0,279	0,064	5,458	0,005

Note. Independent variables: Big Five factors, R — multiple correlation coefficient, *Adj R²* — Adjusted R-squared, F — Fisher's statistic, p — level of significance.

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