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The Problems of Contemporary Education

Perceptions of Neural Network Use in Higher Education: Case Study

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Abstract

The integration of artificial neural networks (ANNs) into various fields, particularly education, has recently garnered considerable attention because of their potential to improve learning processes and optimize administrative tasks. This article aims to explore the potential of neural networks in the context of higher education, based on a case study conducted in Southern Federal University. The study employed a mixed methodological approach combining quantitative surveys, pedagogical experiments, and qualitative interviews. The study involved 132 3rd and 4th-year university students divided into a control group (CG) and an experimental group (EG). EG students were subjected to educational processes involving ChatGPT and other ANN-based tools, while CG students adhered to traditional teaching methods. The obtained data were analyzed using mathematical statistics, including Pearson's χ2 test, to compare the digital skills and perceptions of the two groups.

According to the results, EG students significantly improved their digital skills compared to CG students. Students generally had a positive opinion about ANNs, recognizing their ability to facilitate learning and save time. However, concerns about the reliability and potential biases of the information provided by ANNs were also noted. The study concludes that ANNs have significant potential to improve the quality of higher education by enhancing learning efficiency and reducing administrative burden. Recommendations for the implementation of ANNs in higher education are provided. The findings show that neural networks in higher education have great potential to improve the learning process.

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Keywords: artificial neural network, learning, students, teachers, evaluation system, learning success.

1. Introduction

Today, neural networks (NNs) are popular and are used in many fields, including education. UNESCO's program document "ChatGPT and Artificial Intelligence in Higher Education: Quick Start Guide" (Lukina et al., 2025) presents several initiatives. First, NNs can be used to improve and increase the efficiency of individualized educational processes. Students can use NNs to gain insight into alternative solutions to problems, improve their knowledge through a Socratic dialog with the NN, and review their existing knowledge to fill in the emerging gaps (Polozhentseva et al., 2024; Radhakrishnan, 2023). Instructors can use NNs to create new exercises and approaches and assess students' knowledge in a more efficient and automated way. Second, NNs can be used as an auxiliary tool in scientific research. Although NNs are hardly capable of generating original content and new concepts, a researcher can use them to search for the right formulations of ideas they have already thought of, generate unusual research topics, and find archives and data sets for the study. Third, NNs can solve a plethora of problems in educational administration. They can be used to answer applicants' many questions during the admissions process, help students register for courses and portals, send reminders about pending tasks, and translate materials into the language of the incoming international student.

Another advantage of using NNs in this area is that they are available around the clock and can provide support at any time. NNs improve the accessibility of education. Foreign learners can use them to create texts in different languages they are just learning.

Today, NNs are commonly used by scientists and engineers for research and development of software or systems related to that research. Hence, it is crucial to learn the basics of NNs and be able to apply the knowledge to solve problems that may arise in the future. Students need to understand the potential of NNs and their potential applications (Santos, 2024; Lamar, Roach, 2019).

Experts (Jaruga-Rozdolska, 2022; Radhakrishnan, 2023) question the feasibility of using NNs amid a complete reformatting of the labor market, where many professions are at risk of extinction or a substantial reduction of the human role in the labor process, and the creation of new creative content. The scientific community is already imposing restrictions on scientific papers generated in whole or in part by NNs or their derivatives.

According to studies, NNs are data processing systems that try to mimic the features of the human brain and its learning process (Lukina et al., 2025). They are parallel and distributed data processing systems designed to exploit and model the features and functions of the human brain (Wasik et al., 2018). NNs can learn in their environment and improve process performance through learning. NNs are capable of receiving and discovering new information and using it to improve their problem-solving capabilities (Fiore, 2019).

Literature analysis shows significant interest in NNs and their place in education. With the increasing use of artificial intelligence (AI) in education, the number of published studies in this area has grown. The findings of X. Chen et al. (2022) demonstrate an upward trend in the academic community's interest in using AI for educational purposes. Major research topics include intelligent tutoring systems for special education; natural language processing for language education; intelligent analysis of educational data for performance prediction; discourse analysis in computer-aided collaborative learning; NNs for learning assessment; and recommender systems for personalized learning (Bosov, 2022; Rybakova et al., 2024).

N. Valko and V. Osadchyi (2020) consider the problems connected with implementing the educational process based on modern information technologies. According to N.G. Repkina (2016), the main purpose of digital technologies in education is to achieve a significant level of individualization of the learning process, considering the individual characteristics and capabilities of its participants. The realization of such an approach is made possible by applying elements of the NN theory in the learning process. I.R. Khabibullin et al. (2023) note that NNs can be used to build a model of the learning process to significantly strengthen the teacher's control over it. NNs can be adapted to the specific learning tasks and the individual characteristics of students and instructors.

The problem of learning success is one of the most topical in education. The possibilities of its computation are a promising area for scientific research and practical application (Shamsutdinova, 2022). R.L. Ulloa Cazarez and C. Lopez Martin (2018) address this problem by proposing three types of NNs for predicting student performance constructed from standardized

variables. Statistical comparison of the NNs' prediction accuracy with statistical linear regression demonstrates that the three NNs have a higher prediction accuracy. Therefore, the NNs are proposed as a technique for early prediction and identification of students at risk of failure.

A study by C.F. Rodriguez-Hernandez et al. (2021) notes that further conceptual and methodological understanding of NNs in education is needed to advance their systematic implementation. The results suggest that NNs can be systematically implemented to categorize students' academic performance. Prior academic achievement, socioeconomic background, and high school performance characteristics are the most important predictors of students' academic achievement (Kazachenok, 2020; Ling et al., 2024).

Researchers T. Saito and Y. Watanobe (2020) note that NN implementation will be incomplete if it does not provide effective tools to those students who want to improve NN work processes or opportunities to redesign them for other tasks, which vastly expands the horizons of their application and implementation prospects. E.G. Rincon-Flores et al. (2020) provide several examples of learning tools that can be used to work with different types of NN models and learn the basics of NN using visual interactive tools that allow creating custom NNs and working with the already existing ones fairly easily. Using these tools, users can understand and learn the mechanisms of a typical NN by using the features of different models and the corresponding learning algorithms (Guslyakova et al., 2025; Okewu et al., 2021).

When considering NNs in education, it is important to mention their hands-on and most popular manifestation at present, chatbots. The most popular of them is ChatGPT, a chatbot with a conversational AI interface developed in November 2022 by OpenAI Lab. ChetGPT is one of the most advanced AI programs (Tlili et al., 2023). C. Kooli (2023) notes that while ChatGPT's primary function was to mimic human conversation, its capabilities go far beyond that. It is already clear that ChatGPT is a revolutionary tool when it comes to AI-based conversational bots. Using natural language processing and generative AI backed by deep learning, ChatGPT can produce human-like text and maintain a conversational style that enables more realistic dialogs (Pesonen, 2021).

Chatbots are becoming a trend in many fields including medicine, products and services (Castrillón et al., 2020), and education (Akhmetshin et al., 2021; Golubeva et al., 2023), indicating that they have the potential to change the way students learn and search for information (Tolmachev et al., 2022).

Introducing NNs in the learning process at educational institutions is relevant, which raises the need to analyze the existing capabilities of these digital tools and identify the main prospects for their application in higher education.

2. Methods

To achieve the purpose of the study, a mixed-methods research design was employed. The method used to collect data for the study was the analysis of scholarly sources from Research Gate, Google Scholar, and Scopus. The main research methods included a survey, a teaching experiment, and a follow-up interview with the participants of the pedagogical experiment, which were carried out during the second semester of the 2022-2023 academic year.

The total sample of subjects comprised 132 3rd- and 4th-year students, including 71 control group (CG) and 61 experimental group (EG) students. CG students were taught using traditional methods, while EG students were taught with the support of neural network tools, primarily ChatGPT.

A structured questionnaire comprising two closed-ended questions was developed for the study:

1. "Which digital tools do you use most frequently during your studies?" (Multiple choice, 8 predefined options including mobile applications, search engines, digital libraries, chatbots, neural networks, online learning platforms, statistical tools, and video resources.)

2. "How would you rate your level of digital skills from 1 to 5, where 1 is very low and 5 is very high?".

In the questionnaire, "chatbots" referred to AI tools with a conversational interface (e.g., ChatGPT), while "neural networks" referred to non-chatbot applications of ANNs such as image recognition systems, automated scoring models, or adaptive learning platforms. Although the questionnaire included only two questions, they were specifically designed to capture both usage patterns and perceived digital competence, which were the central focus of the pedagogical experiment.

Subsequent processing of the results of the pedagogical experiment was carried out using mathematical statistics methods. The task was to identify differences in the distribution of certain features (level of digital skills) when comparing two empirical distributions. For this purpose,

we applied Pearson's χ2 test. The measurement scale had five categories ("very low", "low", "average", "high", and "very high"), hence the number of degrees of freedom was v = 4.

The null hypothesis H0: there are no differences in the self-assessed level of digital skills in the CG and EG.

Alternative hypothesis H1: there are significant differences in the self-assessed level of digital skills in the CG and EG.

To clarify the issues related to the use of NNs in teaching, an additional interview was conducted with EG students. The first interview question concerned the use of NNs and their derivatives in teaching. The next interview question was formulated as follows: "In your own experience, how do you see the perspectives of chatbots and neural networks in learning and social life?".

3. Results

Responses to the question "Which digital tools do you use most frequently during your studies?" were collected before the pedagogical experiment. Table 1 presents the distribution of responses in both the control (CG) and experimental (EG) groups.

Table 1. Digital tools most commonly used by students

No.	Digital tools	Share of respondents, %	
		CG Respondents	EG Respondents
1	Mobile applications	84.1 %	79.8 %
2	Search engines	81.8 %	82.4 %
3	Digital libraries and databases	52.3 %	54.7 %
4	Chatbots (e.g., ChatGPT)	29.5 %	27.2 %
5	Neural networks (e.g., automated scoring, AI tutors)	29.5 %	31.4 %
6	Learning platforms (e.g., Moodle, Coursera)	11.4 %	10.5 %
7	Statistical data analysis tools (e.g., SPSS, R)	6.8 %	8.1 %
8	Videos on video hosting sites (YouTube, etc.)	4.6 %	3.8 %

The respondents' answers suggest that the most popular digital learning tools are mobile applications and search engines. In second place are digital libraries and databases, and in third place are chatbots and NNs, which indicates their growing popularity. Further research is needed to determine the dynamics of this process.

Responses to the question "How would you rate your level of digital skills from 1 to 5, where 1 is very low and 5 is very high?" before the pedagogical experiment are presented in Table 2.

Table 2. Self-assessed level of digital competence of participants in the survey before the pedagogical experiment

Rating	Share of respondents, %	
	CG	EG
1	0	0
2	4,5 %	5.2 %
3	25.1 %	23.9 %
4	52.3 %	51.7 %
5	18.1 %	19.2 %

As we can see, respondents in both groups rate their digital skills and digital competence highly. These results are unsurprising because during the time of forced distance learning the level of digital competence among participants in the educational process increased. Them being constantly online and performing educational tasks that in most cases required understanding digital interaction tools.

From the table of χ2 values for the significance level α = 0.05 and v = 4 degrees of freedom, we obtain the critical value of χ2crit = 9.488. Since the value of the test before the pedagogical experiment χ2 < χ2crit (2.132 < 9.488), i.e., falls outside the critical zone, at the start of the experiment the CG and EG had no significant differences by the level of digital competence.

Responses to the question "How would you rate your level of digital skills from 1 to 5, where 1 is very low and 5 is very high?" after the pedagogical experiment are summarized in Table 3.

Table 3. Self-assessed level of digital competence of participants in the survey after the pedagogical experiment

Rating	Share of respondents, %	
	CG	EG
1	0	0
2	4.1 %	0
3	24.6 %	20.3 %
4	52.3 %	56.1 %
5	18.8 %	23.6 %

The calculation of $\chi 2$ for the CG and EG after the pedagogical experiment shows that $\chi 2 > \chi 2crit$ (16.317 > 9.488). This gives us grounds for rejecting the null hypothesis H0. Accepting the alternative hypothesis H1, we can assert that these samples have statistically significant differences.

After the pedagogical experiment, the following answers on NNs and their derivatives in teaching were obtained during interviews with EG students (Table 4).

Table 4. Categories and statements regarding the use of neural networks in education

Category	Subcategory	Statement
Availability and response speed	Quick retrieval of information	The positive points are that the answer was found quickly; if I made mistakes in the tasks, the chatbot explained what kind of mistake it was and why; there was a selection of subjects (math, chemistry).
	Time-saving functionality	Finds information quickly, text uniqueness is 100 %. It is very convenient and time-saving, performs tasks well and accurately, but performs poorly in creative matters (e.g., create a thing that doesn't exist yet).
	Analysis of extensive information	It helps me with writing reports, analyzing large texts (I ask it to write brief theses), and also assisted with creative tasks.
Language Capabilities	Multilingual support	I was thrilled to find out that ChatGPT supports Russian, which made it much easier to work with. This bot has made it much easier to discover hard-to-find material. However,
Limitations and Concerns	Doubts about accuracy	Generally positive, but you have to keep in mind that a chatbot often makes mistakes and you should always check for the validity of its statements. Therefore, without your own knowledge, chatbots will not be of much help. The negative aspect is that some information is incorrect and the bot makes grammatical and lexical errors. There is a possibility of inaccurate or partially inaccurate presentation of information.
	Experience of tautology	There was some tautology in the output.
	Experience of mistakes	I'm not sure of the validity of what it finds, I still have to check it myself.

Students are generally positive about such technologies, as they provide opportunities for more effective learning and save time. Among the negative aspects of this technology, they note the partial unreliability of information and some tautology in the text. Especially concerning is the possibility of mistakes in answers to questions.

Responses to the interview question regarding the prospects for chatbots and NNs in learning and society's life are presented in Table 5.

Table 5. Respondents' answers on the prospects of chatbots and NNs in education and social life

Category	Subcategory	Statement
Transformative Potential	Expansion of applications beyond learning	A good example would be a psychological aid chatbot. It would provide support to people when they cannot turn to a specialist for help.
	Integration into everyday life	These technologies (neural networks in particular), given their convenience and efficiency, will become part of the educational process and everyday life, just as the Internet once did.
Learning Enhancement	Simplified access to knowledge	It is a unique experience that requires no direct contact with a live person. A chatbot can respond to a query instantly. In my opinion, this will allow us to avoid "rote learning", keeping notes, writing essays and term papers. These technologies greatly facilitate the assimilation of material and the search for it. Neural networks make it ever easier to find the information you need, as well as complete almost every possible task, if you get the wording right. Learning has become much easier. I think it's promising.
	Reduced cognitive load	They will make some aspects easier, for example, finding information. But the person has to have developed critical thinking and be able to analyze the given answer.
Risks and Ethical Concerns	Misuse by uninformed students	The uninformed part of students (90 %, myself partly included) may misuse them when writing essays, answering various questions, etc., i.e., wherever they can.
	Reduced critical thinking	We will start to think less and slowly lose our intelligence.
	Unclear future outcomes	Today, I can see vast, large-scale prospects for the development of this sphere. Of course, we cannot say what it will all lead to and what consequences it will bring, but we can already say that this is the future, a certain leap in the evolution of technology, and this sphere will only continue to evolve and develop.

4. Discussion

The responses obtained in our investigation of the prospects of using NNs and their derivatives in the educational process allow us to make the following generalizations. For most respondents, the use of NNs and their derivatives, particularly chatbots, is a desirable prospect and they note many positive factors for education and learning. These can be psychological aid bots and search engines, although these technologies are merely assistants and the person still needs to develop critical thinking and their views on the world around them.

Many researchers are also interested in the prospects of introducing NNs and their derivatives into the educational process of universities. Thus, the ethicality of using NNs and AI in the educational process is a debatable issue in the context of our research.

C. Kooli (2023) remarks that there has come a new era of education and research based on chatbots and AI, the application of which is associated with several challenges and limitations, primarily moral. C.F. Rodriguez-Hernandez et al. (2021) discuss the potential uses of AI and chatbots in academia and their impact on science and education from an ethical standpoint,

identifying the benefits and limitations of AI and chatbots and their role in supporting human experience and judgment. I.R. Khabibullin et al. (2023) emphasize the need to adapt to the new reality of AI and chatbots in education, in which greater awareness, the adoption of appropriate legislation, and stronger moral values will protect the education system.

The use of chatbots in assessment and examinations also raises the question of the role of technology in education. It is important to recognize that one of the main values affecting the quality of education is the relationship between the student and the teacher, which acts as a factor affecting learning success (Malika et al., 2022; Ybyraimzhanov et al., 2019). Introducing modern chatbots as an alternative to teachers has more questionable points than positive ones (Shamsutdinova, 2022). In support of this point of view, we should cite a study by N.G. Repkina (2016), which states that the application of chatbots in assessment and examinations favors technological solutions over traditional pedagogical methods, which can lead to the devaluation of teachers.

Among the ethical concerns associated with chatbots in education are the potential substitution of human relationships (especially communication) and the threat to learning experiences (Kazachenok, 2020; Togaibayeva et al., 2023). This is especially important in counseling and mental health, where students may seek emotional support from chatbots instead of qualified professionals. I.R. Khabibullin et al. (2023) show that although chatbots are deemed helpful by students, they are not perceived as a substitute for human support.

Another moral challenge is the possibility of bias in chatbots (Ulloa Cazarez, Lopez Martin, 2018). AI systems are as unbiased to the extent that the data they learn from is unbiased. If the data used to train chatbots is biased, chatbot responses may also be biased. This can lead to unfair assessment results and potential discrimination and inequality in education.

Chatbots have become a promising educational tool that can enhance learning by providing personalized and immediate feedback to students. Nonetheless, using chatbots in education also raises moral issues, one of which is a failure to uphold the principles of academic integrity in teaching and research activities (Yespolova et al., 2019). The temptation to trust NNs to write an essay or a more substantial paper or to create a presentation or a bank of ideas is quite significant, so every student needs to be extremely responsible about using NNs in the learning process. Students should clearly understand that an NN is meant to be an assistant, not a tool for completing assignments or writing papers. Regardless of specialty, the student's primary goal is to gain maximum knowledge and experience with relevant tasks (Ybyraimzhanov et al., 2022).

Based on the conducted review of studies, we developed a series of recommendations for the implementation of NNs in the higher education system:

1. It needs to be clearly understood what categories of participants in the educational process (students, teachers, administrators) of the higher education institution need to be prioritized in implementing NNs and to what extent. Relying on these results, it is possible to determine the most sensitive limits of needs for these technologies and allocate resources.

2. It is important to determine the limits of the university infrastructure in the context of NN application and the extent to which the staff are trained to work with such systems. Progressive ideas are often met with resistance on the part of personnel (due to their lack of understanding of the positive effects of their use and the opportunities to improve their work). It is important to implement accessible courses, workshops, or online resources to familiarize the staff with the possibilities provided by the higher education institution for using NNs in the learning process (authorizations, technical capabilities, etc.) and with the toolkit of these systems itself.

3. The introduction of NNs into the educational process requires continuous improvement. It is important to adopt this approach to developments in this area and the already available tools. Participants in the educational process should be provided with the most relevant NN models for familiarization and use.

4. Naturally, one of the most pressing issues that can hinder the introduction of NNs in the university educational space is the ethics of applying these technologies. Like any relationship within society, relationships in the sphere of NN application need to be regulated. Modern universities need a flexible approach to NNs and their derivatives in the educational process. The first step towards the rational use of NNs in the educational space of a particular institution may be the introduction of a regulation/code on the use of NNs and their derivatives in the educational process, where the institution's governing body will clearly define the limits of the use and application of NNs and the results obtained from them in educational activities within their area of expertise. Such documents will help to legalize the use of NNs within the ethical limits of

the educational environment and open up prospects for further development of the regulatory and legal components of this process.

5. Students present the leading force that drives the education system towards reforms and improvements. Therefore, it is crucial to involve students, especially those in relevant specialties (as most classical and polytechnic universities have computer science departments or faculties) to introduce NNs and their derivatives into the educational process. Because modern students are constantly spending time in the digital environment, they can propose unconventional solutions to the application of NNs in education, and such a resource should be utilized in the development of the national higher education system. One of the effective ways to generate new ideas and approaches is joint projects and competitions for the best solutions in the use of NNs and their derivatives in the educational process.

6. The results and achievements of NN implementation should be shared with the academic community and the public. Higher education institutions can provide free access to the results of NN implementation in their educational environment (which can be achieved with cloud services and open repositories) and thus maintain interest in the developments, work, and experience of the educational community and all parties interested in NNs.

5. Conclusion

Summarizing the results of this study, we should note that the use of NNs in higher education has the potential to significantly improve the learning process. Using NNs in higher education is still in the development stage, but some successes have already been documented.

One of the promising directions of NN applications is the automation of student assessment. Creating NNs capable of independently assessing students' assignments and giving grades can significantly reduce the load on teachers and make the assessment process more objective.

NNs in higher education can improve curriculum planning and class scheduling. NNs can aid in determining the optimal sequence of courses and distributing the learning load among students. Feedback chatbots and their analogs can be an effective tool to significantly reduce the workload of teachers and support the staff of university departments on the path of optimizing managerial and educational processes.

Hence, NNs in higher education have great potential and can help achieve better learning quality outcomes. However, additional research is needed to realize this potential and implement valid NNs understandable not only to a few specialists but to most participants in the educational process (students, teachers, and administration). To successfully implement NNs in higher education, several technical and ethical issues need to be addressed: establishing rules for the use of these tools by students, both in the context of academic honesty and in compliance with other rules and principles relevant to the academic community, ensuring the protection of privacy, and preventing the possibility of misusing NNs. NNs cannot completely replace the human factor in higher education. The utilization of NNs should be focused on improving the quality of learning and contributing to students' development rather than replacing lecturers.

This study has several limitations. First, the focus of the article was on a single university, lack of probability of sampling and validation of the research instruments, which may affect the generalizability of the findings. Nonetheless, the findings offer valuable preliminary insights into the integration of neural networks in higher education and can serve as a basis for more comprehensive future research.

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The Relationship between School Climate, Engagement, and Academic Achievements among Students, Focusing on Fifth-Grade Classes in the Dukagjin Region

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Abstract

The school climate and its effects on academic performance have been a feature of policy debates in countries around the world. Consistently, international empirical studies have shown that a positive school climate (student-teacher relationships, disciplinary climate, teacher expectations, etc.) can generally improve students' academic performance. The purpose of this research is to analyze the connection between school climate, academic engagement, and the academic performance of students. The sample in this study covers 413 fifth grade pupils from primary schools in the districts of Peja, Gjakova, Deçan, Istog, Klina, and Malisheva. Additionally, this study seeks to prove that a positive school climate is a contributing factor to the level of academic engagement and achievement of fifth graders. From the numeric data presented, the mean school climate assessment score is (M = 97.70, SD = 11.11). Amongst the different elements of the school's atmosphere, the students' engagement is on average higher than all the other elements. Bullying has a lower average compared to other aspects of the school climate.

Through this research, we conclude that fifth-grade students perceive school engagement more highly, meaning they feel more connected to their school environment compared to other aspects of the climate, such as teacher-student relationships, student-student relationships, set expectations, appropriate rules, school safety, and other relationships.

Keywords: school climate, academic commitment, academic achievements, students, teachers.

1. Introduction

School climate refers to the overall spirit and way of life at school. It is experience-shaped and reflects the prevailing norms, aims, values, relationships, teaching style, and organizational arrangements that are present (Cohen et al., 2009). Research suggests that a

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positive school climate can lead to better academic performance, especially when there are high academic expectations and strong relationships between teachers and students. (Wang, Degol, 2016). Student engagement refers to the active participation of students, their motivation, and investment in their learning experiences, which play an important role not only in the educational aspect but also in individual personality development. When students feel connected to their school environment and have positive interactions with peers and teachers, they are more likely to engage in their studies (Amerstorfer, 2021). Academic achievement refers to students' performance in academic tasks, such as grades, standardized test scores, and graduation rates. A considerable number of studies have shown a positive correlation between aspects of school climate and organizational outcomes related to learning, such as creativity, initiative, and effectiveness. These climate dimensions were found to be effective predictors of creative performance across various criteria, samples, and settings. Furthermore, these dimensions were especially strong predictors of creative performance in turbulent, high-pressure, competitive environments (Hunter et al., 2007). However, on the other hand, there are relatively few mechanisms responsible for the connection between school climate, academic engagement, and academic achievement. This is due to the influence of various factors that may exist within the framework of the school's climate. Nevertheless, it should be emphasized that the idea of school climate as a fundamental construct supporting academic achievement and engagement can serve as a reference point in evaluating the performance of the educational system in Kosovo and beyond. We haven't come across any studies in Kosovo that look at how students feel about their school environment and how that affects their school work and grades. This study aims to find out how school climate, student engagement, and academic success connect for fifth graders. The research questions are:

1. What are fifth-grade students' perceptions of school climate?
2. How is school climate related to students' academic engagement and academic achievement? As a hypothesis, we have included the hypothesis: H1: School climate is positively related to the academic engagement of fifth-grade students and their academic achievement. This study is among the first of its kind and has implications for students, academic levels, non-governmental organizations, central and local levels, and the community at large.

2. Literature review

As social and biological beings, humans, in addition to the fundamental needs discussed by Maslow, certainly have other needs that are also manifested. Education is one of the important components for individuals as beings, as it benefits them not only in terms of professional advancement and preparation for labor market needs but also in expanding their knowledge base, strengthening social cohesion, and building social relationships as a prerequisite for the development of a democratic society. In this context, education also encompasses school climate and the relationships among students themselves and between students and teachers, with the aim of achieving academic success. Studies show that the way a school feels can really affect how well students do. Things like safety and how confident teachers feel matter a lot. Also, how involved students are – like how they act, feel, and think—plays a big role in their success in school (Tomaszewski et al., 2024).

Furthermore, school climate positively reflects on students' academic achievements, although it is also influenced by a variety of other factors, whether external or internal. It should be noted that, according to the author (Boykin, 2023), Research shows that a good school environment really helps students do better in their studies (Geleta, 2017). School climate really matters how well students learn and do in school. A positive school climate helps create a good vibe. It brings people together, like students and teachers, and even students with each other. This connection helps everyone get involved and shows what the school does well. Consequently, studies have emphasized the levels of school climate, incorporating the influence of a variety of factors, as race, gender, religion, culture, demographic aspects, the profile of the teacher, and other factors undoubtedly play a role in creating the school climate.

Therefore, a positive school climate leads to better outcomes for both teachers and students. Students who feel good about their school environment are more motivated to learn. They feel like they can succeed and grow. They also enjoy learning new things and are more likely to be kind and helpful to others (Hanuliaková, 2015). In the Kosovar context, a variety of reforms have been developed in recent years by the Ministry of Education, Science, Technology, and Innovation. These changes are not just about fixing up schools. They also aim to improve how students do in

class. It's about training teachers at all levels, from elementary to college. Plus, they're working on how to set up and run classrooms better to create a good school environment. This study looks at how the school climate affects student engagement and success in the Dukagjin region (Peja, Gjakova, Istog, Klina, Deçani and Malisheva), focusing specifically on fifth-grade classes and analyzing the variables of city, age, gender, and residence. Overall results indicate a positive climate within the schools, which influences not only academic achievements in school but also personal development. We can say that school climate theory refers to how the overall atmosphere of a school, as perceived by both instructors and students, influences educational success and student development. It includes various aspects such as staff and student morale, satisfaction with the school, and the psychological climate of the classroom.

3. Methodology of the work research

This is a quantitative study that included data from 413 fifth-grade students from primary schools in the Dukagjin region: the cities of Peja, Gjakova, Deçan, Istog, Klina, and Malisheva. The sample selection was done randomly, this aims to fully engage students from these municipalities and compare their perceptions and evaluations on the topic, including the influence of such factors as: demographic, social, ethnic, gender, municipal, etc. Regarding data collection procedures, the data collection for this study was carried out by students of the Faculty of Social Sciences and students of the Faculty of Education. As for the progress of the research, it involved several important phases. First, permission was obtained from the school director for the implementation of the research. Subsequently, both the students and their teachers were very cooperative and willing to facilitate the realization of this research. Second, the completion of the questionnaires was done in classes in a group setting. There was no refusal to participate in the research from the students' side. The measuring tools included a demographic section. This section asked questions about age, gender, where you live, your lifestyle, how many siblings you have, and details about your family. It also covered parents' jobs and education, family income, school performance, especially in math, and any extracurricular activities. The School Climate Questionnaire (Delaware School Climate Survey –Student (DSCS—S), which includes 30 questions. The responses to the questions are ranked from 1-4 (strongly disagree, disagree, agree, and strongly agree). This questionnaire includes 8 aspects of school climate: teacher-student relationships, student-student relationships, engagement in school, specific expectations, appropriate rules, safety in school, and bullying. This questionnaire has been applied in many countries around the world and has shown high psychometric values. In our research, this questionnaire demonstrated high reliability with a Cronbach's Alpha of .81. The data for this study were analyzed using IBM SPSS No. 26. Descriptive analyses were applied to assess the school climate scale and its subscales. Since the distribution of the data is non-parametric in this case, Kruskal & Wallis analyses (instead of ANOVA) were conducted to evaluate significant differences in school climate and its aspects according to municipalities (Peja, Gjakova, Deçan, Klinë, Istog, Malisheva). This research included data from 413 fifth-grade students from primary schools in the cities of Peja, Gjakova, Deçani, Istog, Klina, and Malisheva. Pearson correlation analyses were applied to assess the relationship between academic achievements, school climate, and school engagement (see Table 1).

Table 1. Description of the sample characteristics

Variable	**N = (413)**	**%**
Cities		
Peja	142	35.3
Gjakova	103	25.6
Deçan	93	23.1
Istog	36	9.0
Malisheva	18	2.5
Klina	23	4.5
Gender		
Girl	210	52.2
Boy	192	47.8
Residence		

Variable	N = (413)	%
Rural	267	65.2
Urban	146	34.8

Table 2. Results – Descriptive Analysis of the Level of School Climate and Its Aspects

Tab. 2	N	Mean M	Standard Deviation DS	Minimum	Maximum
School Climate	413	97.70	11.11	60.00	148.00
Student Engagement with the School	413	19.84	3.63	12.00	63.00
Teacher-Student Relationships	413	14.08	2.39	6.00	42.00
Student-Student Relationships	413	12.68	2.19	7.00	16.00
Appropriate Rules	413	13.28	1.96	6.00	41.00
Clear Expectations	413	13.41	2.63	4.00	16.00
Safety in School	413	9.93	2.76	3.00	52.00
Bullying	413	7.73	2.10	3.00	12.00

Descriptive analyses reveal the averages for school climate and its various aspects. The overall average score for school climate is M = 97.70, SD = 11.11, M = 97.70, SD = 11.11, M = 97.70, SD = 11.11. Among the aspects of school climate, engagement with school has the highest average, whereas bullying shows the lowest average. Additionally, this research supports the hypothesis that a positive school climate is correlated with the academic engagement and academic achievements of fifth-grade students.

Table 3. Kruskal-Wallis Analyses of School Climate and Its 7 Aspects by Cities

Variable														
	Pejë		Gjakovë		Deçan		Istog		Klinë		Malishevë			
	N	MR	N	MR	N	MR	N	MR	N	MR	N	MR	Krusk all & wallis	p
School Climate	142	203.24	103	231.91	93	161.60	36	181.65	23	308.60	18	200.08	27.635	000***
Engagement in school	142	210.52	103	217.96	93	217.96	36	173.11	23	272.30	18	245.47	21.089	.001***
Teacher-Students Relationships	142	212.85	103	216.82	93	159.16	36	205.17	23	281.20	18	191.50	27.540	.000***
Student-Student Relationships	142	210.70	103	226.93	93	159.15	36	169.69	23	288.75	18	217.42	21.350	.000***

Appropriate Rules	142	193.37	103	224.25	93	180.63	36	217.82	23	253.50	18	181.78	11.175	.048*
Clear Expectations	142	206.56	103	227.42	93	166.85	36	183.89	23	294.35	18	175.94	22.292	.000***
School Safety	142	195.55	103	234.01	93	174.46	36	188.42	23	271.85	18	189.22	18.414	.002***
Bullying	142	182.88	103	192.85	93	243.19	36	186.15	23	227.35	18	198.86	17.681	.003***
*p<.050, **p<.010, ***p<.005														

The Kruskal-Wallis H analyses indicate a significant difference in school climate values among the cities of Peja, Gjakova, Deçan, Malisheva, Klina, and Istog, $\chi^2(3) = 27.635$, $p = .001$. Fifth-grade students in the municipality of Klina reported higher and more positive perceptions of school climate compared to students from other municipalities. The table shows that students in Klina also had higher perceptions of other aspects of climate compared to students from other municipalities. The lowest perceptions of school climate were reported by fifth-grade students in the municipality of Deçan.

Table 4. Pearson Correlation Analyses for School Climate and Its Aspects, Academic Success, and Academic Engagement

	Academic Achievements	Engagement with School	Climate in school	Teacher-Student Relationships	Student-Student Relationships	Specific Expectations	Appropriate Rules	School Safety	Bullying
Academic Achievements	1	.068	.129**	.130	.074	.106*	160*	.064	-.112*
Engagement with School		1	.774**	.476**	.376**	.398**	.494**	280**	-143**

Pearson correlation analyses show a positive and significant relationship between academic achievement and school climate, $r(413) = .129$, $p = .010$. Furthermore, students' academic achievements also showed a significant and positive correlation with the aspect of specific expectations, $r(413) = .106$, $p = .034$, and appropriate rules, $r(413) = .160$, $p = .009$. Conversely, a negative and significant correlation was found between school success and bullying, $r(413) = .112$, $p = .025$.

4. Results and discussion

This study found that a good school climate really helps fifth graders do better in their studies and stay engaged. These findings are consistent with previous results, which have concluded that

school climate is linked to students' academic achievements and academic engagement. On the flip side, research shows that a school where bullying happens can be scary for students. This kind of atmosphere makes it hard for kids to adjust and learn. When students are afraid of being picked on or left out, they are more likely to drop out and do badly in school (Mehta et al., 2013). When it comes to school climate, there's a clear link between academic success and having clear rules and expectations. These come from the structure that teachers set up. Additionally, the results of this study demonstrate that bullying has a negative correlation with academic achievements and academic engagement among fifth-grade students. These results are also consistent with findings made thus far in this field. It is worth noting that regarding aspects of school climate, our study shows that fifth-grade students perceive higher engagement with the school, feeling more connected to their school environment, compared to other aspects of climate such as teacher-student relationships, student-student relationships, established expectations, proper rules, school safety, and other significant issues.

School Environment

In recent years, school climate has been the focus of an increasing number of systematic empirical studiesSchool climate is one of the important factors that determine the success or failure of educational management. A good or conducive school climate can provide support or encouragement to the school principals, teachers, staff, and students to perform various activities according to their respective duties and functions. (Syahril, 2018). School climate is about what it's like at school. It affects how students learn. This includes things like the school's atmosphere, safety for students, and how involved everyone in the school community is. A good school climate means the school takes care of students' needs, whether that's their learning, feelings, behaviors, or mental health. What's school climate? It's all about how people feel and get along at school. It includes things like rules, goals, values, and how students and teachers interact. A good school climate helps kids grow and learn. This is important for them to lead happy, productive lives in our society (NSCC & CSEE, 2021). School climate is how students relate to each other and can show how they act in the community. When schools have a positive and stable climate, it helps kids grow and learn. It's important for a good life in a democracy. A positive school environment helps everyone feel safe and welcome. When people feel involved and respected, it makes a big difference. Students, families, and teachers should all team up to shape a shared vision for their school. Teachers help show how fun and useful learning can be. Everyone plays a part in making the school run well and keeping it clean. But, there isn't a clear agreement on what parts of school climate should be looked at for evaluation.

We looked at past studies on school climate and combined them with current research NSCC, the National School Climate Council and NSCC. There are five important areas to think about when assessing school climate. These are safety, relationships, social media, teaching, and the school environment. Each area has its own specific details to look at. Research shows that many educational agencies at federal, state, and local levels back policies to improve school climate. Having a good school climate is key for several reasons. It can help create a safe space and support positive outcomes for students in life (CMEC, 2021). Studies show there are five key things that help improve school climate: Safety: this includes physical safety, emotional safety, rules, norms, and bullying policies. Students and staff need to feel safe at school, both in body and mind. Clear behavioral expectations and the enforcement of rules help achieve this. Teaching & Learning: High academic standards, support for learning, professional development opportunities for teachers, and the use of interactive teaching methods promote student achievement. Relationships: Positive and respectful relationships between students, teachers, support staff, and families/community members build connections. Encouraging social engagement helps achieve this. Environmental-Physical: The physical surroundings, available resources and supplies, and the aesthetic appeal of the school building and classrooms also impact the climate. Institutional Environment: Factors such as leadership, student participation, collaboration, and morale contribute to the overall atmosphere. A shared vision and inclusive decision-making are important in this context (Lesson Bud, 2023). A good school environment helps students succeed in their classes. It also brings everyone together and makes sure no one feels left out. The development of a positive climate is a prerequisite for the holistic education of students and the continuous development of the pedagogical and social aspects of the school and family (Zuna, 2017). This development reflects not only in teaching or student outcomes but also in other psychological and social aspects. This shows

that a good environment helps students feel more motivated. It affects their social, cultural, and physical experiences. The findings showed that students who felt there was more discipline and order in school, along with better relationships with their teachers, had fewer behavior problems. This means a positive school environment can help reduce issues with students acting out. (Wang et al., 2010). According to Blum et al., 2002), Good relationships and solid classroom management are key. They help create an environment where all students can succeed, including those with disabilities. These strategies not only help students feel more connected but also cut down on behavior issues. They can also help close achievement gaps, lower dropout rates, and keep teachers in the classroom (CII, 2010). When institutional mechanisms exist, it is also easier to promote classroom climate, which then reflects in the relationships between teachers and the students themselves.

The relationship between school climate and academic engagement

In numerous studies on school climate, there is a recurring question of how school climate is related to academic outcomes. Which specific aspects of school climate are linked to student achievements, and what is the mechanism underlying this relationship? Based on the study by Phuntsho, 2020), student engagement has long been recognized as one of the important factors in student learning and academic achievement. When students are really engaged, they tend to do better in their classes. This shows up in their grades and test scores. It also helps connect the school climate with how well students do in their studies. Meanwhile, in identifying directions for further research, Wang, Degol, 2016) argue that school climate should be conceptualized as a multidimensional construct and that specific components of school climate should be identified in relation to students' academic outcomes. They pointed out that earlier studies were too simple. They only looked at school climate from one angle using one tool and one source. Additionally (Phuntsho, 2020: 109) cite authors Wang and Holcombe (2010) found in their study that school climate was positively correlated with all dimensions of engagement. Furthermore, emotional engagement was significantly correlated with student academic achievement compared to the other two dimensions. These studies illustrate how school climate directly or indirectly predicts student academic achievement by influencing student engagement. They also highlight the mediating role of student engagement between school climate and student academic achievement. We can say that these studies show a correlation between school climate and academic engagement. In this context, both teachers and students play important roles, as cooperation and collaboration between both parties are needed to achieve results in the field of education. However, it is also significantly influenced by various factors, including demographics, geographical areas, gender, student personality, ethnicity, or other significant factors. Researchers think that how a school feels impacts things like student behavior, attendance, school size, and how happy teachers are at their jobs. According to Bryk and Schneider (2003), When schools make a good environment for learning, students do better. They often achieve more than you might expect based on their background. (Belton, 2024). Therefore, it can be concluded that there is a connection between the creation of a positive school climate and academic achievements, which also serve as additional motivation for students to achieve concrete results.

The link between school climate and how well students do in school is important. We should look at this from different points of view

Studying student engagement can help us understand how school climate and achievement go hand in hand. Some research shows that when schools have a positive climate, students are more engaged. Other studies suggest that when students are engaged, they learn better and do well in school. Thus, educational engagement fosters student effort and promotes personal academic success. Membership is successfully established when students form social bonds with peers or adult authorities within the school context. From this perspective, students who fail to achieve these two goals are at a higher risk of dropping out (Archambault et al., 2009). Student engagement is a key factor that connects school climate and student success. Knowing this helps us understand how a positive school environment can boost learning. For school leaders, this information is crucial. It helps them see if the changes they make in schools really improve how students engage and, in turn, their grades. By figuring out how different aspects of school climate impact student performance, we can find better ways to support schools and students. (Konold et al., 2018). Additionally, the relationship between school climate and academic achievement is significantly influenced by various important factors. Thus, the authors (Boykin et al., 2024) cite

studies related to this issue. The authors found that students who feel unsafe in class tend to score lower on tests. Those who felt safe did better on their math exams and didn't miss school because they felt unsafe. When kids are absent too often, it hurts their learning. Plus, it can impact other students in the same class. More research on student attendance was done by Van Eck et al. (2017) researchers discovered that students in schools with a tough atmosphere often have more absenteeism. In other words, when the school environment is not great, students tend to miss more days. The good news is that this works both ways. A better school climate can help boost attendance.

On the other hand, when measurement is a matter of perspective or perception, using assessments from multiple informants is considered best practice as a tool for capturing a range of viewpoints that can enhance the evaluation of a particular trait. (Bauer et al., 2013). School climate ratings can come from both students and teachers. But their views on the school might not be the same because they have different roles. For example, student engagement can be defined by three specific dimensions: behavioral, affective, and cognitive. Collectively, these dimensions represent the complexity of the student experience (Wang, Degol, 2016: 667). Similarly, studies by Ramsey et al. (2016) show that students experience schools as recipients of services; they are expected to follow the academic schedule and adhere to the rules of conduct within their school building. Conversely, teachers perceive schools as providers of services; their role is to deliver academic instruction, guidance, and discipline within their classrooms. While students and teachers engage with their school environment regularly, parents' experiences are more intermittent and less structured. Nonetheless, it is also noted from studies that school climate is positive when there is collaboration among the three parties: school, parents, and students. However, over the past decades, not only in Kosovo but also in other countries, there have been fluctuations in school climate, with periods of both decline and improvement. While in the past, school climate was under the authority of the teacher, thereby respecting a hierarchy in the classroom, it can no longer be said the same today, as a constructive climate now requires collaboration with parents and students. The National School Climate Council (2008) talks about how a good school climate helps kids grow and learn. This is important for a happy life in a community. A positive school climate includes a few key things:

– Norms and values that help everyone feel safe emotionally and physically.
– School members who respect and engage with each other.
– Students, families, and teachers working together to build a shared vision for the school.
– Teachers who show how much fun and rewarding learning can be.
– Everyone in the school cares about how the school runs and looks.

School climate matters a lot. When schools focus on being positive places, every student gets a fair shot at success. This helps them become caring and responsible adults. Good school practices also help students graduate. Graduates are more likely to lead happy lives. They care about others, take part in their communities, and know how to work well with others. This way, they can be valuable members of society (National School Climate Council, 2008: 2). More and more reports and studies are stressing how important a positive school climate is. It helps to reduce gaps in achievement and supports healthy growth. A good school environment also helps students build the skills and knowledge they need to succeed in today's world (Piscatelli, 2011) and improving teachers' job satisfaction by creating an effective learning environment for students. Therefore, in the context of creating and developing school climate, specifically in the classroom, the factors mentioned above clearly have an impact. Thus, each of the aforementioned factors represents a characteristic, as they are also key elements in ensuring an inclusive climate, thereby creating a physically, socially, and culturally warm environment that would, in principle, foster motivation for students and enhance learning outcomes.

5. Limitation

This study is cross-sectional in nature, which limits its ability to establish cause-and-effect relationships between the study variables. Additionally, the factor of honesty in participants' responses when completing the questionnaires should be considered when interpreting the results.

6. Conclusion

School climate should be considered an important aspect of students' academic achievements and engagement by policymakers, school management, and teachers. Attention is also needed on the phenomenon of bullying, as the results of this study indicate a negative relationship with

students' academic achievements. Future studies should take into account the examination of these variables, including students from different school years. This study is inherently multi-sectoral, and as such, it cannot assess causal relationships among the study variables. However, it is still a model that reflects data for a specific region, which includes schools from 6 municipalities with 413 fifth-grade students. Based on what we have elaborated so far, we have seen that the climate in the schools of the Dukagjin region shows that the Kruskal-Wallis H analyses indicate a significant difference in school climate values among the cities of Peja, Gjakova, Deçan, Malisheva, Klina, and Istog. Fifth-grade students in the municipality of Klina reported higher and more positive perceptions of school climate compared to students from other municipalities. The table shows that students in Klina also had higher perceptions of other aspects of climate compared to students from other municipalities. The lowest perceptions of school climate were reported by fifth-grade students in the municipality of Deçan. Additionally, Pearson correlation analyses show a positive and significant relationship between academic achievement and school climate. Furthermore, students' academic achievements also showed a significant and positive correlation with the aspect of specific expectations. Conversely, a negative and significant correlation was found between school success and bullying. Overall, this work, despite its limitations, with a small and representative sample, is nonetheless a model that can serve other stakeholders for future steps in the study. In conclusion, the study shows that school climate is correlated with students' behaviors and attitudes, as well as academic achievements. Outside and inside factors play a role too. These include things like race, gender, where you live, and your income level. These elements are important for making everyone feel included. They help create a friendly place where students feel comfortable. This can boost their motivation and improve how much they learn.

7. Declaration of Competing Interest

The authors say there is no conflict of interest, and they have properly credited all the sources used.

8. Funding

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Managing Professional Development Activities for Teacher Educators at Vietnamese Universities: A Mixed-Methods Case Study Approach

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Abstract

This study explores the management of professional development activities for teacher educators in Vietnam, within the context of ongoing educational reforms. Using a convergent mixed-methods design, the research combines qualitative interviews with 38 participants and surveys from 288 faculty members and administrators. The findings reveal a divergence between the priorities of university administrators and faculty members: while administrators emphasize formal development programs, faculty members prefer informal learning approaches such as self-directed study and collaborative activities. The study also identifies contradictions between professional development management and faculty recruitment, evaluation, and remuneration processes. The research highlights the need for a more systematic, integrated policy approach that aligns recruitment, development, evaluation, and remuneration to enhance faculty motivation and professional growth.

Keywords: professional development activities, teacher educators, faculty motivation, professional growth, Vietnam.

1. Introduction

The future of teacher education is increasingly unpredictable, relying on how educators and trainers enhance their professionalism in response to societal changes (Cochran-Smith, 2000). Professional development is key to improving teacher training quality (European Commission, 2013) and overall education quality (Goodwin, Kosnik, 2013).

Global studies on teacher educator professional development focus on policy and management by teacher training universities. The European Commission (2013) advocates for continuous professional development regulations, emphasizing faculty autonomy (Meeus et al., 2018). However, some studies highlight shortcomings in policies, such as an overemphasis on

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publication achievements and insufficient research funding (Guberman, McDossi, 2019). These studies focus more on policies than on managing teacher educators' professional competencies.

Keophengla's (2020) study is one of the few exploring teacher educators' competencies in Laos, though it lacks a coherent theoretical framework. In Vietnam, limited studies, such as those by Tran-Tu-Hoai (2017) and Pham-Thanh-Vinh (2017), focus on specific policies but lack a strong theoretical basis. No studies have yet examined the actual management of professional development activities for teacher educators in Vietnam.

The Ministry of Education and Training (MOET) issued Circular No. 20/2013, setting guidelines for faculty professional development in Vietnam, aiming to enhance teaching and research capacity. From 2017 to 2021, the Teacher Education Program (ETEP) aimed to improve faculty capacity through professional development activities across the country (ETEP Management Board, 2021).

Based on these reasons, we conducted this research to examine the current state of professional development management in teacher training institutions in Vietnam and propose effective, evidence-based measures to enhance the professional capacity of teacher educators in this national context. This study aims to contribute valuable knowledge to both the theoretical and practical aspects of teacher educator professional development. By examining the management of professional development activities for teacher educators in Vietnam, the research will offer insights into the alignment, or lack thereof, between institutional priorities and the preferences of faculty members. It will shed light on the dynamics of professional development management, particularly how formal and informal approaches to faculty growth coexist and sometimes conflict. Through these contributions, the research will not only enrich academic discourse on teacher educator development but also provide practical insights that can inform policy decisions, administrative strategies, and the professional practices of educator trainers in Vietnam and other countries undergoing similar educational reforms.

2. Conceptual frameworks

2.1. Teacher Educators

Teacher educators are individuals who teach, guide, and support teacher education students, and they make significant contributions to the development of learners into effective teachers (Koster et al., 2005; Lunenberg et al., 2014). In this study, the definition of teacher educators as provided by Koster et al. (2005), Lunenberg et al. (2014), and the European Commission (2013) is adopted. However, the study focuses specifically on teacher educators working at universities that train future teachers, in line with the scope of the paper.

2.2. Professional Competence of Teacher Educators

Professional competence is defined as eexpertise in information sources, access methods, technologies, services, and management, combined with the ability to critically assess, strategically apply, and use this knowledge to accomplish specific tasks and attain desired results (UNESCO, 2007). Analysis of the core competencies for teacher educators in Europe (European Commission, 2013) reveals that professional competence for teacher educators may include multiple components such as: teaching, research, curriculum development, assessment, engagement with the professional community, and stakeholders; vision; professional development; and other personal competencies. However, these competencies must reflect the professional roles of teacher educators, which include: teacher of teachers, coach (mentor, advisor); curriculum developer; gatekeeper (assessor); and broker (connecting learners with internal and external stakeholders) (Lunenberg et al., 2014). In this study, based on the approach of UNESCO (2007) and the European Commission (2013), the concept of professional competence for teacher educators is framed as the competencies in teaching and scientific research, enabling teacher educators to effectively perform both teaching and research roles.

The teaching competencies of teacher educators can be demonstrated through various factors. To be specific, teachers need to have a comprehensive understanding of subject matter; familiarity with teaching theories for adult learners; the integration of updated teaching content; the development of more effective instructional plans; the use of diverse teaching strategies and methods; the incorporation of information technology in instruction; the enhancement of learners' cognitive abilities; the guidance of learners in engaging in productive professional activities; the monitoring, evaluation, and provision of feedback on learners' practical tasks; and the ability to work effectively with a diverse range of learners.

As for scientific research competence, the research capabilities of teacher educators encompass: the design of robust and scientifically sound research; the creation of tools and implementation of effective data collection methods; data analysis; familiarity with ethical standards; understanding of copyright-related processes; adherence to ethical guidelines in research; presentation of compelling research findings; proper citation of sources in accordance with international standards; and the publication of high-quality scientific articles in academic journals and conferences.

2.3. Professional Development Activities for Teacher Educators

Professional development activities for teacher educators include efforts to expand theoretical knowledge in specific subject areas and other aspects, including awareness and behavior, aimed at developing the professional competencies of educators (Smith, 2003). Professional development, or capacity-building activities, are intended to: improve the professional practice and teacher training efforts of teacher educators; sustain interest in the professional field for personal and career development; and advance within the profession (Smith, 2003). In this study, the author adopts Smith's (2003) perspective, where professional development activities are viewed as efforts to improve the professional practice and competencies of teacher educators, as well as to maintain their interest in their professional field to foster personal and career development. This definition includes both formal activities (organized by institutions) and informal activities (self-directed professional development) which aimed at enhancing both the professional competencies and research skills of educators, aligned with their two key responsibilities: teaching and research.

2.4. Management of Professional Development Activities for Teacher Educators

Management is viewed as a social process involving the responsibility of planning and regulating the activities of a unit in the pursuit of specific goals (Junega, 2018). In this study, the author adopts a management approach based on the management functions theory, emphasizing the planning, organizing, directing, and monitoring of professional development activities for teacher educators.

Management is a social process involving planning and regulating activities to achieve specific goals (Junega, 2018). This study adopts a management approach based on management functions theory, focusing on planning, organizing, directing, and monitoring professional development activities for teacher educators.

Planning is a key step in managing professional development, ensuring effective implementation (Bubb, Early, 2007). It involves setting goals, identifying activities, and addressing challenges in the development plan. This includes analyzing current activities, surveying faculty needs, setting objectives, determining content and formats, and establishing monitoring and evaluation criteria (Lloyd, Aho, 2020; Liu et al., 2016; Hallinger et al., 2017).

Organization involves allocating resources to achieve objectives (Bateman, Snell, 2013). It includes issuing reward policies, promoting faculty participation in academic communities, providing financial and administrative support, organizing tailored training, and ensuring a fair process for approving research topics (Silova et al., 2010; European Commission, 2013; Liu et al., 2016; Tran-Thi-Hue, 2016; Ping et al., 2018).

Directing aims to motivate and engage faculty to achieve high performance (Bateman, Snell, 2013). This involves fostering idea sharing, gathering feedback, guiding faculty to meet goals, and ensuring conditions for participation in development activities.

Monitoring and evaluation assess the success of professional development activities and make adjustments as needed (Bateman, Snell, 2013). This process includes establishing evaluation criteria, conducting assessments, rewarding high performers, and using results to refine future activities (Hallinger et al., 2017).

3. Research methods

In this study, the author employs a convergent mixed-methods research design (Johnson, Christensen, 2017) within a multiple case study approach, where qualitative research is the primary method for deeply exploring the research issue. This design enables the collection of rich and diverse data by examining multiple cases simultaneously (Johnson, Christensen, 2017). The benefits of this approach include: (1) comparing similarities and differences between cases; (2) testing theories more effectively by observing outcomes across cases; and (3) generalizing findings from multiple cases rather than a single case (Johnson, Christensen, 2017). The mixed-

case study design combines both qualitative and quantitative data, which are analyzed independently before being compared (Creswell, Creswell, 2018).

The study uses purposive sampling to gain insight into the experiences of teacher training universities (Yin, 2018). Due to time and financial constraints, two universities were selected: one from the northern region and the other from the southern region of Vietnam. These universities represent distinct types of teacher training institutions – one a key teacher training university and the other part of a regional university system. The selection criteria follow the homogeneous purposive sampling method (Patton, 2014) and include: (1) both universities offer teacher training across educational levels, from preschool to high school; and (2) both have a long history in teacher education, with one university having over 60–70 years of tradition and the other more than 40–50 years. Detailed information on these universities is provided in the table below.

Table 1. General Information about the two Teacher Training Universities Selected for the Study

Information	University A	University B
Development history	40–50 years	60–70 years
Institution type	Teacher Training University under the Ministry of Education and Training	Teacher Training University under a Regional University
Number of faculty members - With a PhD - With a Master's Degree - With a Bachelor's Degree	400–600 150–200 300–350 15–20	200–300 100–150 50–100 0–5

Source: Internal Statistical Data of the Universities – updated December 2021

This table provides detailed information regarding the development history, institutional type, and faculty composition of the two teacher training universities selected for the study, including the number of faculty members with various academic qualifications.

In this study, purposive sampling technique combining with snowball sampling technique which were applied to select participants at two schools - cases that can provide a lot of information for the research problem (Creswell, Clark, 2018). The interview questions aimed to gather information on the following topics: (1) policies related to the enhancement of teaching and scientific research competencies for teacher educators at two universities; (2) an evaluation of the management of professional development activities for teacher educators at two universities and its impacts on the improvement teacher educators' professional competencies over the past five years; (3) factors influencing the management of these training activities for teacher educators at two universities over the last five years; and (4) measures to enhance the management of these training activities for teacher educators at two universities.

The interviews were conducted by the authors, ranged in duration from 15 to 40 minutes. The specific steps of the interview process were as follows: (1) Contacting the interview subjects in advance to provide information about the research, the interview questions, a consent form for participation, and to schedule the interview; (2) Conducting the interviews (eight interviews were conducted in person at the interviewees' faculty offices during office hours, three interviews took place via the MS Teams platform, and the remaining 27 interviews were conducted on the Zoom platform), with all interviews being recorded. The process of analyzing interview data follows the steps outlined by Creswell and Creswell (2018), which include: (1) organizing and preparing the data for analysis; (2) reviewing all data; (3) coding the data; (4) developing descriptions and themes from the data; and (5) presenting the descriptions and themes.

The study interviewed three groups of participants to gather their perspectives: (1) university/school-level administrators, (2) department/faculty-level administrators and academic department heads, (3) teacher educators, and (4) specialized staff responsible for managing professional development activities at the universities. A total of 38 individuals participated in in-depth interviews across the two universities (19 participants from each university).

Regarding the surveys, the study collected feedback from faculty members and administrators at the department and academic unit levels. A total of 119 valid survey responses were collected from University A, and 169 valid responses from University B. The overall total number of valid survey responses from both universities was 288.

4. Results

4.1. Planning Professional Development Activities for Teacher Educators at Universities

The data in the Table 2 below show that the majority of responses from faculty members at both universities indicate a high level of agreement with all aspects of planning the management of professional development activities for teacher educators.

Table 2. Survey Data on Planning Professional Development Activities for Teacher Educators at Universities

Indicator	Content	University A			University B		
		Mean Score	Standard Deviation	Number	Mean Score	Standard Deviation	Number
P1	Analysis of the current status of professional development activities for teacher educators	3.54	0.94	119	3.91	0.73	169
P2	Regular survey of teacher educators' needs for participating in professional development activities	3.61	1.02	119	3.72	0.85	169
P3	Setting goals for professional development activities for teacher educators	3.76	0.97	119	4.02	0.75	169
P4	Defining the content of professional development activities for teacher educators	3.77	0.99	119	3.93	0.76	169
P5	Identifying the forms of professional development activities for teacher educators	3.79	1.07	119	4.04	0.79	169
P6	Defining the criteria for evaluating professional development activities for teacher educators	3.55	1.10	119	3.85	0.77	169
P7	Providing full information on the strategy for faculty development and the professional	3.80	1.02	119	4.04	0.71	169

Indicator	Content	University A			University B		
		Mean Score	Standard Deviation	Number	Mean Score	Standard Deviation	Number
	development plans for teacher educators						

At both University A and University B, faculty members most strongly agreed with statements about the provision of full information on the university's faculty development strategy; the identification of professional development forms for teacher educators; the identification of professional development content; and the setting of goals for professional development. In both universities, the least agreement was observed regarding the definition of evaluation criteria for professional development activities and the regular surveys of teacher educators' needs for participation in such activities.

The interview results from administrators and faculty members at the two universities also suggest that both groups are concerned with the aspect of needs assessment when planning professional development activities. At University A, 10 responses from administrators and faculty, and at University B, 11 responses highlighted this concern. Both universities regularly conducted surveys to assess the development needs of teacher educators. However, one response from each university expressed dissatisfaction with how the results of these surveys were used in the planning process. Specifically, these respondents noted that while the surveys focus on general needs, they sometimes fail to address the actual, specific needs of the faculty members.

The planning process for professional development activities at both universities follows a needs assessment procedure as outlined in the research by Lloyd and Aho (2020). However, some faculty members expressed dissatisfaction with the specificity and effectiveness of the development plans, indicating that some plans were not fully tailored to meet the real needs of the educators.

4.2. Implementing Professional Development Activity Plans for Teacher Educators at Vietnamese Universitie

Table 3. Survey Data on Implementing Professional Development Activity Plans for Teacher Educators at Universities

Indicator	Content	University A			University B		
		Mean Score	Standard Deviation	Number	Mean Score	Standard Deviation	Number
I1	Issuance and dissemination of high-incentive reward policies for faculty publishing internationally	3.70	1.04	119	4.23	0.76	169
I2	Issuance and dissemination of specific regulations for classroom observation and faculty professional activities	3.63	0.98	118	4.03	0.74	169
I3	Issuance and dissemination of specific regulations for participation in professional	3.40	1.01	118	3.72	0.84	169

Indicator	Content	University A			University B		
		Mean Score	Standard Deviation	Number	Mean Score	Standard Deviation	Number
	associations and communities						
I4	Provision of administrative support and funding for faculty to participate in professional development activities	3.67	0.95	119	3.84	0.79	169
I5	Organization of additional training courses aligned with the faculty's teaching and research needs	3.31	0.91	119	3.34	0.76	169
I6	Fair and transparent approval of research project proposals	3.82	1.04	119	3.92	0.85	169

The survey results in the Table 3 indicate that faculty members at both universities generally agreed with most aspects related to the implementation of professional development plans for teacher educators. However, the content "Organization of additional training courses aligned with the faculty's teaching and research needs" received the lowest ratings. Both University A and University B showed lower satisfaction with this aspect, rating it at an average level.

At University A, faculty rated the most positively in terms of the fair and transparent approval process for research project proposals and the issuance and dissemination of high-incentive reward policies for faculty publishing internationally. At University B, the highest ratings were given to the dissemination of reward policies for international publications and the establishment of specific regulations for classroom observation and professional activities.

Several faculty members at University A noted that the university has not yet issued specific regulations on classroom observation and professional activities, which has resulted in inconsistent implementation across departments. In contrast, five faculty members at University B indicated that the university has clear regulations on these activities, which are well implemented across departments and faculties.

The establishment of specific regulations for faculty participation in professional associations also received a lower rating from faculty at both universities. Besides, a few faculty members at both universities expressed concerns about the decentralized nature of the management of professional development activities, as multiple departments and units are involved in overseeing this process.

Regarding the approval of research projects, some faculty members at University A raised concerns about the timing of the approval process, which is sometimes too delayed relative to the research proposal submission period, potentially affecting the timeliness of research topics. While the survey results on the fairness and transparency of research project approval were generally positive, a few faculty members at University A suggested that more transparency is needed, such as providing explanations when a research proposal is not approved.

Faculty members at both universities appreciated the training courses related to teaching and research needs, such as courses on pedagogical skills, ICT integration in teaching, and workshops on the 2018 General Education Program and STEM education. However, many faculty members expressed the view that the organization of these courses was often driven by top-down

management perspectives, rather than a deep consideration of the actual teaching and research needs of faculty members (12 comments at University A and 16 at University B).

4.3. Leadership in Directing Professional Development Activity Plans for Teacher Educators at Vietnamese Universities

The results presented in the table below show that among the aspects of leadership in directing professional development plans for teacher educators, two items received ratings of agreement or higher from faculty members: (1) "Faculty leaders (department heads, academic unit leaders) regularly monitor and guide faculty to implement professional development activities according to objectives and content from the beginning of the year," and (2) "University, faculty, and department leaders regularly create opportunities for faculty to exchange feedback with management on the content, format, and timing of professional development activities." The remaining three items, which relate to organizational culture, academic environment, and the professional climate that encourages faculty participation in professional development, were rated at an average level by both administrators and faculty at the two universities.

Table 4. Survey Data on Leadership in Directing Professional Development Activity Plans for Teacher Educators at Universities

Indicator	Content	University A			University B		
		Mean Score	Standard Deviation	Number	Mean Score	Standard Deviation	Number
D1	University, faculty, and department leaders encourage and motivate faculty to share and spread new ideas within the unit	3.26	1.01	119	3.28	0.76	169
D2	University, faculty, and department leaders regularly create opportunities for faculty to exchange feedback with management on the content, format, and timing of professional development activities	3.34	0.88	119	3.37	0.75	169
D3	University, faculty, and department leaders regularly listen to faculty feedback on adjusting professional development policies	3.27	0.91	119	3.33	0.74	169
D4	Faculty leaders (department heads, academic unit leaders) regularly monitor and guide faculty to implement professional development activities according to objectives and content from the beginning of the year	3.67	0.88	119	3.86	0.74	169

Indicator	Content	University A			University B		
		Mean Score	Standard Deviation	Number	Mean Score	Standard Deviation	Number
D5	University leadership directs departments and academic units to cooperate with functional departments to support faculty participation in professional development activities	3.59	0.93	119	3.87	0.73	169

Survey and interview results from administrators and faculty at the two universities show that both institutions have activities in place to encourage and motivate faculty to share new ideas within their academic units at the university, faculty, and department levels. In the process of directing professional development activities, administrators at both universities tend to use coercive power, reward power, and expert power to encourage and motivate faculty to participate in professional development (Lloyd, Aho, 2020). However, the relatively modest evaluations regarding the creation of an academic and professional environment that encourages faculty participation in professional development activities are important data points. These results suggest areas for improvement, particularly in strengthening the institutional culture and environment that supports faculty development.

In summary, the results indicate that both universities demonstrate leadership in motivating faculty to engage in professional development, but there is room for further improvement in fostering a more supportive academic culture. Enhancing the effectiveness of these leadership practices could further encourage faculty participation in professional development activities, as highlighted by faculty feedback from both institutions.

4.4. Monitoring and Evaluation of Professional Development Activity Plans for Teacher Educators at Vietnamese Universities

Table 5. Survey Data on Monitoring and Evaluation of Professional Development Activity Plans for Teacher Educators at Universities

Indicator	Content	University A			University B		
		Mean Score	Standard Deviation	Number	Mean Score	Standard Deviation	Number
E1	Identification of criteria for monitoring and evaluating the implementation of professional development activities for teacher educators	3.55	0.94	119	3.85	0.73	169
E2	Dissemination of the criteria for monitoring and evaluating the implementation of professional development activities for teacher educators	3.45	0.95	119	3.83	0.73	169

Indicator	Content	University A			University B		
		Mean Score	Standard Deviation	Number	Mean Score	Standard Deviation	Number
E3	Full monitoring and evaluation of faculty participation in professional development activities each year	3.69	0.94	119	3.94	0.72	169
E4	Rewarding individuals and groups with outstanding achievements in professional development activities	3.49	0.95	119	3.77	0.72	169
E5	Using the results of monitoring and evaluation to adjust professional development activities for teacher educators	3.61	0.93	119	3.88	0.78	169

As indicated in the Table 5, faculty members at both universities rated the item "Full monitoring and evaluation of faculty participation in professional development activities each year" the highest (with mean scores of 3.69 for University A and 3.94 for University B). The lowest ratings were given to the item "Rewarding individuals and groups with outstanding achievements in professional development activities" (mean scores of 3.49 for University A and 3.77 for University B).

The interview results also revealed that faculty expressed their views on various aspects of the monitoring and evaluation of professional development activities. These included the identification of criteria for monitoring and evaluation (9 comments from faculty at University A and 2 comments from University B), dissemination of the monitoring and evaluation criteria (2 comments from University A and 5 comments from University B), including professional development results in performance evaluations and KPIs (4 comments from University A and 3 comments from University B), and using the results of evaluations to continuously adjust support for faculty participation in professional development (3 comments from University B).

In practice, both universities conduct regular reviews of professional development activities to assess their alignment with faculty needs and the effectiveness of different development activities. However, some faculty members noted that these reviews were somewhat superficial, primarily recording teaching hours and research activities, while many other professional development activities were not adequately documented. Additionally, at University A, some faculty members pointed out that the use of professional development results to evaluate the quality of training courses seemed to lack emphasis, or if conducted, was often merely procedural. Furthermore, some faculty expressed dissatisfaction with the rewards system for outstanding individual or group achievements in professional development, suggesting that the university should also implement sanctions for those failing to meet required teaching hours or professional development activity participation.

In short, the study on professional development activities for teacher educators at the two universities showed that both institutions have established criteria for monitoring and evaluating faculty participation in these activities. However, these criteria are largely tied to the conversion of professional development into teaching and research hours that faculty engage in during the academic year. The universities also monitor and evaluate faculty participation by requiring faculty to report their teaching hours and research activities annually. Nevertheless, interview results

indicated that this monitoring process is seen as somewhat formal and lacking depth. In other words, both universities lack a more comprehensive, systematic evaluation framework that would fully assess faculty involvement in professional development activities.

4.5. The impact of Managing Professional Development Training Activities on the Professional Competencies of Teacher Educators at Vietnamese Universities

Pearson's product-moment correlation coefficient (r), which quantitatively measures the strength and direction of the relationship between two variables, yields a numerical value ranging from -1.00 to +1.00, with 0 indicating no correlation (Field, 2018). The bivariate correlation analysis also calculated the significance values (p), which assess the statistical significance at a given threshold, such as $p < 0.05$ (Creswell, Guetermann, 2019). Detailed information, including the correlation coefficients and significance values for each dimension of professional competencies and the composite scores of the management of teacher educators' professional development training activities dimensions, can be found in Table 6.

Table 6. Results of Correlation Analysis between Management Elements of Professional Development Training Activities and Professional Competencies of Teacher Educators at 2 universities

Dimensions	University A						University B					
	1	*2*	*3*	*4*	*5*	*6*	*1*	*2*	*3*	*4*	*5*	*6*
1. TC	-	.59**	.41**	.34**	.38**	.36**	-	.54**	.45**	.46**	.44**	.41**
2. SRC	-	-	.25**	.26**	.22*	.24**	-	-	.51**	.54**	.55**	.50**
3. P	-	-	-	.87**	.74**	.73**	-	-	-	.87**	.77**	.72**
4. I	-	-	-	-	.79**	.80**	-	-	-	-	.79**	.73**
5. L	-	-	-	-	-	.93**	-	-	-	-	-	.90**
6. E	-	-	-	-	-	-	-	-	-	-	-	-

Notes: ** p < .05 (2-tailed); * p < .01 (2-tailed);TC: Teaching competencies; SRC: Scientific research competencies; PC: Professional competencies; P: Planning Professional Development Activities for Teacher Educators at Universities; I: Implementing Professional Development Activity Plans for Teacher Educators at Vietnamese Universities; L: Leadership in Directing Professional Development Activity Plans for Teacher Educators at Vietnamese Universities; E: Monitoring and Evaluation of Professional Development Activity Plans for Teacher Educators at Vietnamese University

The Pearson test results for the relationships between independent variables (teaching competencies (TC); scientific research capacity (SRC) and dependent variables (P: Planning Professional Development Activities for Teacher Educators at Universities; I: Implementing Professional Development Activity Plans for Teacher Educators at Vietnamese Universities; L: Leadership in Directing Professional Development Activity Plans for Teacher Educators at Vietnamese Universities; E: Monitoring and Evaluation of Professional Development Activity Plans for Teacher Educators at Vietnamese Universities) – in pairs for each university A and B reveal that the significance value (sig) of the test is less than 0.05. This indicates that there is a statistically significant linear correlation between these pairs of variables in both universities.

To assess the strength or weakness of these correlations, the absolute value of the Pearson correlation coefficient (r) can be considered (Field, 2018). As noted by Field (2018), if the absolute value of r in Pearson analysis is less than 0.1, it indicates a very weak correlation; less than 0.3, a weak correlation; less than 0.5, a moderate correlation; and 0.5 or greater, a very strong correlation. The results presented in Table 6 indicate that, at the university A, management activities of professional development training activities for teacher educators (such as planning, implementing, directing, and evaluating professional development activity plans for teacher educators) exhibit a moderate positive correlation with their teaching competencies ($r < 0.5$) and a weak positive correlation with their scientific research competencies ($r < 0.3$). Similarly, at the university B, these activities also show a moderate positive correlation with teaching capacity ($r < 0.5$), but demonstrate a strong positive correlation with research capacity.

5. Conclusion

It can be observed that while the two universities have developed strategies for advancing research capacities within their faculty, along with specific goals derived from these strategies, certain areas still require further detail and systematization to ensure that faculty members at different stages of their careers have ample opportunities to develop their research capabilities. This aspect, related to the necessity for universities to implement specific policies for faculty at various career stages, has also been addressed in the research of Dengerink et al. (2015), Kelchtermans et al. (2018), Guberman et al. (2020), and Boyd et al. (2021). Faculty members in different career stages require tailored development strategies for both their research and teaching competencies.

The results of this study provide an overview of the current state of professional development management for teacher educators at two exemplary teacher training universities in Vietnam, within the context of educational reforms linked to the implementation of the 2018 General Education Program. The findings indicate that while administrators emphasize formal development forms, faculty members tend to focus more on informal development, such as self-directed learning and collaborative approaches. This preference aligns with the findings of Meeus et al. (2018), who suggest that professional development policies for teacher educators should emphasize faculty autonomy and be based on an understanding of their needs regarding informal learning opportunities. However, in practice, universities often regard professional development as an individual responsibility of faculty members rather than adopting a system-wide policy approach to support faculty career development (Guberman, McDossi, 2019).

Generally, both administrators and faculty agree on the importance of functions such as planning, organizing, supervising, and evaluating professional development activities for teacher educators. However, there are still some limitations in the management of these functions. The study also highlights the existence of contradictions between the management of professional development activities and faculty recruitment, evaluation, and remuneration at the universities. For instance, during recruitment, if faculty members are not selected based on rigorous and appropriate criteria, this can lead to a lack of commitment to remain at the university or to actively engage in professional development activities. Guberman et al. (2020) discuss how improper recruitment criteria may lead to suboptimal hiring outcomes, which can subsequently affect the professional growth of faculty members.

Moreover, the study suggests that when evaluating faculty performance, if the outcomes of faculty efforts are not adequately recognized throughout their careers, this could diminish their motivation to participate in professional development activities. Therefore, it is essential for administrators to consider and implement integrated solutions that align recruitment processes with professional development activities and ensure that performance evaluations and remuneration are consistent with faculty participation in development programs. The coherence and synergy among these processes – recruitment, development, evaluation, and remuneration – are crucial and are integral elements in the human resource management process. The findings of this research, along with the proposed human resource management model, provide both theoretical and practical foundations for administrators at the two universities to consider when developing specific, reasonable, and coherent policies related to recruitment, development, evaluation, and remuneration.

6. Limitations

There are, however, several limitations to this study concerning the sample, scope, and data collection and analysis methods. First, the study was limited to the university level, while the management of professional development activities for teacher educators may involve both university and national levels. To explore the management of professional development activities at the national level, interviews with national-level administrators responsible for professional development would be required. However, the researcher was unable to access these national-level administrators. Second, the study was limited in terms of the number of case studies. Specifically, there are about fourteen teacher training universities in Vietnam, distributed across various regions and typically categorized into three types: (1) key teacher training universities, (2) regional teacher training universities, and (3) faculties of education within multi-disciplinary universities. However, this study only covered two case studies, representing the first two categories, due to limitations in research resources and time constraints.

Since the findings of this study are primarily based on case studies from two universities in Vietnam with a limited dataset, future research could extend to additional teacher training

universities across Vietnam in order to gather a larger and more representative sample of data. Future research could also explore the management of professional development activities for teacher educators at teacher training institutions in Vietnam through additional perspectives that were not addressed in this study, such as: policies related to this management in the context of the 2018 reforms to the Vietnamese general education program; the influence of different leadership styles of managers and leaders at various levels within the universities of teacher education on the professional growth of teacher educators; and the development of professional learning communities for teacher educators in Vietnam.

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Application of Artificial Intelligence Tools in the Educational Practice of Russian Schools

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Abstract

The examination of AI tools integration in Russian education sector is informed by the rapid developments and increased adoption of AI technologies that holds a great potential to transform education. The objectives of the research focused primarily on analyzing shifts within instructional strategies, technical infrastructure, and sociocultural aspects being used in Russian schools. An extensive analysis of government documents, industry and academic research reports, surveys, and case studies from Russian schools was conducted and the most important patterns, factors, and impediments toward the usage of AI technologies in the classroom were associated with and tendencies were formulated. In this work, we formulate working classification of Android applications designed for the integration of artificial intelligence in primary and secondary basic educational institutions and discuss the qualifications necessary for the proper use of these applications. The technology readiness level and infrastructure gaps in Russian educational institutions have also been evaluated, which have shown pronounced regional disproportions in the availability of digital resources.

The research addresses the extent of the impact of AI-supported teaching techniques on learners' outcomes, engagement, and skill acquisition; on the other hand, a teacher's productivity and professional development. In this paper, we present a comprehensive examination of the ethical, legal and social impacts as well as the policy suggestions for supporting responsible and equitable usage of Artificial intelligence technologies in education in Russia. The analysis provided strives to enhance the understanding and the ability to make goals and actions to integrate Artificial Intelligence in school education in Russia and construct cohesive implementation plans

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that are capable of making educational opportunities in Russia more accessible, responsive and equipped to the demands of the times.

Keywords: artificial intelligence, education, Russian schools, personalized learning, digital transformation.

1. Introduction

Education has surely benefitted from the rapid advancement of AI fused with machine learning, natural language processing, and data analytics (Abuže, Ļubkina, 2021). Not only do AI-powered systems stand a good chance of transforming education for the better, they have been found to improve room for additional advancement through personalization and customized assessments alongside intelligent tutoring and the use of educational policy and practice informed data (AI Tools Arena, 2023). Russia has also shown interest in AI-integration to education which is fueled by the national policies focused on the growth of the digital economy and modernization of the education system (Asthana, Hazela, 2019). Unfortunately, several challenges hinder smooth integration of AI in the education sector within Russia, such as lack of adequate technological infrastructure, insufficient levels of preparedness of teachers and students along with various ethical and social issues concerning the use of AIEd (Bakker et al., 2023).

This study offers an evaluation of AI adoption in Russian schools, tracking current development and prospecting for future value. While analyzing the pedagogical propositions and instructional designs needed for effective implementation in the classroom, we also identify relevant AI applications across different subject areas. Special focus is devoted to assessing school networks' technological preparedness and determining infrastructure needs, especially in relation to socioeconomic and regional factors that shape digital use. This research also investigates the consequences of AI-based pedagogical approaches on student learning outcomes, engagement, skills acquisition, and their respective influence on teacher effectiveness and professional learning. We analyze the AI's social, legal, ethical, and educational concerns within a school setting and suggest strategies for the ethical, equitable, and sustainable application of these technologies.

This research has the potential to improve both the theory and practice regarding the implementation of AI in education. It could influence policy-making not just in Russia, but in other countries as well. By analyzing the opportunities and risks, as well as the possible impacts that using AI technologies in schools may have, this study can assist educational leaders, decision makers, and those in the information technology domain in using the innovative functions of AI to improve the quality, accessibility, and outcomes of education. It also addresses the use of AI within the broader context of policy issues related to education systems and their impact on workforce development and progress in society, which constitutes a significant gap in academic literature.

An examination of the literature suggests a growing focus on educational AI solutions such as adaptive learning environments, automated tutoring systems, and learning analytics (Bamford, 2023). Machine learning techniques have been utilized in student profiling, predicting academic performance, and recommending learning materials (Delgado et al., 2020), whereas natural language processing has provided capabilities for automated essay grading, conversational tutoring systems, and sentiment analysis of course evaluations (Dergaa et al., 2023). In spite of these advancements, most of the researched literature is dedicated to the online or traditional college level of education as the majority of studies conducted tried to analyze the possibilities of AI use in these areas while neglecting the school level integration of AI in educational programs and teaching methods (Dillenbourg, 2016). The advancement of technology brings new terminologies which are often misinterpreted, for example “adaptive learning” could also mean “intelligent tutoring”, or “learning analytics” and this ever-changing vocabulary makes it difficult to grasp important concepts (Elliott, Soifer, 2022). For the purposes of this study, we take the broader approach to AI as a system in computer technology that is designed to carry out functions such as human vision, cognition, thinking, and judgment (Halaweh, 2023). The focus of our examination is on the integration of AI in education for learners classified as being at the primary and secondary school levels.

Despite the growing literature on AI-assisted teaching and learning, understanding the effective application of AI in real learning environments remains largely uncharted (Hawes, Arya, 2023). Prior research pointed to the need for evidence based investigation of the impact AI tools have on teaching processes, their usability, scalability, and effectiveness in different educational settings (Holmes et al., 2019). Furthermore, there has been a lack of attention towards examining

the ethical and social issues surrounding AI-powered educational resources and the experiences of the students and teachers who use them (Hou et al., 2022).

We seek to close these gaps by presenting a holistic picture of the AI integration processes in Russian schools, drawing on multiple sources and stakeholder perspectives. We advocate for the position that effective integration of AI technologies into the school education system needs an all-round strategy comprising didactic, technological, and socio-economic components that correspond to the national objectives as well as international benchmarks of modern education. By doing so, we expose, not only the real difficulties and advantages of AI implementation into Russian schools, but also the value of educational AI for the improvement of the quality of education, the equity of educational opportunities, and the readiness of students for life in a complex digital society which needs more integration.

2. Materials and Methods

To answer the research questions, we undertook a systematic literature review, comprehensive stakeholder surveys and interviews, and quasi-experimental evaluation of AI augmented learning interventions within a mixed approaches research framework of three phases.

Our sample consisted of 200 schools purposefully chosen to reflect the entire educational geography of the Russia. This include 120 urban schools from the major cities (Moscow, Saint Petersburg, Novosibirsk, Yekaterinburg, and Kazan) and 80 rural schools from Central Russia, Siberia, Volga region, Urals, and the Far East. Both state (80 %) and private (20 %) schools were incorporated with varying curricular emphasis: STEM-specialized (30 %), humanities-specialized (25 %), and mixed (45 %). In order to have several points of view about the use of AI, we approached a large number of stakeholders: 500 school managers (principals, deputy principals, and heads of IT), 1,500 teachers of different subjects, 5,000 elementary and secondary school students, 200 parents, 30 government officials responsible for education, and 50 specialists in educational technology. This multi-stakeholder strategy enabled us to structure different AI adoption factors and impacts from various educational settings and participant perspectives.

Systematic Literature Review. From the very beginning, we devised a particular search strategy for peer-teviewed articles and policy documents concerning AI in education throughout the duration of 2018 and 2023. We looked for publications in high impact journals (those with greater than 2.0 impact factors) that are listed in major databases such as Scopus and Web of Science. The initial set of keywords “artificial intelligence”, “machine learning”, “education”, “school”, and “Russia” led to the recovery of 1,524 references. As this number was very large, we applied a set of filters to determine the relevance of the articles. Once we filtered based on methodological rigor and data completeness, we were left with 85 articles. In forming the corpus, we did our utmost to adhere to the PRISMA criteria (Saura et al., 2022; Seufert et al., 2021).

Surveys and Interviews. Drawing from the literature summaries previously conducted, a set of questionnaires for 500 school administrators, 1,500 teachers, 5,000 students and 200 randomly selected schools across 50 regions of Russia was developed and administered. In addition, we also conducted semi-structured interviews with 30 policymakers and 50 EdTech specialists and 100 parents. Participants were surveyed on AI awareness, their personal usage of AI, associated benefits and challenges of AI, and what resources would need to be implemented in order to facilitate more effective AI usage on a Five-Point Likert Scale (1-5, 1 being strongly disagree and 5 being strongly agree). We did interviews with participants regarding perceptions on ethics and social issues and strategic direction for AI usage integration at the school level. We used NVivo 12 to perform coding of interview transcripts and analyzed quantitative data using descriptive data analysis, factor analysis, and multivariate regression analysis in SPSS v.28.

Quasi-Experimental Impact Evaluation. This study used a quasi-experimental design of 20 purposively sampled schools to study the impact of AI based adaptive learning systems on student achievement. Our focus was on the performance in mathematics and science in the 7th to 9th grades with a total of 1,000 subjects split evenly between experimental and control groups. At the commencement of the year, students took full baseline assessments which were followed by performances scores during the intervention period. We enriched the achievement data with student motivation metrics and platform engagement to examine correlations between usage behavior and learning outcomes. Effects were estimated using multilevel modeling and propensity score matching methods to reduce selection bias and yield effect sizes.

Throughout the entire process, we employed strict methodological controls. Each instrument of assessment was externally reviewed and piloted while validity was ensured through mixed-methods triangulation. The study was approved by (IRB #2023–01-128) Russian Academy of Education where all informed consent from the participants was collected. Sample sizes were determined by power analyses with meaningful effect size (0.3) at 0.8 statistical power to the five percent alpha significance level.

We managed the missing values with multiple imputation methods and outlined all statistical assumptions. T-tests, ANOVA, regression modeling, factor analysis, and structural equation modeling were conducted with R version 4.2 and SPSS version 28. For the qualitative aspects, inter-rater reliability was established through the use of Cohen's kappa which exceeded our set benchmark ($\kappa > 0.8$). In line with reporting requirements, measures of effect size (Cohen's d, eta squared) were noted in the results alongside probability values for the entirety of the findings.

3. Results

Our analysis suggests that Russian schools display marked differences in the level of AI adoption, which is driven by urban – rural differences, type of governance (public/private), and institutional focus or specialization. Based on the survey conducted among 500 administrators, 45 % of the schools surveyed reported using at least one platform or tool powered by AI and the adoption was much higher in cities than in rural areas (58 % vs. 32 %). Especially widespread were Adaptive Learning Systems (28 %), Intelligent Tutoring Services (23 %), and Learning Analytics (19 %). In addition, the other analysis showed a simultaneous effect of the degree of technological preparedness, the disposition of administrators and teachers, and the policy encouragement on the possibility and scope of everyday AI innovations in educational practice (Suh, Ahn, 2022).

To summarize, this complex study on the strategic implementation of AI in Russian primary and secondary schools was accomplished in stages. The findings pointed out the advantages of AI-powered educational platforms, which include automated personalization, as well as data and behavior analysis, alongside concerns for substantial teacher training, resource distribution, and proper ethical and equity considerations (Tovani-Palone, 2023). Having analyzed various data types from different stakeholders, the current research captures the subtleties of school AI integration in Russia, highlighting the overarching and policy-oriented research gaps to be addressed in subsequent studies.

Table 1. AI adoption rates by school type and region

School Type	Region	Number of Schools	AI Adoption Rate, %
Urban	Central	40	62.5
	Northwestern	30	60.0
	Southern	25	56.0
	Volga	35	54.3
	Ural	20	55.0
	Siberian	30	53.3
	Far Eastern	20	60.0
Rural	Central	20	35.0
	Northwestern	15	33.3
	Southern	20	30.0
	Volga	25	28.0
	Ural	15	33.3
	Siberian	20	30.0
	Far Eastern	10	30.0

The survey also revealed significant differences in the level of AI integration across subject areas and grade levels. As shown in Table 2, AI tools were most commonly used in STEM subjects, particularly in mathematics (45 % of schools) and computer science (38 %). The adoption rates were lower in humanities and social sciences, with only 15 % of schools using AI in language arts and 12 % in social studies. AI integration was also more prevalent in high school grades (42 %) compared to middle school (28 %) and elementary school (19 %).

Table 2. AI adoption rates by subject area and grade level

Subject Area	Elementary School, %	Middle School, %	High School, %
Mathematics	25	40	60
Computer Science	15	35	55
Science	20	30	45
Language Arts	10	15	20
Social Studies	5	10	18
Foreign Languages	12	18	25
Arts and Music	8	12	15
Physical Education	5	8	10

The interviews with policymakers and EdTech experts provided further insights into the drivers and barriers of AI adoption in Russian schools. The majority of the respondents (85 %) viewed AI as a promising tool for improving educational quality and equity, highlighting its potential for personalized learning, adaptive assessment, and data-driven decision-making. However, they also identified several challenges hindering the widespread adoption of AI, such as the lack of technical infrastructure (mentioned by 75 % of respondents), insufficient teacher training (70 %), and concerns about data privacy and security (65 %).

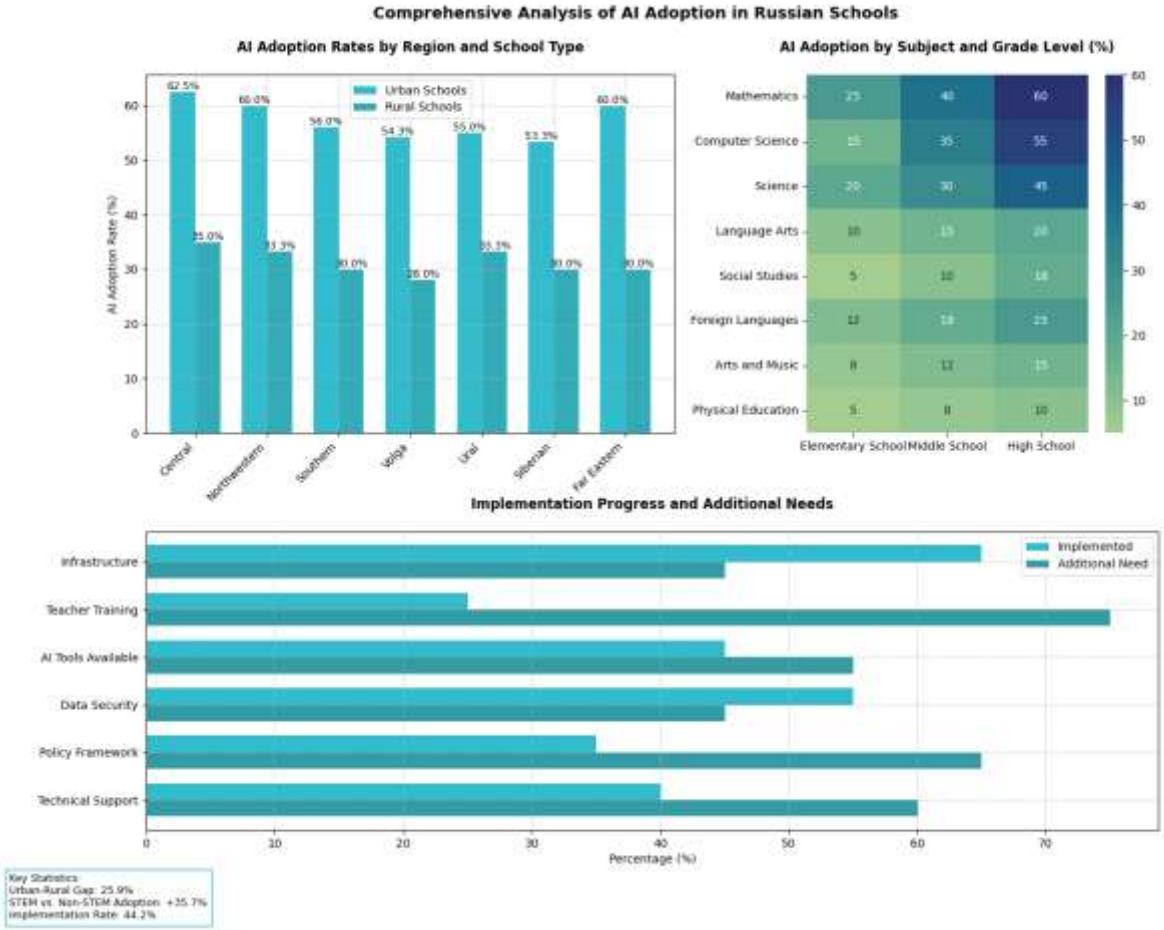

Fig. 1. AI Adoption Analysis in Russian Schools

In the past few years, there has been an increasing government-focused effort on AI educational technology adoption in Russia. The AI-powered teaching technologies development

and implementation program Digital Education was announced in 2019 with the subsidization of 1.5 billion rubles (roughly 20 million US dollars) being set aside for its expenses. The program aimed to introduce a national AI platform for personalized learning to 50 % of schools in Russia by 2024. The reality on the ground tells a more complicated story, though – while places like Moscow and St. Petersburg are racing ahead with implementation, other regions such as the North Caucasus and Far East lag considerably behind.

Outcome Learning Assessment

The results AI-assisted learning tools achieved from our AI supported learning tools was positive here. Students who utilized the AI systems (n = 500) outscored their coequals within the group without the AI systems (n = 500). In the Standardized test scores of my children, AI scoring students achieved better grades than those in the control group AI systems in comparison to: mathematics 85.6 points (SD = 12.4) and control students 79.4 (SD = 15.6); science scored 82.3 (SD = 14.5) and control group 75.8 (SD = 17.2). Both differences could achieve the significance level at $p < 0.01$ (mathematics: $t(998) = 6.45$, $p<0.001$; science: $t(998) = 5.87$, $p < 0.001$) and the strength of the distinctions is medium effectiveness (Cohen's d=0.41 for mathematics; d = 0.37 for science).

Results from the student surveys corroborated the findings related to the test scores. Students utilizing the AI tools reported significantly greater motivation and engagement across all areas. They found learning more enjoyable (M = 4.2, SD = 0.8), considered the platform more valuable (M = 4.4, SD = 0.7), and showed stronger willingness to continue using it (M = 4.1, SD = 0.9). On the other hand, students in the control group provided significantly lower ratings on the same measures (enjoyment: M = 3.6, SD = 1.1; usefulness: M = 3.5, SD=1.2; intention: M = 3.2, SD = 1.3). These differences weren't subtle – all were significant at $p<0.001$ (enjoyment: $t(998) = 9.12$, $p < 0.001$; usefulness: $t(998) = 12.34$, $p<0.001$; intention: $t(998) = 11.56$, $p < 0.001$) with effect sizes between moderate and large (Cohen's d values of 0.58, 0.78, and 0.73 respectively). Combined, these results indicate that strategically integrated AI tools may not only enhance academic achievement, but also transform students' perceptions of the learning experience.

Table 3. Comparison of student motivation and engagement by group

Variable	Treatment Group (N = 500)	Control Group (N = 500)	t-value	p-value	Cohen's d
Enjoyment of learning	4.2 (0.8)	3.6 (1.1)	9.12	<0.001	0.58
Perceived usefulness	4.4 (0.7)	3.5 (1.2)	12.34	<0.001	0.78
Intention to continue using AI	4.1 (0.9)	3.2 (1.3)	11.56	<0.001	0.73

Notes: Means and standard deviations (in parentheses) are reported. All variables were measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

We collected teacher opinions regarding the use of AI tools in the classroom and the responses were rather diverse. A solid 60 % of users of the AI platform believed it increased the effectiveness and efficiency of their teaching. Integration was not always smooth, however, as 25 % of teachers who responded to our survey reported having difficulty integrating the new tools into their lessons. Time investment also seemed to be a common theme, with 70 % of respondents reporting that the adoption of AI cost them additional hours of teaching and training time. It was worth it for many, however, as a little more than half (55 %) believed that AI could eventually reduce their workload by automating repetitive tasks such as grading and providing feedback to students. Generally parents of children that were using the AI tools had a favorable view of the technology. We found out during the interviews that 80 % of parents believe AI is helpful for their children's education. Three quarters appreciated the personalized feedback children were getting and 70 % thought these technologies could aid in preparing their children for the job market. Even with this generally positive stance, parents still had some worries. Almost half (45 %) voiced concerns over their children becoming overly reliant on digital tools.

In a similar vein, 40 % are worried about reduced physical interaction with others during the learning process. Also, worries regarding privacy have not gone unnoticed from parents' monitors as 35 % of them voiced concerns over how data and information is secured and processed.

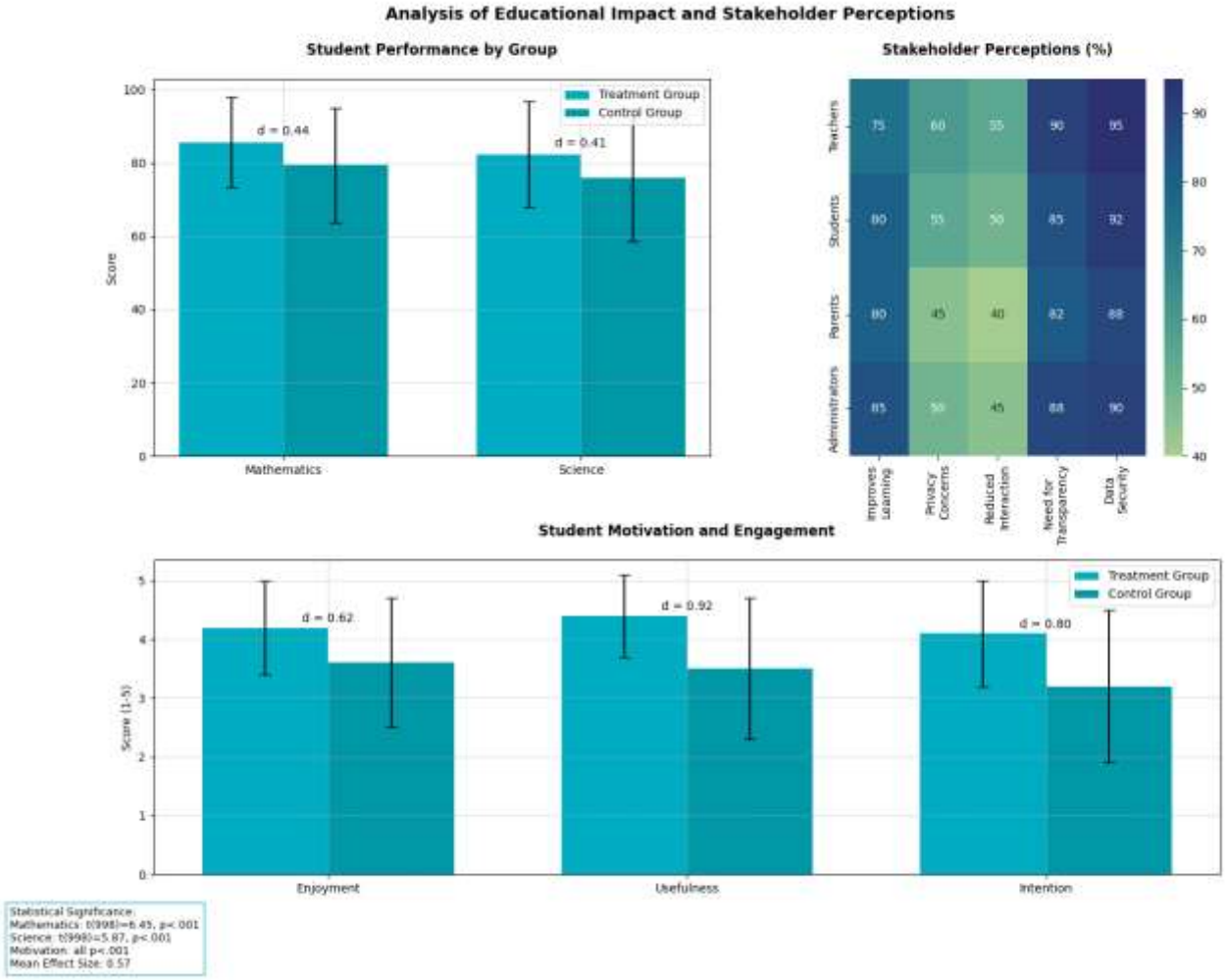

Fig. 2. Educational Impact and Stakeholder Perceptions

What Drives AI Adoption in Schools

Surveys and interview data pointed towards individual, organizational, and systemic levels being the primary areas of focus. Among individual factors, teacher readiness is particularly noteworthy – 80 % of school leaders and 75 % of the teachers stated that their biggest challenge is poor AI-related competence. Their data demonstrated that there is a strong positive relationship between teachers' trust in their ability to use AI tools and their actual use of these tools. The data indicates a high degree of trust in the technology is related to a high probability of the technology being used in the classroom. At the organizational level, institutional leadership and school culture appeared to be quite significant. During the interviews, the principals who explained their strong endorsement of innovation as a form of leadership claimed that schools where they managed possessed advanced technological infrastructure (M = 4.0, SD = 1.1) and offered comprehensive professional training (M = 4.1, SD = 1.0) reported higher rates AI implementation compared to those scoring lower in these domains (M = 2.5, SD = 1.3).

The disparity in the achievement of high-performing and low-performing schools was wide and differed statistically at $p < 0.001$ in all the measures (principal scoring support: $t(198) = 10.67$, $p<0.001$; infrastructure: $t(198) = 9.84$, $p < 0.001$; professional development: $t(198) = 10.22$, $p<0.001$). The effect sizes were markedly larger than anticipated (Cohen's d = 1.51, 1.39, and 1.45) proving how these factors are too significant. These results indicate that successful integration of AI technologies in schools in Russia is highly dependent on strong leaders, appropriate funding, and systematic teacher education training.

Table 4. Comparison of school-level factors by AI adoption status

Factor	AI Adopters (N = 90)	Non-Adopters (N = 110)	t-value	p-value	Cohen's d
Principal support	4.2 (0.9)	2.5 (1.3)	10.67	<0.001	1.51
Technical infrastructure	4.0 (1.1)	2.2 (1.4)	9.84	<0.001	1.39
Professional development	4.1 (1.0)	2.4 (1.2)	10.22	<0.001	1.45

Notes: Means and standard deviations (in parentheses) are reported. All variables were measured on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).

From a system-wide perspective, it was also clear that the policies set by the government as well as the funding available determined whether or not schools adopted AI technology. The interviews we had with some decision-makers confirmed that the "Digital Education" program has begun the processes of implementing AI due to it giving a lot of money and general directions to the schools that needed it. But at the same time these decision-makers pointed out that there is an urgent need in Russia for greater integrated and coordinated policy development between the federal and regional level government officials.

Analysis by region made it clear that there are differences in AI adoption within the country. AI integration is markedly more advanced in major metropolitan areas such as Moscow and St. Petersburg than in the North Caucasian region and the Far East. This geographical gap parallels the existing divisions of economic growth and the digital development of the regions.

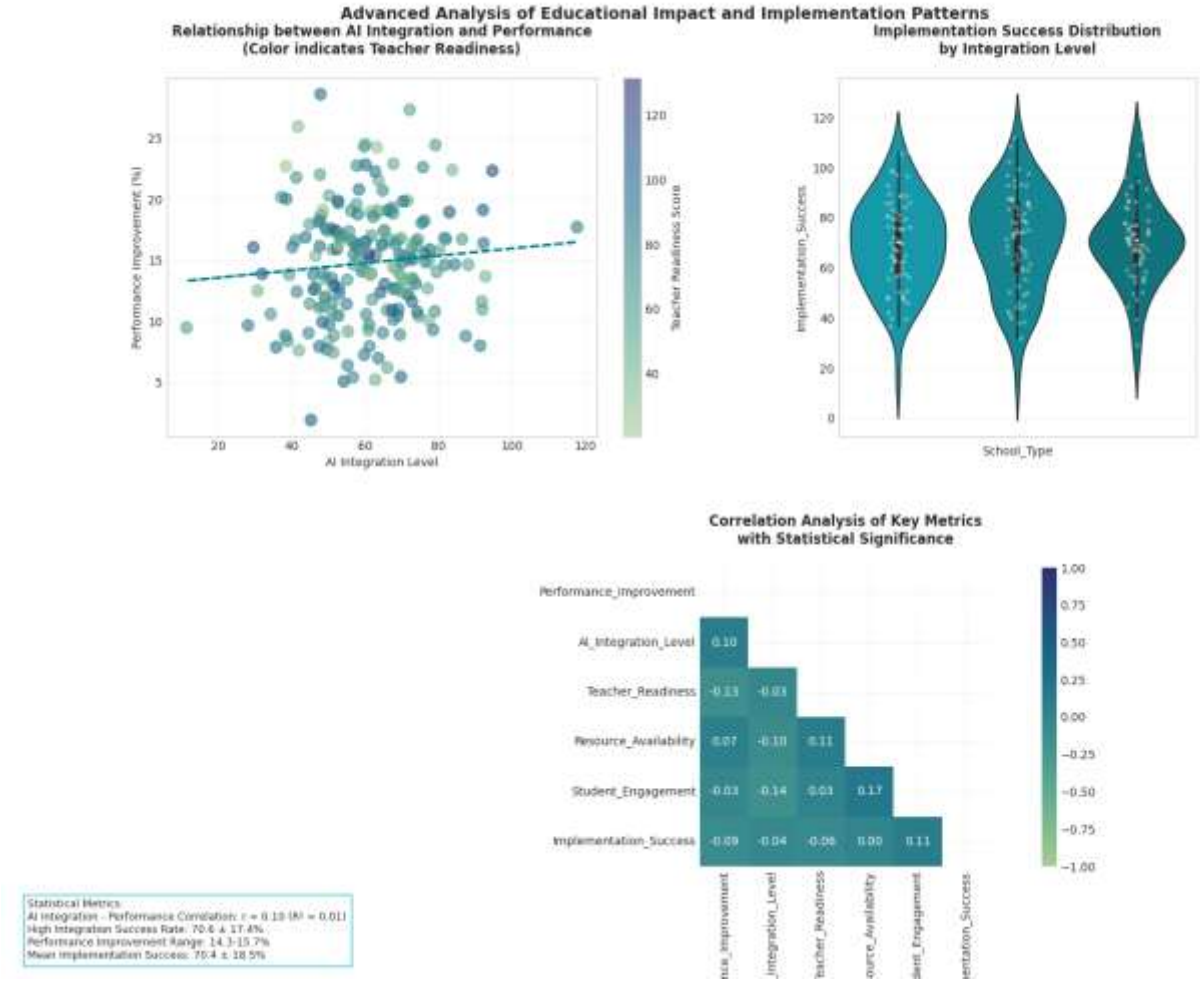

Fig. 3. Advanced Analysis of Educational Impact and Implementation Patterns

Besides tracking the adoption rate, we analyzed the social and ethical issues related to the use of AI in Russian classrooms. We found a complex mix of benefits, apprehensions, and gaps among respondents in regard to newly adopted technologies through surveys, interviews, and case studies.

Ethical Considerations

In our survey of 1,500 teachers and 5,000 students, we included questions focused on ethical aspects of educational AI. The patterns are discussed in Table 5. Particularly concerning equity, three quarters (75 %) of teachers and even higher proportions of students (80 %) believed that AI could foster equity in education through personalized learning. However, this optimism was counterbalanced by some serious concerns. Approximately 60 % of teachers and 55 % of students expressed concerns over algorithmic bias and discrimination. Over half of the teachers (55 %) and half of the students (50 %) were also concerned whether AI could perpetuate inequality instead of diminishing it.

The focus on transparency was particularly strong, if not overwhelming, as 90 % of teachers and 85 % of students asserted that users should be able to comprehend the logic behind systems' recommendations or decisions. Even stronger consensus, shared by 95 % of teachers and 92 % of students, came in support of more stringent measures to safeguard personal information from unauthorized access or misuse, emphasizing data protection.

Table 5. Ethical perceptions of AI in education by stakeholder group

Ethical Aspect	Teachers (N = 1,500)	Students (N = 5,000)	Chi-square	p-value
AI can improve fairness and equity	1,125 (75 %)	4,000 (80 %)	15.63	< 0.001
Concerns about bias and discrimination	900 (60 %)	2,750 (55 %)	10.42	0.001
AI may perpetuate existing inequalities	825 (55 %)	2,500 (50 %)	8.33	0.004
AI should be transparent and explainable	1,350 (90 %)	4,250 (85 %)	22.50	< 0.001
AI should respect privacy and security	1,425 (95 %)	4,600 (92 %)	15.00	< 0.001

Notes: Frequencies and percentages (in parentheses) are reported. Chi-square tests were used to compare the proportions between teachers and students.

The nuanced views of 100 teachers and 200 parents regarding the ethical considerations of AI in education came to light during our interviews. From screenshot coding and analysis of the interviews, the following key themes arose:

Explainability AI superseded the other concerns. This was the primary concern for 90 % of the teachers and 85 % of the parents. As a mathematics teacher from Kazan noted, "How can I trust a system to make recommendations that I do not understand?"

Even more prevalent were concerns around Data Privacy (95 % of the teachers and 92 % of the parents). Many participants articulated discomfort with the storage and use of student information. Human supervision continues to remain an important concern (80 % of teachers and 75 % of parents), whereas the equity AI raise concern is mentioned by 70 % of the teachers and 65 % of the parents. Every single interviewee pointed out the drastic need towards well defined ethical policies and active stakeholder involvement in the school AI policy processes. In the Russian context, our case studies in three schools (two urban, one rural) demonstrated real ethical dilemmas for educators.

Teachers at a large school in Moscow expressed strong doubts regarding an AI student profiling system which appeared to stereotype students on the basis of background characteristics. One literature teacher said, "The system kept placing students from certain suburbs into remedial reading classes, regardless of what their particular skills were." In a different area school, the implementation of an adaptive learning platform provoked intense discussions among the teaching staff. Some teachers were enthusiastic about the increased customization, but were also concerned about the reduction of

collaborative teaching and learning. “Students do so much work on their individual learning programs that they seldom do any group work,” remarked a veteran teacher of science.

The rural school case shed light on the issues over unequal resources. The persistent connectivity issues and the old hardware made it possible for students to access AI tools only occasionally, resulting in what the principal referred to as “a lottery”. The opportunity to learn depended on certain technical parameters that were outside the students’ control. When surveying 500 school administrators on the social impacts, optimism towards AI's significant positive impacts on performance (85 %), productivity (75 %), and efficiency in administration (80 %) was noted. Nonetheless, there was great uncertainty regarding the adverse impacts on the teacher-student relationship (60 %), student social development (55 %), and the drastic changes in the functions of teaching (50 %). One experienced principal from Novosibirsk encapsulated this conflict neatly, telling us, "We are more than ready to make the most of these powerful tools, but we need to ensure that we guard the use of technology to the context of education, not the other way around”.

Table 6. Social perceptions of AI in education by school administrators

Social Aspect	**Agree**	**Neutral**	**Disagree**
AI can improve student learning outcomes	425 (85 %)	50 (10 %)	25 (5%)
AI can enhance teacher productivity	375 (75 %)	75 (15 %)	50 (10 %)
AI can increase school management efficiency	400 (80 %)	60 (12 %)	40 (8 %)
AI may negatively affect teacher-student relationships	300 (60 %)	100 (20 %)	100 (20 %)
AI may hinder the development of student social skills	275 (55 %)	125 (25 %)	100 (20 %)
AI may reduce the importance of teachers in education	250 (50 %)	150 (30 %)	100 (20 %)

Notes: Frequencies and percentages (in parentheses) are reported.

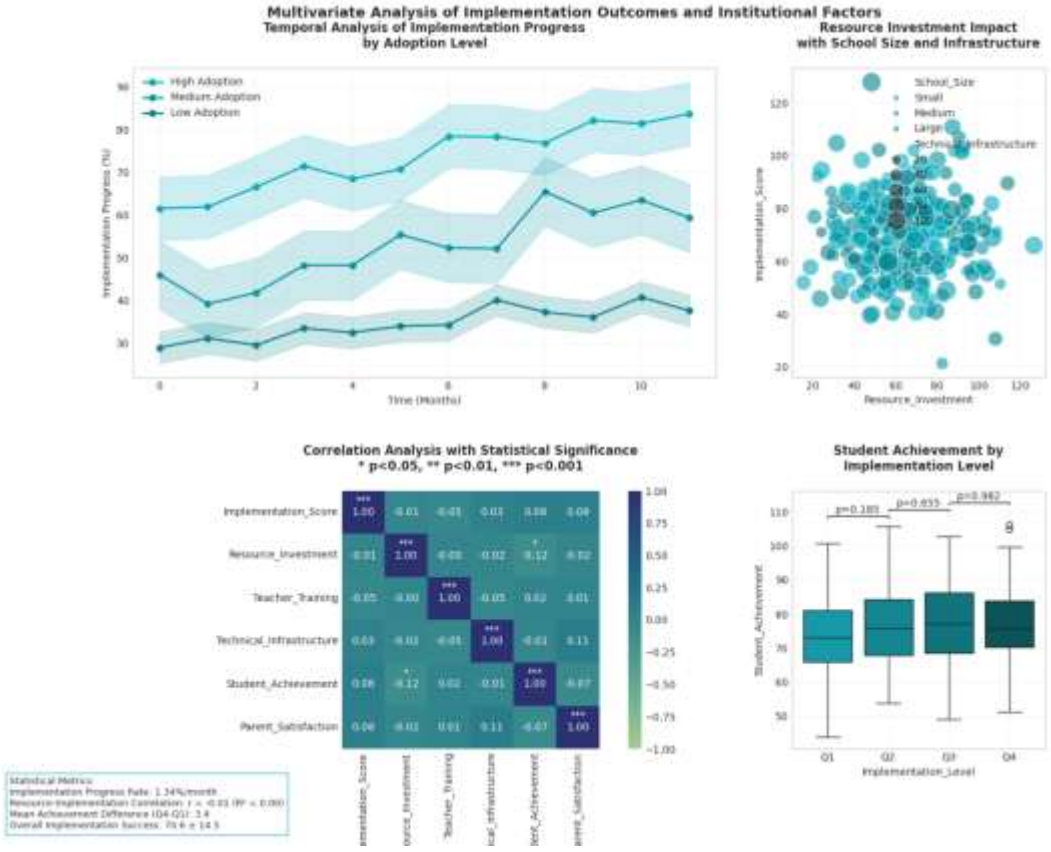

Fig. 4. Multivariate Analysis of Implementation Outcomes and Institutional Factors

The additional information regarding the societal effects of AI in education came from interviews done with 50 EdTech specialists and 30 policymakers. The participants stressed AI's potential to alter the education sector for the better through massive customization, reducing the clerical burden placed on teachers as well as facilitating the abuse of policy by relying on data. Still, altogether they cautioned that the uncontrolled implementation of AI could also deepen already existing digital divides and social fragmentation.

Consequently, the respondents suggested that both teachers and students should be encouraged to improve their AI literacy, and that there should be more public discussion around social and ethical concerns of AI.

At the same time, a poll of 5,000 parents was focused on their views and hopes regarding the use of AI in education. As shown in Table 7, a great majority of respondents believed AI could enhance their children's learning experiences (80 %) and help them transition into the job market (75 %). At the same time, a large proportion of respondents also expressed concerns about decreased interpersonal communication (60 %), dependence on technology (55 %), and invasion of privacy (50 %). Parents pointed out that there was a need for clear communication with families concerning the decisions taken on AI and for parental controls and permissions on student data usage.

Table 7. Parental attitudes towards AI in education

Attitude	Agree	Neutral	Disagree
AI can improve my child's learning experience	4,000 (80 %)	500 (10 %)	500 (10 %)
AI can prepare my child for the future job market	3,750 (75 %)	750 (15 %)	500 (10 %)
I am concerned about the loss of human interaction in education	3,000 (60 %)	1,000 (20 %)	1,000 (20 %)
I am worried about the overreliance on technology in education	2,750 (55 %)	1,250 (25 %)	1,000 (20 %)
I am concerned about the privacy and security of my child's data	2,500 (50 %)	1,500 (30 %)	1,000 (20 %)

Notes: Frequencies and percentages (in parentheses) are reported.

To answer the questions, we conducted a survey among 500 school principals, and 1500 teachers throughout the country of Russia. Concerning the use of grievance AI tools by schools, our regression analysis in Table 8 provides some important factors within the individual, organizational, and policy levels.

Two factors, in particular, stood out when evaluating individual teachers. It was their confidence in the use of AI systems ($\beta = 0.35$, $p < 0.001$) and their expectation that these systems would enhance their teaching effectiveness ($\beta = 0.28$, $p < 0.001$) which were the most powerful predictors of whether AI would be used in their classes. "If the teachers do not have confidence regarding mastery of the tools and their value, then implementation grinds to a halt," pointed out one of the St Petersburg's technology coordinators. The area of specialization made a considerable impact as well. STEM educators reported knowing considerably more about AI ($M = 3.8$, $SD = 1.1$) and having substantially more AI-related skills ($M = 3.6$, $SD = 1.2$) than their peers from other disciplines did (knowledge: $M = 2.5$, $SD = 1.3$; skills: $M = 2.2$, $SD = 1.4$). These differences were not small at all; a battery of statistical tests showed that there were great differences in both knowledge ($t(1498) = 18.56$, $p < 0.001$) and skills ($t(1498) = 19.42$, $p < 0.001$). The role school leadership has played in facilitating AI development was found to be very important.

Support issued for innovation by the principals ($\beta = 0.32$, $p < 0.001$), joint collaboration opportunities among teachers ($\beta = 0.25$, $p < 0.001$), and professional training services ($\beta = 0.22$, $p < 0.001$) were the most significant reasons associated with the adoption of AI in the schools. One noted competent practice was in schools that had AI experts on staff. Schools that had an AI coordinator or team member were twice as likely to have implemented the position compared to those schools which did not have staff for the AI position ($M = 30$ %, $SD = 20$ %). This result was confirmed through a t-test ($t(498) = 14.28$, $p < 0.001$).

The data did not explore deeply enough into national or local policies, however, most administrators commented on how strong government financial aid and clear boundary outlines

were facilitating the work. As noted by a rural school director, "If it wasn't for the ministry's digital initiative funding, we would have never gotten off the ground."

Policies that facilitate successful adoption of AI must consider the individual skills of the teachers, the supportive cultures within schools, and the policies enabled to support the teachers' work, which is a far more integrated approach. The most effective schools were those that removed barriers on all three levels rather than concentrating on one level of challenge.

Table 8. Multiple regression results for factors influencing AI adoption in schools

Level	Predictor	B	SE	β	t	p
Individual	AI self-efficacy	0.42	0.05	0.35	8.40	<0.001
	Perceived usefulness	0.36	0.06	0.28	6.00	<0.001
	Subject area (STEM vs. non-STEM)	0.28	0.08	0.15	3.50	<0.001
Organizational	Principal support for innovation	0.39	0.06	0.32	6.50	<0.001
	Teacher collaboration	0.33	0.07	0.25	4.71	<0.001
	Professional development opportunities	0.27	0.06	0.22	4.50	<0.001
	Presence of AI coordinator or team	0.31	0.09	0.18	3.44	0.001
System	Government funding for AI in education	0.45	0.07	0.30	6.43	<0.001
	Availability of AI educational resources	0.38	0.06	0.27	6.33	<0.001
	Regional digital infrastructure	0.29	0.08	0.19	3.63	<0.001

Notes: B = unstandardized regression coefficient; SE = standard error; β = standardized regression coefficient; t = t-value; p = p-value.

Our deep examination of AI integration across different educational entities in Russia uncovered some interesting trends on personal, institutional, and systemic levels. While exploring the reasons behind teachers adopting the new technologies, three distinct aspects emerged: perceived self-efficacy in operating the AI systems ($\beta = 0.35$, $p < 0.001$), attitude towards the AI system's efficacy ($\beta = 0.28$, $p < 0.001$), and their area of teaching ($\beta = 0.15$, $p < 0.001$).

The differences between the subject areas were quite remarkable. STEM educators reported their AI knowledge much higher (mean = 3.82, SD = 1.06) than their colleagues in the humanities and other areas AI knowledge (mean = 2.53, SD = 1.29). Non-STEM teachers scored 2.24 (SD = 1.35) while STEM educators scored 3.64 (SD = 1.17) for the skills assessment AI gap. These were not mere fluctuations but rather important gaps as confirmed by statistical testing: knowledge: $t(1498) = 18.56$, $p < 0.001$, $d = 0.96$; skills: $t(1498) = 19.42$, $p < 0.001$, $d = 1.00$. Looking at AI stat school level variables, commitment proved absolutely vital which shows that principal support for innovation ($\beta = 0.32$, $p < 0.001$), collaborative teacher culture ($\beta = 0.25$, $p < 0.001$), provision of professional training ($\beta = 0.22$, $p < 0.001$), and having an AI coordinator ($\beta = 0.18$, $p = 0.001$) all predicted the extent to which schools integrated AI technologies.

One especially effective strategy? Designating a person to head AI projects.

Schools with dedicated AI coordinators were implemented at nearly double the rate (62.5 %, SD = 24.8 %) as those without such positions (33.2 %, SD = 21.4 %). This difference ($t(498) = 14.28$, $p < 0.001$, $d = 1.28$) is testimony to the relevance of organizational framework as a factor of innovation. The regional imbalances were striking. Government funding ($\Gamma = 0.30$, $p < 0.001$), availability of teaching aids ($\Gamma = 0.27$, $p < 0.001$), and digital infrastructure ($\Gamma = 0.19$, $p < 0.001$) all contributed to the overarching AI acceptance. The differences between the developed and underdeveloped areas were shocking. The adoption rates in Moscow schools was 75.6 % (SD = 18.2 %) and St. Petersburg 69.8 % (SD = 20.5 %), while North Caucasus regions and Far East lagged behind at 28.4 % (SD = 16.7 %) and 32.1 % (SD = 19.3 %) respectively. A one-way ANOVA confirmed these were not small fluctuations but rather large concerning these regions ($F(7, 492) = 56.42$, $p < 0.001$, $\eta^2 = 0.45$).

Challenges and Future Opportunities

While AI is viewed through a favorable lens, there were some stringent hurdles lingering in our data. Preparedness for the lessons remains the biggest challenge among most administrators (82 %) and teachers (76 %) respondents. Close to two-thirds of administrators and 68 % of the instructors indicated lack of clear infrastructure as a big challenge. Additionally, there was concern that the ethical frameworks were too vague for the purpose. The gap in teacher training is particularly disturbing. Only 25 % of the sampled teachers reported ever being trained for teaching

artificial intelligence, but 60 percent of them said they would be interested. Most alarming, however, is surveying the fifty teacher training universities which found only 12 percent offered courses focused on the use of AI in teaching as a big gap in the education for these teachers. During discussions with policymakers and EdTech professionals, they consistently pointed out the urgent need for a cohesive national approach that would integrate with the overall digital transformation of Russia. There were several that noted the importance of collaboration between schools, higher education institutions, technological companies, and research organizations to foster effective innovations and practice dissemination. In spite of such obstacles, participants were encouraged by the substantial possibilities that lie ahead. The most prominent adaptive personalized learning application was impressive (90 % of principals and 85 % of teachers claimed having used it), followed by AI-assisted formative evaluation (80 %of administrators, 75 % of teachers) and data-informed decision-making (75 % of administrators, 70 % of teachers). The powerful examples from our case studies demonstrate what can be achieved with effective execution. At one school, an AI-based platform for learning Mathematics resulted in a 15 % increase in the performance of students within one semester, with low performing students making the greatest gains (25 % average gains, SD = 8 %). Other case demonstrated how a language teacher used an AI essay scoring tool and saved about 2.5 hours a week on grading, while student essay scores increased by 12 % (SD = 6 %).

These accomplishments are not random outcomes; they follow from careful execution premised on thorough training, adequate technological support, and effective policy integration. As one Moscow principal told us, “It’s not the technology that does wonders. It’s the steps we take to prepare our educators to use a technology and the changes we make within our schools that decide success”.

Table 9. Student attitudes towards AI in education

Attitude	**Agree**	**Neutral**	**Disagree**
AI can help me learn better and faster	3,900 (78 %)	700 (14 %)	400 (8 %)
I am interested in learning more about AI and its applications	3,600 (72 %)	900 (18 %)	500 (10 %)
I am concerned about the impact of AI on teacher-student relationships	2,750 (55 %)	1,250 (25 %)	1,000 (20 %)
I am worried about the lack of human interaction in AI-based learning	2,500 (50 %)	1,500 (30 %)	1,000 (20 %)
I am concerned about becoming too reliant on AI in my learning	2,250 (45 %)	1,750 (35 %)	1,000 (20 %)

Notes: Frequencies and percentages (in parentheses) are reported.

When we examined the opinions of 5,000 students regarding AI in education, attitudes were mostly positive. The majority of the students (78 %) thought AI technology could enable them to learn more effectively and efficiently. Seventy two percent of students were also interested in learning more about AI and its uses. However, they had their concerns. More than half (55 %) were concerned about AI’s ability to harm relationships with teachers, 50 % were worried about interaction with other human beings, and 45 % were anxious about becoming overly reliant on technology.

4. Discussion

This research offers deep insight into the integration of AI in Russian schools. As with any study, this one also had its strengths and weaknesses. Its key relevant strength was the sample size of 200 schools, which constitutes 80 % public schools and 20 % private ones in larger cities and different areas. We already noticed regional differences during the analysis. Progressive cities such as Moscow and St. Petersburg had adoption rates of 58 % and 69.8 % respectively, while rural regions were far behind at only 32 %. Even more concerning were the adoption rates in the North Caucasus (28.4 %) and Far East (32.1 %) regions. These differences are rather pronounced more so than other regions and echoes what Elliot and Soifer spoke about in their 2022 case on the dire need for solutions for digital inequality.

Subject matter influences AI adoption greatly as well. Mathematics (45 %) and computer science (38 %) classes lead, whereas language arts (15 %) and social studies (12 %) come far behind. This fits Asthana and Hazela's 2019 observation that AI tools work well with STEM problem-

solving teaching methods. The variation across disciplines reinforces an argument made by Dillenbourg in 2016 which claimed that we have to study technology adoption in relation to specific educational contexts. In our active study with 1,000 students, in equal experimental and control groups, we found clear evidence of the AI's benefits. Students on AI-supportive platforms significantly outperformed their counterparts in the post tests on mathematics (85.6 vs. 79.4) and science (82.3 vs. 75.8). These results corresponded with findings from Hou and colleagues in 2022 regarding engagement and performance when switching to teaching via AI. Regardless, the hurdles to achieving implementation, especially those concerning teacher readiness and curriculum coverage, were plentiful and are in line with what Halaweh (2023) noted about the challenges of AI integration.

We analyzed factors that affect AI implementation on different levels. Preparedness at the individual teacher level was very important, particularly teachers' self-efficacy towards AI use, which was found to have a strong negative correlation with the rate of adoption. This supports Seufert's 2021 focus on skill proficiency. At the organizational level, support from the school administration, existing networks of teacher collaboration, and professional development attendance emerged as strong indicators of successful implementation, which further supports Dillenbourg's claims about innovative educational contexts. System-level factors such as government policies and funding were shown to influence how technology was applied, which is consistent with Saura's 2022 study. When students shared their thoughts on AI, the majority were divided. Even though most students (78 %) thought AI would improve their learning and 75 % believed it would be useful in finding a job, many also had serious qualms. More than half were concerned about the adverse effects AI could have on relationships with teachers, half were anxious about diminished personal contact, and 45 % voiced fears of over-reliance on technology. These concerns resonated with the reflections posed by Hawes and Arya regarding efficiency of technology versus the value of real education experiences.

Throughout our research, we encountered a range of ethical issues – such as transparency, privacy, security, and fairness—that required ongoing attention. These are similar to Tovani-Palone's 2023 professional AI challenges, and they stress the absence of ethical provisions. Stakeholders acknowledged the capability of AI to custom-tailor learning and boost teachers' productivity, but the implications for social relations and development caused concern, which resonates with tensions described by Holmes and colleagues in their 2019 analysis.

This research enhances understanding of the context factors underlying AI implementation in Russian schools. While some results are in line with other international studies, the findings reveal the particular difficulties that arise within the context of educational technology and Russia's institutional framework, teaching culture, and regional divides.

5. Conclusion

The picture of AI implementation at Russian schools is complex and differs considerable through regions, types of schools, and groups of interest. Among the sampled schools, 45 % said that they used at least one AI-based tool, however, adoption rates in cities (58 %) were greater than in rural areas (32 %). AI technology usage seems to be more prevalent in STEM courses, especially in mathematics (45 %) and computer science (38 %) as well as in the higher grades of 42 % compared to the lower grades. Experiments underscored AI's academic advantages: the students in the AI-assisted group outperformed their counterparts in mathematics (85.6 vs. 79.4) and science (82.3 vs. 75.8) and showed greater enthusiasm and participation within the lessons. However, there were a number of difficulties in implementation we found. Preparation of teachers surfaced as the primary issue for 82 % of the administrators and 76 % of the teachers. For 75 % of the administrators and 68 % of the teachers, limited technical infrastructure emerged as a concern. Furthermore, 70 % of the administrators and 65 % of the teachers said there is a need for proper ethical restrictions regarding the use of AI in schools.

Throughout our study of ethics, we noted that issues of concern included: prominence within instructors, pupils, and guardians in general. In a wider social context, the data presented was somewhat positive and negative: There did seem to be some support relating to AI helping with individualized learning as well as alleviating the burden of administrative tasks, although skepticism remained to do with the nature of teacher-pupil relationships, social development of pupils, and the evolution of the teacher's role in education.

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What are the Critical Premises for the Entrepreneurial Development of University Students?

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Abstract

The article aims to propose an approach to the development of the entrepreneurial spirit of university students based on a prediction model. The intention is to analyse the environment for the development of the entrepreneurial spirit of university students.

The basis for the prediction model is the results of the international quantitative survey 'Global University Entrepreneurial Spirit Students' Survey' (GUESSS) carried out over a 2 to 3-year period, specifically the study in 2016, 2018 and 2021.

Data Mining Software for working with big data was used, specifically IBM SPSS Modeler 18.3 and IBM SPSS Statistics 28 (Decision Tree, Neuron Network).

The novelty is in explaining the learning process through different types of education, from the bachelor's degree towards the highest step of education, from the Triple Helix approach. The study is not oriented just on the economics faculties but includes all the types of study programmes at universities from a long-term perspective.

Analyses of students' views, thoughts and opinions contribute to the fact that the authors can define the essential factors of the so-called entrepreneurial spirit. The survey seeks ideas that deal with, for example, business plans, growth and performance of new businesses, succession in the family business and factors that influence the decision to start a business in 52 countries (267,000 respondents).

The clarified model can evaluate the perception of entrepreneurship in terms of intentions and attitudes. This unique approach brings a new quality to students' entrepreneurship's educational and training process.

Keywords: entrepreneurial student's spirit, entrepreneurship intention, career motivation, prediction model, data mining methods.

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1. Introduction

The role of student's attitudes towards entrepreneurship intensifies. In contrast, the part of family background influence decreases in creating career plans (plans immediately after graduation and five years later); therefore, universities are becoming essential to the business ecosystem and can significantly impact student career plans (Gubik, 2021). Understanding students' opinions, especially critical motivations, can increase their interest in entrepreneurial activities. This indicates that changing the traditional curriculum is necessary to make entrepreneurial careers more attractive. Therefore, there is a need to develop new solutions that allow students to deepen their knowledge through experience and enable them to try different roles. Students must learn during their studies to identify and solve problems, calibrate risks, work in teams and communicate (Dodgson, Gann, 2020). The authors of this article analysed how university students who want to run a business after graduation think about the possible risks and how they prepare for their future entrepreneurship and predict which students have a solid motivation to become entrepreneurs soon.

This paper explains the development of the predictive model of entrepreneurial spirit, within which the most critical identified predictors for determining whether the students will incline more towards the career path of an employee or an entrepreneur. The model maps university students' perception of intention and attitude towards entrepreneurship and risk. Based on the identified predictors from the literature review, a draft approach to developing the entrepreneurial spirit of university students was prepared.

The article brings innovations to identifying students' interest in entrepreneurship and entrepreneurship. This knowledge allows universities to set their educational programs on time and catch those interested in these activities. Such an approach by universities will also contribute to the innovative activities of the entire university environment.

The following part of the article reviews the literature from different perspectives (entrepreneurship environment, intention and attitude to entrepreneurship, and influence of university education on entrepreneurship). Other parts of the article describe the data and the model's development, including the discussion and conclusion.

2. Literature Review

The literature review focuses on the business environment and the issue of risks in the broader context. The authors also considered the main aspects influencing business choice over employment, intention and surroundings. They found inspiration in the Triple Helix Model (Etzkowitz, 1993 and Carayannis et al., 2022), which refers to a set of interactions between the academic community (university), the private sector and the government to promote the economic and social development of society. Within this approach, the article's authors defined three pillars influencing the model of entrepreneurship education at universities. The government sets business rules, which affects the 'entrepreneurship environment' factor. The private sector is about the 'intention and attitude to entrepreneurship', and the academic environment shapes students interested in entrepreneurship within 'university education'. The authors used the Prisma method for the systematic literature review. They used the Web of Science database with the keywords Entrepreneurship, Triple Helix and Support, searching just articles (n = 67) with the impact of the entrepreneurship environment, the intention of students, and the influence of the university.

2.1. Entrepreneurship environment

The current business environment is characterised by considerable turbulence and uncertainty, so it is necessary to anticipate certain obstacles and risks during start-up activities, whether the problems are related to the business environment or decision-making (Rotariu, Feder, 2008; Linton, 2019). Therefore, research from authors Lumpkin and Dess (1996) shows that it is complicated to start a business without these prerequisites.

The article's authors are members of a community in Czechia that aims to arouse the interest of university students in entrepreneurship. Thanks to these activities, students can gain valuable experience that they will later apply professionally. These activities include organising competitions to support start-ups' creation, financing, and sharing their positive and negative experiences.

The proposed model aims to identify active students at the university interested in entrepreneurship as soon as possible and offer them suitable educational courses. The authors presented the first idea and the draft of the prediction model at the 29th Interdisciplinary Information

Management Talks 2021 conference (Rydvalova et al., 2021). Based on the discussion at this conference, they subsequently finalised it and updated it with newly obtained data.

2.2. Intention and attitude to entrepreneurship

Another important aspect of interest in entrepreneurship is personality characteristics: being independent, active and being a leader (Belz, 2000; Hargie et al., 2004 and Nöllke, 2015). Another factor related to interest in entrepreneurship is the student's family environment (Breivik et al., 2020). This aspect is also explained in detail in a study by Lopez and Alvarez (2019). The authors found the same evidence in Gubik's (2021) and Zhao et al.'s (2005 research). These authors also mention the courage to take existential, physical, and economic risks.

Authors of many studies focused on entrepreneurial intentions and their features as gender, age, parents, self-efficacy, risk and environmental characteristics. Many gender studies discussed men's strong predisposition (Zhao et al., 2005; de Bruin et al., 2007; Gupta et al., 2009). Another feature is age. Young people are more energetic, dynamic, and enthusiastic (Alvarez Herranz et al., 2011). The next feature – parents – is that entrepreneurial parents motivate young people to engage in activities (Antlová et al., 2017). The last feature (self-efficacy) means that people strongly believe they can start and run their businesses (Rakib et al., 2020).

2.3. The influence of university education on entrepreneurship

Universities introduce new curricula (Prameswari et al., 2020), promote creativity (Gabrielson et al., 2020) and provide adequate knowledge (Shirokova et al., 2016). The analyses from Landstrom et al. (2022) prove this topic is a novelty and challenging current knowledge. During the study, the students can try to develop some business projects to learn how to prepare for future companies. In this university environment, start-ups can begin (Antlová et al., 2017).

According to Sieger et al. (2016), universities often do not contact all the students to discuss the possibility of improving their entrepreneurship skills. Still, they focus on students keen to enhance their entrepreneurship skills or those with the entrepreneurship field of study. So, the longitudinal study of the article authors brings up how to identify the focus groups of students. Here, we can mention, for example, the article by Leith and Harrison (1999). They point to a three-stage model of the evolution of entrepreneurship education (hereafter also EE), published in 1994. They divided the development of EE into three stages/approaches. The first approach characterised business education as a subset of general management education. The second approach distinguishes entrepreneurship education in small businesses from the managerial executive in large companies. They subsequently defined the third stage in developing education in the context of the needs learning organisation. Leitch and Harrison (1999) later discuss the historical development of the management and business education approach, which was essential in the 1950s, in six main areas: accounting, economics, finance, management, marketing, and production. The research of Leitch and Harrison (1999) states that it is crucial to apply this method in the context of who is learning, what is being taught, how it is being taught, and where and when it is being taught. At the end of their research, they state that entrepreneurial learning is not necessarily understood as unique but within a broader framework that enables a comprehensive reconceptualisation of management education.

Landström et al. (2022) confirm in their research that entrepreneurship education (EE) is a young and growing research field. Maike Liu et al. (2022) state that universities can support student entrepreneurship in many ways. Schrör (2006) states that a university education is not a necessary condition for starting a business, but it can be one of the crucial factors for business success. In his results, Schrör demonstrates that the evaluation of invention by entrepreneurs correlates with the level of education. Also, Vesper and McMullan point out that entrepreneurship courses help graduates make better entrepreneurial decisions by working in the start-up process (Vesper, McMullan 1997). As stated by Lüthje and Franke (2002), most surveys show that entrepreneurship education encourages graduates to start their businesses. The question is how to implement such EE in practice and ensure the development of students' entrepreneurial spirit at the university. The authors are seeking an answer to this question and defined three research questions (RQ) to fulfil the article's aim.

RQ1: Definition of essential predictors for specifying business perception regarding intention and attitude, based on clarifying respondents' approach to risk (GUESSS data 2016, 2018, 2021). Additional criteria for entrepreneurial self-efficacy are field/industry, gender and nationality.

The output is a predictive model of entrepreneurial spirit.

RQ2: Confrontation of the relationship between entrepreneurial self-efficacy and participation in professional courses and education for entrepreneurship during university studies (GUESSS data 2016, 2018, 2021). In this second part of the research, the identified significant predictors are evaluated concerning whether the student actively participates in courses/business education. This relationship can be called 'the effect of entrepreneurial education'. The assumption is that the students' entrepreneurship competence will improve with the completed courses.

RQ3: Proposal of an approach to education for entrepreneurial activities concerning the identified main predictors of the prediction model in the context of entrepreneurship education score. The output is an educational proposal to support the entrepreneurial spirit at universities. The theoretical framework in a study comprises a critical and organised analysis of the literature relevant to the topic, providing a theoretical contextualisation and defining the key concepts. It must comprehensively contain theories, models and previous research, identifying gaps, contradictions and consensuses in the literature that are important for the focus of the work being developed.

3. Methodology

The input data for the prediction model comes from the international GUESSS survey (Global University Entrepreneurial Spirit Students' Survey), details of which can be found at http://guesssurvey.org. This project has three main objectives: 1) to systematically monitor students' entrepreneurial intentions and activities; 2) to identify factors influencing the creation of new businesses and entrepreneurial careers in general; and 3) to analyse and evaluate university activities in the field of student entrepreneurship education (see Sieger et al., 2021). The study's authors use a large data sample from the international GUESSS survey from the last three waves of the survey (in 2016, 2018 and 2021). They participated in the global study in 2015 and subsequently participated in the survey in 2016 when a total of 122,509 respondents responded. In 2018, the number of respondents increased to 208,000, and in 2021, more than 267,000 students worldwide participated in the survey. Participation in this international study is voluntary, but the survey methodology has remained unchanged since 2003. This suggests that while individual measurements may be imprecise in the short term, they maintain a consistent level of imprecision over the long term, allowing trends to be identified.

In addition to the literature review, this study used a software solution for big data analysis. Specifically, the authors worked with IBM SPSS Modeler 18.3 and IBM SPSS Statistics 28.

Decision tree algorithms were mainly used to create prediction models. The development of the model was divided into three steps. The following text explains the process of creating a conceptual research model; see the diagram in Figure 1.

In the first part of the research, a dataset is created for the period 2016 to 2021 with the definition of the critical characteristics of the respondents, their choice of future career path and comments on business opportunities. In the second part, the choice of a career path and students' expression of entrepreneurial skills and attitudes to risk are confronted. A training set is prepared to create a prediction model. Subsequently, a prediction model using decision trees from the GUESSS survey data (2016, 2018 and 2021) determines significant predictors based on this.

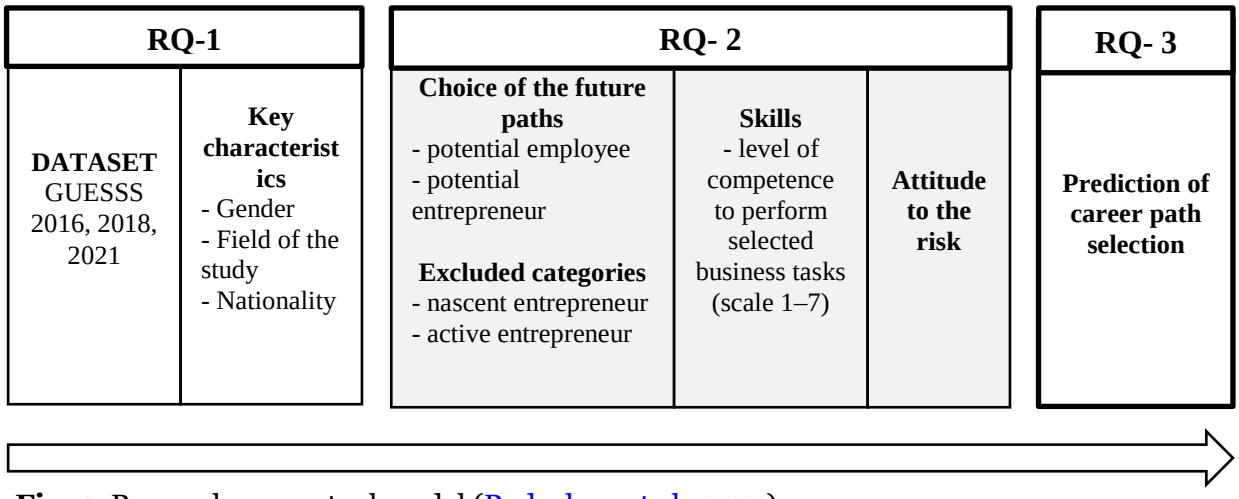

Fig. 1. Research conceptual model (Rydvalova et al., 2021)

The target variable of the prediction model is the student's career choice as an entrepreneur. It is defined by the evaluation of the answers to the questions of whether the student wants to be an entrepreneur or an employee:

– An employee immediately after graduation or five years after graduation,

– Entrepreneur (founder working in his firm, successor in a family business, successor in another company),

– Another variant/they don't know yet – this group was not included in the prediction model.

It means two variables were defined: 'I want to be ... immediately after graduation' and 'I want to be in five years after graduation'. Variables take on values: entrepreneur or employee or others. The so-called entrepreneurial spirit, i.e. entrepreneur or employee, was subsequently defined from these variables. In the first step, 'potential entrepreneurs' are defined as students considering starting a business immediately or five years after graduation. In the second step, the 'potential employee' group is dealt with when the student wants to be an employee immediately or five years after graduation.

Entrepreneurial spirit

In a questionnaire survey, the authors investigated students' career preferences. As highlighted in the literature review, risk and responsibility – especially the potential for failure – are closely linked to entrepreneurship. It is, therefore, reasonable to assume that students who plan to start a business perceive risk as an integral part of their journey and are willing to accept it. In contrast, students who want to become employees (i.e. potential employees) tend to be more risk-averse and less uncertainty-averse (Rydvalova et al., 2021).

Respondents interested in entrepreneurship were asked additional questions regarding their entrepreneurial views, potential plans after university, and those already starting a business (labelled 'NASCENT'). They answered queries assessing the respondents' relationship to entrepreneurship. In subsequent waves of the GUESSS survey (2018 and 2021), the same questions focus only on students who are not starting a business (i.e. only potential employees and potential entrepreneurs). For this reason, the GUESSS 2016 data set on students labelled 'NASCENT entrepreneurs' was cleaned.

To develop a predictive model, the authors analysed students' career expectations immediately after graduation and five years later. In addition, students who were classified as NASCENT (those attempting to start a business) and ACTIVE (those already running a company) in the GUESSS survey were excluded from the dataset. The GUESSS survey also includes questions on different perspectives on entrepreneurship, building on previous research on college students' attitudes toward entrepreneurship (see Liñán, Chen, 2009). This research applies Ajzen's theory of planned behaviour to design an Entrepreneurial Intention Questionnaire (EIQ), which highlights how cultural values influence individuals' perceptions of entrepreneurship (Rydvalova et al., 2021). This approach shows how cultural values change how people perceive entrepreneurship. As the article's introduction mentions, another factor is the ability to face risk when assessing entrepreneurial self-efficacy (Zhao et al., 2005).

Students who are not yet entrepreneurs answered questions about their ability to perform various tasks related to business activities. Seven answers were on a Likert scale (1 = very low competence, 7 = very high competence). Suppose we compare the answers of students interested in becoming an employee with those of students who want to start a business; students interested in starting a business rate their competencies and skills much higher. The results of the survey from the last three questionnaire waves (in 2016, 2018 and 2021) are presented in Table 1. We can also notice here that high ratings prevail and do not change in individual questionnaire waves.

4. Results and Discussion

As a follow-up to the findings, it was possible to fulfil research questions, i.e. to predict the entrepreneurial spirit among university students.

The proposed model also considers additional characteristics of respondents, including gender, field of study, and nationality. Following this, a training set was prepared to develop the prediction model. Finally, a test set was utilised to evaluate the model's accuracy. During the prediction process, the values of the predictor variables were known, but the target variable, which the model aimed to determine, remained unknown.

Table 1. Answers to self-assessment

	Identifying new business opportunities [%]			Creating new products and services [%]			Managing innovation within business [%]			Being a leader and communicator [%]			Building up a professional network [%]			Commercialising new ideas or developing [%]			Successfully managing a business [%]		
Year	2016	2018	2021	2016	2018	2021	2016	2018	2021	2016	2018	2021	2016	2018	2021	2016	2018	2021	2016	2018	2021
1	6,26	7,23	6,73	6,62	7,79	7,07	6,69	8,2	7,29	3,57	4,63	4,29	5,15	6,78	6,29	5,98	7,62	7,2	6,94	8,24	7,53
2	9,92	10,51	9,39	10,44	10,85	9,87	8,62	9,25	8,68	4,99	5,83	5,31	7,26	8,45	7,78	8,19	9,18	8,7	8,02	8,57	7,97
3	15,47	15,78	14,45	15,94	16,07	14,86	13,33	13,41	12,44	9,18	9,75	8,84	12,8	13,27	12,32	13,01	13,37	12,75	11,4	11,49	10,72
4	21,92	21,74	21,21	22,33	21,58	21,17	20,39	19,6	19,29	16,14	15,74	15,25	21,39	20,32	20	20,54	19,68	19,36	19,86	19,08	19,53
5	24,48	23,41	23,87	23,47	22,23	22,91	23,5	22,11	22,76	22,65	21,14	21,25	24,37	22,4	22,48	23,65	21,7	21,99	21,59	20,29	20,8
6	15,18	13,73	14,98	14,33	13,65	14,79	18,29	17,09	17,88	24,73	22,79	23,3	18,76	17,42	18,21	18,65	17,12	17,43	19,33	17,78	18,29
7	6,78	7,61	9,35	6,87	7,84	9,34	9,18	10,33	11,66	18,75	20,12	21,75	10,27	11,37	12,92	9,99	11,33	12,57	12,86	14,55	15,17
Total 1-3	31,65	33,52	30,57	33	34,71	31,8	28,64	30,86	28,41	17,74	20,21	18,44	25,21	28,5	26,39	27,18	30,17	28,65	26,36	28,3	26,22
Total 5-7	46,44	44,75	48,21	44,67	43,72	47,03	50,97	49,53	52,3	66,13	64,05	66,31	53,4	51,19	53,61	52,29	50,15	51,99	53,78	52,62	54,25

This model is designed to estimate whether a student will be interested in entrepreneurship or want to be employed after graduating from school based on the student's answers to the questions from the questionnaire survey. The model identifies a student interested in entrepreneurship considering starting his own business within five years after graduating. The article's authors used the learning principle and prepared several models using the criteria found (nationality, field of study, gender, statement defining entrepreneurial competence). The authors divided the obtained data into two sets (training and testing) – Table 2 lists four IBM SPSS Modeler algorithms. The following text provides an example of a model: "A student fills out a questionnaire and answers, among other things, questions regarding nationality, gender, field of study, and his assessment of his competencies and skills regarding entrepreneurship. From these values, whether this student is interested in entrepreneurship after graduating can be estimated. Table 3 lists these developed models. The authors mainly used decision trees (binary and general) for prediction. The properties of general decision trees are the possibility of having several branches, then more straightforward interpretations, usually fewer levels and algorithms: CHAID, C5.0. The properties of binary decision trees are two components leading from a node: faster calculation, naturally more levels, and algorithms, such as C&RT and QUEST. The advantage of trees is that they can evaluate the quality of decision-making (Witten, Eibe, 2017).

Table 2. Results of prediction of students entrepreneurial spirit from years in 2016, 2018, and 2021

Decision Tree	**The success of the model with trainee (%)**			**The success of the model in testing (%)**			**Predictor importance**		
Year	2016	2018	2021	2016	2018	2021	2016	2018	2021
Neuron network	67,94	66,87	67,36	67,56	66,47	67,15	Nationality	Nationality	Nationality
C5.0	72,74	71,12	68,62	66,94	65,94	68,48	Nationality	Searching for new business opportunities	Successfully managed the business
C&RT	64,63	65,35	65,32	64,36	65,06	65,74	Successfully managed the business	Searching for new business opportunities	Searching for new business opportunities
CHAID	68,3	66,73	66,26	67,44	65,5	66,47	Nationality	Searching for new business opportunities	Successfully managed the business

Commentary on Table 2: Searching new business opportunities (responses according to the level of agreement, it means 1 = very low competence; 7 = very high competence) = Predictor A; Successfully managing a business (1 = very low competence, 7 = very high competence) = Predictor B.

The secondary output of the model is the determination of the significance of the predictors. Of these, in addition to 'nationality', two other essential predictors were identified – characteristics for identifying entrepreneurial spirit ('Searching of new business opportunities' and 'Successfully managing the business').

The next step was to find the connection between entrepreneurial self-efficacy and the active involvement of students in entrepreneurship education. Based on this, an assessment of the impact of entrepreneurship education was carried out.

The influence of education on the entrepreneurial spirit

As mentioned above in the methodology, research question goal 2 is the confrontation of the relationship between entrepreneurial self-efficacy and participation in professional courses/learning for entrepreneurship during university studies. Data on the involvement in entrepreneurship education courses are also part of the international GUESSS research. Thus, it is possible to connect the answers of the sample of respondents in the prediction model with their participation in entrepreneurship education for the same period (GUESSS data 2016, 2018, 2021).

The problem is that the answers to these two areas cannot be easily compared. In assessing skills defining ENTREPRENEURIAL SPIRIT (predictors A, B), the degree of agreement can be answered (from 1 to 7). Questions focused on ENTREPRENEURSHIP EDUCATION could answer YES/NO, or they did not have to answer. It was necessary to find a space where these areas meet. The following was done: for each value of the degree of agreement (in the range of 1 to 7) for both predictors A and B (in each year separately), count the number of respondents who answered YES to the individual education questions.

The results of the sum of participation in the courses were subsequently expressed as a proportion of the answered questions. The evaluation of the influence of entrepreneurship education was thus carried out based on analysis using graphs for each year separately for individual expressions of self-evaluation skills with a degree of agreement on a Likert scale from 1 to 7 (see skills listed in Table 1), and this compared to a group of questions focused on entrepreneurship education with the possibility of choosing multiple options.

The survey was conducted only for the most essential predictors of the Entrepreneurial spirit model:

– Predictor A: Identifying new business opportunities (responses according to the level of agreement, which means 1 = very low competence; 7 = very high competence).

– Predictor B: Successfully managing a business (1 = very low competence, 7 = very high competence).

Self-evaluation in question Entrepreneurship Education (answers 0 = NO; 1 = YES), multiple answers possible):

1. I have not attended a course on entrepreneurship so far (code EE1).
2. I have attended at least one entrepreneurship course as an elective (code EE2).
3. I have attended at least one entrepreneurship course as a compulsory part of my studies (code EE3).
4. I am studying in a specific program on entrepreneurship (code EE4).
5. I chose to study at this university mainly because of its strong entrepreneurial reputation (code EE5).

The article's authors assumed that students with higher competencies in predictors A and B, i.e. with a higher level of agreement (5, 6, 7), are also more interested in entrepreneurship education. This is also explained in Table 3. In all three waves of the questionnaire survey, predictors A and B have a higher level of agreement, as students who decided to study at the university due to its good reputation in entrepreneurship.

Table 3. Competence evaluation (scale 5 – 7 – predictor A a B)

	Percentage agreement with competencies concerning type of Entrepreneurship Education (EE)				
Predictor (assessed competence) in year:	EE1 [%]	EE2 [%]	EE3 [%]	EE4 [%]	EE5 [%]
A-2016	39,61	57,86	53,65	60,19	73,83
A-2018	37,18	57,24	54,32	62,40	71,44
A-2021	39,80	61,95	58,49	68,91	77,56
B-2016	46,81	64,68	62,16	68,69	78,84
B-2018	45,45	64,37	61,98	69,61	77,51
B-2021	46,73	65,72	62,50	72,37	80,89
A-average through the years 2016-2021	38,86	59,02	55,49	63,84	74,28
B-average through the years 2016-2021	46,33	64,92	62,21	70,22	79,08

Table 3 shows the assessment of the degree of agreement with predictor A – Identifying new business opportunities (answers using the degree of understanding, i.e. 1=very low competence; 7 = very high competence) in 2021, always by students who are not yet entrepreneurs. At the same time, interest in business education is here – EE (percentage share of agreement with participation in a given type of education among all those who expressed their opinion).

The variant of entrepreneurship education EE1: If the student did not attend the course on entrepreneurship, his level of agreement with predictor A also decreases. As we can see, only 39.86 % of students who did not participate in the business course in total (i.e., evaluation of the given competence on a scale of 5 to 7) had a higher level of agreement with predictor A.

The variant of entrepreneurship education EE2: Completing at least one entrepreneurial course as an optional subject simultaneously with a higher degree of agreement with predictor A was indicated by a total of 61.9 % (i.e. evaluation of the given competence on a scale of 5 to 7). Here is an interesting comparison with the compulsory course variant. If the student takes only one course, an optional subject is more suitable than a compulsory one. The variant of entrepreneurship education EE3: Completing at least one entrepreneurial course as a mandatory part of the study at the same time with a higher degree of agreement with predictor A was indicated by a total of 58.5 % (i.e. evaluation of the given competence on a scale of 5 to 7).

The variant of entrepreneurship education EE4: It is evident that a higher degree of agreement with predictor A (i.e. value 5, 6, 7) is further associated with the student's answer that they are studying a specific programme on entrepreneurship, a total of 68.9 % of respondents (i.e. evaluation of the given competence on a scale of 5 to 7).

The variant of entrepreneurship education EE5: In total, 77.6 % of students who rated their competence in the field of 'Identifying new business opportunities' with a higher degree of agreement (i.e. rating the given competence on a scale of 5 to 7) state that they chose their university precisely because that it has a 'strong entrepreneurial reputation'.

As mentioned above, the degree of agreement with the given competence marked as predictor A increases with the conceptual approach to EE. Interestingly, we see a slight decrease in agreement with competence concerning the subject's optionality (EE2) or obligation (EE3) in this area of education. Keeping a particular interest in EE within study programmes that are not directly focused on EE can be recommended. This pattern of behaviour can be observed in all three periods, 2016, 2018, and 2021, for both predictors A and B (see Table 3), even during the pandemic period.

The limitation of the survey is that the questionnaire is voluntary and is not primarily focused in any particular way. However, the methodological procedure is always the same, which has been the case since 2003. Based on this, it was concluded that in the short term, all measurements are imprecise, but in a long time, they are still equally vague, and in the case of extensive data, it is

possible to proceed to define a trend. The authors expect new data from a future survey in 2025 and would like to continue developing more precise models with other predictors, such as the main field of study.

5 Conclusion

Based on the research results, diversifying education supporting entrepreneurship is necessary. To the prediction model of entrepreneurial spirit (see Table 3), the most critical factors for stimulating interest in entrepreneurship among university students are nationality, the ability to identify new business opportunities, and successfully managing a company. The authors expect to improve the educational process and develop a new approach to entrepreneurial education soon.

The nationality factor is a determinant linked to the institutional environment that affects business activities in a given country. The institutional environment plays a significant role in motivating entrepreneurship and creating barriers or restrictions when setting legislative requirements, regulations and conditions. The influence of the institutional dimension (regulatory, normative and cultural-cognitive) on the probability that a person will become an entrepreneur was discussed, for example, by Urbano and Alvarez (2014). In connection with the above, introducing entrepreneurship education at universities across study programmes can be recommended (see the simplified model, Figure 2). Model presents the concept of connecting the external environment from the point of view of the Triple Helix Model and the design of the educational concept based on the identified predictors of entrepreneurial spirit. Testing the entrepreneurial spirit has a massive benefit in preparing modern entrepreneurship courses and individual coaching students keen to have a business after graduation.

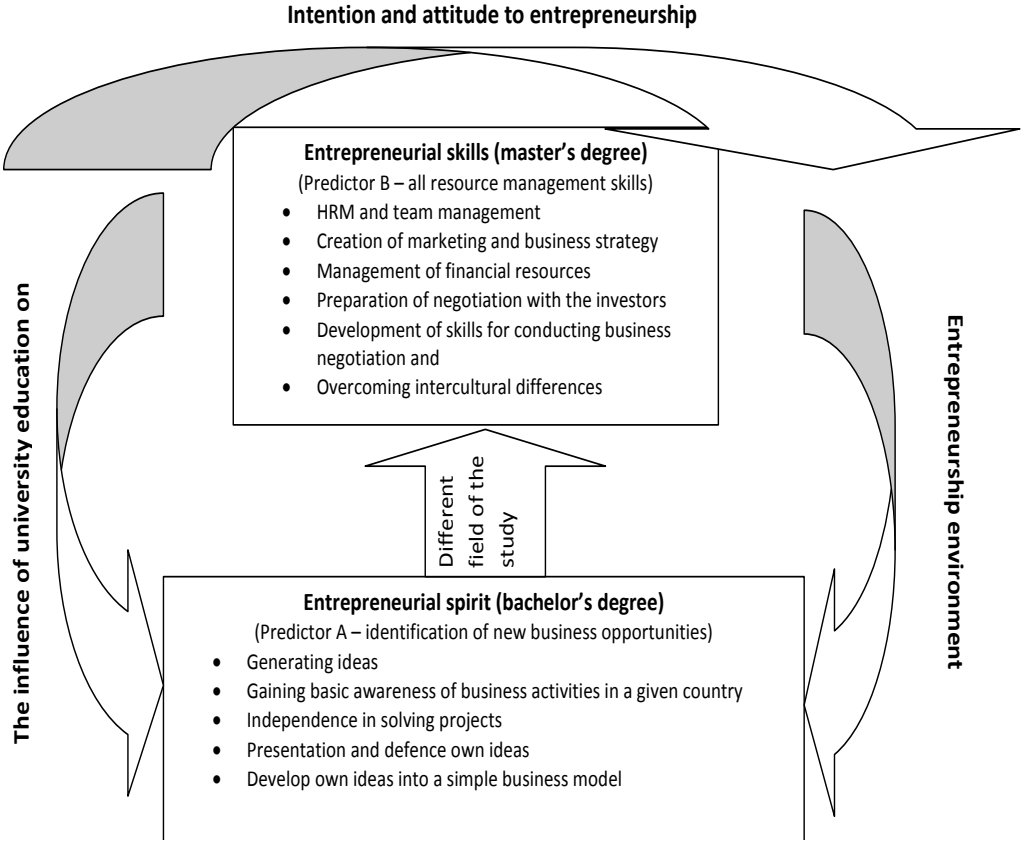

Fig. 2. A simplified model of university education for the development of the entrepreneurial spirit

In the bachelor's degree, the authors recommend focusing on the issue of generating ideas and gaining essential awareness of business activities in a given country. The ability to independently approach project solutions, present and defend your ideas, develop your idea into a simple business model, and prepare for business negotiations. As part of the subsequent degree of university studies, in connection with the definition of the meaning of the given start-up project, it is essential to practise managing all resources. In human resources management (HRM),

emphasis should be put on team management, the importance of individual roles in the team, and creating a marketing and business strategy. Also, it is necessary to be able to manage financial resources, including preparation for negotiations with an investor, developing skills the students need to lead business negotiations and overcoming intercultural differences. For doctoral students, training focused on creating academic spin-off companies can be considered.

Universities contribute to the entrepreneurial spirit, encourage creativity and provide relevant expertise in their study courses (Baubonienė, 2018). For example, in Austria, the concept of an entrepreneurial university was directly introduced (Sperrer et al., 2016). It is also essential to realise that the government's responsibility for tax policy and the overall business climate is vital for entrepreneurship development. Another significant factor is innovation. This also fits into the concept of the Triple Helix System, which was introduced in the nineties by the author Etzkowitz (1993). The results of the authors of the article and their proposed prediction model correspond to this concept.

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Policy Recommendations for Blended Learning in Higher Education in Vietnam

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Abstract

This paper presents the results of a status assessment and policy recommendations for blended learning in higher education in Vietnam. To collect data on the status, a questionnaire survey was conducted at 3 universities and colleges in Ho Chi Minh City with 1,138 students participating in the survey. The survey results were analyzed using the Statistical Package for the Social Sciences (SPSS). By comparing the survey data with the qualitative research results available for analysis, the findings show that blended learning offers significant benefits in the digital age. However, this learning method still has disadvantages such as significantly reducing direct interaction between lecturers and students, and the learning experience of students is also reduced. The requirements for improving students' selection of learning activities and self-management skills are higher, while universities lack effective quality management systems. Inadequate information technology infrastructure and equipment hinder effective online learning. Some students feel heavy pressure to study, have low self-awareness, and when switching to a new learning method lacking direct supervision and instruction from lecturers, their motivation and study habits have decreased. Blended learning requires frequent changes in methods, depending on the field of study and the conditions of each university. To address these practical challenges, the paper proposes a comprehensive government strategy for blended learning that aims to promote learning motivation, improve online teaching skills, and develop infrastructure for digital content in universities. These macro-level policies are crucial for promoting blended learning in higher education in Vietnam.

Keywords: blended learning, policy, higher education, students, Vietnam.

1. Introduction

The concept of "blended learning" has been around since the 2000s and is now widely used, especially since the COVID-19 pandemic. Young (2002) noted that the combination of online and

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traditional face-to-face teaching is not yet widely recognized for application in higher education, although it is a major trend. The American Society for Training and Development believes that blended learning will be in the top 10 trends in higher education in the coming decades and the number of blended courses will continue to increase, potentially reaching 80 % to 90 % of all courses (Rooney, 2003). By 2005, Bonk and Graham had outlined the fundamentals of blended learning systems and discussed trends in their implementation. In K-12 education, blended learning has emerged as a powerful new approach in the United States (Barbour, 2019; Long et al., 2020).

Following the global trend, in Vietnam, the Ministry of Education and Training (2016, 2021) has issued many documents requiring implementing online teaching and learning. Recently, the Project "Enhancing the application of information technology and digital transformation in education and training in the period 2022–2025, with a vision to 2030" was the Prime Minister approved (Prime Minister, 2022). This project has created a legal basis for the implementation of blended learning at universities. The objectives of this project are: i) Innovating teaching and learning activities, focusing on people, and equipping lecturers and students with the necessary awareness and skills to apply information technology and digital transformation. There must be strong directives across all sectors and levels to engage educational institutions and the entire society in this initiative; ii) By 2030, ensure that managers, lecturers and students have access to a strong national online teaching and learning platform and strongly implement digital transformation in the education sector; iii) Prioritize investment in building digital infrastructure, establishing a strong teaching and learning environment and teaching management; develop open learning resources for users to use for free anywhere, anytime.

Talking about blended learning, although it has been applied in educational institutions for many years, but very sporadically, it has really become a mainstream trend in the past few years (To, 2012). It was not until 2020 that this learning method gained more attention from scholars, partly due to the impact of the Fourth Industrial Revolution and the necessity imposed by the COVID-19 pandemic (Vo, 2023). Therefore, blended learning is still a new method in Vietnam.

Thus, in the context of strong digital transformation, the implementation of blended learning still faces many challenges in universities. The research questions that need to be answered are: i) What are the benefits and advantages that blended learning brings to teaching? ii) If blended teaching and learning is implemented, what difficulties and challenges will higher education institutions face? iii) In addition to the difficulties of lecturers, what challenges must students overcome to learn effectively?

Based on such a context, it is urgent and relevant to conduct a survey and assessment to accurately perceive the current situation, thereby finding answers to the above questions and recommending policies for developing blended learning at universities in the coming time.

2. Literature Review

The concept of blended learning: Over the past 20 years, the concept of blended learning has emerged as a central term in education (Singh, Thurman, 2019). Currently, blended learning is understood as a teaching method in which direct learning time and online learning time are allocated reasonably, helping teachers and students complete the course most effectively. According to Bonk, Graham (2006), blended learning includes both direct instruction and indirect instruction through devices and the Internet. Picciano (2007) describes it as the planned and pedagogically meaningful integration of online and face-to-face activities. Horn, Staker (2014) pointed out that blended learning is an educational program in which online and face-to-face learning takes place at appropriately selected times. In this process, the lecturer is the instructor, students collaborate and teaching content and learning methods are coordinated to achieve the objectives of the subject. In Vietnam, the Ministry of Education and Training (2016) defines blended learning as a combination of online and traditional teaching methods to improve the effectiveness and quality of education.

The benefits of blended learning: There are 6 following benefits, as pointed out by Bonk, Graham (2016) and agreed upon by most researchers, listed as follows: 1) Teachers' teaching and students' learning are diversified with many situations with many different opportunities, pedagogical richness is liberated. The combination of different learning spaces allows for extended learning time and the incorporation of more suitable activities within each space; 2) Students and teachers always have equal access to educational resources and knowledge. Multiple and convenient communication channels help reduce the time spent on secondary tasks, thereby

providing more time to focus on pedagogical activities to improve training efficiency. Digital educational resources are provided openly, are easily accessible online, and are always available; 3) Blended learning helps learners choose their time proactively and is not bound by the requirement to be present at training facilities, making it easier to adapt. Consequently, it increases social interaction; 4) It provides opportunities for increased learner autonomy by combining the benefits of direct interpersonal interaction and online settings, making it more effective than other teaching methods (Kerres, De Witt, 2003; Pratt, 2002). This aligns with the multimedia theory, which suggests that richer media enhance learning ability, particularly for complex tasks (Daft, Lengel, 1986); 5) The cost of blended learning is reduced, increasing economic efficiency for both service providers and learners. Therefore, the cost of courses will decrease, allowing additional funding for improving access to educational resources and helping teachers improve access to resources (Graham, 2013); and 6) Garrison and Kanuka (2004) pointed out that with its advantages, blended learning promotes the integration of advanced technologies, redesigns the curriculum and fosters learning communities, thereby promoting the digital transformation of universities. It increases student interest, awareness, and satisfaction, motivating them to engage more deeply in the learning process. Dziuban et al. (2006) noted that with blended learning, student satisfaction is higher than with traditional face-to-face courses.

Difficulties and challenges when applying blended learning: When assessing the current situation of blended learning in some areas, the authors pointed out 6 difficulties arising in its application (Bonk, Graham, 2006; Cojocariu et al., 2014; Graham, 2018), specifically as follows: 1) Blended learning has significantly reduced the direct interaction between teachers and learners. They must significantly change their discussion and debate habits from face-to-face to online indirect. Learning is spread out at different times and places. Differences in culture, language, communication skills and technological level are also barriers. Asynchrony or lack of equipment also contributes to communication barriers; 2) The time for students to switch from direct to indirect interaction is a long and difficult process. They need to be able to choose learning activities and adjust their learning according to actual conditions so as not to be affected. In addition, many students' planning and time management skills are not good, which can create frustration and boredom with learning; 3) The biggest challenge is to build and maintain a quality Learning Management System and create a safe and effective online learning environment. Developing countries also face additional difficulties in training and improving technological skills for both teachers and students, redesigning learning environments to suit blended learning models, ensuring coherence between online and traditional learning activities; 4) Creating a harmonious structure between creativity and learning poses great challenges. Universities are always under pressure to design creative learning activities and choose supporting technologies that are suitable for their economic conditions. While learning creativity, they must avoid relying too much on technology; 5) Establishing an effective learning environment is always under pressure from the need to adapt to culture, change habits, and expectations of individuals. This is a complex and difficult task; and 6) Blended learning requires both teachers and students to have adequate learning devices (such as computers, smartphones, and an Internet connection with adequate speed). Insufficient or inconsistent basic equipment also creates barriers that are difficult to overcome. The reality is that today, educators and students either lack devices or have inconsistent devices, but they cannot afford to buy uniform ones. Private space for online teaching and learning is also a challenge for many. On the other hand, technical problems when using digital devices such as download errors, installation problems, login problems, and audio and video glitches are also common. The above challenges are certainly more serious for developing countries that lack infrastructure and equipment. For example, in Malaysia, Jong et al. (2021) identified limited internet connectivity and a lack of information and communication technology skills among students as two major issues requiring intervention. In contrast, Olaniran et al.'s (2020) study in South Africa found that students' lack of skills to apply new technologies was a significant factor, despite the availability of infrastructure.

The models are often used in blended learning: The characteristic of blended learning is that it is necessary to use many different learning models. Depending on the goals and content of the course, the learning model must be adjusted appropriately. Staker & Horn (2012) has proposed 6 blended learning models as follows: 1) "Face-to-Face Driven" model - With this model, more time is spent on traditional classroom learning than online learning; 2) In the "Rotation" model, learning is organized alternately between online learning and face-to-face learning; 3) With the

"Flex" model, students learn mainly online with a personalized learning schedule; 4) "Online Lab" model, after studying face-to-face, students are allowed to participate in additional online courses to perfect their knowledge and skills; 5) With the "Self-Blend" model, in parallel with studying face-to-face at their university, students are allowed to take online courses outside; and 6) The "Enriched Virtual" model organizes students to study mainly online, occasionally coming to the university to participate in direct experiences.

Choosing the right blended learning process for each subject can be quite difficult. However, Bokolo et al. (2020) suggest that to successfully implement blended learning, the process must consider interactive activities (direct and indirect), accessibility to learning resources; testing, assessment, and feedback for students when building the process. The four learning processes selected for the survey were selected as follows:

a. Margie (2003) offers a three-step process: 1) Step 1. First classroom learning session; 2) Step 2. Online learning; and 3) Step 3. Final classroom learning session. In this approach, face-to-face instruction is employed at the beginning for orientation activities and at the end for assessment and conclusion. Meanwhile, online teaching is utilized in the intermediate phase for exchanges and discussions aimed at resolving any remaining issues.

b. Author Lewis, Orton (2005) proposed a 3-step process: 1) Step 1. Students' self-study online to research basic knowledge, apply knowledge and skills learned through computer networks; 2) Step 2. Organize direct learning in class to practice knowledge application skills; 3) Step 3. Through online learning, lecturers guide students to debate and discuss in groups to deepen knowledge and practice necessary skills.

c. Ginns, Ellis (2007) c. Ginns & Ellis (2007) outline a four-step process: 1) Step 1. The instructor delivers lesson knowledge directly in the classroom; 2) Step 2. The instructor organizes face-to-face classroom discussions for students to deepen their knowledge; 3) Step 3. Students organize online self-study either individually or in groups; and 4) Step 4. Organize face-to-face learning to review previously learned concepts and knowledge. This process places more emphasis on face-to-face instruction. Experiments on this model show that instructors guiding lessons through face-to-face interactions have helped students better prepare for online lessons.

d. Btzer et al. (2015) proposed a five-step process: Step 1. Before the course begins, the instructor introduces the objectives and structure of the lesson and identifies the responsibilities of the parties involved; 2) Step 2. The instructor guides the students on how to approach the learning content in class; 3) Step 3. The students study online to research and gain a deeper understanding of the lesson objectives and content; 4) Step 4. All students come to class to be directly guided by the lecturer to summarize the lesson and discuss to solve remaining problems; 5) Step 5. The instructor and students evaluate the teaching and learning outcomes. With this process, the instructor directly guides the identification of learning objectives, imparts knowledge, and develops skills for the students.

It has been noted that the benefits, challenges and difficulties associated with the implementation of blended learning have been extensively and systematically studied, but it has not become an official trend. When the COVID-19 pandemic hit, online teaching became a mandatory requirement, there was no other choice. All educational institutions were required to organize online teaching and as seen, many difficulties and challenges have arisen in most countries around the world. Therefore, educational administrators were forced to look for solutions to these problems. Some notable examples include:

i. According to D'Souza et al. (2020), in the United States, teachers have rapidly shifted to online instruction for STEM students. However, at Wesley University, STEM students faced challenges such as economic disparities, increased family responsibilities, the need to stay motivated, social isolation, and heightened psychological stress.

ii. In response to the COVID-19 pandemic, Taiwanese scholars aim to address the multidimensional challenges of e-learning, thereby optimizing learning solutions. They recommended that policymakers and educators develop a more comprehensive technical environment to support the ongoing adoption of e-learning systems. Furthermore, when designing high-quality elearning courses, they have relied on students' perceptions and attitudes as a key factor in addressing how to interact and build learning models (Lee et al., 2021).

iii. To adapt to the new educational context, Ukraine has developed an algorithm for establishing business training centers. This is a multi-stage process that considers, for example, management support, the creation of a legal basis and financing of activities. Ensuring support

conditions, content development, personnel training and control mechanisms are also carefully considered (Bondar et al., 2020).

iv. Malaysia is a country with similar conditions to Vietnam, the sudden change from face-to-face to online teaching requires teachers to quickly adapt to many issues. Factors such as infrastructure, online resources, and the work environment significantly influenced teachers' use of online educational technology in their teaching activities. Ensuring the necessary infrastructure and conditions is crucial to helping teachers design and effectively use online educational tools (Kai Wen, Tan, 2020).

In Vietnam, the Government (2022) has issued a policy to innovate educational organization methods and transform teaching into a digital environment. Universities must encourage lecturers and students to make digital transformation an essential daily activity for them. It is society's responsibility to ensure that teachers and learners have the necessary resources to enable them to engage in online teaching and learning activities. In that context, the results of blended learning that Vietnamese universities have achieved are not enough. There are still many difficulties and challenges (Dinh, 2020; Dinh, Vo, 2021; Hoang, 2015; Ho, 2021; Nguyen, 2018; Nguyen et al., 2020; Vu, Nguyen, 2019; Vu, 2020). In fact, many cases have shown that even when management levels have provided full and clear guidance, the implementation of activities in general and blended learning in particular at universities still encounter great difficulties. To meet the objectives set by the Prime Minister, it is crucial to accurately assess the current situation regarding the benefits and challenges and identify suitable processes for organizing blended learning to propose future development policies.

3. Research Methodology

3.1. Research Design

To analyze student preferences for blended learning, 1,138 students from three universities and colleges in Ho Chi Minh City (HCMC) were surveyed. Students were asked to choose an objective, anonymous response from five levels ranging from the lowest (1.0 points) to the highest (5.0 points). The questions are based on research results from scholars worldwide addressing the following problem groups:

a. Regarding the advantages and benefits of blended learning, there are 6 questions based on the research results of Bonk, Graham (2016), Kerres, De Witt (2003), Pratt (2002), Daft, Lengel (1986), Garrison, Kanuka (2004), and Dziuban et al. (2006) asking about 6 benefits: Diversity and effectiveness of teaching; increased access to knowledge; flexibility in arranging teaching and learning time; creating opportunities for autonomy in choosing teaching and learning methods; reducing costs for teachers, learners and society; and managers, lecturers and students can adjust their time flexibly.

b. Regarding the difficulties and challenges, the selected questions from studies by Bonk, Graham (2006), Cojocariu et al. (2014) and Graham (2018) confirmed: Direct interaction between subjects in the teaching and learning process is reduced; students may have difficulty choosing learning activities that match their goals, abilities and interests, often lack self-management skills and struggle with problems of distraction, lack of concentration and motivation. There is also significant pressure to design innovative learning activities and choose appropriate technological tools to support learning, without becoming too dependent on technology.

c. Regarding individual students' difficulties with 6 contents: i) Weak Internet connection, users lack necessary skills, reducing interaction; ii) The supervision of lecturers changes from direct to indirect, a part of students with low learning awareness may be affected in their learning outcomes; iii) The interaction between people and computers when learning online creates a one-way, boring feeling; iv) Insufficient learning materials, learning software and learning management; v) The infrastructure supporting blended learning of society, of universities, as well as of lecturers and students is lacking or not synchronized enough; and vi) The current society's mentality of only caring about degrees makes students learn to cope, the quality is reduced more than face-to-face learning.

d. Regarding the choice of blended learning processes with 4 processes by Margie (2003), Lewis & Orton (2005), Ginns & Ellis (2007), and Btzer et al. (2015) with steps as described above.

e. Finally, regarding the choice of duration structure between online and face-to-face learning with 4 options: Option 1 is 30 % online/70 % face-to-face, option 2: 20/80 %, option 3: 40/60 %, and option 4: 50/50 %.

Survey data were collected through Google Forms. SPSS software (IBM, 2024) was used for data processing. 07 variables related to blended learning were included for analysis and evaluation are: i. Advantages and benefits; ii. General difficulties and challenges; iii. Difficulties of students and families; iv. Blended learning process 1; v. Process 2; vi. Process 3; and vii. Process 4. Assessment of the current situation was reviewed and analyzed using Boxplot charts and non-parametric tests. To analyze student preferences regarding the structure and duration of blended learning processes, Chi-Square Tests were used. The assessments and evaluations of the current state of blended learning were confirmed through a combination of quantitative results and existing qualitative results from practical studies.

3.2. Survey Sample and Respondents

To ensure diversity in the research area, the survey sample was selected from 3 public universityies in HCMC with different characteristics: 1) Saigon University with 373 selected pedagogy students as respondents, this is a major with fewer practical exercises and experiments; 2) HCMC University of Technology and Education, a university with more practical exercises and experiments, selecting 218 students; and 3) Cao Thang Technical College with 547 selected students, this is the school with the most experiment and practical hours among the three chosen schools. All three university and coleege admit students from many regions of Vietnam, with the majority from southern provinces of Vietnam. The social composition and economic conditions of 1,138 selected students from 3 schools' enrollment are basically similar, with no significant differences.

3.3. Collect and Process Survey Data and Reliability of Results

After verifying the accuracy of all responses, the data were uploaded to SPSS software for processing. The Cronbach's Alpha tool was used to assess the reliability of the 5-point Likert scale (see Table 1).

Table 1. Assessment of Data Reliability Outcomes

	Reliability Statistics		Corrected Item-Total Correlation					
	Cronbach's Alpha	N of Items	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6
The advantages and benefits of blended learning	0.879	6	0.702	0.695	0.797	0.784	0.638	0.701
Difficulties and challenges of blended learning	0.891	6	0.677	0.728	0.741	0.732	0.722	0.666
Difficulties of individual students when participating in blended learning	0.884	6	0.642	0.724	0.710	0.739	0.703	0.654
Blended learning processes should be selected	0.766	4	0.560	0.542	0.603	0.559	-	-

The results obtained in Table 1 confirmed that the Cronbach's Alpha values for the four variables (where the Blended Learning Process is the combined result of three component variables) are all greater than 0.7, and the correlation values for each variable are all greater than 0.3. Therefore, the scale and variables used in the survey are appropriate and reliable.

4. Discussion and Results

4.1. Student Evaluation and Preferences

4.1.1. Student Perceptions of Advantages and Benefits

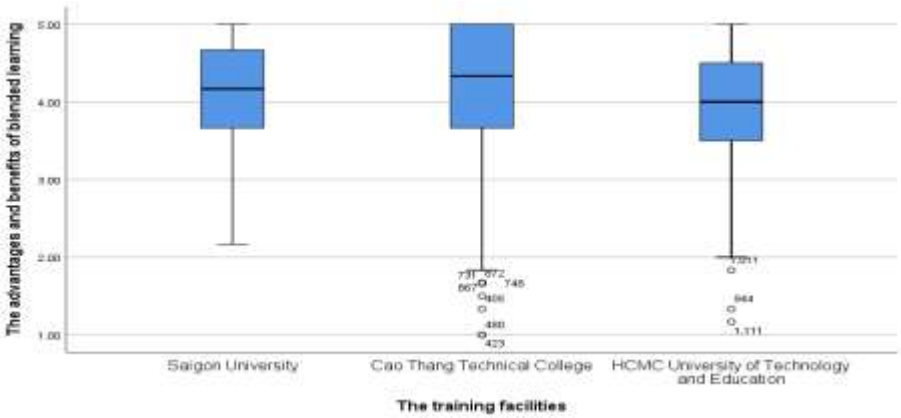

Fig. 1. Boxplot Illustration of the Advantages and Benefits of Blended Learning

As shown in Figure 1, most students highly appreciated the overall advantages and benefits of blended learning. Although there are still a few exceptions, the distribution of data allows us to confirm that most students believe that blended learning has superior advantages over traditional teaching methods. According to the survey data, the proportion of students giving the highest rating for the six benefits and advantages at Saigon University ranges from 30.3 % (for activities with more diverse, tightly integrated, and effective teaching) to 54.2 % (for more autonomy in time management for teachers and students). At Cao Thang Technical College, the range is from 41.9 % (for diverse, tightly integrated, and effective teaching activities) to 55.8 % (for more autonomy in time management for teachers and students). At HCMC University of Technology and Education, the range is from 31.2 % (for activities with more diverse, tightly integrated, and effective teaching) to 44 % (for more autonomy in time management for teachers and students).

Table 2 of the non-parametric test results shows the difference in evaluation among the 3 educational institutions (p value = 0.0 < 0.05). Pairwise analysis shows that: i) The pair of Saigon University and Cao Thang Technical College has no difference (p value = 0.116 > 0.05); ii) the pair of Saigon University and HCMC University of Technical Education shows a difference (p value = 0.002 < 0.05), in which Saigon University students rate higher (Average rating: 312.95 > 267.00); iii) The pair HCMC University of Technical Education and Cao Thang Technical College also showed a difference (p value = 0.000 < 0.05), in which students from Cao Thang Technical College had a more positive assessment (Average rating: 403.18 > 332.36).

Table 2. Kruskal-Wallis Test Results on the Advantages and Benefits of Blended Learning

Ranks				Test Statistics [a, b] The advantages and benefits
The advantages and benefits of blended learning	The training facilities	N	Mean Rank	
	Saigon University	373	569.92	Kruskal-Wallis H 18.053
	Cao Thang Technical College	547	600.95	df 2
	HCMC University of Technology and Education	218	489.86	Asymp.Sg .000
	Total	1138		a. Kruskal Wallis Test b. Grouping Variable: The training facilities

4.1.2. Regarding the difficulties and challenges of blended learning

It is noteworthy that when assessing the challenges, the opinions of students at the three educational institutions were remarkably similar (Figure 2). Among the 6 challenges surveyed, students at Saigon University who rated them at the lowest level ranged from 2.9 % (on students' difficulties in choosing learning activities) to 4.6 % (on teachers and students having difficulty in synchronizing the necessary equipment). At Cao Thang Technical College, these assessments

ranged from 4.4 % (on challenges in establishing and maintaining a quality teaching management system) to 7.9 % (on teachers and students having difficulty in synchronizing the necessary equipment to participate in teaching and learning). At HCMC University of Technical Education, assessments ranged from 2.8 % (on students' difficulty in choosing learning activities that fit the course objectives) to 6.9 % (on reduced direct interaction between teachers and students, students and students).

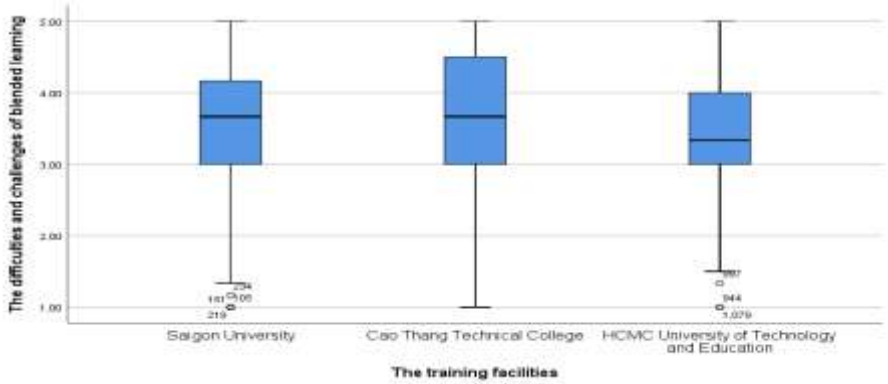

Fig. 2. Boxplot Chart on the Difficulties and Challenges of Blended Learning

The non-parametric test results show a difference in evaluation among the three schools (p-value = 0.001 < 0.05, Table 3). Pairwise comparisons revealed that: i) Saigon University and Cao Thang Technical College show no difference (p-value = 0.446 > 0.05); ii) Saigon University and HCMC University of Technology and Education exhibit a difference (p-value = 0.002 < 0.05), with Saigon University students rating higher (Mean Rank: 312.42 > 267.9); and iii) HCMC University of Technology and Education and Cao Thang Technical College also show a difference (p-value = 0.001 < 0.05), with students from Cao Thang Technical College perceiving greater difficulties (400.28 > 339.63).

Table 3. Kruskal-Wallis Test Results in Difficulties and Challenges of Blended Learning

Ranks				Test Statistics [a, b]
	The training facilities	N	Mean Rank	The difficulties and challenges
The difficulties and challenges of blended learning	Saigon University	373	577.86	Kruskal-Wallis H 13.276
	Cao Thang Technical College	547	592.28	df 2
	HCMC University of Technology and Education	218	498.03	Asymp.Sg .001
	Total	1138		a. Kruskal Wallis Test b. Grouping Variable: Educational Institutions

4.1.3. Regarding Individual Students' difficulties

The Boxplot chart (Figure 3) illustrates a slight reduction in the recognition of individual students' difficulties in meeting the requirements to engage in blended learning in engineering majors. According to survey results, among the six challenges students face, the most significant difficulties are as follows: At Saigon University, 35.4 % of students said that difficulties with the Internet, skills and study locations were the most challenging factors; 34 % believed that students' learning attitudes to cope would increase dangerously; 27.9 % believe that when there is no direct supervision, students can avoid testing and supervision from teachers. These challenging problem groups yielded nearly identical results at Cao Thang Technical College, with 36.6 %, 35.6 % and 32.9 % rated it at the highest level. At HCMC University of Technical Education, the most challenging problem groups had lower selection frequencies (24.8 %, 24.8 % and 21.1 %, respectively) but were consistent in the nature of the challenges.

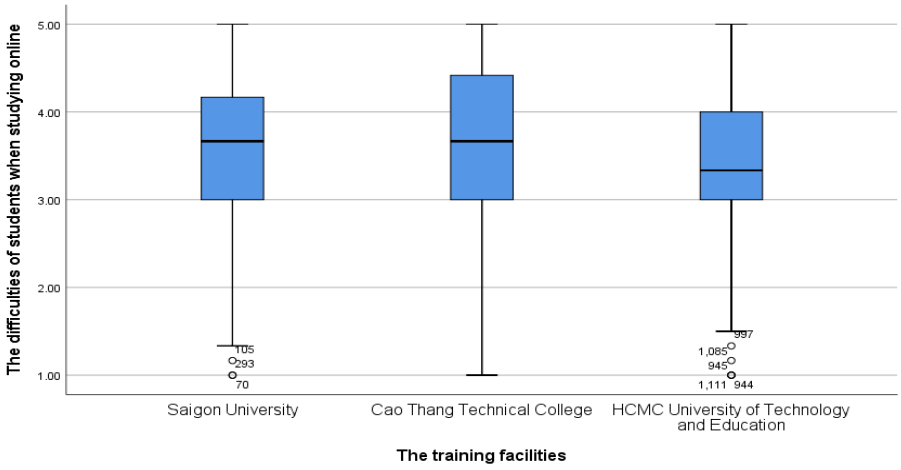

Fig. 3. Boxplot Chart of Individual Student Challenges in Blended Learning

The results of the assessment of the difficulties and challenges of blended learning were generally consistent. However, there was also a small difference in the distribution of selected opinions among the three universities and colleges based on the non-parametric test (p value = 0.012 < 0.05, Table 4). The results for Saigon University and Cao Thang Technical College are essentially similar (p-value = 0.832 > 0.05), yet students at Cao Thang Technical College still perceive more difficulties (Mean Rank: 462.03 > 458.26). When comparing HCMC University of Technology and Education with Saigon University, and HCMC University of Technology and Education with Cao Thang Technical College, there are noticeable differences in evaluation (p-values are 0.002 and 0.008, respectively, both < 0.05). In both comparisons, students from HCMC University of Technology and Education rate the difficulties lower than those from the other two institutions.

Table 4. Kruskal-Wallis Test Results on Individual Students' Difficulties in Participating in Plended Learning

Ranks				Test Statistics [a, b] The difficulties of students
The difficulties of students when studying online	The training facilities	N	Mean Rank	
	Saigon University	373	582.27	Kruskal-Wallis H 8.773
	Cao Thang Technical College	547	584.33	df 2
	HCMC University of Technology and Education	218	510.43	Asymp.Sg .012
	Total	1138		a. Kruskal Wallis Test b. Grouping Variable: The training facilities

4.1.4. Regarding the Selection of Blended Learning Process

The analysis of student choice frequencies and Boxplots shows a clear distinction in the choice of blended learning processes. This shows that it is difficult to identify a specific process. Managers who want to have the right policy need to consider the actual conditions of each university and each specific location to choose the optimal option. The best option may be to increase the autonomy and self-responsibility of colleges and universities. The results of the options are as follows:

a. Process 1: Students from Saigon University have an average score of 4.0, with 36.2 % considering it reasonable, 30.6 % fairly reasonable, and 21.4 % extremely reasonable; Cao Thang Technical College students are 4.0, 28.3 %, 21.4 %, and 37.5 %; and HCMC University of Technology and Education students are 3.0, 36.7 %, 26.6 %, and 20.2 %, respectively. At Cao Thang Technical College, students tend to choose Process 1 more.

b. Process 2: Saigon University students have the following choices in order: Reasonable, fairly reasonable, extremely reasonable are 4.0 %, 30.8 %, 30.6 % and 27.3 %; Cao Thang Technical College students have 4.0, 29.3 %, 20.3 % and 37.3 % respectively; and HCMC University of Technology and Education 3.0, 39.0 %, 26.1 % and 19.7 %. Saigon University and Cao Thang Technical College students tend to like Process 2 more.

c. Process 3: The order of the above-mentioned choices of Saigon University students is 4.0, 24.9 %, 32.4 % and 33.2 %; Cao Thang Technical College students have 4.0, 27.4 %, 23.4 % and 37.8 %; and University of Technical Education 4.0, 29.8 %, 33.9 % and 21.1 %. Students at Saigon University and Cao Thang Technical College tend to prefer Process 3 more.

d. Process 4: Saigon University 4.0, 19.6 %, 32.7 %, and 40.5 %; Cao Thang Technical College 4.0, 26.5 %, 21.2 %, and 43.7 %; HCMC University of Technology and Education 4.0, 28.9 %, 35.8 %, and 24.8 %.

In general: Saigon University students tend to choose processes 2, 3, and 4. Cao Thang Technical College students tend to like all 4 processes. HCMC University of Technical Education students tend to not like all processes.

4.1.5. Regarding the Selection of the Duration Structure between Online and Face-to-face learning

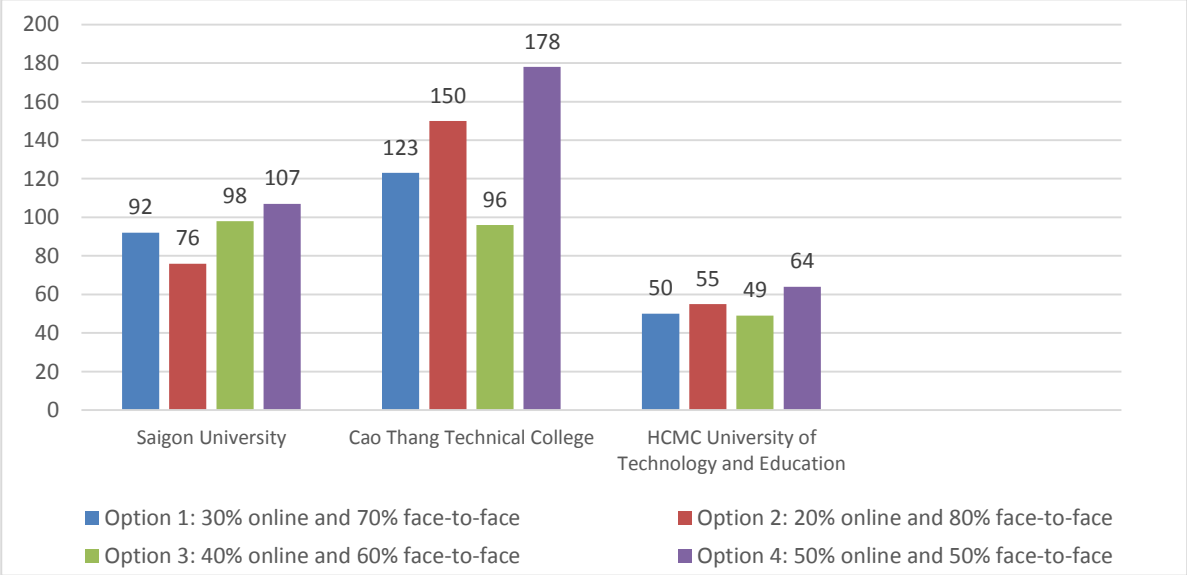

Fig. 4. Chart Describing the Number of Opinions on Choosing the Duration of Learning

A visual representation of the number of opinions on choosing the duration structure (Figure 4) shows that differences in opinions are more pronounced in Cao Thang Technical College and Saigon University.

The results of the Chi-Square test, with Sig value = 0.027 < 0.05, can make the following comments about students' choices:

a. Saigon University: Pairs with observed frequency lower than expected are options 2 and 4, specifically 76/92.1 and 107/114.4. Accordingly, options 2 and 4 are related and significantly decrease in option 2. Pairs with observed frequency higher than expected frequency are options 1 and 3, specifically 92/86.9 and 98/79.6. Therefore, options 1 and 3 are related and increase in option 3.

b. Cao Thang Technical College: Pairs with observed frequency lower than expected are options 1 and 3, specifically 123/127.4 and 96/116.8. Therefore, options 1 and 3 are related and decrease significantly in option 3. Pairs with observed frequency higher than expected frequency are options 2 and 4, specifically 150/135.1 and 178/167.8. Therefore, options 2 and 4 are related and increase significantly in option 4.

c. HCMC University of Technology and Education: Pairs with observed frequency lower than expected are options 1 and 4, specifically 50/50.8 and 64/66.9. Thus, options 1 and 4. Pairs with observed frequency higher than expected are options 2 and 3, specifically 55/53.8 and 49/46.6. Thus, options 2 and 3 are related; the deviation between options is not significant.

4.2. Essential Insights from the Scenario

a. Most students appreciate the benefits and advantages of blended learning, especially overcoming the disadvantages that traditional methods cannot do. The perception of specific benefits also varies among students in different fields of study with different durations of practical and experimental learning. These results are consistent with the evaluations of regulatory agencies (MOET, 2016; MOET, 2021; Prime Minister, 2022) and are quite consistent with previous scientific studies (Dinh, 2020; Vo, 2023). These findings further emphasize the need for blended learning implementation. On the other hand, it is of particular importance to tailor the blended learning organization process to the characteristics of each learning area.

b. The various challenges and obstacles identified by students at three different educational institutions indicate significant barriers to the implementation of blended learning. The difficulties focus on the following issues: Barriers to interaction shift from direct to indirect interaction; difficulties arise in choosing learning; students lack self-management skills; students may lose focus and lack motivation to learn; difficulties in establishing and maintaining a quality teaching management system; difficulties in social information technology infrastructure. The recognition of these challenges in blended learning also varies between different disciplines and different universities. This reality has also been identified by the highest management levels (MOET, 2021; Prime Minister, 2022) as the guiding principle for the development of blended learning by management levels and universities in the coming period. These are requirements for issuing policies to remove barriers.

c. The challenges faced by students focus on the very basic issues of blended learning (from content, methods to media). The assessments were conducted from many different perspectives both in teaching and teaching management at universities and are consistent with most recent studies in Vietnam. All identified this as an important issue that managers must pay attention to (Nguyen et al., 2020; Vu, Nguyen, 2019; Vu, 2020; Vo, 2023). This reality requires administrators to implement social policies to support infrastructure and teaching equipment that combine both students and universities.

d. The choice of training process also varies in degree between schools and training majors. This is also a pressure for university administrators in deciding on the choice of process for blended learning. Considering the aggregated data according to the average value of the three levels of reasonable, quite reasonable and extremely reasonable, the results show that students of the three universities and colleges have a common tendency to choose Process No. 4 (the rate of students choosing this process at Saigon University is 92.8 %, Cao Thang Technical College is 91.4 % and HCMC University of Technical Education is 89.5 %). The results showed that students have a strong need for guidance, mentoring, and assessment from instructors. Fear of moving entirely to online learning remains high. Through discussions with students, the authors found that students in basic science programs tend to prefer online learning; while students in engineering programs tend to prefer face-to-face learning. This again calls for flexible and adaptable blended learning policies.

e. In fact, students' choices regarding the time structure between online and face-to-face learning are quite diverse. In terms of the number of selections, all three schools lean towards option 4 (50 % online learning/50 % face-to-face learning). However, chi-square tests show that: students from Saigon University and Cao Thang Technical College predominantly choose option 4 in the expected relationship with option 2; the deviation between options is not significant in the choice of students from HCMC University of Technology and Education. Therefore, there is no universal model for all types of schools, and mechanisms are needed for universities to autonomously select models for each academic discipline.

5. Policy Recommendations

The conclusions drawn from the survey affirm that students demand benefit from the advantages of blended learning. With this legitimate demand, educational institutions in Vietnam have implemented blended learning quite extensively, especially since the COVID-19 pandemic. However, the actual implementation in universities is still fragmented and lacks a unified legal framework, so the effectiveness is not high. In such a context, policies promoting the development of blended learning have been issued (MOET, 2016; MOET, 2021; Prime Minister, 2022). To organize blended learning effectively and coherently, overcome fragmentation, and eliminate current barriers, the Ministry of Education and Training needs to develop a blended learning

development project to establish a framework for systematic guidance on blended learning activities. On that basis, it is recommended that higher management levels (Government, National Assembly) promptly issue laws and regulations related to the blended learning format to create a complete legal corridor for implementation units. Important and urgent policy components that need to be addressed include:

a. Issue a legal framework regulating the integration of online and traditional learning activities in the education system. The goal of the legal framework is to create a flexible learning and learning management environment, creating a legal framework for educational institutions to be autonomous and creative in choosing teaching processes and building time structures for online and face-to-face learning. All stages of managing blended learning activities, from planning, organizing, directing, to testing and evaluating, must be synchronized to create a solid foundation for universities and colleges to implement. This is also the basis to ensure that management at all macro levels is accurate and effective.

b. Policies for investing in technical infrastructure and the orientation of technology utilization are essential. The policy goal is to take advantage of information technology tools to enhance learning and teaching. That is to activate the creation of learning management software, mobile applications and build online learning platforms. Issue criteria and standards for technology investment for individuals and organizations in society to implement. Ensure priority of financial resources to support colleges and universities to equip modern technology, suitable for the requirements of the 4.0 Industrial Revolution. It is necessary to select and determine the order of priority so that in the coming years, Internet coverage will be achieved in all regions, cloud computing and artificial intelligence will be developed, etc., to be widely applied in universities. Universities and colleges must ensure priority of financial resources to invest in upgrading strong enough technical infrastructure.

c. Focus on developing digital educational content in all educational institutions. Universities and colleges proactively seek solutions to quickly use various online teaching technologies, quickly digitize and modernize teaching and learning processes. Creating digital teaching materials and learning resources that are easily accessible and interactive is essential for blended learning in the era of digital transformation. The government must provide clear and specific directives for investment at both the system and institutional levels.

d. Ensure open access and improve digital skills for both teachers and learners. Focus on training and developing skills in using digital tools for teachers and students so that they can carry out blended learning activities effectively, suitable to local conditions. The Ministry of Education and Training needs to issue a curriculum framework and content for training and fostering both teachers and learners in general throughout society. It is necessary to address the relationship between content, methods and teaching tools. Along with the development of an open learning materials system, it is necessary to ensure free access for everyone.

e. Make amendments and supplementations to improve outdated regulations on assessment and feedback in teaching. The purpose is to update and change regulations on assessment in traditional teaching and provide opportunities for frequent assessment and feedback through online tests, group discussions and project-based learning. The Ministry of Education and Training needs to issue complete regulations on testing and evaluation (for lecturers, learners and educational activities) to serve as a basis for unified management in the national education system. Assessment results should be used as a basis for adjusting course designs on online learning applications and related activities.

f. Enact policies to support personalized learning. This should focus on two aspects:

– The Ministry of Education and Training needs to issue full regulations on personalization in blended learning activities. These regulations create a legal basis for students to adjust their learning speed, choose content and learning methods suitable to their needs and goals. Organize training courses to develop the skills of all learners in society, help them to be autonomous and creative in learning interactions, create a foundation for continuous learning and lifelong learning of everyone. Issue standards and use assessment techniques to evaluate individual learning outcomes.

– Implementing social policies to support economically disadvantaged students in accessing information technology services and aiding with purchase minimum means for online learning such as computers, and Internet access

6. Study Limitations

With a sample size of 1138 students, selected through representative sampling to ensure scientific integrity, the results analyzed using the Kruskal-Wallis Test are deemed reliable. The collected data clearly illustrates students' preferences for blended learning. Such a sample is large enough and representative enough to make policy recommendations.

However, the survey sample was limited to three universities and colleges in HCMC. Although attempts were made to select typical variables of blended learning to survey and evaluate them in universities with different training majors, this study could not fully capture the diversity of the problem. Therefore, students' evaluations may not reflect every aspect of blended learning comprehensively.

Although the policy recommendations reflect the general practical needs of Vietnamese universities at the macro level, their effective application to a specific university requires detailed local analysis.

7. Conclusion

Implementing blended learning is one of the urgent requirements to meet the digital transformation requirements in training institutions. In Vietnam, universities and colleges have a later start than many countries in the world. The results of this study show that students appreciate the potential and advantages of this learning method. However, in the current context, challenges and difficulties are still significant. The information technology infrastructure of society is not yet synchronized. Learning support equipment for students is lacking and outdated, while the economic conditions of many families cannot meet them. The legal framework for organizing blended learning is insufficient, creating unnecessary legal obstacles. Students' motivation, self-discipline, and learning skills are among the internal barriers. To develop blended learning effectively, the government must establish comprehensive strategies and create a robust legal framework to empower educational institutions and enhance the mobilization of social resources for development. The policies recommended by this study are urgent and should be issued by the government soon.

8. Ethical Contributions

The authors declare that the manuscript is honest, truthful and transparent, not omitting any key aspects of the investigation. This study complies with all ethical writing standards. The respondents were anonymous, the study did not collect personal data from the participating students.

9. Conflict of Interest

The authors confirm that there are no conflicts of interest regarding this publication.

10. Author Contributions

The authors have significantly and directly contributed to the intellectual content of this work and have given their approval for its publication.

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Characteristics of Students' Perceived Goal of Mathematics Teaching and Motivation to Learn Mathematics

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Abstract

Currently, there is a decline in students' interest in learning mathematics. At the same time, PISA tests detect a declining level of mathematical literacy. The aim of the research described below was to find out what effect the students' perceived goal of teaching mathematics has on their motivation to learn mathematics. 239 students aged 18 and 19 participated in the research. We used a mixed methods approach to obtain the necessary data. According to our findings, students find mathematics useful but not of personal value to them. The goal of teaching mathematics, as perceived by students, is not sufficiently motivating for them to achieve good performance in learning mathematics. At the same time, they do not consider it useful for them to acquire additional new knowledge from mathematics.

Keywords: the goal of teaching mathematics, motivation, personal value, mathematics, good performance.

1. Introduction

Mathematics significantly affects a person's personal and working life and is essential for an individual's individual and working life (Maass et al., 2019). It is not surprising that several studies have shown a positive correlation between the level of mathematical skills of a school graduate and their applicability on the labour market (Rønning, 2022; Pepin et al., 2021; van der Wal et al., 2017; Bakker, Akkerman, 2014; Hoyles et al., 2010). A positive correlation was even found between mathematical education and the rate of increase in the employee's salary (Rosse, Betts, 2004). Currently, the demand of employers that school graduates have sufficiently developed

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mathematical skills is becoming stronger, because they support many other skills needed to solve problems professionally, but also in a person's everyday life (Gainsburg, 2015). The fact that mathematics education supports students' progress in other subjects has been one of the reasons why mathematics is considered part of a person's general education (Henn, Kaiser, 2001).

In recent years, international student testing has also shifted from testing mathematical knowledge to testing mathematical literacy. The essence of mathematical literacy is the student's ability to realize the role of mathematics in the real world and, based on it, to correctly assess and make decisions as required of a constructive, engaged and thinking citizen (Niss, 2015). Despite the stated findings about the place of mathematics in general education and its impact on applicability in the labor market, the level of students' mathematical literacy is decreasing (Foster, Schleicher, 2022). This decline in the level of acquisition of much-needed mathematical skills by students leads experts to constantly search for appropriate means to reverse this undesirable trend. The analysis of lessons within the framework of TIMSS 1999 found that the content of teaching mathematics is mainly the transfer of finished products and the learning of ways of thinking when solving tasks is absent (Givvin et al., 2009).

Students take hundreds or even thousands of hours of mathematics at school and learn various calculation algorithms and definitions that they will almost never use in everyday life or work (Boaler, 2015). According to the findings (Di Martino, Zan, 2011), this form of teaching mathematics creates a distorted image of mathematics in students, which is one of the factors creating a negative emotional disposition of the student towards mathematics and a belief about its uselessness for everyday life, thus reducing their motivation to learn with mathematics. According to 2015 Fields Medal winner Maryam Mirzakani, school math has moved away from real math. The gap that has arisen between school mathematics and real mathematics is probably the core of the problem of mathematics education. Instead of memorizing definitions and calculation procedures, he recommends that teaching mathematics focus on creatively finding own solution procedures based on already acquired knowledge. We believe that learning mathematical procedures and definitions is not the full use of the potential of mathematics as a teaching subject. Students often do not see the transfer of mathematical skills to other scientific disciplines, and even to their future professional life, i.e. j. the need to study mathematics as an essential element of a person's general education is hidden from them. The goal of our research was to find out what goals of mathematics education would be meaningful for students and, above all, motivating to learn mathematics.

2. Theoretical basis

The term "motivation" is generally seen as the energy that drives people to achieve a goal. Motivation significantly affects not only a person's decision to do something, but also how long and how intensively he will devote himself to the given activity (Han, Yin, 2016). Motivation plays one of the most important roles in achieving students' goals in a given subject (e.g. Hung et al., 2019; Brooker et al., 2018; Xiong et al., 2015). According to the source, motivation is most often divided into internal and external. Internal motivation comes from the individual himself, who is motivated by the achievement of a set goal. According to El-Adl & Alkharusi (2020), students are intrinsically motivated by goals the achievement of which has personal value for them and recognize the potential benefits they will gain from achieving this goal. Extrinsic motivation is stimulated by the environment in which the individual is (Weber, 2003) and the motivating factor can be benefits other than the achievement of a set goal. In the school environment, this benefit for the student is, for example, achieving a good evaluation. It follows from the above that the motivation itself is driven by the goal. The term "goal" means an ideal idea of what should be achieved in a given activity. According to Goal-setting theory (Locke, Latham, 2002), set goals affect individual performance through several mechanisms. Goals primarily direct an individual's attention and efforts to goal-directed activities and at the same time eliminate activities that are not relevant to goal achievement. A correctly defined goal helps to focus attention and energy primarily on those activities that are related to the set goal. Since achieving a goal requires energy, the amount of which is positively correlated with the level of difficulty of the goal (Latham, Locke, 2013), the second important function of goals is to mobilize the energy needed to achieve the goal. Another key factor in achieving a goal is persistence. The level of difficulty of the set goal mobilizes not only the amount of energy, but also its equal expenditure, so that it is enough for the individual until the moment of reaching the goal. For some goals, it is advisable to work intensively in a

shorter time, for other goals, more gradually over a longer time interval. A goal set in this way encourages persistence in achieving it. Goals also influence an individual's performance indirectly by leading to the discovery and use of task-relevant knowledge and strategies (Wood, Locke, 1990). From the above overview of the basic knowledge of Goal-setting theory, it follows that the goal of an activity has a motivational potential, because it can mobilize, concentrate, and manage the internal energy necessary for its achievement in an individual.

Each subject, including mathematics, was included in general education by experts with the aim of developing the student's personality. Experts have set educational goals that students should achieve in individual subjects. However, according to Achievement goal theory, the same goals motivate students to different learning activities that are related to different goal orientations. Initially, two basic types of goal orientations were identified, which reflect different priorities of the student in learning. Mastery goals represent the target orientations of a student who wants to not only develop already acquired skills and competences in a given subject, but also acquire new skills and competences and understand new ideas. On the other hand, performance goals are a manifestation of an effort to demonstrate individual skills and abilities that the student has already acquired in the given subject. Two more were later added to the original two target orientations. Mastery-avoidance goal orientation, which represents the student's effort to retain already acquired knowledge and skills at the highest possible level.

A student set up in this way is strongly motivated by goals that encourage repetition and practice of the subject matter. Performance-avoidance goal orientation, which represents an effort to maintain a good image of one's knowledge and skills (Elliot, 1999; Elliot, Muryama, 2008). Different goal orientations of students indicate their different expectations from achieving the goal, i.e. j. for them, goals represent certain general values. They achieve these goals in such a way that the achieved goal represents a subjective value for them. Subjective values can go beyond the context of the goal itself. Therefore, we think that before a student decides to achieve a set goal, a process of evaluating the subjective importance of this goal takes place inside him – internal motivation and at the same time an estimate of the necessary "quality" of its achievement – external motivation. These two factors together determine the amount of energy available to the student to achieve the goal.

One of the most influential theories for explaining decisions in achieving study goals is the Erwartungs-Wert-Theorie (Eccles et al., 1983; Eccles, Wigfield, 2020). According to this theory, the expectation of success and the subjective value that the student perceives in relation to the set goal are central determinants of learning and performance behaviour. Even these two elements significantly influence the student's relationship to the given teaching subject. Behind the expectation of success lies the student's belief in how well he can fulfill the set goal (Eccles, Wigfield, 2020). Self-efficacy is also strongly connected with the expectation of success, especially at the global level and not in relation to specific goals (Marsh et al., 2019). Subjective value includes four sub-dimensions: the joy associated with achieving a goal, the importance of good performance to oneself, the utility of achieving a goal to oneself, and the costs necessary to achieve a goal (Eccles 2005; Eccles, Wigfield, 2020). The costs of achieving a goal include the amount of effort (energy) and time expended. While intrinsic enjoyment, importance, and usefulness contribute positively to the subjective value of a task, perceived cost affects it negatively (Wigfield et al., 2017).

The general goal of general education is to develop mathematical thinking, historical thinking, linguistic thinking, etc. which is the core and meaning of an individual's school preparation for his future professional and personal life in society (Arievitch, 2020). In the context of school education, the teaching of mathematics has a specific position. Mathematical education belongs to the general education of every person, not only because of the high value of the knowledge imparted, but also for its general educational function (Henn, 2001). Students in mathematics classes should not only learn to count but should gain an overview of general relationships. They should know not only how to count, but also why they count like that (Blankertz, 1982). This means that teaching mathematics should primarily pursue goals such as the development of logical thinking and the desire to gain insight into the internal structure of new knowledge. Thus, according to Jordan et al. (2008) students develop self-confidence in their own thinking abilities and a desire for knowledge. Kilpatrick et al. (2001) synthesized research in the field of mathematics education using the concept of mathematical proficiency as the goal of teaching mathematics. Mathematical proficiency has five dimensions:

– Conceptual understanding – understanding of mathematical concepts, operations, and relationships,

– Fluidity of the procedure – skill in performing procedures flexibly, accurately, efficiently, and adequately,

– Strategic competence – the ability to formulate, represent and solve mathematical problems,

– Adaptive thinking – the ability to think logically, reflect, explain, and justify,

– Productive disposition – seeing mathematics as reasonable, useful, and necessary in conjunction with belief in one's own mathematical abilities.

Several research studies have found that teaching mathematics has more or less moved away from its primary goal (e.g. Fuson et al., 2007; Givvin et al., 2009; Gjære, Blank, 2019; Polotskaia, 2022). For example, in an analysis of mathematics lessons in TIMSS 1999 (Givvin et al., 2009), mathematics lessons were described as 'highly algorithmic', 'rule-oriented' and too focused on procedures and rules, with insufficient attention to understanding mathematical concepts with little room for pupils' own thinking. Similarly, according to Wolfram (2010), up to 80 % of mathematics teaching focuses on calculations – algorithms, which are not so crucial in the age of computers. He recommends that the teaching of mathematics should once again focus on the development of skills such as asking the right questions, analysing, creating models, and interpreting results.

Navarro-Ibarra et al. (2017) stated in their work that according to the current didactics of mathematics, mathematics teaching is often based on selling ready-made knowledge and memorizing it, while it should be based on a creative cognitive process with the active participation of learning subjects. Such a focus of mathematics teaching causes students to rely on knowledge of procedures and rules, and these rules and procedures are learned without understanding (Fuson et al., 2007) and not on their own creativity and ability to think correctly. The student is a passive recipient of ready-made recipes for solving individual tasks, this causes a decrease in motivation to learn mathematics as a set of knowledge that needs to be memorized (Escalera-Chávez et al., 2019).

Learning mathematical formulas and rules and memorizing them results in mathematics being complicated for students (Das, 2019) and of little interest because students do not find such skills useful (Pascual, 2022). The deviation of mathematics teaching from the original goal apparently results in a continuous decline in interest in learning mathematics from primary to secondary school (Köller et al., 2001; Frenzel et al., 2012). And it is interest that is an important motivational factor, because it has the function of initiating the desire to achieve a goal that the individual has evaluated as interesting for him. Interest represents a person-goal relationship and is characterized by an individual's involvement in achieving a goal that interested him (Hiddi, Renninger, 2006). Interest theories are based on the assumption that students' individual interest is conditioned by situational interest.

It is assumed that situational interest in mathematics is initiated in interest-dense situations in which students build their own mathematical knowledge in a social environment (Bikner-Ahsbahs, Halverscheid, 2014). For the development of interest in learning mathematics, the fact to what extent the student considers himself capable of learning mathematics plays a key role (Rakoczy et al., 2013; Schukajlow, Krug, 2014). It is this factor that causes a decline in interest in mathematics in higher grades of elementary school and high school. The student gradually finds himself in a social environment where disinterest in mathematics prevails and thus the strength of the situational interest in mathematics also weakens.

We think that the low motivation of students to learn mathematics is due to a lack of intrinsic motivation, because students find it uninteresting. The goal of our research was to find out what kind of mathematics would be interesting for students, i.e. j. how to present mathematics goals to students so that these goals are the primary motivational factor towards the study of mathematics.

3. Methodology

Pedagogical research was carried out in selected secondary schools in Slovakia, always with the consent of the management of the given school, teachers and respondents. The secondary schools whose administrations provided preliminary consent for the research were organized alphabetically by their respective locations. From this list, six secondary schools were selected through simple random sampling using the tool randomnumbergenerator.org.

At the selected schools, all students in the final grades were approached through class teachers. A total of 256 students came to meet with the research team. At this meeting, the students present were familiarized with the content of the research and assured of the overall anonymity of the research. The researchers answered all the questions of the students present, taking care not to influence the reactions of the students during the implementation of the research with their answers. After the initial meeting, 239 students aged 18 and 19 participated in the research itself.

A mixed methods approach was chosen as the research method, which integrates a quantitative questionnaire method with a qualitative interview (Chirumamilla et al., 2020). The aim of the questionnaire research was to find out what type of motivation to learn mathematics prevails among students graduating from high school. According to Fraenkel et al. (2011), it is appropriate to supplement the quantitative questionnaire research with an interview, which allows to gain a deeper insight into the structure of the knowledge obtained from the questionnaire method.

In the quantitative part of the research, a standardized SRQ-Academic questionnaire by Ryan and Connel (1989) was used. This questionnaire is aimed at identifying the motivation and regulation of pupils in the school environment. The questionnaire consists of four parts, each of them is focused on one of the student's activities in the context of school education. Part A is focused on activities related to preparation for teaching. Part B for activities related to the elaboration of tasks that the student receives from the teacher during the lesson. Part C focuses on activities associated with trying to master even more demanding tasks assigned in class. Part D focuses on activities aimed at trying to perform well in class. 8 statements are assigned to each area. These statements saturate the four subdimensions of the student's motivation for the given activity. These motivational (regulatory) dimensions are external motivation, introjected motivation, identified motivation and intrinsic motivation. According to the subjective perception, the student marks the degree of truth of the statement on a four-point Likert scale (1 – disagree, 4 – agree). We used the questionnaire described above in the context of teaching mathematics in order to identify the dominant form of regulation and motivation of the student to learn mathematics.

With the subsequent semi-structured interview, we wanted to identify the difference in the perception of the goal of teaching mathematics between students with predominant intrinsic and extrinsic motivation to learn mathematics. The interview was focused on two basic areas: 1) the expectation of success in mathematics and 2) the subjective value of mathematics, which are the basis of the Erwartungs-Wert-Theorie. Sixteen students participated in the interview, of which eight students with identified predominant external motivation and eight students with identified external motivation. All interview participants agreed to the audio recording. The interview lasted 28 minutes on average. We used a constant comparative method, an inductive coding process (Corbin and Strauss 1990), to obtain data from individual interviews.

To start the experiment, we stated the following research hypothesis:

H: Students' perceived goal of mathematics teaching affects their motivation to learn mathematics.

For the analysis of the research results, we used selected statistical methods, namely methods of descriptive statistics and factor analysis.

4. Data analysis

Before the actual statistical analysis of the data obtained by the questionnaire method, the validity and reliability of the data was first verified. Given that there is a mutual relationship between reliability and validity (good reliability is a necessary condition for proper validity), in our case we calculated reliability to verify the reliability of the data. Cronbach's alpha (e.g. Zumbo et al., 2007) is used to clearly determine the reliability (internal consistency of the test), the calculation of which is part of statistical software. In our case, the value of Cronbach's alpha $\alpha = 0.817$ was calculated using the STATISTICA program. This value points to a strong linear dependence of the questionnaire items (the influence of random errors on the test result is very small), i.e. j. the value $\alpha = 0.817$ confirms the reliability of the obtained data (Cronbach, 1951).

In the next step of the statistical data analysis, we verified whether the respondents who participated in our research can be considered a representative sample with sufficient accuracy. Using the method of principal components, we first determined the number of latent variables – the number of dimensions. Using the STATISTICS program, we obtained a table of eigenvalues of the correlation matrix (Table 1).

Table 1. Eigenvalues of the correlation matrix

Value number	Eigenvalue	% Total variance	Cumulative Eigenvalue	Cumulative %
1	8.080	25.250	8.080	25.250
2	4.680	14.626	12.760	39.876
3	3.274	10.230	16.034	50.106
4	2.258	7.057	18.292	57.163
5	1.159	3.622	19.451	60.785
6	1.058	3.307	20.509	64.092

Since, according to Kaiser's criterion, the number of factors should be equal to the number of eigenvalues of the realization of the correlation matrix, which are greater than one, we included only six eigenvalues in Table 1. It shows that this condition is met by six eigenvalues of the correlation matrix, which together (cumulatively) explain 64.092 % of the total variance. In the next step, we performed factor analysis (FA) for 6 and 5 factors. In both cases, we achieved an unsatisfactory solution, because the 5th and 6th factors were saturated by one, respectively, two variables. Based on the above, we decided to use four factors, in accordance with the authors of the SRQ-Academic questionnaire. When performing FA for four factors, we reduced the original thirty-two variables to four latent variables – dimensions. The first dimension explains 25.250 % of the variance contained in the thirty-two observed variables, the second dimension 14.626 %, the third dimension 10.230 % of the variance and the last fourth dimension explains 7.057 % of the variance. The total percentage of explained variance is 57.163 %. The situation is illustrated in Figure 1.

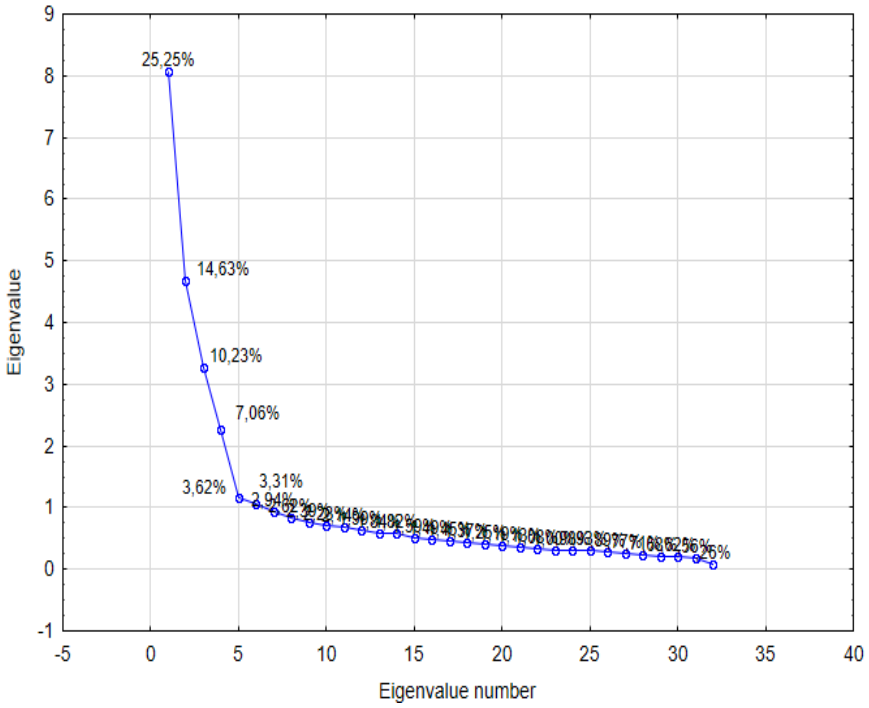

Fig. 1. Correlation matrix eigenvalues and percentage of explained variance

Given that the FA result has a relatively complex structure, for a simpler interpretation of the results it is appropriate to go to the so-called a simple structure in which each factor is highly correlated with (and named after) several variables and its correlations with other variables are low. The transition to a simple structure is made possible by the rotation of the factor scheme – VARIMAX (Osborne, 2015). After the first rotation, we received the following estimate of the matrix of factor loadings (Table 2).

Table 2. Estimation of factor saturation matrix

Factors and items	Factor loading			
	1	2	3	4
Factor 1: Extrinsic motivation				
A. Why do I do my homework?				
2. Because I have a problem if I don't do it.	**0.74**	-0.13	0.13	-0.09
6. Because it's my duty.	**0.78**	-0.05	0.13	-0.15
B. Why do I work on tasks during class?				
9. So the teacher doesn't yell at me.	**0.78**	-0.04	0.12	-0.08
14. Because that's the rule.	**0.76**	-0.03	0.01	-0.23
C. Why do I try to answer difficult questions during class?				
20. Because it's my duty.	**0.80**	-0.04	0.07	-0.15
24. Because I want the teacher to say only good things about me.	**0.75**	-0.04	0.21	-0.13
D. Why do I try to be the best in school?				
25. Because it's my duty.	**0.75**	0.01	0.10	-0.17
28. Because I enjoy working on school tasks as best as I can.	**0.77**	0.03	0.12	-0.09
32. Because I can earn a reward if I do well.	**0.79**	-0.08	0.01	-0.21
Factor 2: Introjected motivation				
A. Why do I do my homework?				
1. Because I want the teacher to think I'm a good student.	0.06	**0.66**	0.02	0.04
4. Because I would feel bad if I didn't do it.	0.09	**0.64**	0.02	0.09
B. Why do I work on tasks during class?				
10. Because I want the teacher to think I'm a good student.	0.03	**0.65**	0.07	-0.02
12. Because I would feel embarrassed if I didn't try.	0.00	**0.67**	0.05	-0.01
C. Why do I try to answer difficult questions during class?				
17. Because I want my classmates to think I'm smart.	0.02	**0.83**	0.03	0.03
18. Because I would feel embarrassed if I didn't try.	0.06	**0.82**	0.02	0.00
D. Why do I try to be the best in school?				
26. Because teachers think I'm a good student.	0.02	**0.69**	0.03	0.07
29. Because I feel bad if I don't do well.	0.10	**0.66**	0.07	0.10
31. I'm proud of myself when I do well in school.	0.06	**0.62**	-0.02	0.15
Factor 3: Identified motivation				
A. Why do I do my homework?				
5. Because I want to understand the subject.	0.16	0.03	**0.76**	0.18
8. Because it's important for me to do my homework.	0.08	-0.02	**0.76**	-0.04
B. Why do I work on tasks during class?				
11. Because I want to learn new things.	0.13	-0.05	**0.74**	0.05
16. Because it's important for me.	0.11	-0.05	**0.79**	0.13
C. Why do I try to answer difficult questions during class?				
21. Because I want to find out if I'm right or wrong.	0.03	-0.03	**0.81**	-0.05
23. Because it's important for me to answer them.	0.10	-0.11	**0.77**	0.11
D. Why do I try to be the best in school?				

Factors and items	Factor loading			
	1	2	3	4
30. Because it's important for me to do well in school.	0.14	0.02	**0.79**	0.24
Factor 4: Intrinsic motivation				
A. Why do I do my homework?				
3. Because it's fun for me.	0.22	0.03	-0.18	**0.74**
7. Because I enjoy doing my homework.	0.20	0.14	-0.14	**0.68**
B. Why do I work on tasks during class?				
13. Because it's fun for me.	0.21	0.05	-0.06	**0.69**
15. Because I enjoy working on tasks during class.	0.19	0.05	-0.11	**0.65**
C. Why do I try to answer difficult questions during class?				
19. Because I enjoy answering difficult questions.	0.24	-0.04	-0.03	**0.72**
22. Because it's fun to answer difficult questions.	0.22	0.09	-0.12	**0.64**
D. Why do I try to be the best in school?				
27. Because I'll have problems if I don't do well in school.	0.20	0.08	-0.15	**0.66**
Eigenvalues	8.08	4.68	3.27	1.16
% of variance	25.3	14.6	10.2	7.06

The use of factor analysis showed that the results obtained by us in Table 2 are consistent with the division of variables into individual factors, which is also declared by the authors of the used questionnaire. Based on the results obtained by statistical analysis, we conclude that the respondents in our research can be considered a representative sample with sufficient accuracy. At the same time, the same division of the questionnaire items into individual factors allows us to keep the original names of the latent variables.

Subsequently, we evaluated the data obtained by questionnaire quantitative research using the Relative Autonomous Index (RAI). First, we calculated the average score in each of the 4 subdimensions for each respondent ($\bar{x}_{Instri}, \bar{x}_{Ident}, \bar{x}_{Intro}, \bar{x}_{Exter}$). Then it applies to RAI

$$RAI = 2 \cdot \bar{x}_{Instri} + 1 \cdot \bar{x}_{Ident} - 1 \cdot \bar{x}_{Intro} - 2 \cdot \bar{x}_{Exter}$$

$RAI < -1{,}5$ value corresponds to prevailing external motivation, $-1{,}5 < RAI < 0$ corresponds to introjected motivation, $0 < RAI < 1{,}5$ corresponds to identified motivation and $RAI > 1{,}5$ corresponds to internal motivation. In Table 3, we present the calculated average score $\bar{x}$ and the average value of the Relative Autonomous Index $\overline{RAI}$ in individual subdimensions. For more details on RAI, see, for example, Grolnick & Ryan (1989).

Table 3. Mean score and mean value of RAI in subdimensions

	External motivation	Introjected motivation	Identified motivation	Intrinsic motivation
$\bar{x}$	2,350	2,511	2,315	1,970
$\overline{RAI}$	-3,584	-0,940	0,861	2,584

The values in Table 3 indicate that external motivation to learn mathematics dominates among the respondents, which was also confirmed by calculating the relative frequency of the dominant motivation among the respondents (Figure 2).

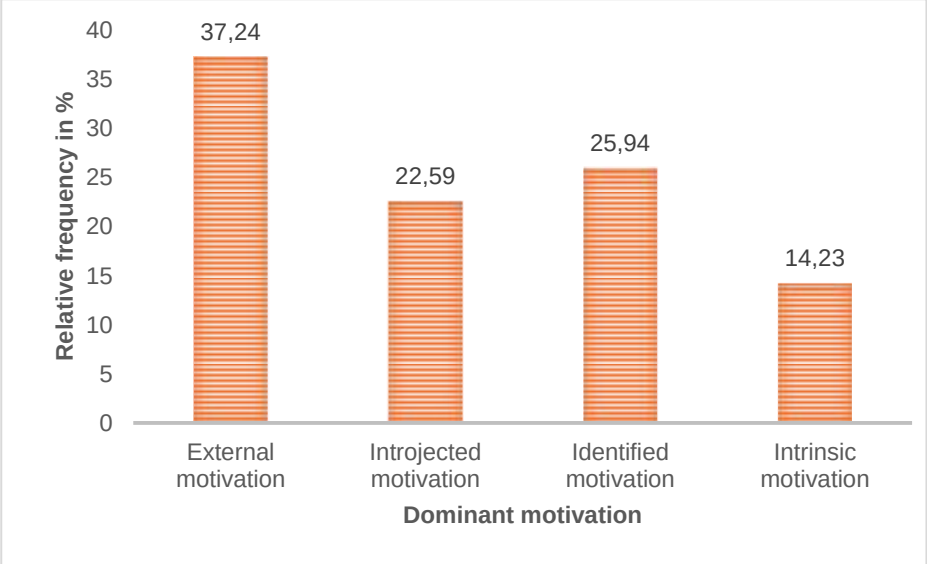

Fig. 2. Relative frequency of dominant motivation

Figure 2 shows that external motivation has the largest relative frequency of dominating motivation (37.27 %). When we add to it the relative frequency of the dominance of introjected motivation (22.59 %), we find that the motivation to satisfy external demands dominates in up to 59.86 % of students learning mathematics. To learn mathematics in order to develop one's own knowledge and skills - internal motivation significantly dominates only 14.23 % of students.

5. Findings from interviews

In the first part of the interview, we found that students consider knowledge and skills in mathematics valuable and necessary. This opinion prevailed not only among students with a dominance of internal motivation, but also among students with external motivation to learn mathematics. Despite this perception of mathematics as a value, most of them expressed that they would not like to study mathematics in their next studies. Almost all students with extrinsic motivation and also three students with predominant intrinsic motivation expressed themselves in this way. Student S6 expressed this fact most succinctly:

"It's great to know such things, but for my future life I already know about enough math."

In particular, students with predominant internal motivation in the interview also indirectly pointed out the reason for trying to avoid mathematics. The students pointed out the discrepancy between the declared goals of teaching mathematics and the goals that, according to them, are pursued by the actual teaching of mathematics. Student S12 expressed himself most clearly in this regard:

"Teachers often tell us why mathematics is necessary in everyday life, but the mathematics we learn seems different to what they say, and frankly, I don't know what it will do for me."

Another key point of intersection in the students' statements was the agreement in the perception of the goal of teaching mathematics. The opinion prevailed among the respondents that the goal of teaching mathematics is to learn to apply memorized calculation algorithms quickly and flawlessly in solving problems. What was interesting in this context was the finding that for students such a goal does not cause demotivation to learn mathematics. According to their statements, they are primarily demotivated by repeating learned procedures in tasks that lack a real context. Student S1 said:

"I calculated a lot of quadratic equations, but what's the point?"

In the second part of the interview, focused on the expected success in mathematics, we found out that students with internal motivation consider solving the assigned task as success, but students with external motivation consider correctly remembering the procedures as success. In this context, it was a remarkable finding that the joy of solving the task is conditioned differently for these groups. Students with external motivation are happy if they managed to choose the correct solution procedure and did not make any numerical error. To illustrate, here is the statement of student S10:

"I'm going to learn the procedure properly and I'm really happy when I manage to use it well."

Intrinsically motivated students experience the joy of solving a task if they managed to solve it on their own with the use of already acquired knowledge.

"I don't enjoy counting routine tasks, but I'm otherwise happy when I figure something out on my own."

From the statements of the students, it follows that for students with external motivation, the joy of solving the assigned task is primarily conditioned by a good result, but for students with internal motivation, the joy of solving the task is mainly conditioned by the quality of the reasoning process, i.e. j. on the way to the result.

During the interview, we also noted the difference between students with predominant internal motivation and students with predominant external motivation in the perception of the time they invest in learning mathematics. Extrinsically motivated students perceive learning mathematics as time-consuming, often much more time-consuming than other subjects. Three of them said that they only learn mathematics as much as they should, because they are not willing to invest more time. Student S3 said.

"It takes me a lot of time to master the procedures, and the result is not always consistent."

Intrinsically motivated students reported spending more time on math when something new is being learned. They spend that time mostly trying to understand new concepts and connecting with already acquired knowledge. After that, they spend less time learning the procedure, because they understand its individual steps. S14 spoke succinctly on this topic.

"When I know what it's about, the procedure often offers itself to me."

6. Discussion

In the quantitative part of the research, we found that 59.83 % of students (respondents) graduating from secondary school had a predominant external motivation to learn mathematics, and the remaining 40.17 % had a predominant internal motivation. However, the use of the basic division of motivation into intrinsic and extrinsic (Middleon, Spanias, 1999) brought a somewhat incomplete insight into the internal structure of the division of students' dominant motivation to learn mathematics. We think that a more faithful picture of the distribution of the dominant motivation to learn mathematics offers the preservation of the original four subdimensions into which the items of the used SRQ-Academic questionnaire were divided. In the case of retaining four subdimensions, external motivation consists of significant external motivation, which was found to be dominant in 37.27 % of students, and introjected motivation, which was dominant in 22.59 % of students. Introjected motivation is characterized as extrinsic motivation with a low level of intrinsic motivation (Ryan, Deci, 2000).

Internal motivation can be divided into intrinsic, i.e. j. intrinsic motivation (Ryan, Deci, 2000). This type of motivation dominated in 14.23 % of students. In addition to the prevailing internal motivation, there is identified motivation, in which the share of internal motivation and external motivation is in favour of the internal one. The identified motivation was dominant in 25.94% of students. Based on these findings, we conclude that the largest part of students learns mathematics based on significant external motivation. Thus, the motive for learning mathematics for them is not to develop their mathematical knowledge and skills, but to satisfy external requirements, such as getting a good evaluation from the teacher or parents. On the other hand, the smallest part of students is motivated to learn mathematics almost exclusively from internal conviction (intrinsic motivation). These students learn mathematics based on their own internal decision in order to improve and develop their mathematical knowledge and skills.

An interesting finding was that there is a relatively large group of students (48.54 %) for whom an exclusive type of dominant motivation was not identified. For these students, one can speak of a "mixed" motivation to learn mathematics. For them, external motivation is "mixed" with internal, while for some external motivation prevails over internal and for others internal motivation prevails over external. We assume that they have a certain internal dynamic between the strength of external and internal motivation. These students may switch from external to internal motivation and vice versa. In the context of other research, one of the factors causing the transition from one form of motivation to another could be the importance of success in mathematics (Herges et al., 2017; Mo, 2019). However, it is not generally possible to say what type of motivation this factor supports. According to Hulleman et al. (2010), striving to get a good grade in mathematics promotes intrinsic motivation for some students and extrinsic motivation for others. Therefore, this factor is considered a neutral motivational factor.

The conducted semi-structured interview brought us additional findings that allowed us to better understand the dynamics of the symbiosis of students' intrinsic and extrinsic motivation to learn mathematics. In the statements of the students, we identified several common features that allowed us to better understand the information obtained by the quantitative part of the research. First of all, we found agreement among students that mathematics is necessary and useful for the development of humanity. On the other hand, lack of interest in mathematics in further studies indicates that mathematics education is not a personal value for most students. According to the students, this discrepancy is caused to a significant extent by the discrepancy between the declared goal of teaching mathematics and the perceived goal of teaching mathematics on the part of the students. This basic finding of ours extends the conclusions of the research carried out by Voica et al. (2020), who suggested that students' level of motivation to learn mathematics is linked to their individual beliefs.

It follows from the students' statements that the goal of teaching mathematics is the quick and flawless application of memorized procedures. And the fulfilment of this goal has a demotivating character for students, in several aspects. Students with a dominant external and also students with a dominant internal motivation to learn mathematics agreed that a strong demotivator for them is the "endless" practice of calculation procedures, even on tasks "detached" from reality, which corresponds to the finding (Boaler, 2015). Although both groups agreed in identifying a strong demotivator, the causes of demotivation are different. In the first group, the cause is the repetition of a procedure they already master. In the second group, the reason is the large amount of time they need to gradually remember the procedure. Several students (mainly from external motivation) indicated that a good performance in mathematics is not decisive for them personally, therefore they focused on learning the minimum necessary to achieve a "good" grade for them. At the same time, their motivation to learn mathematics decreases with the increasing time required to learn increasingly complex procedures with uncertainty of success. In further research, it would be necessary to investigate whether reducing the feeling of failure in mathematics by correctly approaching students' mistakes will slow down the decline in motivation to learn mathematics.

In contrast, students with a strong dominance of intrinsic motivation see good performance in mathematics as a sign that they "think" well and are therefore motivated to learn mathematics. The decrease in their motivation to learn mathematics is smaller than that of students with external motivation. It emerged from their statements that this is primarily caused by the decreasing correlation between teaching mathematics and their personal interest.

Based on our research, we conclude that a key role in the dynamics of the symbiosis of external and internal motivation is played by the factor: The importance of good performance for oneself. This factor is closely connected with the perceived goals of teaching mathematics. If the student perceives the set goal as important for him, it is motivating for him to achieve a good performance in achieving it. It follows from the statement of the students that this connection could be one of the foundations of the emergence of the dominance of internal motivation to learn mathematics over external. Their internal motivation gains even more advantage if they manage to achieve the desired performance. Internally motivated students considered the ability to solve problems independently, based on already acquired knowledge, to be a good performance. This finding of ours complements the knowledge that students associate understanding with greater liking of mathematics (Wilkie, Sullivan, 2018).

7. Conclusion

From the first – quantitative part of the research, it emerged that students are mostly dominated by an exclusively external motivation to learn mathematics. The form of dominant motivation is strongly influenced by the goal of teaching mathematics, which is perceived by the students. If the goal of teaching mathematics corresponds to their personal value, then they are motivated to achieve this goal. A goal perceived as personally useful, coupled with the personal value of performing well in achieving it, supports intrinsic motivation to learn mathematics. Students with dominant internal motivation do not experience the increasing time-consuming nature of learning mathematics as negatively as students with external motivation.

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The History of Education

Organization of School Education in the Military Zone under the German Occupation in 1941–1943: the Sumy Region Example

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Abstract

Based on an extensive study of archival sources, the authors analyze the state of school education in the Sumy Region during the German occupation. A unique feature of this region is the fact that throughout the German occupation it remained within the so-called “military zone,” where the Wehrmacht was considered to be the supreme authority and local control was exercised by military commandants.

The authors conclude that, on the eve of the attack on the USSR, there was a debate among German leaders about future policies in the occupied territories. Alfred Rosenberg proposed fostering the development of Ukrainian national consciousness, which would include allowing the development of the educational system in Ukraine. However, other leaders, including Hitler, disagreed with this approach, and the education on these territories was officially restricted to the elementary level.

The policy on education in the military zone can be divided into three periods. The first period lasted from the Wehrmacht's occupation of various regions (in the Sumy Region – August-October 1941) until May 1942, when schools were closed for various reasons. During this period an active segment of the Ukrainian intelligentsia, hoping that the German occupation policy would resemble that of 1918, directed their efforts toward restoring the school network. There was a tendency to revive education based on pre-Soviet models, as evidenced by the opening of gymnasiums for boys and girls. However, it was impossible to fully restore the network of primary and secondary educational institutions due to objective factors. Educators also sought to use

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German authorities' permissions to establish new secondary-level institutions. The second period spanned from May to September-October 1942, during which no educational activities took place. All secondary educational institutions, such as gymnasiums, were closed under various pretexts in accordance with Directive No. 34. The third period began in September-October 1942 and lasted until the end of the occupation (for the Sumy Region – September 1943). This period was characterized by a gradual departure of the German military authorities from Hitler's initial educational policies, allowing Ukrainian activists to open primary and secondary schools.

Despite the vigorous efforts of Ukrainian activists, who understood the importance of education for national development, most of their plans could not be implemented due to prohibitions and restrictions imposed by the German occupation authorities. Even the Germans themselves eventually recognized the mistakes in their educational policies in the occupied territories.

Keywords: Sumy Region, German occupation, military zone, education.

1. Introduction

The level of educational development is, in many aspects, the foundation of the cultural, political and economic progress of a nation and state. Therefore, policies in this sphere act as a sort of "litmus test," reflecting the overall goals of the political forces in power. This is particularly true for occupational regimes.

An analysis of numerous documents from the leadership of Nazi Germany reveals that Ukraine, within the envisioned dominion of the "Thousand-Year Reich," was assigned the role of an important source of raw materials, agricultural products, cheap labor and a market for German industrial goods. Accordingly, this aim also shaped the educational policies.

However, there were certain differences among the German leaders regarding this issue. Alfred Rosenberg, who was regarded as an "expert on the eastern territories" within the Nazi Party, advocated for a differentiated policy in the occupied regions of the USSR. On June 20, 1941, in a speech addressed to a selected group of German leaders, he noted that every effort should be made to raise Ukrainian national consciousness, establish a university in Kyiv, open technical higher education institutions, promote the development of the Ukrainian language, publish works of Ukrainian classics and actively preserve the memory of Ukrainian leaders such as Khmelnytsky, Konashevych-Sahaidachny, and Mazepa. He reiterated some of these points at a meeting at the Fuhrer's headquarters on July 16, 1941.

However, other German leaders did not share his views. The decisive stance was taken by Adolf Hitler, who repeatedly addressed this topic. On September 17, 1941 he stated that it would be a mistake to educate the local population; he also opposed the opening of a university in Kyiv and suggested that it would be better not to educate those people at all. Rosenberg adjusted his position and, as the head of the Ministry for the Occupied Eastern Territories, directed Reich Commissioner (Reichskommissar)Erich Koch to allow only elementary schools and establish vocational schools for agriculture and crafts with limited functions (Kosyk, 1993:514, 533, 543).

The Sumy Region was not a part of the Reichskommissariat Ukraine(Reich Commissariatof Ukraine) and, along with Chernihiv, Kharkiv, Voroshilovgrad (Luhansk) and Stalino (Donetsk) regions, remained in the so-called "military zone" throughout the occupation period. Supreme authority in this area rested with the Wehrmacht and, on the local level, with commandant's offices. The local intelligentsia, working in "auxiliary" governing bodies, played an important role in restoring educational institutions. This defined certain peculiarities of the occupation policies in the region.

2. Materials and Methods

The main sources used in this research are case materials and issues of the local newspaper *Sumskyi Visnyk* (*the Sumy Herald*) from the period of the Nazi occupation of the Sumy Region (1941–1943), preserved in the State Archive of the Sumy Region (Sumy, Ukraine). Additionally, materials from the Central State Archive of the Supreme Bodies of Government and Administration of Ukraine (Kyiv, Ukraine), particularly fund KMF-8, were used. This fund contains documents of German army groups and their rear security units, reports of field commandant's offices, the Ministry for the Occupied Eastern Territories and others.

Both general historical and specialized historical methods were employed in the research. Universal methods such as analysis, synthesis, classification, periodization and generalization of factual material from sources were utilized. These methods facilitated important conclusions regarding general

trends and certain changes in the policies of Nazi occupational authorities in the field of education in the Sumy region and other regions within the military zone. The use of specialized historical methods helped to understand the key events related to the activities of the local Ukrainian intelligentsia in the sphere of primary and secondary education. In particular, the historical-typological method made it possible to evaluate specific achievements in the Sumy Region.

3. Discussion

To comprehend the processes that occurred in the sociocultural sphere of the occupied territories in Ukraine, it is necessary to understand the plans of the Nazi Germany's leadership, as well as the discussions among different German officials regarding changes in this sphere. In addition to the archival documents mentioned above, the work of V. Kossyk is particularly useful in this regard (Kosyk, 1993). While the author provides a multifaceted analysis of various aspects of occupation policies in Ukraine, including the education sphere (mainly in the regions of the Reichskommissariat Ukraine (Reich Commissariat of Ukraine), the final part of the monograph contains a large number of German documents. Some of these were used in our research. In general terms, the educational policies of the Nazi occupiers were highlighted by M. Koval, V. Lenska, H. Hordiyenko (Koval, 1999; Lens'ka, 1990; Hordiyenko, 2015). V. Shaikan examined the state of education in Ukraine during the occupation period through the lens of ideological confrontation (Shaykan, 2008).

The regional aspect is of significant importance for studying the processes in the field of education. V. Hinda devoted part of his work to the Nazis' educational policies in the Reichskommissariat Ukraine (Reich Commissariat of Ukraine) in general and the General District "Zhytomyr" in particular (Hinda, 2012; Hinda, 2008). F. Poliansky covered the Ternopil Region (Polyans'kyy, 2010), while K. Kostak, V. Arkhipova and O. Saltan studied the Kharkiv Region (Kostak, 2023; Arkhipova, 2008; Saltan, 2018).

Various aspects of education in the military zone of Ukraine were highlighted by V. Nesterenko, including the occupiers' policies on primary, secondary and vocational education, de-Sovietization and propaganda in education (Nesterenko, 2005; Nesterenko, 2014; Nesterenko, 2016). However, regarding the Sumy region, these studies provide only fragmented data, which identifies the relevance of the current research.

4. Results

On the eve of the German-Soviet war the education system in the USSR was actively developing. The transition from general primary education to incomplete seven-year secondary education had begun. At the same time, the number of schools offering full ten-year secondary education was increasing. In the Sumy Region, this looked as follows: in the 1940-41 academic year the region had 514 primary four-year schools with 34,484 students, 489 incomplete secondary schools with 127,776 students and 199 secondary schools with 113,204 students (Narodna osvita..., 1973: 92). Most of the population at that time lived in rural areas, but secondary and incomplete secondary schools were primarily established in cities. The largest city was the regional center, Sumy, with a pre-war population of about 70,000 people. On the eve of the war, the city had 19 schools, nine of which were secondary schools. These schools educated about 10,000 students and employed 380 teachers. In addition, there was a pioneers' palace, a young technicians' station and a music school. Higher and specialized secondary education was represented by the Pedagogical Institute with a workers' faculty, machine-building, chemical-technological and road construction technical schools, as well as a medical-nursing school (Istorija..., 1973: 112). However, due to the war and depopulation processes, the population of the city decreased to about 43,000 by the beginning of the occupation. During the occupation, the population continued to decline (Nesterenko, 2014). Other towns and smaller settlements in the region had considerably less population but were less affected by depopulation.

The occupation of the Sumy Region by the German forces began in late August 1941 from the north and lasted until mid-October of the same year. The regional center, Sumy, was occupied by Wehrmacht units on October 10. In February and early March 1943, units of the Red Army liberated a significant part of the region during their advance near Kharkiv but suffered defeat and were pushed back east. The German occupation of the region lasted until September 1943, with Sumy being liberated by the Red Army on September 2.

At the beginning of the German occupation in 1941, military-administrative bodies (field and local commandant's offices) did not always promptly arrive in their areas of responsibility and were unable to establish an effective management system immediately. Moreover, the areas of responsibility were significant (15-20 districts for a field commandant's office, 4-5 districts, sometimes more, for a local commandant's office). For instance, the local commandant's office (Ortskommandantur) in Sumy oversaw the Krasnopilskyi, Myropilskyi, Khotynskyi, Sumskyi, Shtepivskyi, Ulyanivskyi and Nedryhailivskyi districts. The commandant's offices faced staffing shortages, particularly translators and interpreters. In these conditions, some local intellectuals, unaware of Germany's true intentions and hoping the Germans would behave as they did in 1918 (during the Ukrainian State under Hetman P. Skoropadskyi), began working in the education departments of district and city administrations, aspiring to revive Ukrainian statehood and develop national education. Typically, the pre-Soviet education system served as their model.

There were also objective difficulties caused by military actions and other factors, such as the use of educational facilities for German military units, hospitals, etc. In Sumy the Education Department of the City Administration announced in the local newspaper *Sumskyi Visnyk* (*the Sumy Herald*) on November 20, 1941, that enrollment for primary schools, as well as separate gymnasiums for boys and girls, would soon begin. The delay was explained by ongoing repairs and the need to equip the facilities (SV, 1941, November 20).

In the November 23 issue of the same newspaper, it was again reported that the educational institutions mentioned above would soon open. However, since they could not accommodate all applicants, the City Administration temporarily allowed the opening of private schools and preparatory groups for enrollment in state schools and gymnasiums, as well as for taking exams externally. The Education Department provided the necessary permits and promised favorable conditions for those opening such institutions, including tax exemptions and, "if possible," the provision of premises (SV, 1941, November 23).

The same newspaper issue featured a large advertisement on its last page, announcing that starting December 1, 1941, applications for primary schools, gymnasiums for boys and girls would be accepted at the Education and Propaganda Department Office (Sumy, Lebedynska St., 10). The detailed admission rules were published there as well. The primary schools were four-grade institutions where boys and girls studied together free of charge. Children aged 8 to 10 years, who were illiterate, were admitted to the first grade; children aged 9 to 11 years, who could read, write, count and knew basic arithmetic up to 100, were admitted to the second grade; children aged 10 to 12 years, who could freely and expressively read and retell what they read, had basic knowledge of sentences and understood elementary spelling rules, could count and knew basic arithmetic up to 1000, were admitted to the third grade; children aged 11 to 13 years, who could consciously and expressively read books, retell what they read, knew basic morphological and syntactic rules and could apply them in practice (verified through dictation), perform arithmetic operations with numbers of any size, had knowledge of length, weight and time measurements, were admitted to the fourth grade. Children who had previously studied in secondary school were admitted to primary school without examinations in the corresponding grade to which they had progressed. Parents had to commit that their children would follow the internal rules of a school. The gymnasiums for boys and girls were eight-grade institutions with a tuition fee of 600 karbovanets per year, payable quarterly. Children aged 10 to 12 years, after passing exams based on the curriculum of two primary school grades, were admitted to the first grade; children aged 11 to 13 years were admitted to the second grade; children aged 12 to 14 years were admitted to the third grade; children aged 13 to 15 years were admitted to the fourth grade; children aged 14 to 16 years were admitted to the fifth grade; children aged 15 to 17 years were admitted to the sixth grade; children aged 16 to 18 years were admitted to the seventh grade; and children aged 17 to 19 years were admitted to the eighth grade. Additionally, students from former incomplete or complete secondary schools were admitted without examinations under the following conditions: to the first grade if they had completed two grades; to the second grade if they had completed three grades; to the third grade if they had completed four grades; to the fourth grade if they had completed five grades; to the fifth grade if they had completed six grades; to the sixth grade if they had completed seven grades; to the seventh grade if they had completed eight grades; and to the eighth grade if they had completed nine grades (SV, 1941, November 23).

The call from the Department of Educationof the Sumy City Council regarding private initiatives in education quickly found support among educators. In early December 1941, three

advertisements were published in the local newspaper. Teacher L.P. Erastova announced the formation of a group for preparing students for the first and second grades of gymnasiums for boys and girls, as well as for all grades of the four-year school (Sumy, Berestovska Street, 10; payment by agreement). Later she repeated that advertisement several times in subsequent issues of the newspaper. For preparation for the 4th-7th grades of the gymnasium, S. Sapun also invited students from the 6th-9th grades of secondary school for paid lessons (Sumy, Hitler Street, 17). Preparatory groups for younger children at home were organized by V.L. Nosovich and N.F. Tychinska (Sumy, Lebedynska Street, 6) (SV, 1941, December 4). Later, teacher S. Lyntvaryova placed a similar advertisement about preparing students for the 3rd-5th grades of gymnasiums for boys and girls, and all grades of primary school (Sumy, Nyzhna Voskresenska Street, 7, second floor) (SV, 1941, December 11).At the end of December, teacher V. Ignatyeva advertised lessons following the curriculum for the 1st-4th grades of primary school (SV, 1941, December 25). In this case, it was a replacement for primary school. In early January 1942, teacher L.D. Lazaryev announced preparations for the 1st-4th grades of gymnasiums for boys and girls,also preparations for primary schools and German language lessons (Sumy, Troitska Street, 53) (SV, 1942, January 4). In mid-January 1942, teacher Kinashevska announced the formation of a group for deaf-mute children to prepare them for various grades in a school for the deaf (Sumy, Kovalivska Street, 9) (SV, 1942, January16). In early April 1942, teacher P.S. Bilousov offered lessons for all grades of the gymnasium in the Russian language, physics, biology and chemistry, also for the first four grades of the gymnasium in mathematics (Sumy, Novomistenska Street, 5, apartment 12) (SV, 1942, April 1). In early May 1942, teacher Voloshina opened the first grade of a primary school on a paid basis – "by agreement" (SV, 1942, May 6).

On December 12, 1941, a four-year primary school was opened in Sumy on Doroshenkivska Street. Before the start of classes, the representatives of the Sumy Cathedral, led by the rector O. Shcherbyna, held a prayer service in the presence of students and their parents – something that had not occurred under the Soviet rule. The head of city schools, E.P. Popov, on behalf of the Department of Educationof the Sumy City Council, congratulated the teachers and students on the beginning of the academic year, wished them success and emphasized that teachers, with the support of parents, should pay special attention to educational work. The school director Ustymenko acquainted parents and students with the internal rulesof the school (SV, 1941, December 18). On December 21, the newspaper reported that classes were soon to begin in a second primary school on Romenska Street (SV, 1941, December21).

On December 18 of the same year, *Sumskyi Visnyk* (the local newspaper) published an announcement about the opening of a private gymnasium (Sumy, Ukrainian Square, 17) with separate classes for boys and girls. The organizer was the aforementioned S.S. Sapun. At the same time, student registration was extended until December 21 (SV, 1941, December 18). It can be assumed that in the difficult conditions of occupation and winter, parents' ability to pay for their children's education was limited. Additionally, there were issues with repairing the premises. In early January 1942, the evening and weekend German language courses for 80 people (four groups) were organized at the private gymnasium in Sumy by the same S.S. Sapun, with a fee of 70 karbovanets per month (SV, 1942, January 4). On January 2, a pedagogical meeting was held at the Sumy City Council regarding the opening of the gymnasium, although it had not been officially openedyet. The head of the Sumy City Council, I.P. Korniyenko, emphasized that the main task of educators was to "eradicate Soviet influence on youth and its morals,revive a national sense among young people, foster love for Ukraine, its customs, traditions and its national art" (SV, 1942, January 7).

The Education Department of the Sumy City Councilalso took care of homeless orphans. At the beginning of December of that year, *Sumskyi Visnyk* published anarticle titled "Caring for the Younger Generation," responding to a "correspondence" by a certain Mr. Toryanikov. The note criticized the unsatisfactory upbringing of the younger generation during Soviet times, claiming that children were leaving schools illiterate, uncultured and undisciplined. For orphans, the Soviet authorities opened orphanages in cities and patronages in villages. However, life for children in these institutions was described as "depressing" and "miserable." The article also reported the opening of a shelter for homeless orphans at 5 Petropavlivska Square, designed for 15 children. The publication included an appeal from the city council to the citizens to support the institution with clothing (SV, 1941, December4). By January 1942, the capacity of the shelter had been increased to 25 children (SV, 1942, January 7). By mid-February, the number of boys and girls had

grown to 35. The shelter included a playroom where children could play billiards and chess. For their nourishment, the Sumy Butter Plant provided milk daily, and each child received 300 grams of bread. The City Consumer Cooperative sent other food products. However, there was a significant shortage of linens. The shelter was managed by Mr. Bielchikov (SV, 1942, February 18).

In the January 1942 issue of the newspaper, an article authored by the head of the Education and Propaganda Department, V. Nits, and the head of the School Department, Ye. Popov, provided information about the educational institutions that had been opened and plans for new ones in the city of Sumy and the surrounding district. The article stated that theSchool Council had been established under the City Education and Propaganda Department, composed of experienced teachers who had worked in pre-revolutionary educational institutions. This council defined a four-year elementary school as a transitional type of educational institution, where the first two grades prepared children for entry into a gymnasium. The council developed curricula, programs, internal and extracurricular rules for schools, and reviewed Soviet textbooks.

Given the financial situationof the city, it was planned to open two gymnasiums during the current year–a classical gymnasium for boys and the onefor girls with eight general education grades, as well as four elementary schools. However, due to difficulties with repairs, only two schools were able to open on January 1, 1942: School No. 4 on Doroshenkivska Street and School No. 3 on Romenska Street. The opening of the gymnasiums was delayed because permission (presumably from the commandant's office) was only obtained a few days earlier, and rapid repairs were underway in the building of the former gymnasium for girls. The elementary schools were funded by the City Council, with 48,000 karbovantsi allocated to each, and education there was free of charge. The gymnasiums, in addition to an annual tuition fee of 600 karbovantsi per student, received subsidies from the city council: 20,000 karbovantsi for the gymnasium for boys and 32,000 for the one for girls. The City Council also provided some equipment. As the gymnasiums were temporarily housed in the same building, they shared a physics classroom and a library. However, there was no room for a natural history laboratory, a "fundamental" library, a sewing classroom and a music classroom.

The Education Department in Sumy received 320 applications from individuals wishing to work in schools, but only about 80 were approved. The remaining 240 unemployed teachers were issued meal vouchers and fuel orders or were sent to work in rural schools. As for students, initially, there were few applications, likely because parents did not expect schools to reopen. However, once School No. 4 began operating, the number of applications increased so dramatically that it was impossible to accommodate everyone.

285 applications were submitted to the gymnasium for boys and 450 to the one for girls. However, the delay in starting the school year raised concerns that classes might not begin. Therefore, the Department of Education worked out the "Regulations on Private Schools in the City of Sumy" and allowed S. Sapun to open preparatory groups corresponding to gymnasium classes, where 60 students began their studies.

The Department of Education in Sumy issued permits for opening schools in rural areas of the region, including Tereshkivka, Nyzy, Kosovshchyna, Mala Chernechchyna, Velyka Chernechchyna, Nyzhnia Syrovatka and Malyy Bobryk. In the village of Yastrubyne, teacher Brazhnyk received permission to open preparatory groups. Guidelines for opening schools were also provided to representatives of Stechkivka, Stepanyvka, Bitytsia, Vasylivka, Krynychne hamlet, Yastrubyne, Grebenykivka, Velykyy Bobryk, Yusupivka, Baranivka, Markivka, Tokari, Vyzyrivka, Mykolaivka and Basy station.

Education specialists identified a number of problems and outlined measures to address them. Firstly, children aged 6-7 in preschool groups remained outside the educational system, as far as a four-year primary school was insufficient for admission to vocational schools. They proposed creating a general Ukrainian school with a seven-year curriculum divided into two levels: the first, a four-year course for children aged 6-10, enabling them to enter gymnasiums; the second, for ages 11-13, preparing students for vocational schools, and to be mandatory and free of charge. Secondly, as an "extension" of general primary schools, three vocational schools were planned to open during the current year. However, there were challenges with providing them with material and technical resources. Thirdly, plans were underway to open a real school in Sumy with a seven-year curriculum and a second gymnasium for girls. Fourthly, it was proposed to establish a specialized school in the city for training and retraining teachers, drawing on experience found in German literature (SV, 1942, January 7).

The gymnasium for boys and the one for girlsbegan their operations in Sumy as their administrations accepted payments for the first quarter of tuition (150 karbovanets) in mid-January 1942 (SV, 1942, January 16). However, based on later publications in the local newspaper *Sumskyi Visnyk*, full-fledged classes only started in mid-February. The gymnasium for boys operated in the classrooms of former School No. 16, with classes held in two shifts: grades 1-4 began at 8 a.m., while grades 5-8 started at 12 p.m. The director of the gymnasium for boys was Pervukhin (SV, 1942, February 18). The gymnasium for girls began classes on February 16 in grades 5-8 in the building of the former School No. 5 on Pokrovska Street, 9 (SV, 1942, February 15).

More information is available regarding the German language courses offered at the gymnasium. Director S. Sapun discussed their operations in *Sumskyi Visnyk*. Instead of the planned 80 students, 140 people aged 17 to 60 enrolled within three days. Classes began on January 16, 1942, with three main and three parallel groups: beginners, preparatory conversational and conversational. Each course was designed for 300 hours, and graduates of the final course received translator qualifications. The courses were provided with instructors, lighting and heating. Due to high demand, they began enrollment for three additional groups in the third shift (SV, 1942, January 25). At the end of February, the additional admission for 40 students was announced (to the second and third groups), with classes planned to start on March 16. Enrollment required an upfront payment of 210 karbovanets for 150 hours – half the total cost (SV, 1942, February 27). Due to the high demand, the administration of the language courses required extra teachers (SV, 1942, March 8). By April 1, 1942, 300 people were studying in 14 groups in the German language courses in Sumy. On the same day, these private courses were subordinated to the state, with plans for further expansion. There were enough instructors, but there was a shortage of textbooks, so newspapers, technical and fiction literature were actively used in classes. After completing theoretical training, students underwent a two-week practical internship at enterprises and institutions (SV, 1942, April 1). In mid-April of the same year, a second evening group was formed, admitting individuals who had studied German in grades 7-9 of former secondary schools and technical institutes, with preference given to those already employed in organizations (SV, 1942, April 17). By mid-May, the courses had 18 groups, including eight advanced groups and seven intermediate groups, composed of individuals with prior the German language trainingin grades 7-9. The first three beginner groups consisted of “workers” with no prior preparation. Six groups studied after work hours, with a total of 389 students attending in four shifts, with each group studying for two hours. Practical training was scheduled to begin on June 26, and exams were planned for July 13. By then, 89 translators were expected to graduate, 10 of whom were already working as translators in organizations such as the labor exchange, the machine-tractor station and the forestry department (SV, 1942, May 22).From June 1, enrollment began for a new group of civil servants. Additionally, a translation bureau was organized at the courses, providing paid translation services of Ukrainian, Russian and German (SV, 1942, May 24).

However, the knowledge level of graduates from short-term courses was insufficient, as understood by their administration. Thus, in mid-June, a new enrollment was announced for the two-year state-run German language courses. Classes were scheduled to begin on July 1 in daytime and evening groups (SV, 1942, June 17). This new phase in the development of the courses was described by their director, S. Sapun, in the pages of the local newspaper *Sumskyi Visnyk*. In his opinion, “liberated Ukraine needs qualified translators and German language teachers,” which short-term courses could not provide. Therefore, he proposed opening a German language school in Sumy, which would train translators in two years and German language teachers in three years. The regulations and curriculum had already been submitted to the City Administration for approval. They proposed dividing the training into “six seminars with two five-month semesters per year.” After each semester, “students of the school” were required to pass an exam. In addition to the German language and literature, the curriculum included the Ukrainian language and literature, economic geography, Ukrainian culture, pedagogy, and methodology of teaching German. During the fourth semester, students were to undertake a one-month translator internship, and during the sixth semester they were supposed to have a teaching internship in German. Tuition was set at 50 karbovantsi per month, with the city administration also providing a subsidy. Applicants for the first-year course were required to pass exams in the German language and the Ukrainian language and literature at the level of a seven-year school curriculum, and for the second-year course – at the level of a nine-year school curriculum. The German language textbooks were to be provided free of charge. To accommodate students from the rural areas the

school planned to offer a dormitory and a canteen. It was also proposed to establish an external study program and six-month short-term courses under the old regulations (SV, 1942, July 8). Thus, the courses were aimed to evolve into a full-fledged educational institution similar to a specialized pedagogical college. In August 1942, student enrollment for the first and second years of the three-year German language school was announced, with exams in German and Ukrainian scheduled for August 24. Applicants also had to complete a questionnaire and pay six months' tuition upfront, amounting to 300 karbovantsi (SV, 1942, August 9). An interesting announcement from the course administration appeared in *Sumskyi Visnyk* at the end of August that year. Former course attendees were required to return their textbooks within three days, with a warning that failure to comply would result in legal action (SV, 1942, August 30). In September, an additional enrollment of students for the first and second years of studying German was announced, with entrance exams scheduled for September 19 and classes starting on the 21st (SV, 1942, September 13).

On the pages of *Sumskyi Visnyk* P. Butenko proposed, following the example of the Lublin newspaper *Nashi Visti* (Our News), publishing German language lectures for self-study. He expressed hope that the administration of the Sumy State German Llanguage Courses would support the idea (SV, 1942, April22). However, this did not happen. V.O. Pankova conducted paid private German lessons for junior high school students (SV, 1942, January 30). A.I. Zynevych offered private German lessons at home and via correspondence (likely by mail) (SV, 1942, February 25). In the village of Mala Chernechchyna, a rural teacher, F. Kolbus, organized a study group for villagers to learn German in mid-March 1942 (SV, 1942, March 18). In May 1942, N.A. Muravyov offered classes for adults in German, French and English (Sumy, Sadova Street, 41) (SV, 1942, May 15).

On January 2, 1942, an elementary school was ceremoniously opened with prayers at the Experimental Station, ten kilometers from Sumy (SV, 1942, January 11). However, after two weeks, the school was closed due to a lack of resources for heating. Appeals for assistance by the school headmaster to the village administration and the estate manager (former state farm) yielded no results. The school in Bitytsia faced challenges in providing material support for teachers, with the village elder being blamed. Two teachers sent from Sumy worked for more than a week without receiving food or money. The elder cited the absence of instructions from the District Land Administration (SV, 1942, March 15).A similar situation occurred in the village of Zaliznyak, the Krasnopilskyi District, where the head of the village council, despite orders from the District Land Administration, withheld teachers' food rations for two months. Salary payments were also delayed (SV, 1942, July 10).

On January 20, classes began at Primary School No. 1 in Sumy, located on Psilska Street (SV, 1942, January 18). By the end of January, there were four primary schools operating in Sumy and 16 primary schools in the Sumy and surrounding districts. The ceremonial opening of Yastrubine Primary School (People's School) was attended by the German commandant Fritz Konfetingaer, the village elder Andrukhov and the students' parents. The school was well-equipped with a good building, supplies, teaching materials, notebooks and fuel. However, in large villages like Yunakivka, Pysarivka, Khotin, Mykolaivka, Viry, and Ulyanivka local authorities (elders) did not take steps to open schools. In Stezkivka, out of five available school buildings, including one that previously served as a 10-year school, only one was opened, necessitating classes to be conducted in two shifts. The local elder Derevyanko hesitated to open additional schools, fearing there would not be enough students (SV, 1942, January 25). In the village of Stepankivka, classes began in the second half of February 1942. Over 100 students were enrolled in grades 1-4, and a total of 160 students had signed up, including those for grades 5-6. The headmaster, P. Taranov, managed to preserve school property and even establish a small auxiliary farm with two horses, a wagon and a sled (SV, 1942, March 15). On March 5, education commenced at the school in the village of Riasne, the Krasnopillia District, with a ceremonial prayer and the consecration of the building by Father Paladiy (SV, 1942, March20). In the District of Shtepivka (the Sumy Region), 21 schools were opened in December 1941, and in the spring of 1942 classes began at the Markivka Gymnasium (SV, 1942, May 10). By early May, three groups of youth from the Districts of Shtepivka and Nedryhailivwere admitted for preparatory studies at the gymnasium (SV, 1942, May22).By mid-May 1942, there were 34 schools operating in the Krasnopillia District (school types were not specified) (SV, 1942, May22).

Several shortcomings of the 1941-1942 academic year were noted. Teaching in many schools was still conducted in Russian. Even teachers, who held lessons in Ukrainian, communicated in

Russian during breaks and extracurricular time. At the gymnasium for girls in Sumy, for example, cosmography was taught in Russian because the teacher did not know Ukrainian. The same applied to teachers of German. The arithmetic curriculum for fourth grade was considered overly demanding, leaving insufficient time for reinforcing knowledge and solving problems. Efforts to enroll students and to staff schools with teachers were deemed insufficient, with responsibility placed on village elders, including those in Velyka Chernechchyna and Kekino. As for schooling process in Mariivska, Holovashivska, Hrytsakivska, Basivska, Pishchanska, Strilychanska and other village councils,it lacked the conditions for uninterrupted operation, causing schools to remain closed. In Tokari the teachers were not provided with housing (SV, 1942, August 23).

Information on the opening of gymnasiums and schools in other districts of the Sumy Region is fragmented. In January 1942, a gymnasium for boys operated in Lebedyn, and by March, a gymnasium for girls with an eight-year curriculum was also functioning. This is evidenced by records of teacher salary payments (SASR, F.R-1949, Op. 2, Spr. 3: 56, 132).

Following Adolf Hitler's directives, Alfred Rosenberg, Minister for the Occupied Eastern Territories, issued instructions to Reich Commissioner(Reichskommissar) Erich Koch on November 18, 1941, stating: "...To create the general conditions for establishing order, it is sufficient to allow the existence of elementary schools. Additionally, agricultural and craft vocational schools with limited objectives can be established" (Kosyk, 1993: 543). Similar directives were issued to the Wehrmacht command. Based on these instructions, on December 29, 1941, Section VII of the Wehrmacht Zone B (Ukraine) issued Directive No. 34. According to this directive, elementary schools, industrial, agricultural, forestry vocational schools, professional courses for female personnel in housekeeping, sewing, healthcare and hygiene were permitted in the occupied territories. However, universities, polytechnic institutes, gymnasiums, lyceums, secondary schools, teacher seminars, general secondary schools and specialized schools for specific professions were prohibited (Kosyk, 1993: 549-550).

Thus, during the initial period of the German occupation, the military authorities' policy on school education was ambiguous. The decision to open a particular educational institution, especially one providing more than four years of education, depended not on ideological guidelines but on the stance of officials from the local and field commandant's offices. The initiative of the local Ukrainian administration and intellectuals also played a significant role.

After the aforementioned Directive No. 34 had been issued, the situation changed. The closure of secondary schools was carried out gradually and under various pretexts. For instance, in the districts of the Sumy Region under the jurisdiction of Field Command 198(u) in Okhtyrka, the directive was enforced under the guise of spring fieldwork and the potential deployment of teachers and students aged 16 and older to work in Germany. However, in his report, a field command official expressed concerns about the possible negative consequences of the directive: "The closure of schools, whose curricula have caused no complaints, has been met with misunderstanding... Ukrainians are distinguished by their desire for education, and ignoring their education system will cause regret and distrust toward the authorities"(CSAHAAU, F. KMF-8, Op. 2, Spr. 157, T. 1: 10).

Thus, since May-June 1942, secondary schools and gymnasiums in the Sumy Region, as well as across the entire military zone of Ukraine, were no longer operational.

In the summer of 1942, German officials resumed discussions about the level of education permissible in Ukraine. The debate extended to the broader issue of how much cultural and national development should be allowed for Ukrainians and the formation of Ukrainian intelligentsia. Two perspectives were represented by General Commissioner of Dnipropetrovsk, Zeltzner, and Alfred Rosenberg's ministry official, Braun. Zeltzner argued that to ensure German dominance in Ukraine for centuries, all Ukrainians should be turned into farmers, the urban population relocated to rural areas, and industrial activity limited to raw material extraction. He viewed the establishment of medical, agricultural, and technical courses at institutes as temporary. Narrowly specialized courses at technical schools were acceptable, as they would prevent the emergence of a Ukrainian intelligentsia. In contrast, Braun contended that without creating conditions for the formation of Ukrainian intelligentsia, the strength and longevity of German leadership could not be guaranteed: "If these capable people are deprived of opportunities for intellectual development, they will respond to this prohibition by forming secret organizations and ideological circles." Braun also pointed out that Germany lacked sufficient human resources to provide the occupied territories with officials and specialists in various sectors. Therefore, the need

for local specialists was significant and it was necessary to establish various training courses for their preparation. He emphasized that the attendees of such courses should have an educational level above four years. He stated the following: "A higher level of education should not pose any dangerous consequences if sufficient German influence on higher education is ensured" (CSAHAAU, F. KMF-8, Op. 1, Spr. 274: 5-10).

The views of Rosenberg's supporters were shared by the military authorities. For instance, the head of the Frontline District "B", Military Administrative Department, noted in report No. 443/42 on August 9, 1942, that the school situation was unsatisfactory because the level of preparation of a student, who had completed a four-year school, was so low, that it was insufficient even for working as a craftsman or an office clerk (CSAHAAU, F. KMF-8, Op. 1, Spr. 6: 203-204). On December 18, 1942, a meeting was held at Rosenberg's Reich Ministry, with the chiefs of staff for the rear area of Army Group "B", during which, among other things, the opening of seven-year primary schools and technical schools was proposed(CSAHAAU, F. KMF-8, Op. 2, Spr. 189: 7).

Meanwhile, local authorities were preparing for the new academic year. In June 1942, the Education and Propaganda Department of the Sumy City Administration informed the population of Sumy and surrounding districts that, from September of the same year, a school for deaf-mute children aged 8 to 17 of both genders would be organized in Sumy. Applications were accepted until July 10 (SV, 1942, June 26).

In the village of Novo-Mikhaylivka of the Pidlisnivska Rural Administration, repairs of the school building, teachers' apartments, stoves and fuel sheds were being arranged;the fuel was being delivered. The head of the local school, V. Zhitkov, reached an agreement with the village elder Shkumat to organize hot breakfasts for children. Preparations were successfully underway at schoolsin Katerynivka and Verkhosulsk. However, in Shpylyvka, they were awaiting the appointment of a new school headmaster (SV, 1942, August 5). In August Sumy Primary School No. 3 was enrolling children born in 1934, as well as older students who had not finished the first grade (SV, 1942, August 21). Primary School No. 2 was also registering students for grades 1-4 at the end of August (SV, 1942, August 28).

There were hopes that the German authorities would allow schools beyond the four-year level to be opened. Therefore, preparatory work was also carried out in this direction. For example, the District Department of Propaganda and Education in Putivl planned to open 47 schools with 6,980 students, of which 33 would be four-year schools and 14 – seven-year schools (SASR, F.R-1955, Op. 1, Spr. 12: 78-81). However, these plans remained on paper. The local commandant's office in Konotop allowed the opening of only 46 primary schools in September, 43 in rural areas and three in Putivl. They enrolled 3,797 students, representing 77% of school-age children (SASR, F.R-1955, Op. 1, Spr. 15: 2, 7).

In September 1942, in Sumy, according to a decree from the Sumy City Administration on general primary education, "22 new sets were opened at existing primary schools" (likely referring to classes): at schools No. 1 on Piskivska St., No. 2 on Petropavlivska St., No. 3 on Svyshchanskyi Lane, No. 4 on Doroshenka St., No. 5 on Kholodnogorska St. and No. 6 in Pryshyb. Additionally, a new school No. 39 on Lebedynska St. was also opened (SV, 1942, September 18). By the 9th of October, primary schools were functioning in the city, and 40 – in the Sumy District. Also, in Sumy, a three-year German language school was operating, a vocational school for the training of turners, locksmiths and builders had been opened, a professional school for Ukrainian folk embroidery was active. From October 15, a secondary medical school for feldshers (medical assistants) and midwives was supposed to begin enrolling. Speaking of the latter, boys and girls with seven years of education were accepted, and preparatory groups were organized for those with only primary education. Short-term courses for training nurses were also to be opened. Establishing a commercial-industrial school was also planned (SV, 1942, October 9). The secondary medical school in Sumy (at Piskivska St.,9, in the building of the former School No. 65) was opened on October 20 of the same year, with a 3.5-year curriculum. Those with seven years of education or five gymnasium grades were admitted (SV, 1942, October14). By the end of October, 52 applications had been submitted for the first course, 25 – for the second course, 117 – for the three preparatory groups (SV, 1942, October 30). In October the vocational school also began its work in the building of the former School No. 16. More than 100 young men aged 14-17 enrolled. There were plans to expand the range of specialties, including foundry workers and blacksmiths (enrollment for these groups began in late October);a bit later such specialties as drivers, tractor operators and electricianswere supposed to be included (SV, 1942, October25). Thus, graduates of

the schools were given the opportunity to continue their education and acquire a profession. However, the issue of the development of vocational education requires separate attention.

On November 9, 1942, an inter-district meeting of burgomasters and school inspectors was held at the local commandant's office (Ortskommandantur) in Sumy. Among other topics, the issue of educating adolescents aged 13-18, who were not subject to mandatory four-year primary education, was discussed. It was decided that these young people must either study or work. Therefore, teachers in each district were tasked with registering all adolescents. For those who were unengaged, it was proposed to establish a youth service – *Yunginst*. Two adults in each district were to be appointed to lead groups (40–50 people), separately for boys and girls, with the burgomaster of the district being responsible for the overall work of the youth service. These groups were further subdivided into "communities" of 8–10 members, which would elect a leader, the "comrade." The primary goal of such groups was to promote labor education, carry out various community projects (e.g., maintaining parks and gardens, planting trees, beautifying cities or villages, assisting kindergartens and families, etc.), participate in various production workshops and engage in amateur artistic activities. The meeting also addressed the issue of teachers learning the German language. It was suggested to organize Sunday seminars for them, during which instructional lectures would be given to facilitate independent language learning. In Sumy teachers were to attend language courses. The City German Language School took on the task of developing the appropriate curriculum. Additionally, it was planned to establish at least two vocational schools in each district or to incorporate manual labor into primary schools (SV, 1942, November 13).

The Sumy Department of Education and Culture ordered two thousand copies of a primer prepared in Poltava to be printed (SV, 1942, November 20; Nesterenko, 2005; Nesterenko, 2016).

In February-March 1943, due to the Red Army's advance near Kharkiv, most educational institutions ceased operations. Some parts of the Sumy Region were liberated from the German occupiers, and the latter began preparing to leave Sumy. However, this offensive was unsuccessful. The German forces regained control over the Sumy Region and Kharkiv. As a result, only by the end of March did the educational process gradually resume. For instance, the German language courses in Sumy resumed on March 25 (SV, 1943, March 28). However, since the director of these courses, Semen Sapun, was exposed by the German special services as a leader of an underground Organization of Ukrainian Nationalists cell and executed, the German language school project he had initiated was likely closed, leaving only six-month courses operational. By mid-April, enrollment for two groups withsimilarstudy duration was announced (SV, 1943, April 14). Full-fledged school and language course enrollments resumed only on August 1, 1943 (SV, 1943, August 4). By April, all six primary schools in Sumy were operational. Some schools in rural areas never ceased their activities (SV, 1943, April 18). Furthermore, the German authorities and the city administration conducted a census of children in Sumy starting April 9 to involve adolescents in either education or socially useful labor. Responsibility for ensuring children attended school, playgrounds (for games and sports) or youth service inspections fell on parents. Any failure to comply the requirements allowed the city authorities to impose fines on parents or their substitutes (SV, 1943, April 14).

On May 5, 1943, by the order of the German command, the Education and Culture Department of the Sumy City Administration reopened seven schools and established 10 playgrounds for children aged 6-12. Plans were made to increase the number of playgrounds to 30. However, the number of children attending schools and playgrounds decreased, leading to dissatisfaction from school inspector H. Ustymenko. He again placed responsibility on the parents (SV, 1943, May 16).

Due to interruptions in the educational process, the academic year in rural schools was extended until June 30, while in the city of Sumy, it lasted until July 15. Following this, according to the instructions of the Department of Education and Culture, exams in Ukrainian and German, as well as arithmetic, were conducted for fourth-grade students. Examination commissions were to include a representative from the department as the chairperson. However, preparations for the exams faced certain challenges. In some rural schools, fourth-grade classes were not operational, and the revision of educational materials had not been arranged. In the urban schools of Sumy, exam preparation was underway, but attendance rates were approximately 75-80 %. Only School No. 2 failed to complete its preparation due to a lack of premises; it began functioning only in June and lagged behind other schools by a month in the academic process (SV, 1943, June 9).

By mid-July 1943, exams in rural schools were completed. A total of 30 schools were operational, but only 20 of them had fourth-grade classes. Only 107 students appeared for the exams, of whom 104 passed and received certificates of primary school completion. For example, in Nyzy School, out of 22 fourth-grade students, only 12 (55%) appeared for the exams; in Stepanivka School, only 6 out of 43 (13 %) attended. In Novo-Sukhanivska and Lyntvarivska schools, fourth-grade students stopped attending classes entirely by the end of the academic year. The German language instruction posed particular difficulties due to a lack of textbooks and limited study time. Students from Nyzy, Holovashivka, Kholodivka and Nyzhnosyrovatka schools performed well in German, while those from Lyntvarivska, Novo-Sukhanivska, Liubymivka, and Velykovilmy schools were poorly prepared. Handwriting was also unsatisfactory, attributed to an acute shortage of notebooks and insufficient attention to the matter by teachers. The most significant issue, however, was poor attendance, resulting in up to 60% of students in the Sumy District being held back for another year. By that time the exams in urban schools had just begun (SV, 1943, July 16).

Occasionally, teachers were honored for their dedicated work. For instance, in November 1942, the Sumy Department of Education and Culture, during a special ceremonial session attended by the mayor of the Sumy City Administration and the best teachers of the city, celebrated the 50th anniversary of the pedagogical career of Ivan Vasylovych Milovanov, a headmaster of Sumy School No. 4. Over his 51-year teaching career, he spent 15 years as a teacher at the Nyzhnosyrovatka two-grade school and 36 years in schools in Sumy. In July 1943, the mayor of Sumy awarded Ivan Vasylovych Milovanov with a personal stipend (SV, 1943, July 25).

In the summer of 1943, teachers once again carried out preparatory activities to open secondary schools. This included compiling records of youth under 17 years of age who had completed four or more grades, following the directive of the German authorities. The announcements about the introduction of incomplete secondary education and the opening of corresponding institutions for the 1943-44 academic year were made to local authorities and the population.

From July 18, 1943, applications were accepted for admission to Primary School No. 9 in Sumy (Lebedynska Street, 41), which offered instruction in Russian (SV, 1943, July 23). The final announcement from the Department of Education and Culture of the Sumy City Administration regarding changes in school operations reported the opening of fifth-grade classes for students who had completed four-year primary school in 1943. These classes were to be established at Primary Schools Nos. 1, 2, and 3 in Sumy, starting September 1, 1943 (SV, 1943, August 18).

5. Conclusion

On the eve of the attack on the USSR, debates arose among the representatives of the German leadership regarding future policies in the occupied territories. Alfred Rosenberg proposed promoting the national consciousness of Ukrainians, which included allowing the development of the educational system in Ukraine. However, other leaders, including Hitler, disagreed, and education was officially restricted to the primary level.

During the occupation, the Sumy Region fell under the military zone, and the policy in education can be divided into three periods. The first period: August-October 1941 to May 1942. During thisperiod of time schools reopened, the operating of the school network was renewed under the initiative of active members of Ukrainian intelligentsia, who hoped German policy would resemble that of 1918. Efforts were made to restore the school network, often modeled on pre-Soviet examples, such as the establishment of gymnasiums for boys and the ones for girls. However, it was impossible to fully restore primary and secondary education due to several factors, including damage to school buildings from warfare and looting, their repurposing for military use (e.g., for German troops, hospitals or prisoner-of-war camps), and the lack of initiative from local leaders, particularly in rural areas. For example, in Sumy only four out of 19 pre-war schools and two gymnasiums reopened. Approximately 70% of teachers were unemployed. Private education began to develop as a new phenomenon under these circumstances. Educators also attempted to use permissions granted by the German authorities to create new secondary educational institutions. For instance, the German language courses, initially offered at the gymnasium in Sumy, eventually transformed into a specialized pedagogical college with a three-year curriculum.

The second period: May to September-October 1942. No formal education was conducted during that period. All secondary schools, including gymnasiums, were closed for various reasons under Decree No. 34. During this period of time some German officials debated the level of

education permissible for Ukrainians and the fate of secondary and higher education institutions. Some officials from field commandants' offices criticized the restrictions imposed on education for the Ukrainian population. Meanwhile, Ukrainian activists prepared to open primary and secondary schools, sometimes without official permission from the German authorities.

The third period: September-October 1942 to the end of the occupation of the Sumy Region, September 1943. This period marked the German military authorities' gradual departure from Hitler's initial educational policies, allowing Ukrainian activists to establish primary and secondary schools. This shift was influenced by the stance of Rosenberg's ministry officials and military authorities, who, being in occupied Ukrainian territories, recognized the detrimental effects of strict policies on education, both from a propaganda perspective and in practical terms, as they needed skilled workers and staff from the local population. The network of primary schools expanded during this time. However, military operations in February-March 1943 temporarily halted educational activities in most schools in the Sumy Region. The repression of Ukrainian intelligentsia by the German occupiers, including the execution of Semen Sapun, a key figure in opening gymnasiums and the German language courses in Sumy, severely hindered educational development.

Despite the vigorous efforts of Ukrainian activists, who recognized the importance of education for national development, most of their plans were not realized due to the prohibitions and restrictions imposed by the German occupiers. Even the Germans later admitted the failure of their educational policies in the occupied territories. In the report "Organization of Military Administration" compiled after the occupation, this opinion was noted this way: "Experience has shown that delaying the opening of secondary and higher educational institutions in the occupied territories was an unacceptable mistake" (CSAHAAU, F. KMF-8, Op. 2, Spr. 332: 81).

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Organization of Educational Process in Trade Schools in the second half of the 19th – beginning of the 20th centuries: on the Materials of Kherson Gubernia

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Abstract

The research paper is devoted to studying the organization of the educational process in trade schools of Kherson gubernia, which was aimed at training skilled workers and foremen in various branches of industry and agriculture. Those educational institutions were established to meet the needs of the economy and industry, which were rapidly developing in the second half of the 19th – beginning of the 20th centuries.

The main types of vocational educational institutions in the region were ordinary trade schools, which were intended to train workers in various trade specialties, such as blacksmithing, metalworking, carpentry, turning, etc., and trade schools with a prolonged term of study – a more complex type of educational institution, where training was more extensive, and the study program included both practical mastering of trades and theoretical disciplines.

Training in vocational educational institutions usually lasted 3-4 years. The study program included both general education subjects and special disciplines related to a specific profession. Much attention was paid to practical classes in training workshops. Thus, a dual education system was used – a combination of theory and practice. As a rule, practical subjects were taught by practitioners – blacksmiths, carpenters, stonemasons, mechanics, builders, technologists, etc., which contributed to the sufficient quality of training.

At the same time, despite positive changes, the vocational education system faced a number of problems, in particular, insufficient funding, a shortage of qualified educators, and limited access to education for the lower strata of the population.

Keywords: Ukraine, Kherson gubernia, Russian Empire, education, vocational education, trade schools, organization of training, educational process, study programs.

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1. Introduction

The development of capitalist relations in the Russian Empire as a result of the reforms of the second half of the 19th century gave impetus not only to the economy but also to other social sectors, including education. The Industrial Revolution required professional workers with qualitatively new knowledge and skills obtained in renovated educational institutions of a trade profile. As a result, a network of trade schools began to be formed in all gubernias of the Empire, oriented towards the needs of local sectors of the economy.

In Kherson gubernia, by the beginning of World War I, a small network of lower trade educational institutions of a professional nature had been formed (see: Trygub et al., 2024). They were established mainly during the last quarter of the 19th – early 20th centuries and relied in their activities on a number of legislative acts of the 1880s – 1900s (for detailed, see: Trygub et al., 2023a; Trygub et al., 2023b). Each educational institution organized the educational process in accordance with its own goals and capabilities. Studying this historical experience plays an important role in organizing the modern educational process in vocational educational institutions, providing valuable lessons and models for today's education.

2. Materials and methods

The source basis for the current study has become the materials on Kherson gubernia vocational educational institutions, which were issued in printed form – statutes, regulations, curricula, and reports (Izvlechenie..., 1890; Programmy, 1902; Ustav..., 1904; Ustav..., 1909; Ustav..., 1912). These documents were published as separate brochures and as part of various collections: 'Sbornik Rasporiazhenii po Ministerstvu Narodnogo Prosveshcheniia (Collection of Orders for the Ministry of Public Education), 'Lower Trade Schools'. An important source for analyzing state policy in the field of regulating the content-related characteristics of education are the legislative acts published in the collection 'Polnoie Sobranie Zakonov Rossiiskoi Imperii' (Full Collection of Laws of the Russian Empire) (PSZRI-3).

The study of the organization of the educational process in trade schools of the second half of the 19th century – the beginning of the 20th century is provided with the help of a number of methods that allow an understanding of the peculiarities of the development and functioning of those institutions, as well as the role of vocational education in the context of the social changes of that time. In particular, a historical analysis of teaching and upbringing methods in trade schools is applied to prepare this manuscript. Studying sources of that time, such as curricula, study programs, instructions, and other official documents, allows us to uncover how the educational process was organized, what subjects were taught, and what teaching methods were used in studied educational institutions.

An analysis of scientific and pedagogical literature and publications by teachers, researchers, and public figures who commented on the situation in the field of education, in particular, vocational education, is also conducted, which makes it possible to understand the social, economic, and cultural prerequisites for changes in educational institutions.

The comparative-historical method has become fundamental for comparing different stages of development of tread schools, as well as comparing the organization of the educational process in them, which allows the identification of general trends and specific education features at that level.

The case study method makes it possible to study individual educational institutions and study programs, which allows for a detailed analysis of the specifics of the educational process organization.

Using statistical analysis and statistical data makes it possible to assess training effectiveness, the number of students and graduates, and their social composition.

The methods applied allow for a thorough study of the organization of the educational process in trade schools of Kherson gubernia to identify the peculiarities of pedagogical practices of that time and their impact on the professional training of students. These methods allow for a comprehensive approach to studying the development of vocational education in Ukraine, particularly in Kherson gubernia, in the context of social and cultural changes of that time.

3. Discussion

The study of the meaningful characteristics of the educational process in vocational educational institutions of the Russian Empire became the object of study for leading educators back in the period of vocational education formation in the second half of the 19th century.

Educators were seeking the best models for the formation of the educational environment, and compared the systems of training professional workers in different countries, paying special attention to Great Britain, France, and Germany. Thus, the first attempts at scientific processing of the problem belong to I. Anopov (Anopov, 1889), A. Nebolsin (Nebolsin, 1903), M. Maksin (Maksin, 1909), and others, who raise the issues of training personnel for specific industries and in whose works the experience accumulated by vocational and technical educational institutions during their existence is summarized.

In the regional aspect, the problem of the vocational training content is studied by some Ukrainian scholars – M. Honchar, A. Vasylevych, and S. Sytniakivska. The most fruitful study of the analyzed direction of youth professional training is performed by S. Sytniakivska, who prepared a number of works both on an all-Ukrainian scale and in the context of the Southern Ukraine gubernias (Sytniakivska, 2009; Sytniakivska, 2010). One of the last quite successful dissertations is the study of M.V. Honchar (Honchar, 2015), dealing with the development of lower vocational training in Southern Ukraine in the second half of the 19th – the beginning of the 20th centuries. A broad subject field – all lower vocational educational institutions and expanded geographical boundaries – Taurida and Kherson gubernias, leave significant gaps for future research. The training of shipbuilders in the trade school of the city of Mykolaiv is studied by A. Vasylevych (Vasylevych, 2012). As we can see, in the regional context, although the issue is partially covered, it is still far from obtaining a holistic picture.

4. Results

The formation of vocational education content occurred in the Russian Empire in an utterly unorganized manner. The first such educational institutions in southern cities were formed under local requests, and there were no unified study programs and legally organized curricula. As a result, the organization and content of the educational process in vocational schools and technical schools were quite diverse. As the Ukrainian researcher S. Sytniakivska states, "An analysis of historical and pedagogical sources and archival materials shows that one of the most important problems in organizing the work of vocational educational institutions in Southern Ukraine in the studied period was the lack of a general concept and scientifically based methods of teaching general and special subjects that would take into account the specifics of training in individual specialties, the age characteristics of students, and their social status" (Sytniakivska, 2010: 208). To this, it is necessary to add that the diversity of the educational process in that type of vocational and technical educational institutions also depended on the form of ownership (public or private) and technical orientation (metalworking, carpentry, blacksmithing, flour milling, ship repairing, etc.).

In 1864, when one of the first trade educational institutions was established – the Trade School of Odesa 'Trud' (Labor) Society, there were not even models for the content development of curricula and study programs, and everything depended on the educators' creativity. At the first stage of its development (1864-1871), the mentioned School was primarily oriented on production, namely the trade component of the training process. Students studied Law of God, Russian Grammar, Arithmetic, and Penmanship. To study Drawing and Technical Drawing, students attended a drawing school established in Odesa and received trade training in two workshops – carpentry and metalwork, following the apprentice system. Such a training system was called 'mixed' by the School's historians; the humanitarian subjects were taught systematically, while the practical subjects – in a home workshop, were given unsystematically and depended on the personal aspirations of the foreman and orders. As a result, in 1871, only five students remained at the School, which forced the administration to seek new approaches to training (Izvlechenie..., 1890: 6-8).

In 1874, the School was reorganized into a system-based institution with a four-year term of study, where the educational process was based on the best examples of contemporary pedagogical science of the time. The following subjects were taught: Law of God, the Russian Language, Arithmetic, Algebra, Mechanics, Geometry, Drawing and Technical Drawing, Descriptive Geometry, History, and Geography. A carpentry and metalworking-blacksmithing workshops were established. In the first workshop, students studied during the first year, and the aim was to train manual labor skills, while the latter was used for three years to teach trades. General education and the exact subjects were given in parallel for all four years. In the fifth year, students were assigned to local factories and plants to improve their acquired skills and abilities. The students' successes in manufacturing items were recognized at Odesa Agricultural Exhibition in 1875 with a letter of commendation (Izvlechenie, 1890: 12-14).

Since the late 1870s, the administration had been emphasizing increasing students' interest in practical classes by transferring 10 % of the cost of completed works to them, providing personal scholarships to the brightest, and increasing the number of private orders under the guidance of experienced foremen from the local Bellino-Fenderikh factory. As a result, students "joined classes that provided them with financial and intellectual interest… By completing orders under the guidance of an experienced foreman, students more or less earned their living and also improved their trades" (Izvlechenie…, 1890: 16-17).

In fact, the School continued to follow the path of improving the subject system of industrial training, which was introduced back in the 18th century. Its essence was in combining of industrial work with training, and the main result of the training was considered being the produced item itself: a hammer, furniture, bookbinding, etc. Students of the Trade School of Odesa 'Trud' Society manufactured boxes, hangers, sandboxes, etc. In the process of training, the student made the same items as the foreman. Thus, the only method of training in the School was observation. Training a trade, therefore, consisted in progressing from the manufacture of the simplest to the most complex produced items. The advantage of the subject system was that the student, from the first days of studying at a vocational educational institution, began mastering the technological process of manufacturing produced items. Gradually, the subject system improved and became more complicated: teachers and foremen developed personal methods of independent work of students, and the use of technical drawings and available technical documentation in the process of developing the professional skills of a future foreman started (Sytniakivska, 2009: 133-134; Izvlechenie…, 1890: 30).

During the years 1875–1890s, the curricula were adjusted and supplemented. Besides the already mentioned subjects, Physics and Technology were added, but the distribution of teaching hours with a significant bias towards practical training remained unchanged (see Table 1). We see that production training initially took up ¾ of the time, and later it decreased to almost ⅔ of the entire training time, therefore, the essence of training did not change radically, and the main emphasis was on practical training.

Table 1. Comparative curriculum of Odesa Jewish School of 'Trud' Society for the academic years of 1894/1895 and 1888

Subjects	Grades				Total
	1st	2nd	3rd	4th	
Law of God	1 (1)	1 (1)	1 (1)	1 (-)	4 (3)
Russian Language	3 (3)	3 (3)	2 (2)	2 (2)	10 (10)
Arithmetic	3 (4)	2 (3)	2 (2)	- (-)	7 (9)
Geography	2 (-)	2 (2)	- (2)	- (-)	4 (4)
Algebra	- (-)	2 (-)	1 (-)	- (-)	3 (-)
Physics	- (-)	- (-)	2 (2)	1 (-)	3 (2)
Mechanics	- (-)	- (-)	- (-)	3 (2)	3 (2)
Technology	- (-)	- (-)	- (-)	3 (2)	3 (2)
Technical Drawing	- (-)	2 (3)	5 (3)	5 (3)	12 (9)
Drawing	4 (2)	2 (-)	2 (-)	- (-)	8 (2)
Penmanship	2 (-)	1 (-)	- (-)	- (-)	3 (-)
History	- (-)	- (-)	2 (1)	2 (2)	4 (3)
Geometry	- (-)	3 (2)	2 (3)	1 (-)	6 (5)
Total:	*15 (10)*	*18 (14)*	*19 (16)*	*18 (11)*	*70 (51)*
Trades	33 (41)	30 (37)	29 (34)	30 (42)	122 (154)
Total:	**48 (51)**	**48 (51)**	**48 (50)**	**48 (53)**	**192 (205)**

* The hours in brackets are for 1888.
Compiled on: (Anopov, 1889: 127; Svedeniya, 1895: 4)

In order to enter the 1st grade of the School, it was required: according to the Law of God – the ability to read correctly in ancient Hebrew and knowledge of daily prayers; Russian language – fluent and error-free reading with the ability to tell in own words what have been read, writing to dictation without gross spelling errors; Arithmetic – the first four arithmetic operations and doing easy sums (Svedeniya…, 1895: 4).

If we compare the curriculum of Odesa Trade School and the typical curriculum for a trade school, approved on March 7, 1888, we can see that in the Trade School of Odesa 'Trud' (Labor) Society, there were 35-50 % more hours for practical mastery of trades than those offered by the Ministry of Public Education. Russian Language, Algebra, Physics, History, and Geography were also added, but the number of hours for special subjects (Technology, Mechanics, and Technical Drawing) was reduced. That was due to the national characteristics of the students, the older age of those entering and their better level of knowledge, and also to the four-year term of study because if the three-year curriculum had a total of 130½ hours for the entire course, Odesa School had 192 hours. In addition, at the beginning of the 20th century, a preparatory course was added to the School for those who did not have sufficient knowledge to enter the 1st grade.

As for the program content of the studied subjects, it briefly looked like this:

Law of God was studied in all grades, gradually deepening knowledge of the Old Testament, studying Jewish prayers and the history of the Jewish people.

Russian Language. Basic knowledge, reading, retelling, and dictations were given in the preparatory grade. The 1st grade – etymology; the 2nd grade – syntax; the 3rd grade – reading and analysis of read stories, a brief history of literature; the 4th grade – brief information on the history of literature of the 18th and 19th centuries.

Arithmetic. In the preparatory grade, the concepts of numbers and calculation were studied; abstract numbers and operations on them (addition, subtraction, multiplication, division); named numbers; doing the simplest sums. The 1st grade – divisibility of numbers; simple, decimal, and periodic fractions and operations with them. The 2nd grade – decimal fractions, the metric system of measures, ratios, and proportions. The 3rd grade – refreshing of what had been learned, triple rules, doing sums on all the rules, consolidation of knowledge.

Algebra began in the 2nd grade: the basics of algebra, coefficient, root, formulas, algebraic quantities and operations with them, monomials and polynomials, raising to a power, writing equations; the 3rd grade – extracting roots, extracting square and cube roots, factoring polynomials; the 4th grade – ratios and proportions, equations of different levels.

Geometry also began in the 2nd grade, where planimetry was studied. In the 3rd grade, planimetry and stereometry continued to be studied, and in the 4th grade, simple trigonometry, and measuring surfaces and volumes appeared.

Physics. The 3rd grade – general affections of bodies, hydrostatics, aerostatics, magnetism, and electrostatics. The 4th grade – elementary knowledge of chemistry, galvanism, heat, optics, and acoustics.

Mechanics. The 3rd grade – about motion and force, the simplest mechanisms; the 4th grade – simple and complex mechanisms, the concept of a machine, the resistance of materials, steam, steam boilers and machines, and their control.

Electrical Engineering was studied only in the 4th grade and was introduced into the study program at the turn of the century. The theory of electrical engineering, units of measurement, practical applications, and devices; galvanic elements, electric machines, batteries and transformers, wires, electric lighting, electroplating and electrometallurgy, telegraphy and telephony; the use of electricity in medicine were studied.

Technology. In the 3rd grade, wood technology was studied, and in the 4th grade – metal technology.

Geography was taught according to the general study program and included: the 1st grade – general information on physical geography, meteorology, and a description of the main peoples of the world; the 2nd grade – geography of the Russian Empire.

History was taught in the 3rd and 4th grades to "familiarize students with the most prominent historical figures who had an impact on the cultural development of nations". Attention was paid not so much to the political as to the cultural and economic role of facts, "establishing those principles that are common to all peoples of all countries" (Programmy..., 1902: 33). We see a clearly expressed civilizational or cultural approach to the historical process, which was not typical of the generally accepted study program for the subject in the Russian Empire since state or political history when history was represented by the history of states from ancient times to the present, prevailed.

Geometric Drawing. The 2nd grade – general information about drawing tools, straight and polygonal lines, line measurements, circles; angles and their measurements; areas. The 3rd grade – geometric bodies in 2 planes; depictions of simple objects in 3 planes.

Technical Drawing for carpenters. The 3rd grade – drawing profiles, copying blueprints, drawing from the original. The 4th grade – drawing architectural forms, turning objects, enlarging furniture blueprints.

Technical Drawing for metalworkers included drawing machine parts, drawing machines from the original, making draft blueprints, and selective drawing of certain parts of blueprints.

Drawing: The 1st grade – drawing patterns and simple objects; the 2nd grade – the concept of perspective and drawing geometric bodies with shading; the 3rd grade – drawing complex, sophisticated ornaments with shading; the 4th grade – drawing original items and models of artistic and produced items with pencil, pen, and watercolors.

Penmanship. In the preparatory grade, the students were taught correct writing, writing letters and numbers, and spelling words. In the 1st grade, they wrote proverbs, fragments of texts, and verses, and in the 2nd grade, they began writing correctly in the rondo font, using quad-ruled exercise books (Programmy..., 1902).

At the end of the 19th century, the School taught three trades: carpentry and model making, metalworking and mechanics, and foundry work. Each trade was specialized from the first day a student entered the School. During the first two years, students got used to working on so-called program works and then practiced on orders.

The content of the *Carpentry Trade* included: step-by-step processing of a roundwood with cutting tools and a planer till it becomes a square bar, and during the process, the foreman, using one tool after another, explains the method of their holding and using; five primary methods of joining of wood; kitchen table with drawer and kitchen stool.

The content of the *Metalworking Trade* included: cutting cast-iron tile with a chisel; finishing cutting these tiles in a regular square with different chamfers on their surface; cutting and filing of all sides of the cast-iron cube; filing the outer and inner planes of a right and acute angle; filing the semi-cylindrical surface along the marked edges with a blueing test; processing the second program work – a paperweight with a fine turned handle; making of bevel edge squares and adjustable sliding bevel squares; making hand saw blanks.

To familiarize students with forging and manufacturing of the required metalworking tools (chisels, drills, cutting tools, etc.), they attended the smithy in turn, practicing the smithcraft initially as a hammerman, and later as the assistants of the blacksmith foremen, and at last had to manufacture a number of personally forged tools. In addition, the students also learned how to solder and harden steel and gradually became accustomed to running a treadle lathe and using an engraving tool.

Also, in the 1st and 2nd grades, the students of the metalwork workshop were getting used to maintaining the steam engine on the school locomobile, performing the duties of firemen in turn, and in the 3rd grade – the duties of locomotive operators. Besides cleaning the locomotive boiler and machine, the students performed various maintenance activities like rearranging hatches, reseating taps, and checking valves.

Foundry Trade involved the production of model sand, pig casting, preparatory work for casting cast iron and molding simple items: furnace bars, grates, plates, wheels, and weights.

At the same time, the study process at the School practically did not stop. During the two summer months, classes were suspended only in the classrooms. Practical classes not only did not stop but, on the contrary, intensified since it was in the summer that the most significant number of orders came in. There were no winter vacations or any long breaks in studies, and classes or workshops were closed only on public holidays and annual Jewish holidays (Tekhnicheskie..., 1895: 20-21).

It should be noted that the School graduated fully trained foremen and not trade apprentices, as was observed in most educational institutions of the type. “Even those students”, noted the famous supporter of vocational education in pre-Soviet Russia I. Anopov, “who did not complete the course, upon being hired by private foremen were accepted not as boys ‘for study’, but as hired workers, with a higher wage rate” (Anopov, 1889: 127; Abdulmutalinova, 1998: 118-119).

In 1909, Kherson Jewish community established an educational institution similar to the Trade School of Odesa ‘Trud’ Society. Kherson Jewish Trade School also had one preparatory grade and a four-year course of study. Among the practical subjects taught there were metalworking, cast iron foundry, copper foundry, and modeling (Ustav..., 1912). Thus, vocational training in that school was primarily focused on working with metals.

The educational process at Odesa Trade School at the Orphanage and Odesa City Trade School was based on the Regulations of 1888 and the standard curriculum of 1889 (see Table 2). They had a three-year course of study but differed in the specialization of trade training.

Table 2. The typical curriculum of a trade school, approved on June 26, 1889 (hours per week)

Subjects	Grades			Total
	1st	2nd	3rd	
Theoretical Classes:				
Law of God	1	1	2	4
Russian Language	2	2	2	6
Arithmetic and Bookkeeping	3	2	2	7
Geometry	3	3	-	6
Basics of Physics	-	2	4	6
Metal Technology in Carpentry Trades	-	2	1	6
Metal Technology in Metalworking Trades	-	2	1	
Total*:*	*9*	*14*	*12*	*35*
Penmanship	2	-	-	2
Drawing	4	2	2	8
Geometrical Technical Drawing	3	2	-	5
Technical Drawing	-	2	5	7
Total*:*	*9*	*6*	*7*	*22*
Practical Training:				
in Workshops	24	24	24	72
Total*:*	*42*	*44*	*43*	*129*
Choir Practice	-	-	-	1½
Total:	**42**	**44**	**43**	**130½**

Compiled on: Vysochajshe..., 1889a: 183

Odesa City Trade School trained craftsmen in three main areas: carpentry, metalwork, and drawing and painting. For each specialty, its own technical drawing was taught: geometric and technical for carpenters and metalworkers, and projection – only for painters and artists. Also, gymnastics and various student games were given for the "physical development of the body and agility". Indoor classes were given from 8 to 12 a.m, and practical training was given after lunch – from 1.30 p.m. to 5.30 p.m. (Tekhnicheskie..., 1895: 2).

Odesa Trade School at the Orphanage specialized in carpentry, metalwork, and bookbinding trades. The first two trades were related to metal and wood turning to the extent necessary for a good metalworker and carpenter-furniture maker. Trades were taught according to study programs developed directly by foremen, the heads of trades. The mentioned study program provided the provision of standard for that time knowledge of carpentry and metalwork trades, while the bookbinding course was divided into the bookbinding part (paper cutting, folding, booklet making, trimming, bookbinding, etc.) and the haberdashery part (manufacturing various items covered with paper and calico, from plush, satin, etc., and leather goods). Studies lasted throughout the year (except for the winter (December 23 – January 7) and summer (June 10 – August 23) holidays). However, practical classes in workshops took place almost all year round, except for the Christmas holidays and two-week summer holidays (Tekhnicheskie..., 1895: 24-27).

The organization and content of training in specialized vocational schools – Odesa School of Foremasters and Odesa Flour Milling School, deserve special attention in the analysis.

Odesa School of Foremasters trained junior technicians in engineering construction. The entire course of study was two years long and was divided into two winter semesters from November 1 to April 15 and two summer semesters – from April 16 to October 31. Theoretical courses were studied during the winter, and practical courses during the summer semesters. Winter classes lasted from 8 a.m. to 6 p.m. with a two-hour lunch break. The subjects taught in two grades were Law of God, Russian Language, History and Geography, Arithmetic, Geometry, Drawing and Penmanship, Technical Drawing, Construction Art, Railway Work, Land Surveying, and Preparing Cost Estimates (Tekhnicheskie..., 1895: 78-79).

An analysis of the curriculum shows that the School of Foremasters had a fairly judicious mix of educational and special cycles. However, the main emphasis was on special subjects (for example, Construction Art). That was because of the fact that boys with some general education were accepted to the School. It should be noted that given the shortness of the course and the large number of subjects taught at the School, future foremasters had to study hard and spend the whole day at School, since in their free time from classes they were engaged in making models, making drawings, and blueprints.

No trades were studied at the School, and practical classes included modeling using plaster and wood, inspecting works and factories, and taking plans. All students were required to work for the summer for practical training and, at the beginning of the following year, present the school inspector with a certificate from the person they worked for (Abdulmutalinova, 1998: 124-126).

Odesa Flour Milling School covered a difficult but rapid path from a lower-level vocational school to a secondary one in 10 years. In the absence of generally accepted study programs, the school teachers themselves developed study programs, study programs and organized the educational process during 1902–1904. The educational course was three years, where the primary attention was paid to theoretical classes in special subjects. Practical training at the mill and workshops took up relatively little time (see Table 3).

Table 3. Curriculum of Odesa Flour Milling School (1902–1905)

Subjects	Hours per week			
	Grades			Total
	1st	2nd	3rd	
Law of God	1	1	1	3
Russian Language	2	2	2	6
Mathematics	6	-	-	6
Physics	2	2	-	4
Electrical Engineering	-	-	2	2
Chemistry	-	-	2	2
Mechanics	2	3	-	5
Strength of Materials	-	3	-	3
Technology	2	1	-	3
Construction Art	2	2	-	4
Flour Milling	4	4	3	11
Grain Science	1	-	-	1
Course of Machine Structure	-	2	6	8
Bookkeeping	-	-	2	2
Basic and Technical Drawing	6	-	-	6
Technical Drawing in Construction Art	-	2	-	2
Technical Drawing in Machine Structure	-	3	2	5
Technical Drawing in Flour Milling	-	4	10	14
Practical Training at the Mill	6	8	8	22
Practical Training in Workshops	7	6	6	19
Total:	**41**	**43**	**44**	**128**

Compiled on: Rejsih, 1912: 11

In 1905, a special charter of the School was approved, as a result of which the term of study increased to four years, and graduates were awarded the title of 'Flour Milling Technician' (lower technical schools at that time awarded their graduates the title of Foreman) (Kananyhina, 2012: 8).

In 1909, the School was reorganized into Odesa Flour Milling Technical School and grew to the level of a secondary vocational and technical school. With the reorganization of the institution, changes were made to the curricula and study programs, educational and methodological work was improved, and the facilities and resources were expanded. The curriculum (see Table 3) began teaching 32 subjects, including Algebra, Grain Science, Flour Milling, Baking and Pasta Production, practical classes in workshops, mills, and milling and technical laboratories.

An innovation in the educational process was the laboratory method of studying the millings and listening to students' reports on summer practical training, which took place in the presence of senior students and was accompanied by a wide-ranging discussion. Under the guidance of teachers, carpentry and metalworking trades were studied in the school workshops, models for drawing and technical drawing, and mock-ups were made (Kananyhina, 2012: 9).

An analysis of the content of the curriculum shows that the School began training not only experts in the production of flour or bakery products but also experts in grain trade, which always occupied a serious niche in the foreign trade of Southern Ukraine.

Analyzing the organization of the educational process in trade schools, it should be noted that according to the 'Regulations on Trade Schools' (1893), their educational purpose was to provide students with the knowledge and skills necessary to study any trade from a private foreman. They were supposed to study the basic techniques of a particular trade practically, and in some cases – depending on local conditions – special techniques of any branch of the trade. The training course had a three-year term and was divided into three grades (Vysochajshe..., 1889b: 673-674).

For example, Ananiiv Trade School trained craftsmen in the carpentry-turning and metalworking-blacksmithing trades necessary "for the needs of agriculture in the southern area of Russia". According to the law of 1893, the training lasted 3 years, but "for greater improvement in the chosen trade, those who wish can stay at the School for another year after the end of the three-year course... for the practical study of the assembly and construction of agricultural machines, tools, and their repair" (Ustav, 1904: 595).

Training at the School was practical in nature, and teaching general education subjects was not supposed to exceed the course of two-year rural schools. The School taught Law of God, Russian Language and Penmanship, National History, Geography, Arithmetic, Geometry, Accounting, Physics, Metal Technology, Drawing, Technical Drafting, Choir Practice, and practical classes (see Table 4).

Table 4. Curriculum of Ananiv Trade School (1899)

Subjects	Hours per week			
	Grades			Total
	1st	2nd	3rd	
Law of God	1	1	1	3
Russian Language, Slavic Reading, Penmanship	3	2	2	7
Basics of National History	-	2	-	2
Basics of Geography	2	-	-	2
Arithmetic	4	3	1	8
Practical Geometry	2	2	2	6
Bookkeeping	-	-	1	1
Basics of Physics	-	2	2	4
Basics of Metal and Wood Technology	-	-	3	3
Total:	*12*	*12*	*12*	*36*
Drawing	4	2	2	8
Technical Drawing	2	4	4	10
Total:	*6*	*6*	*6*	*18*
Practical Training	29	34	34	97
Total:	*47*	*52*	*52*	*151*
Choir Practice	1½	1½	1½	4½
Total:	**48½**	**53½**	**53½**	**155½**

Compiled on: Ustav..., 1904: 1753-1754

School lessons in all subjects were one hour long. Three hours were devoted to classroom lessons daily. The school year lasted for a year, except for Sundays and holidays, as well as Christmas (December 23 – January 07), Easter (depending on Easter, since this is a movable Orthodox holiday), and summer (July 15 – August 15) holidays. The school year began on September 1 and continued until May 1. Students studied in workshops during the rest of the school year (May 1 – July 07; August 15 – September 1). On Saturdays, as well as on the eve of

holidays, classes ended at 4 p.m., after which books were issued from the library or choir practice was scheduled.

At the end of the school year, drawings, technical drawings, and other students' works and produced items were exhibited for three days for public viewing. Then there was a solemn reading of the reports, the awards were given to excellent students, and the lists of those transferred to the next class and graduates were announced (Ustav..., 1904: 597-598).

Other schools for craftsmen in Southern Ukraine had a similar organization of the educational process: Odesa Trade School, named after Tsarevich Alexei, and Odesa Jewish Trade School, which also emphasized the training of experts in metalworking and blacksmithing.

In 1895, it was also allowed to establish lower trade schools "for training various kinds of trades". The basic course in such schools lasted three years, but it was allowed to open the 4th grade to improve practical skills. The curriculum was minimized (Table 5). The schools taught trades necessary for the region and trained to repair and manufacture various agricultural tools and machinery in accordance with local conditions. Among the subjects taught were Law of God, Russian Language, Arithmetic, Trades Technology, Accounting, Drawing, and Technical Drawing, depending on the trade of specialization.

Practical classes in lower trade schools lasted all year round, except for the Christmas and Easter holidays. Theoretical education lasted 10 months and was suspended for two summer months. If necessary, students could take turns or go in groups to participate in field work during the summer (Ustav..., 1909: 25-28).

Table 5. Curriculum in lower trade schools (1900)

Subjects	Grades (hours per week)			
	1st	2nd	3rd	4th
Law of God	2	2	2	-
Russian Language	2	2	-	-
Arithmetic	2		-	-
Trade Technology	-	-	2	-
Bookkeeping	-	-	2	-
Drawing or Trade Drawing and Technical Drawing	6	8	6	-
Total:	*12*	*12*	*12*	-
Practical Training	37½	37½	37½	49½
Total:	**49½**	**49½**	**49½**	**49½**

Compiled on: Ustav..., 1909: 39)

We can see that this type was an elementary vocational school, where the number of general education subjects was minimized as much as possible. It is clear that such type of schools were intended primarily for rural areas and could hardly satisfy employers in urban or large enterprises.

As for the lower trade schools of Kherson gubernia, one school was three-year (Stepanivka) and two were four-year (Berezivska and Bobrynets). The latter two specialized in carpentry, metalworking, and blacksmithing, while Stepanivka School had a separate department for stone processing (stone-cutting) in addition to the mentioned trades. In general, the level and content of training in all three schools was at the same level.

5. Conclusion

Appeal to historical experience in organizing the educational process of vocational educational institutions allows not only the preservation of the continuity of traditions but also the introduction of time-tested methods and approaches that contribute to improving the quality of education and training of qualified experts.

An important aspect was the fact that teaching of subjects of the practical cycle was usually provided by practitioners – blacksmiths, carpenters, stonemasons, mechanics, metalworkers, builders, technologists, etc. This contributed to the high quality of training and the acquisition of the necessary manual labor skills, which ensured competitiveness in the labor market and readiness for real work.

At the same time, despite the positive changes, the vocational education system faced several problems, particularly insufficient funding, a shortage of qualified teachers, and limited access to education for the lower strata of the population. However, thanks to the efforts of zemstvos and progressive figures, trade schools continued to develop, making a significant contribution to the training of professional personnel for the economy of the Empire.

Thus, the organization of the educational process in trade schools of Kherson gubernia was based on a combination of theoretical knowledge with practical skills, the active participation of local self-government bodies and the public, as well as compliance with established regulatory and legal standards.

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