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EFFECTIVENESS OF LEARNING FORMATS UNDER UNSTABLE CONDITIONS: EDUCATIONAL PROCESS IN PRIMARY SCHOOL

Abstract. The article presents a comparative analysis of the effectiveness of different learning formats in primary school under prolonged instability caused by the COVID-19 pandemic and martial law in Ukraine. The study examines face-to-face, distance, blended and hybrid learning. The research is based on the results of a nationwide survey of teachers and parents of students in grades 1–4, conducted by researchers from the Institute of Pedagogy of the National Academy of Educational Sciences of Ukraine in 2024. The analysis of respondents' answers enabled the comparison of teachers' and parents' perspectives on different learning formats. The obtained results are presented in the context of comparing effectiveness between urban and rural schools. The impact of the learning format on the academic performance of students in grades 1–2 and 3–4 was determined.

It was established that face-to-face learning remains optimal for primary school students, particularly for grades 1–2 during the adaptation stage to the school environment. Distance learning can be effective if there is adequate methodological support, a sufficient level of digital competence, and high-quality technological infrastructure. Students in grades 3–4 show better adaptation to distance learning compared to younger students. Blended and hybrid learning, despite their flexibility, may complicate students' concentration and ability to stay organized due to frequent changes in interaction formats.

Regardless of the format, the greatest learning losses were recorded in language-literary and mathematical education. At the same time, parents emphasize not only the complexity of primary education content but also the excessively high pace of its acquisition, which complicates material comprehension. Therefore, it is advisable to direct the educational process in grades 1–4 toward the formation of students' functional literacy. Such an approach will help reduce educational losses and create a strong foundation for students' successful learning in basic school.

The obtained results have practical significance for developing strategies to optimize the educational process in conditions of prolonged instability both in Ukraine and in other countries facing similar challenges in organizing education.

Keywords: primary education; face-to-face learning; distance learning; blended learning; hybrid learning; effectiveness of learning formats; unstable difficult learning conditions.

1. INTRODUCTION

The COVID-19 pandemic became a major challenge and, at the same time, a catalyst for the transformation of educational systems worldwide. It led to the widespread adoption of digital technologies and new learning formats, ensuring the continuity of the educational process under constrained conditions.

However, as quarantine restrictions were gradually lifted, Ukraine faced a new and more dangerous challenge: Russia's full-scale military invasion, which brought new threats to the education system. The adoption of UN Security Council Resolution 2601 (2021), which strongly condemns attacks on schools, children, and teachers and calls for an immediate cessation of such attacks and the prevention of actions that hinder access to education, appeared to be ineffective. Educational institutions at all levels suspended learning, and two weeks later, the educational process gradually resumed in regions where the security situation permitted.

Today, for the third consecutive year, Ukraine's education system has been operating under martial law, accompanied by air raid alarms, the threat of shelling and destruction of educational institutions, disruptions in heating and electricity supply, and unstable internet connectivity. Under these conditions, the priorities for educational institutions include ensuring safe learning and working conditions for all participants in the educational process, as well as maintaining the quality of education.

The prolonged impact of crises on the functioning of the education system has prompted a rethinking of approaches to organizing learning during the COVID-19 pandemic and adapting them to wartime conditions. At the same time, different learning formats have an ambiguous impact on students' academic performance, particularly among young primary school children, who are characterized by attention and self-regulation instability, underdeveloped independent learning skills, and the need for direct interaction with teachers. For nearly five years, the educational process has been conducted in face-to-face, distance, hybrid, or blended formats, depending on the school's location and actual capabilities. However, there is no definitive answer to the question: which learning format is the most effective under the disrupted educational process in primary school? In the current unstable conditions, decisions on the continuation or suspension of the educational process and the appropriate format for its implementation are made in a decentralized manner by local authorities and educational institutions.

A targeted and coordinated professional effort by educators and students has contributed to a positive trend in reducing educational losses. According to nationwide monitoring studies, addressing the further minimization of the war's negative impact on students' achievements remains an urgent issue. Finding optimal school learning formats that ensure the achievement of planned educational outcomes and compensate for lost instructional time is now a priority.

Problem Statement

According to a survey of primary school teachers and parents conducted in 2024 by researchers from the Institute of Pedagogy of the National Academy of Educational Sciences of Ukraine, the majority of educational stakeholders consider synchronous online learning to be less effective compared to face-to-face learning (74.4% of teachers and 57.9% of parents) or entirely ineffective (8.5% of teachers and 9.9% of parents). In response to questions about the primary factors contributing to students' learning losses, the most frequently cited responses

from teachers and parents include: "distance education," "distance learning," "online learning," "online lessons," and "online classes." Among the key measures for optimizing the educational process, as noted and proposed by respondents, is the return of students to face-to-face learning (where safety conditions allow) [1].

These findings align with the recommendations of the Ministry of Education and Science of Ukraine, presented in the quality assurance strategy "School Offline" [2], which emphasizes the priority of face-to-face learning.

The challenges of implementing distance (both synchronous and asynchronous) learning in primary education [3], [4], [5], [6], [7] are largely determined by the individual psychological and typological characteristics of children aged 6(7)–9(10) years [8], [9], [10], [11].

At the same time, distance, blended, and hybrid learning formats offer significant advantages in the context of educational instability. Their implementation can substantially contribute to adherence to the principles of systematic and sequential learning, accessibility, and the durability of acquired knowledge, skills, and competencies [12], [13], [14], [15], which is particularly important in the long-term perspective.

In this context, our research focuses on evaluating the effectiveness of learning formats that have been applied in primary education over the past five years under difficult and unpredictable conditions. The findings of this study will contribute to the development of practical recommendations for optimizing educational models during crises and enhancing the resilience of the education system to external challenges.

Analysis of Recent Studies and Publications

The traditional, centuries-old educational process in primary school is based on face-to-face learning. This format typically takes place in a teacher-controlled environment and involves direct personal communication and interaction among participants, using visual teaching aids such as real objects and tangible educational models.

Education is a dynamic field where traditions merge with innovations, fostering sustainable progress and adaptation to the evolving demands of society. The transition from an industrial to an information-based society is transforming approaches to all components of the learning process. The widespread adoption and accessibility of digital learning technologies have accelerated their integration into the traditional face-to-face format, increasing the diversity of technical (digital) tools for both direct and indirect interaction among participants in the educational process [16].

Systematic face-to-face learning ensures high educational effectiveness both under standard conditions in primary education institutions and in times of unpredictable global challenges. This is demonstrated by the experience of Sweden, where primary schools remained open during the pandemic. An analysis of reading skill assessments of 97,073 students in grades 1–3 in Swedish schools demonstrated that word decoding and reading comprehension levels did not decline during the pandemic compared to previous years; moreover, students from low socio-economic backgrounds did not experience negative effects [17].

Primary school students represent the group of learners most in need of direct face-to-face engagement with teachers during the learning process. Being in an educational institution (school environment) influences the development of interpersonal relationships among children, fosters a sense of belonging to the school community, and contributes to changes in self-esteem and the formation of their self-concept. Younger students are generally not yet prepared for self-organization, and the absence of a physical classroom environment often leads to distractions, spontaneous conversations unrelated to learning, and disruptions to the educational process [8], [9], [10], [11]. The risks associated with replacing face-to-face learning with alternative formats (distance, blended, or hybrid learning) are particularly high for first-grade students, especially during the adaptation to school life and the acceptance of their new

social role as students. Additionally, there are significant technical challenges in organizing learning in formats other than face-to-face instruction.

However, under the influence of unpredictable global factors, it is not always possible to ensure systematic face-to-face learning. In the current academic year (2024 / 2025) in Ukraine, many students in grades 1-2-3-4-5 have experienced various learning formats since the very beginning of their schooling. Some schools primarily employ distance, blended, or hybrid learning from grade 1 onwards. Students enrolled in these institutions have become accustomed to and adapted to synchronous online lessons and independent distance learning.

In modern academic discourse, distance learning is defined as education that occurs remotely, without face-to-face interaction between participants in the educational process. It can be either synchronous – using video conferencing services, messaging platforms, group work in virtual learning environments, and digital communication platforms – or asynchronous, relying on digital educational resources that do not require real-time interaction [18], [19].

Numerous studies, particularly those conducted during the COVID-19 pandemic, have analyzed the short-term effectiveness of distance learning. For instance, K. H. D. Tang (2022) highlights that distance learning affected both educators and students in multiple ways, leading to psychosocial stress, exacerbating issues related to the use of modern information and communication technologies for remote learning, internet connectivity, and the quality and accessibility of digital learning materials. These challenges resulted in limitations in education, particularly in its practical components, formative and summative assessments, as well as learning losses and slower knowledge acquisition among students [7].

A survey conducted in Italy – one of the countries which were most severely affected by the COVID-19 pandemic – analyzed the organization of distance learning during school closures and its consequences. The findings indicate that this format negatively impacted education accessibility and increased social inequality, particularly among younger students. The lack of social interactions, low levels of knowledge acquisition, and insufficient cognitive stimulation contributed to significant learning losses [5].

Similar challenges associated with distance learning have been noted in other international studies. For example, a survey of Polish primary school teachers revealed numerous difficulties they encountered during distance learning amid the COVID-19 pandemic. According to research by A. Kruszewska, S. Nazaruk, and K. Szewczyk (2020), key challenges included a lack of technical equipment in students' homes, limited communication with children and their parents, low motivation among younger students, and deteriorating health due to prolonged screen exposure [3].

Comparable results were presented in a study by M. J. Tomasik, L. A. Helbling, and U. Moser (2020), which examined the impact of distance learning on primary school students in Switzerland. The authors observed that learning progress slowed significantly during distance learning, and disparities in students' achievements became more pronounced [6]. Additionally, substantial variations in the effectiveness of the educational process were observed depending on the extent of distance learning interaction. Teachers who conducted lessons exclusively online reported the lowest levels of effectiveness and student engagement compared to those who used blended or hybrid formats or had opportunities for face-to-face instruction [4]. Other studies also highlight the difficulties faced by students, including a lack of self-directed learning skills and limited parental capacity to provide educational support [20].

Despite these challenges, distance learning has been a crucial means of ensuring educational continuity during the instability caused by the COVID-19 pandemic and has served as an alternative to face-to-face instruction [21]. In most cases, this format is considered a solution for emergency situations where face-to-face learning is not feasible [22]. As an adaptive mechanism, distance learning helps reduce dependence on physical classroom presence, which is critical in crisis conditions. M. J. Tomasik, L. A. Helbling, and U. Moser

(2020) assert that distance learning is an effective way to compensate for the absence of face-to-face instruction in emergency situations. At the same time, they emphasize that not all students benefit equally from it [6].

Researchers emphasize the positive aspects of distance learning, including flexibility in time and location of study, as well as the ability to absorb material at one's own pace [1], [23]. Furthermore, the study by M. G. L. Labrado, I. P. Q. Labrado, E. C. Rosal, A. B. Layasan & E. S. Salazar (2020) highlights the development of students' independence and adaptability in the process of distance learning [24].

In cases of the forced prolonged implementation of distance learning, the education system gradually adapts to new realities. Issues related to technical support and the formation of appropriate digital literacy among participants in the educational process are gradually being resolved, thereby reducing the negative impact of these factors on the effectiveness of distance learning. Studies conducted in 2021 and 2022 confirm that for teenagers and adults (provided they have the necessary technical equipment), face-to-face learning and synchronous distance (online) learning via internet platforms and video conferencing tools (Zoom, Google Meet, Skype) yield comparable results. The studies [12], [13], [14], [15] indicate that synchronous distance education does not significantly differ from traditional education in terms of effectiveness and demonstrates higher satisfaction levels among young learners. However, these results cannot be considered conclusive and require further clarification within primary education, as the individual psychological and typological characteristics of young children differ significantly from those of teenagers and adults.

The most common alternative to face-to-face and distance formats is blended learning. As noted by researchers V. V. Kotkova (2017), K. Ponniah, F. T. Jose, I. Sivanadhan, M. Kumar, P. Nadarajan & A. Akhmetova (2022), R. Sybirna, G. Polishchuk, O. Balanutsa & A. Marchuk (2022), blended learning combines traditional and online learning, where students receive materials both in the classroom and through digital educational platforms [18], [25], [26]. Its main advantage is flexibility and adaptability, as the sequential alternation of face-to-face and online learning is considered an effective solution in emergency situations [22]. However, the implementation of this format requires appropriate technological solutions, methodological developments, and teacher training [21], [25]. Other challenges include ensuring access to information and communication technologies and digital learning tools, which limit its universality [22].

The concept of blended learning became particularly relevant during the COVID-19 pandemic when educational institutions worldwide had to adapt their teaching processes to new conditions [18], [22]. Blended learning not only became a necessary means of ensuring continuity in education but also laid the foundation for further modernization of educational systems, as it allowed the integration of face-to-face learning advantages with the opportunities provided by the digital environment [22], [27].

Hybrid learning plays an important role in the modern educational process. Although this term is often used synonymously with blended learning [28], [29], some scholars, including N. Solihati & H. Mulyono (2017); K. Smith & J. Hill (2019), distinguish between these concepts (as cited in [29]). Hybrid learning can be classified as a type of blended learning or considered at the same level as face-to-face, distance, and blended learning. It became widespread during the COVID-19 pandemic and continues to develop as an alternative to face-to-face learning in contemporary conditions [28].

Hybrid learning has its own characteristics, advantages, and challenges. It involves the simultaneous education of some students in the classroom while others participate online through digital platforms such as Zoom, Microsoft Teams, Google Meet, and others [28], [29]. This learning format promotes integration between physically present and remote students, creating additional opportunities for communication and interaction among all participants in

real-time [19], [29]. At the same time, establishing a productive hybrid learning environment was one of the common challenges observed during the pandemic [4], [21]. The successful implementation of this learning format requires appropriate tools and the capability of educational institutions to provide them [29].

M. B. Ulla & W. F. Perales (2022), S. Taggart, B. Skinner, S. Roulsto & R. Austin (2024) state that during the pandemic, the hybrid learning format proved to be an effective solution, particularly in primary education [19], [29]. Its use allowed the optimization of the number of students physically present in schools while maintaining continuity of learning during quarantine restrictions [19].

According to research conducted by scientists from the Institute of Pedagogy of the National Academy of Educational Sciences of Ukraine, distance, blended, and hybrid learning formats are being implemented in Ukrainian educational institutions, including primary schools. However, their share remains lower compared to face-to-face learning [1]. They are considered supplementary formats, while priority is given to face-to-face education, as established in the Ministry of Education and Science of Ukraine's strategy "School Offline" [2]. At the same time, these formats remain indispensable in the challenging conditions of change and instability during wartime. Over the past five years, the sustained application of distance, blended, and hybrid learning has contributed to ensuring the continuity of the educational process [1].

Aim of the study.

The aim of the study is to perform a comparative analysis of the effectiveness of face-to-face, distance, blended and hybrid learning formats for primary school students under prolonged martial law conditions.

2. RESEARCH METHODOLOGY

A comparative analysis of the effectiveness of face-to-face, distance, blended and hybrid learning formats under wartime conditions was carried out based on the comparison of responses from teachers and parents of students in grades 1–4 regarding educational losses in primary school subjects, specifically: Ukrainian language and (Literary) Reading, Mathematics, "I Explore the World," "Design and Technology," Informatics, Art, and Physical education.

The study is based on the results of a nationwide survey involving 31,962 respondents from twenty regions of Ukraine, including 7,395 primary school teachers and 24,567 parents of students in grades 1–4. The survey was conducted using Google Forms, which enabled broad geographical coverage and prompt data collection. The collected data were processed using Microsoft Excel and Voyant Tools for statistical and lexical analysis of the responses.

The authors confirm that all procedures used in this study adhere to ethical standards. The survey was conducted on a voluntary basis; all participants were informed about the aims and objectives of the research and provided informed consent to participate. Minors were not included in the survey (only teachers and parents[1] of students participated). The obtained results are presented in an aggregated form, ensuring complete confidentiality and anonymity of the respondents.

The methods of analysis included: descriptive statistics – analysis of the overall frequency of responses, distribution of respondents by school types, learning formats, and educational losses among students. Correlation analysis was conducted to identify relationships between learning formats, educational losses, and external factors (access to digital infrastructure, digital literacy levels). A comparative analysis was performed to compare the views of teachers and

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[1] *By "parents," we mean the actual parents, grandparents, guardians, and other adults who act in place of parents.*

parents on the effectiveness of different learning formats and the assessment of learning losses. Content analysis of parents' open-ended responses regarding their children's learning difficulties was also conducted. To assess the reliability of the results, a 99.7% confidence interval with a margin of error of ±1.7% was calculated. The results were compared between urban and rural schools, as well as between cycles of primary education (grades 1–2 and grades 3–4).

The distribution of learning formats employed by the respondents, who are primary school teachers, is presented in Figure 1. The survey results from parents on this issue are identical.
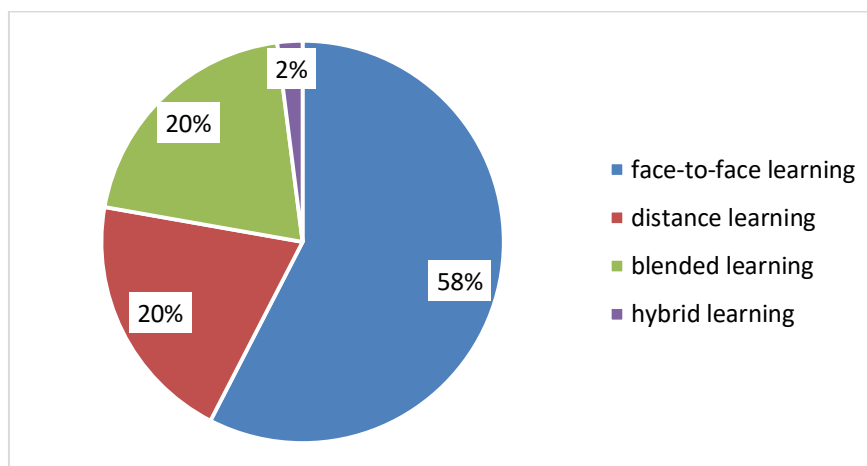

Fig. 1. Distribution of respondents by learning formats
(according to the results of the teachers' survey)

When analyzing the survey results, the data related to blended and hybrid learning formats were combined into a single cluster. This decision was based on the conceptual similarity of the above formats, as well as the limited number of respondents involved in hybrid learning.

The distribution of respondents (teachers and parents) by grade levels is close to uniform (Fig. 2).
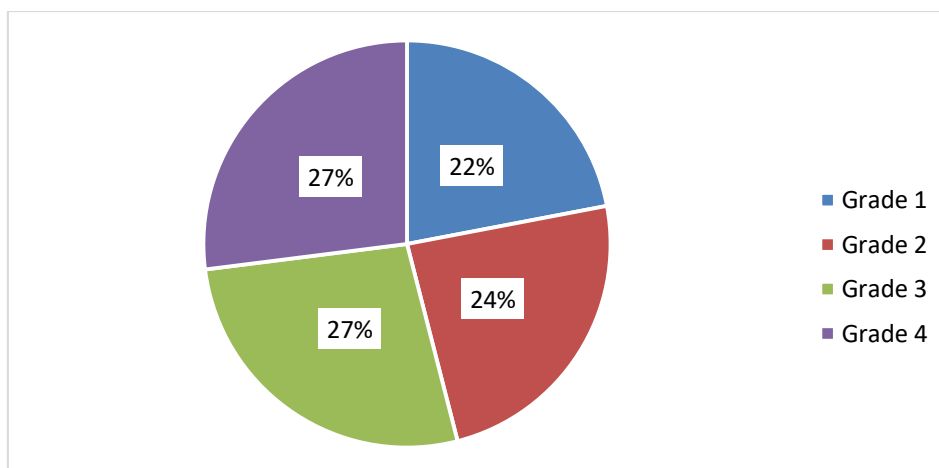

Fig. 2. Distribution of respondents by primary school grade levels

The factors affecting the effectiveness of learning formats include:
- primary school cycle in which the education takes place, as the individual psychological and typological characteristics of students in grades 1–2 and 3–4 differ significantly;
- type of settlement where the school is located: the material and technical support of the educational process, as well as the didactic and methodological training of teachers in

using information and communication technologies for educational purposes, are generally more advanced in urban areas compared to rural ones.

As part of the study, respondents' answers to the questions presented in Table 1 were analyzed.

Table 1

Questions analyzed within the study on the effectiveness of different learning formats in primary school

No.	Respondents	Questions	Academic Subjects	Proposed response options
1	Teachers	Do your students experience learning losses? If so, please specify the subjects in which they encounter difficulties.	Ukrainian language and (Literary) Reading, Mathematics, the integrated course "I Explore the World," as well as the subjects "Design and Technologies," Informatics, Art, and Physical education.	No, Yes, but minor difficulties, Yes, moderate difficulties, Yes, significant difficulties, Difficult to answer.
2	Parents	Does your child experience difficulties in learning? If so, please specify the subjects in which he / she encounters challenges.		
3	Parents	Which topics in specific subjects cause learning difficulties for your child?	Open-ended question	

The study also examined the correlation between students' high academic achievements across different learning formats and their participation in additional tutoring sessions. To this end, an analysis was conducted on parents' responses to the open-ended question: "What measures do you take to overcome your child's learning losses?".

For the formulation of final conclusions, priority was given to teachers' responses over those of parents. This approach was based on the premise that educators possess greater expertise in educational matters and can provide a more objective assessment of primary school students' academic performance, in alignment with the State Standard of Primary Education (2018) and the standard curriculum guiding students' educational preparation.

3. RESEARCH RESULTS

The survey results regarding the effectiveness of different learning formats were analyzed in the context of comparing respondents' (teachers' and parents') assessments of primary school students' learning losses:
– for the first (Grades 1–2) and second (Grades 3–4) learning cycles;
– in urban and rural schools.

A comparative analysis was conducted separately for each cycle in the following sequence: (1) an examination of results in urban and rural schools based on teachers' opinions, and (2) a comparison of teachers' and parents' perspectives on the studied issues. Additionally, the complexity of mastering various school subjects by students in Grades 1–2 and 3–4 under different learning formats was examined.

According to the survey data from teachers and parents of 1st- and 2nd-grade students, learning outcomes in urban areas were somewhat better than in rural areas across all learning formats. Regardless of the format (face-to-face, distance, or blended / hybrid learning), the greatest learning losses were observed in four subjects: Foreign language, Mathematics, Ukrainian language, and Reading. The proportion of teachers reporting significant or moderate learning losses in these subjects ranged from 20% (for face-to-face learning of Ukrainian

language, Reading, and Mathematics in urban areas; Reading in rural areas) to 34% (for distance learning of Foreign language in rural areas).

According to teachers, face-to-face learning is the most effective format in grades 1–2. Approximately 20–25% of respondents reported significant or moderate learning losses among students. Under distance learning, the share of teachers confirming significant or moderate learning losses in Mathematics was 5% higher. In language and literature subjects, the number of respondents increased by 5% in urban areas and by 8% in rural areas.

Under the blended / hybrid learning format in rural areas, survey results were similar to the effectiveness indicators of distance learning. However, in urban schools, 5% more teachers reported moderate learning losses (except for Reading). At the same time, there were almost no teachers who reported significant learning losses among students.

Regardless of the learning format, teachers were unanimous in their assessment that learning losses were less pronounced in the subjects "I Explore the World," "Design and Technology", Art, and Physical education. The proportion of teachers reporting significant or moderate losses in these subjects was 6–8% for face-to-face learning and 10–12% for distance and blended / hybrid formats.
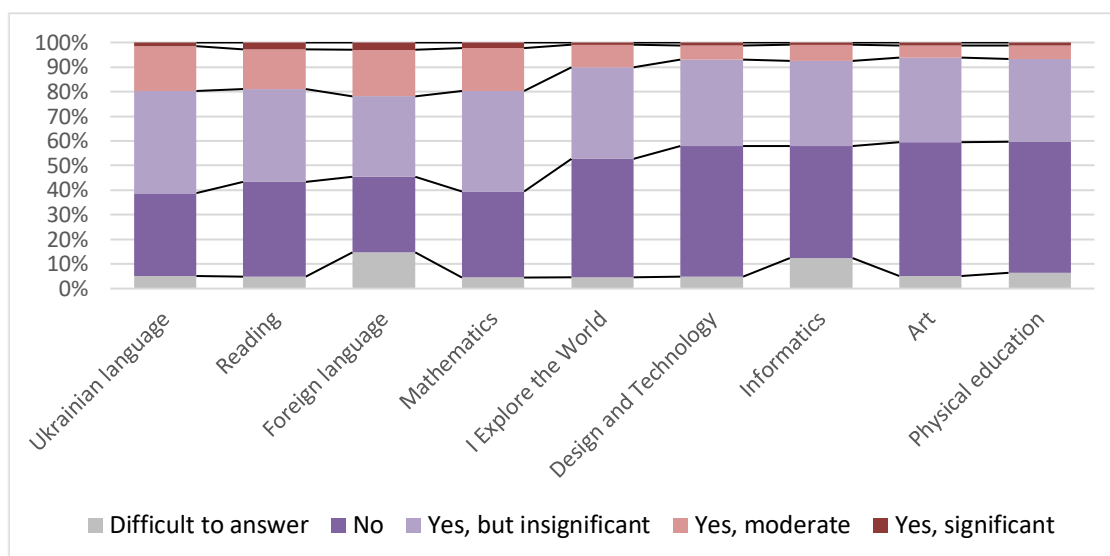
Thus, two groups of subjects can be identified: (1) a group of more challenging subjects (from the fields of language and literature, and mathematics education) and (2) a group of subjects that are easier to master, which are listed above. The best performance in terms of the absence of learning losses was observed in Reading (among the more challenging subjects) and Art (among the less challenging ones).

It is particularly interesting to analyze the effectiveness of mastering Informatics among 1st- and 2nd-grade students under different learning formats. It is logical to assume that distance / blended / hybrid learning would positively contribute to the development of students' digital competence, as they use information and communication technologies daily in the learning process. However, the findings revealed that face-to-face learning resulted in the lowest percentage of teachers (8–10%) reporting significant or moderate learning losses in Informatics. Under blended / hybrid learning, this figure was 10–12%, while under distance learning, it ranged from 11% to 15%.
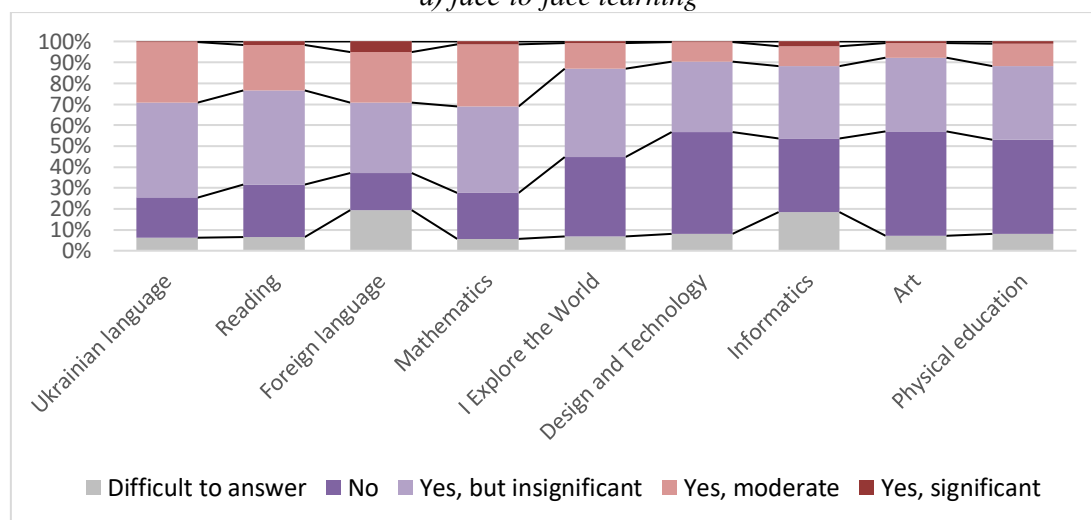
A comparison of the responses from teachers and parents of 1st- and 2nd-grade students provides grounds for concluding that their views on the relative effectiveness of the studied learning formats are largely identical. Like teachers, parent respondents identified face-to-face learning as the most effective format for grades 1–2. In this format, 15–25% of parents reported significant or moderate learning losses among students in the group of more challenging subjects. In the group of subjects that are easier to master, this figure was 5–8%. The number of responses indicating significant or moderate learning losses under distance / blended / hybrid learning was approximately 10% higher.

At the same time, most parents assessed their children's academic performance as higher than reported by teachers. The only exception was the learning outcomes of first- and second-grade students in Foreign language. In this subject, 8% of parents reported significant learning losses under face-to-face learning, 12% under distance learning, and 15% under blended / hybrid learning. Among teachers, this figure ranged from 5% to 8% across all learning formats. The proportion of parents indicating moderate losses in Foreign language learning was 16% (face-to-face learning) and 20% (distance / blended / hybrid formats), while teachers' assessments were 20% and 20–24%, respectively, for the given learning formats.
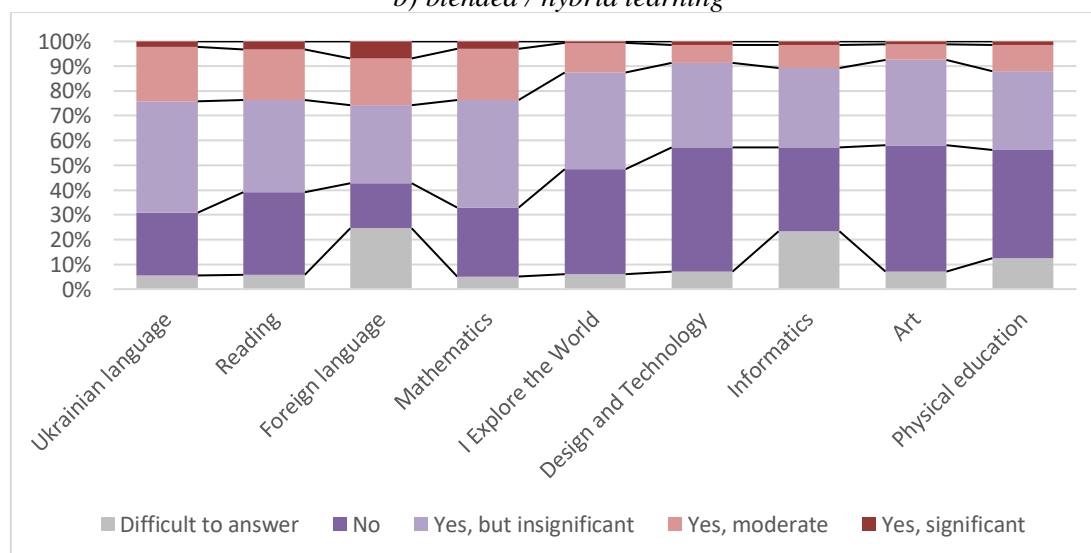
Figure 3 presents diagrams illustrating the learning losses of 1st- and 2nd-grade students in urban schools under different learning formats based on the teachers' survey. This visualization highlights the effectiveness of each learning format under conditions most favorable for the integration of information and communication technologies into the primary school educational process.

a) face-to-face learning

b) blended / hybrid learning

c) distance learning
Fig. 3. Diagrams of learning losses among 1–2 grade students in urban schools under different learning formats (based on teacher survey)

In grades 3–4, the proportion of teachers reporting significant or moderate learning losses among students in the group of more challenging subjects ranges from 22% (for distance learning of Literary reading) to 46% (for blended / hybrid learning of Mathematics). In the group of subjects that are easier to master, this figure decreases to 5% (for face-to-face learning of Art).

Thus, in the second cycle of primary education, the number of teachers indicating significant learning losses among students increases across all subjects, regardless of the learning format. The most substantial increases are observed in the number of respondents reporting losses in Mathematics and Foreign languages. Under the blended / hybrid learning format in urban areas, these figures reach up to 10% and 12% respectively.

Moreover, during the second cycle of primary education, an increase is observed in the number of responses indicating moderate learning losses across all learning formats. Teachers report a decline in students' academic progress in the group of challenging subjects, particularly in the language and literature educational field (Foreign language, Ukrainian language, and Literary reading) and the mathematics educational field.

An analysis of the responses from teachers working in grades 3–4 in urban schools demonstrates the highest effectiveness of the distance learning format. The number of teachers reporting significant and moderate losses in the aforementioned subjects is 1–2% lower compared to the corresponding results from teachers working in the face-to-face format. Distance learning proves to be less effective than face-to-face learning only in the case of Informatics (with a difference of 4%) and Physical education and Art (1–2%).

Under the blended / hybrid learning format, the number of responses indicating significant and moderate losses in Mathematics, Foreign language, Ukrainian language, and Literary reading is approximately 10% higher (compared to distance learning). The results for other subjects remain unchanged.

The number of urban teachers who do not perceive any learning losses among students in grades 3–4 is also highest under the distance learning format. Among the group of challenging subjects, Literary reading leads (with over 35% of responses), while among the subjects that are easier to master, Art and Design and Technology take the lead (both covering approximately 60% of responses).

A comparison of the responses from teachers in grades 3–4 in urban and rural schools provides grounds to assert that the results of face-to-face and blended / hybrid learning are similar across all educational institutions. For most subjects, the difference does not exceed 1–2%, with the largest discrepancy reaching 4% in Mathematics instruction.

At the same time, the distance learning format proves to be less effective for rural schools. The difference in the proportion of responses indicating significant and moderate learning losses in Foreign languages, Ukrainian language, and Literary reading amounts to approximately 8%, while for Mathematics, this figure reaches 16%. For a group of the subjects that are easier to master, the difference ranges from 2% to 4%.

The proportion of teacher respondents who reported no learning losses under distance learning in rural areas is 5%–10% lower than in urban areas for all subjects except Physical education, where this figure approaches 15%.

Overall, based on the survey results of teachers of grades 3–4 in rural schools, the most effective format is face-to-face learning, followed by distance learning, while the lowest student performance is observed under the blended / hybrid format. The discrepancy in the proportion of teachers' responses regarding significant and moderate learning losses in more challenging subjects ranges from 24% (for face-to-face Literary reading learning) to 42% (for Mathematics learning under distance and blended / hybrid formats) and decreases to 5%–6% in statements about losses in the subjects that are easier to master (for face-to-face learning in Physical education and Art).
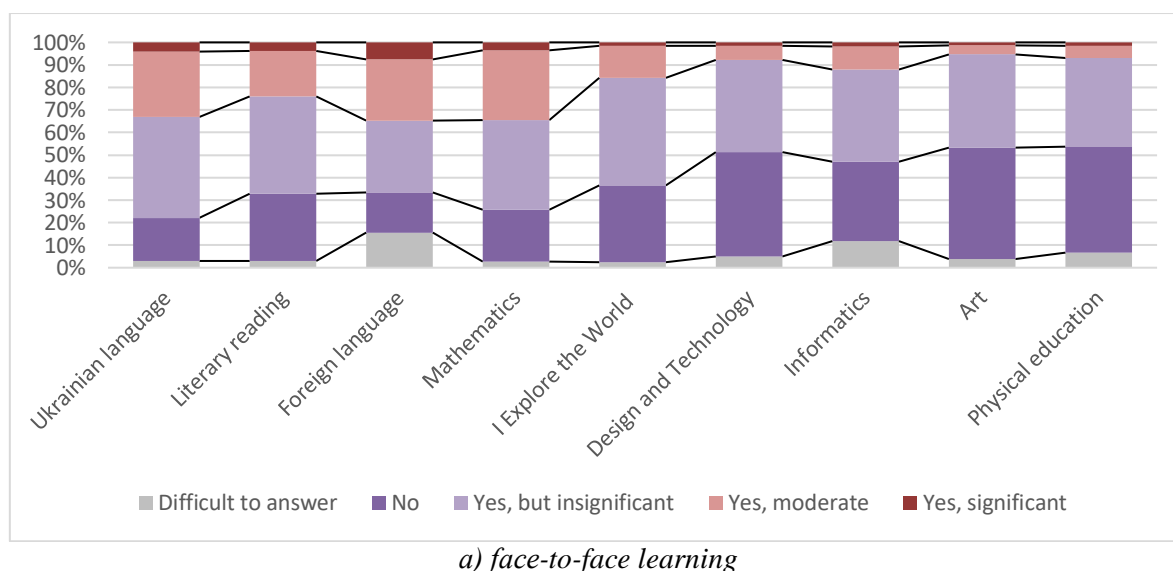
For all (both urban and rural) educational institutions, a comparison of teachers' and parents' responses reveals certain discrepancies. Specifically, the proportion of parent respondents who report significant and moderate learning losses under face-to-face learning compared to distance learning is somewhat lower. Therefore, face-to-face learning can be considered the most effective according to parents of 3rd- and 4th-grade students.

There is also a consistency in responses from parents of both 1st and 2nd as well as 3rd- and 4th-grade students regarding significant losses in Foreign language acquisition. The proportion of parents of third- and forth-graders who support this viewpoint is approximately 12% for face-to-face learning and 20% for distance / blended / hybrid learning.

Regarding Informatics education, both teachers and parents agree that the most effective learning format for this subject is face-to-face instruction, as it ensures the implementation of the educational process with a figure of significant and moderate learning losses at approximately 10%. Under the distance / blended / hybrid format, the proportion of respondents reporting such losses increases significantly (by 15% in the parent survey and 8% in the teacher survey). The absence of learning losses in Informatics under face-to-face learning format is reported by 34% of teachers and 56% of parents, whereas for other learning formats, these figures drop to 30% and 40%, respectively.

Notably, in contrast to the majority of respondents, a small proportion of parents of younger students perceive the primary education system in Ukraine as generally ineffective, citing significant learning losses across all subjects.

Similarly to the illustration of the effectiveness of different learning formats in the first cycle of primary education, the Figure 4 presents diagrams to illustrate the learning losses of 3rd- and 4th-grade students in urban schools under different learning formats according to the teacher survey. This visualization demonstrates the effectiveness of each learning format under conditions most favorable for the integration of information and communication technologies into the primary school educational process.
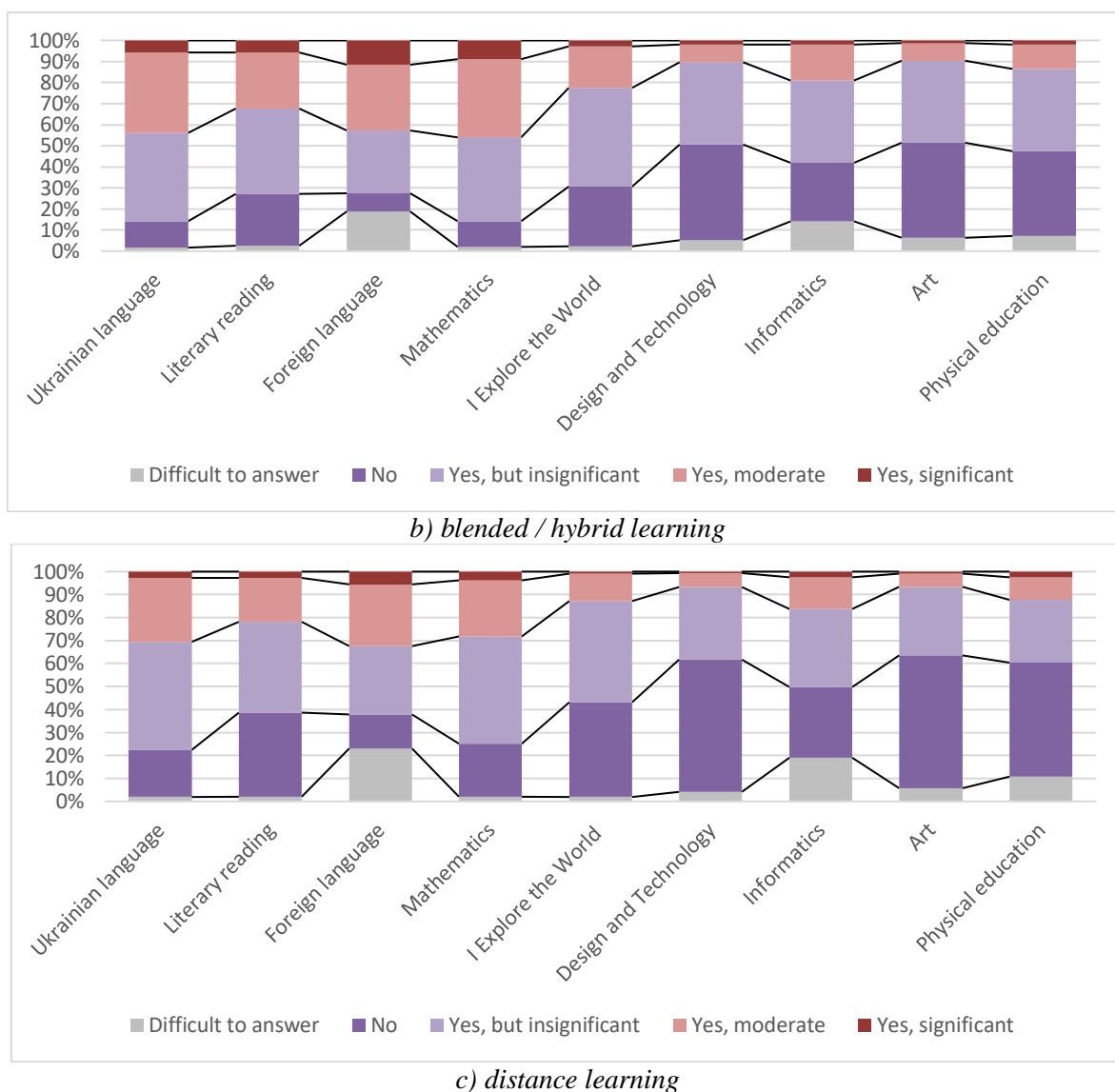

a) face-to-face learning

b) blended / hybrid learning

c) distance learning
Fig. 4. Diagrams of learning losses among 3rd- and 4th-grade students in urban schools under different learning formats (based on teacher survey)

It is essential to examine the specific nature of students' learning difficulties (losses) across face-to-face, distance, and blended / hybrid learning formats. An analysis of parents' responses to the question, "Which topics in academic subjects cause learning difficulties for your child?" revealed consistent patterns in how learning challenges were described across all examined learning formats. The majority of comments pertain to language and literature, mathematics, as well as the integrated subject "I Explore the World", and are presented in a generalized manner. In both cycles of primary education, parents highlight the challenges of mastering the content outlined in the standard curricula. Respondents noted the following concerns:

"The learning pace is too fast.
A new topic is introduced in every lesson – it is overwhelming."
"There is too much material,
and the child does not have enough time to fully comprehend it."
"Too much self-study material."
"Difficult topics every day, with no time for review and reflection."
"Too little time for learning; the child cannot keep up." etc.

Overall, an analysis of typical parental responses regarding their children's learning difficulties suggests that, under wartime conditions, students in both cycles of primary education face persistent challenges in attaining fundamental learning outcomes, such as reading and writing skills, performing arithmetic operations, solving problems, and basic communication in a Foreign language. Additionally, based on the responses, memory development, attention span, logical reasoning, and systemic thinking pose significant difficulties for younger students.

For an objective evaluation of the effectiveness of different learning formats, it is important to consider the influence of non-formal and informal education on students' academic performance. To this end, an analysis was conducted on parents' responses linking the absence or presence of minor learning losses to their children's participation in additional (extracurricular) individual and group lessons in school subjects (Table 2).

Table 2

The Contribution of Non-Formal and Informal Education to the Academic Achievements of Successful Primary School Students

No.	Cycle of education	The number of parents who report the absence or presence of minor learning losses in their children.	The number of parents who report the absence or presence of minor learning losses in their children *and indicate their participation in additional individual or group lessons to catch up with the school curriculum.*
Face-to-face learning			
1	First cycle (grades 1–2)	3679	781 (21 %)
2	Second cycle (grades 3–4)	3513	825 (24 %)
Distance learning			
3	First cycle (grades 1–2)	1422	404 (28 %)
4	Second cycle (grades 3–4)	1590	448 (28 %)
Blended / hybrid learning			
5	First cycle (grades 1–2)	1166	336 (29 %)
6	First cycle (grades 1–2)	1199	302 (25 %)

According to parents' responses, the majority of students (71–79%) who experience no (or almost no) learning losses do not engage in additional lessons with teachers to improve their academic performance at school. Their success is attributed to diligent learning with their schoolteacher during lessons and parental support. No significant differences were identified in the number of students attending additional individual or group lessons to overcome learning losses, across different school learning formats. This proportion is lowest for face-to-face learning, higher by 4–7% for distance learning, and increases by 1–8% for the blended / hybrid format.

5. CONCLUSIONS AND PROSPECTS FOR FURTHER RESEARCH

The results of the conducted study indicate that the learning format (face-to-face, distance, blended / hybrid) is not a determining factor in the academic success of primary school students. It should be considered in the context of the quality of the organization and implementation of the educational process, as well as the students' age, individual psychological and typological characteristics, and other factors.

The analysis of the obtained data confirmed that face-to-face learning remains optimal for primary school students under difficult, unpredictable wartime conditions, provided that the educational process is conducted systematically and consistently. At the same time, distance learning can be effective if supported by proper methodological guidance, an appropriate level of teachers' digital literacy, and equitable access to high-quality digital infrastructure for all participants in the educational process. An important factor is also the level of awareness among students and their parents regarding the use of information and communication technologies (ICT) and digital learning tools. In grades 3–4, there is a tendency toward increased effectiveness of distance learning, which may be associated with the gradual adaptation of students, as well as the development of their independence and self-organization skills.

According to the study's data, in the long-term perspective, the performance of general secondary education institutions under difficult and unpredictable conditions is consistently better with face-to-face and distance learning formats compared to blended and hybrid formats. One possible explanation for this is the difficulties faced by students in grades 1–4 when frequently transitioning between face-to-face and distance learning. Constant changes in the mode of interaction between participants in the educational process can negatively affect younger students' attention span, organization, and motivation to learn, which, in turn, leads to additional learning losses. At the same time, according to scientific publications on the topic of the study, the use of digital technologies within these formats creates opportunities for individualized learning, the development of student independence, and the improvement of their digital literacy.

An analysis of parents' responses indicates no specific learning losses associated with any particular learning format. During face-to-face, distance, blended, and hybrid learning formats, difficulties most commonly arise in subjects within the language-literature and mathematics educational fields. These challenges also pertain to the development of logical thinking and attention concentration in children aged 6(7)–9(10) years. This indicates the need to review and optimize educational programs regardless of the expected learning format, with a focus on developing functional literacy among primary school students to ensure their successful transition to basic education.

To improve the organization of the educational process under unstable conditions, the following measures are recommended:
- optimization of learning formats – face-to-face learning should remain a priority, particularly for grades 1–2, when adaptation to the school environment is crucial. Distance learning should be used with enhanced methodological support and the provision of digital tools for students. Blended / hybrid learning requires clear organization to avoid chaotic transitions between formats;
- strengthening methodological support for teachers through the development of standardized methodological guidelines for teaching in blended and distance formats;
- regular professional development for teachers on issues of digital literacy and the effective use of ICT in the educational process;
- establishing a professional teaching community to support the exchange of experience and best practices for teaching under unstable conditions;
- supporting students in overcoming learning losses by introducing individualized learning trajectories for students with the most significant knowledge gaps, along with additional consultations and remedial lessons in language, literature, and mathematics;
- providing parents with tools to monitor and support their children's learning in the distance format;
- implementing flexible learning models for different regions of the country by developing regional strategies for organizing distance learning based on internet access

and the technical infrastructure of schools; creating distance learning hubs for children from frontline areas who lack access to safe face-to-face learning.

Future research may focus on developing adaptive teaching methods for distance and blended formats, taking into account the age, individual psychological and typological characteristics of children aged 6(7)–9(10) years, the level of digital literacy among educational stakeholders, and socio-economic factors. Another important research direction involves developing strategies to minimize the negative consequences of crisis phenomena and enhance the resilience of educational systems to external challenges.

The experience of the Ukrainian education system under the prolonged impact of global crisis is unique and may serve as a basis for improving educational strategies not only at the national level but also in the international context to strengthen the resilience of education systems to potential external disruptions.

6. AUTHORS' CONTRIBUTION

Oleh Topuzov and Oksana Onopriienko – development of the article concept, formulation of the research objective and conclusions; main contribution to writing the sections "Conclusions and Prospects for Further Research", "Research Methodology", subsections "Problem Statement" and "Aim of the Study"; checking and editing the final text of the article.

Oksana Petruk and Tetiana Pavlova – review, analysis and systematization of modern domestic and foreign publications on the topic of the study, generalization of results of the research on the effectiveness of face-to-face, blended / hybrid and distance learning formats during the implementation of the educational process under the influence of global unpredictable factors; main contribution to writing the section "Analysis of recent studies and publications" and the abstract of the article.

Inna Lipchevska – analysis of the results of the study of the problem of educational losses in primary education, conducted by scientists of the Institute of Pedagogy of the National Academy of Sciences of Ukraine during 2023/2024 academic year; statistical processing and visualization of the obtained data in the context of the studied problem of the effectiveness of face-to-face, blended / hybrid and distance learning formats in primary school; main contribution to writing the "Research Results" section.

All authors participated in reviewing the draft manuscript and preparing the final version of the article.

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ДІЄВІСТЬ ФОРМАТІВ НАВЧАННЯ В НЕСТАБІЛЬНИХ УМОВАХ: ОСВІТНІЙ ПРОЦЕС У ПОЧАТКОВІЙ ШКОЛІ

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Анотація. У статті здійснено порівняльний аналіз ефективності різних форматів навчання в початковій школі за умов тривалої нестабільності, спричиненої пандемією COVID-19 і воєнним станом в Україні. Розглянуто очне, дистанційне, змішане / гібридне навчання. Дослідження ґрунтується на результатах всеукраїнського опитування вчителів і батьків учнів 1–4 класів, проведеного науковцями Інституту педагогіки НАПН України у 2024 році. Аналіз відповідей респондентів дав змогу порівняти погляди вчителів і батьків на різні формати навчання. Отримані результати подано в контексті зіставлення ефективності міських і сільських шкіл. Визначено вплив формату навчання на навчальні результати учнів 1–2 і 3–4 класів.

Встановлено, що очне навчання залишається оптимальним для учнів початкової школи, особливо для 1–2 класів на етапі адаптації до шкільного середовища. Дистанційний формат може бути ефективним за наявності належної методичної підтримки, достатнього рівня цифрових компетентностей та якісної технологічної інфраструктури. Учні 3–4 класів демонструють кращу адаптацію до дистанційного навчання порівняно з молодшими школярами. Змішане та гібридне навчання, попри свою гнучкість, можуть ускладнювати концентрацію уваги й організованість учнів через часті зміни форм взаємодії.

Незалежно від формату, найбільші навчальні втрати зафіксовано в мовно-літературній і математичній освітніх галузях. Водночас батьки наголошують не лише на складності змісту початкової освіти, але й на надмірно високому темпі його засвоєння, що ускладнює сприйняття матеріалу. Тому доцільно спрямувати освітній процес у 1–4 класах на формування функційної грамотності учнів. Такий підхід допоможе зменшити освітні втрати та створити міцну основу для успішного навчання учнів у базовій школі.

Отримані результати мають практичне значення для розробки стратегій оптимізації освітнього процесу в умовах тривалої нестабільності як в Україні, так і в інших країнах, які мають аналогічні виклики щодо організації навчання.

Ключові слова: початкова освіта; очне навчання; дистанційне навчання; змішане навчання; гібридне навчання; дієвість форматів навчання; нестабільні складні умови навчання.