SHORT REPORT ON

What primary school graduates know and can do and how the situation has changed for three years

2021

PART I

Based on the materials of the report on the results of the second cycle of the National External Monitoring Study of the Quality of Primary Education

УКРАЇНСЬКИЙ ЦЕНТР ОЦІНЮВАННЯ ЯКОСТІ ОСВІТИ

SHORT REPORT ON WHAT PRIMARY SCHOOL GRADUATES KNOW AND CAN DO AND HOW THE SITUATION HAS CHANGED FOR THREE YEARS

Based on the materials of the report on the results of the second cycle of the National External Monitoring Study of the Quality of Primary Education *The State of Development of Reading and Mathematical Competencies of Primary School Graduates* in 2021

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The booklet is a summary of the main data represented in Part I of the report on the results of the second cycle of the National External Monitoring Study of the Quality of Primary Education *The State of Development of Reading and Mathematical Competencies of Primary School Graduates* conducted in 2021.

The main focus of the booklet is on the analysis of the data on the level of Reading and Mathematics competencies of primary school graduates as of 2021 and the comparison of these results with the results of the first cycle of monitoring study in 2018. The students' achievements in Reading and Mathematics were analyzed in terms of their dependence on some demographic (students' gender) and institutional (a type of settlement where the school is located; a type of school) factors. Besides, this part of the report includes the study of the effect of distance learning during the COVID-19 pandemic on the learning performance of students who completed primary education in 2021. The conclusions were drawn on the basis of the obtained data.

The materials can be useful for education administrators and managers, teachers, scientists, as well as for everyone dealing with issues of the quality of education, pedagogical measurements, and monitoring research in education.

УДК 373.3.012

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WHAT NEMSQPE IS AND PECULIARITIES OF NEMSQPE 2021

The National External Monitoring Study of the Quality of Primary Education "The State of Development of Reading and Mathematical Competencies of Primary School Graduates" (hereinafter referred to as NEMSQPE) was initiated by the Ministry of Education and Science of Ukraine in 2016. Its purpose is, on the one hand, to obtain objective data on the current state of development of key (reading and mathematical) competencies of primary school graduates, and on the other hand, to trace the changes in the quality of primary education that follow implementation of the New Ukrainian School Concept throughout the country. To achieve the second of the mentioned goals, this monitoring study is biannual. The main study of the first cycle of NEMSQPE was successfully implemented in 2018, and the second one was planned for 2020. However, due to the COVID-19 pandemic, collecting data from schools became possible only in the spring of 2021.

The participants of NEMSQPE are Year 4 students who complete primary education and the teachers who teach them. The NEMSQPE participants, who completed their primary education in 2017/2018 and 2020/2021, studied according to the State Standard of Primary Education of 2011 and the educational programs based on that Standard. However, prospective Year 4 students participating in the next NEMSQPE cycles will be those studying according to the 2018 State Standard of Primary Education and curricula based on the principles of the New Ukrainian School.

During the Monitoring Study, students take **Reading or Mathematics test** and complete **questionnaires**, and their teachers complete questionnaires related to the subject of the test their students take (Reading or Mathematics). The test data collected during NEMSQPE 2021 made it possible to draw objective conclusions about the levels of development of students' reading and mathematical competencies, and the questionnaire data helped to trace the associations between these levels and various factors of the educational and non-educational environment. A comparison of the results of student testing based on the results of the first and second cycles of NEMSQPE enabled us to determine the trends in the educational achievements of Year 4 students over three years (between 2018 and 2021).

An innovation of the NEMSQPE second cycle was the expansion of the focus of attention on topical issues related to the implementation of distance learning in primary school and its impact on the quality of the educational process. In order to study these issues, the participants of NEMSQPE 2021 were additionally asked to complete questionnaires called "Distance Learning during the COVID-19 Pandemic".

Based on the results of NEMSQPE 2021, "The Report on the Results of the National External Monitoring Study of the Quality of Primary Education "The State of Development of Reading and Mathematical Competencies of Primary School Graduates" was prepared. The abovementioned report consists of two parts: "What Primary School Graduates Know and Can Do and How the Situation Changed over Three Years" and "Learning Prerequisites and Outcomes".

Part I of the report gives answers to the following main questions:

- What is the level of reading and mathematical competencies of primary school graduates as of 2021?
- How did primary school graduates' learning outcomes change over three years – between the first and second cycles of NEMSQPE (between 2018 and 2021)?
- What is the effect of demographic (students' gender) and institutional (types of settlement, where schools are located, and types of schools) factors on the Year 4 students' learning outcomes?
- How did distance learning of different duration affect the level of primary school students' mastery of reading and mathematical skills?

The booklet summarizes the key points of Part I of the Report. You can read the full text of the report on the Ukrainian Center for Educational Quality Assessment website.

THE SAMPLE OF THE NEMSQPE 2021 PARTICIPANTS

7,991 students and 475 teachers from 355 institutions of general secondary education took part in NEMSQPE 2021. All students participating in NEMSQPE 2021 studied in classes with the Ukrainian language of instruction. 4,192 students took a Reading test and completed Reading questionnaires and 3,799 students took a Mathematics test and completed Mathematics questionnaires.

The sample of participating students represented 426,375 Ukrainian primary school graduates in 2021 according to various parameters (type of school, type of area, region of location of the school). However, the sample of the teachers surveyed is unrepresentative, but it still can clearly reflect the characteristics of primary school teachers as of 2021.

The main study data collection in schools within the second cycle of NEMSQPE was in April–May 2021.

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THE LEVEL OF DEVELOPMENT OF YEAR 4 STUDENTS' MATHEMATICAL COMPETENCY IN UKRAINE IN 2021

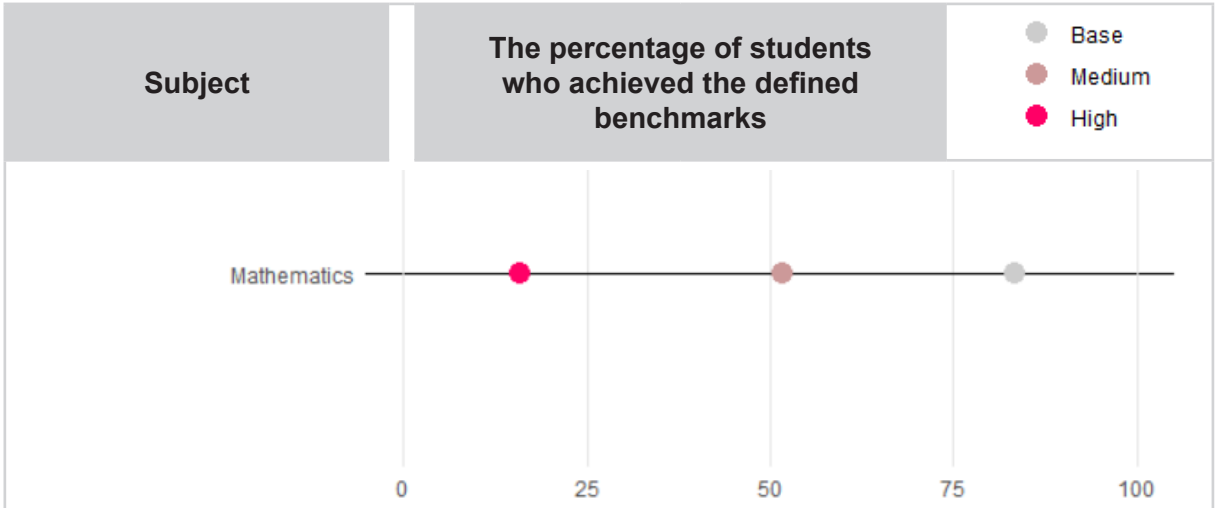
The level of the development of primary school graduates' **mathematical competency** can be measured taking into account their achieving the benchmarks of **mathematical competency** defined within the NEMSQPE.

The data obtained during the monitoring study in 2021 (see Table 1) show that 15.9% of primary school graduates passed the high benchmark, 51.6% passed the medium one, and 83.3% passed the base one. This means that in 2021, 16.7% of Year 4 students encountered significant problems while solving the simplest problems related to real life situations known to them (such students scored no higher than 170 on a scale of 100–300 points).

On **the low** (**base**) **level**, students should demonstrate a certain understanding of mathematical concepts and procedures related to such domains of mathematical knowledge as "Numbers and Expressions", "Geometric Shapes and Quantities", "Measurement", "Data Analysis", and perform simple calculations with natural numbers, apply mathematical knowledge for solving simple problems related to real life situations known to them. Students can follow clearly described procedures. They are able to choose and apply simple strategies to solve problems. On this level, students can use information from only one source and reason directly from it.

On **the high level**, students should apprehend mathematical concepts and procedures related to such domains as "Numbers and Expressions", "Geometric Shapes and Quantities", "Measurement", "Data Analysis", apply mathematical knowledge to solve problems that cover novel and less familiar situations that go beyond the standard ones, cover less familiar and novel situations and are presented in more complex contexts. At this level, students can work purposefully on a task and use well-developed reasoning skills and ability to draw conclusions, using information from both single and multiple sources.

Table 1 – Achieving the benchmarks of the development of mathematical competency by primary school graduates



Subject	High (230)	Medium (200)	Base (170)
Mathematics	15.9	51.6	83.3

If we analyze the results of the tests regarding the gender of the participating students (see Fig. 1), we see that boys who completed primary education in 2021 demonstrate a higher level of mathematical competency than girls. The difference in mean scores between boys (202.2) and girls (197.6) is statistically significant.

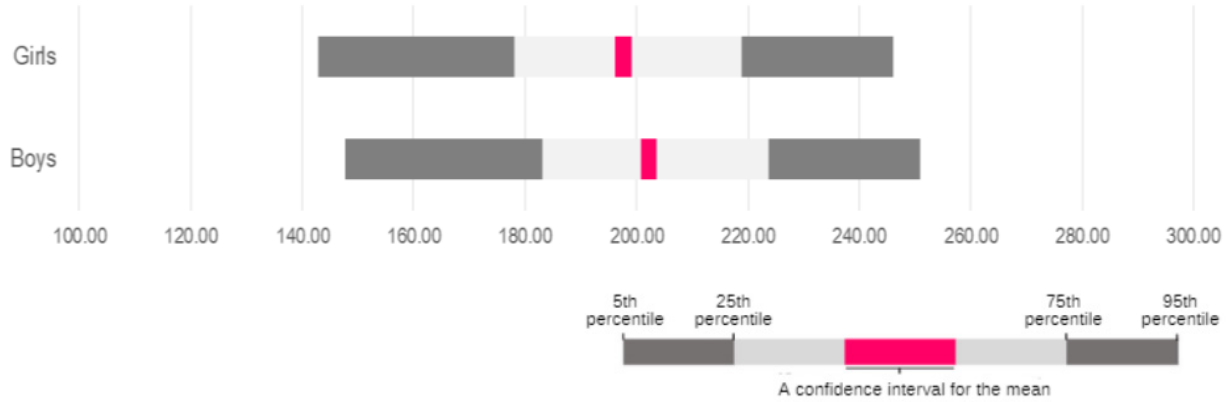


Figure 1 – The distribution of score points, by the gender of the students (Mathematics)

The data of NEMSQPE 2021 indicate differences in Year 4 students' test results in Mathematics based on the type of settlement where their schools are located (see Fig. 2). Thus, the mean score of students studying in cities (207.5) is significantly higher than the mean score of their peers from large towns (199.9). However, the mean score of primary school graduates who study in small towns (195.0) is significantly higher than the mean score of their peers who study in villages (190.7), while the latter is significantly lower than that of Year 4 students who study in schools located in small towns.

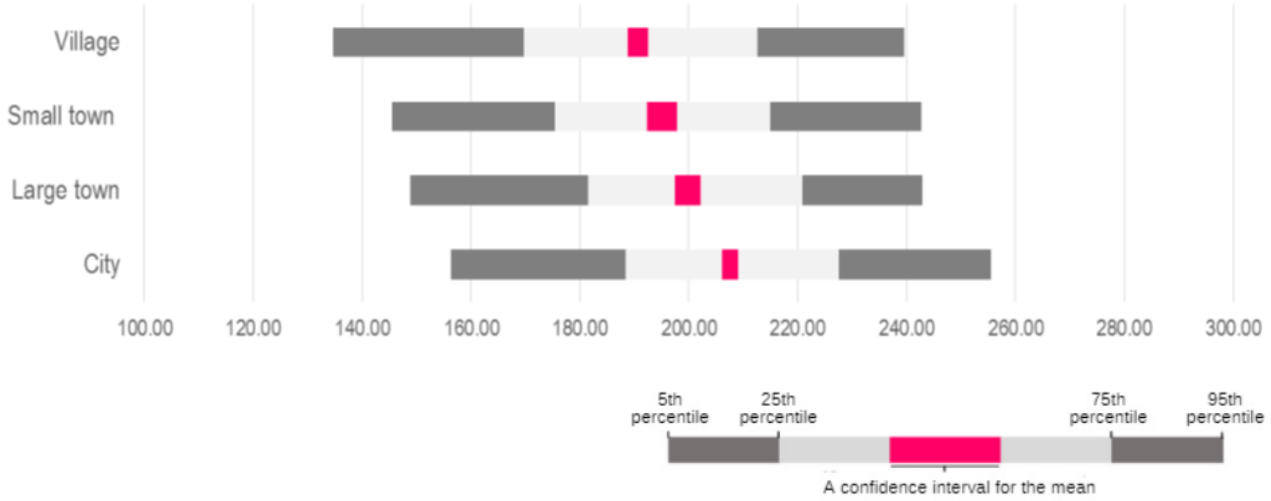


Figure 2 – The distribution of students' score points, by the type of settlement where the school is located (Mathematics)

There is also an association between Mathematics performance and the type of primary school the students attended (see Fig. 3). The mean score of Year 4 students who attended regular general education schools is 13.6 points lower than the result of those who attended gymnasiums or lyceums. The mean scores of students who attended specialized schools (214.0) and gymnasiums and lyceums (209.5) also differ significantly.

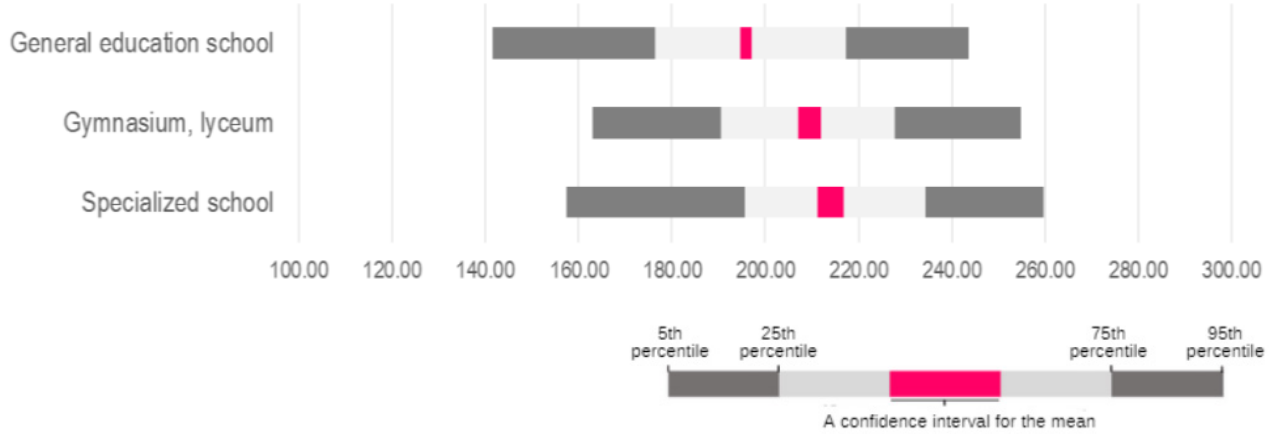
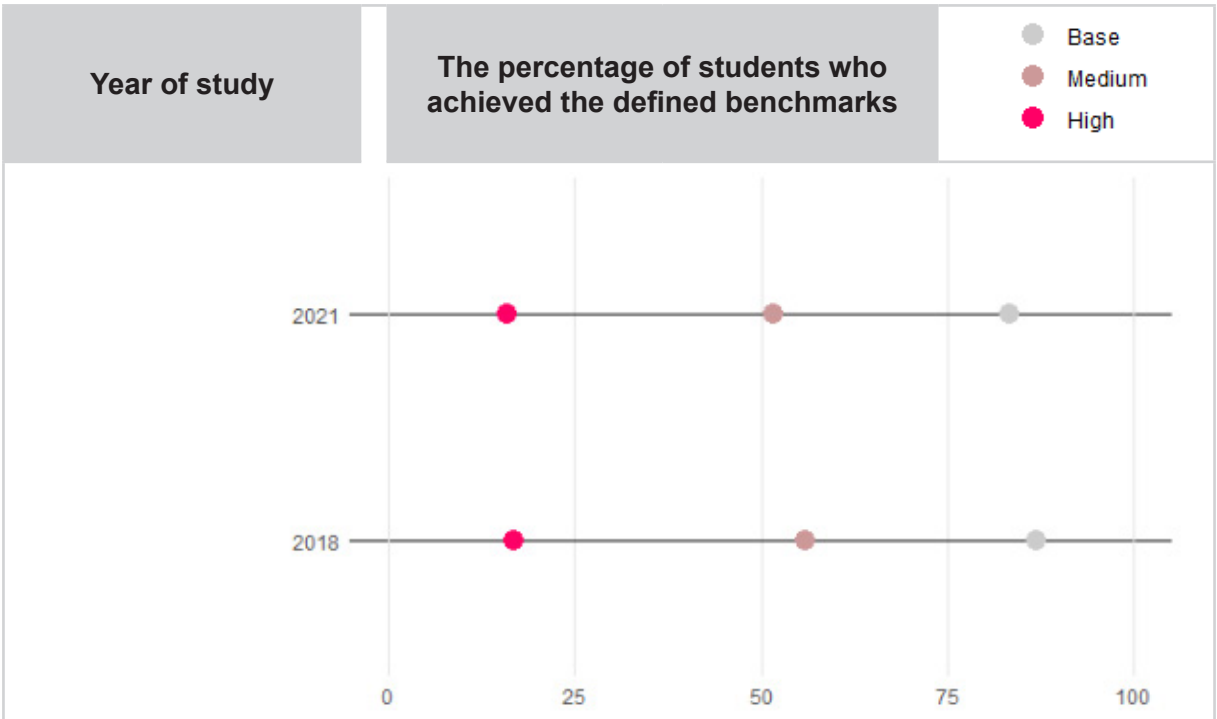


Figure 3 – The distribution of students' score points, by the type of school (Mathematics)

Comparing the mean scores of primary school students who participated in the monitoring study in 2018 and 2021 (see Table 2) can result in the conclusion that the level of mathematical competency of primary school graduates has decreased. The mean score obtained by Year 4 students who completed primary education in 2021 (199.8) is significantly lower than the mean score obtained by their predecessors who completed primary school in 2018 (202.9).

Table 2 – Achieving the benchmarks of the development of mathematical competency by primary school graduates in the 2018 and 2021 cycles of NEMSQPE

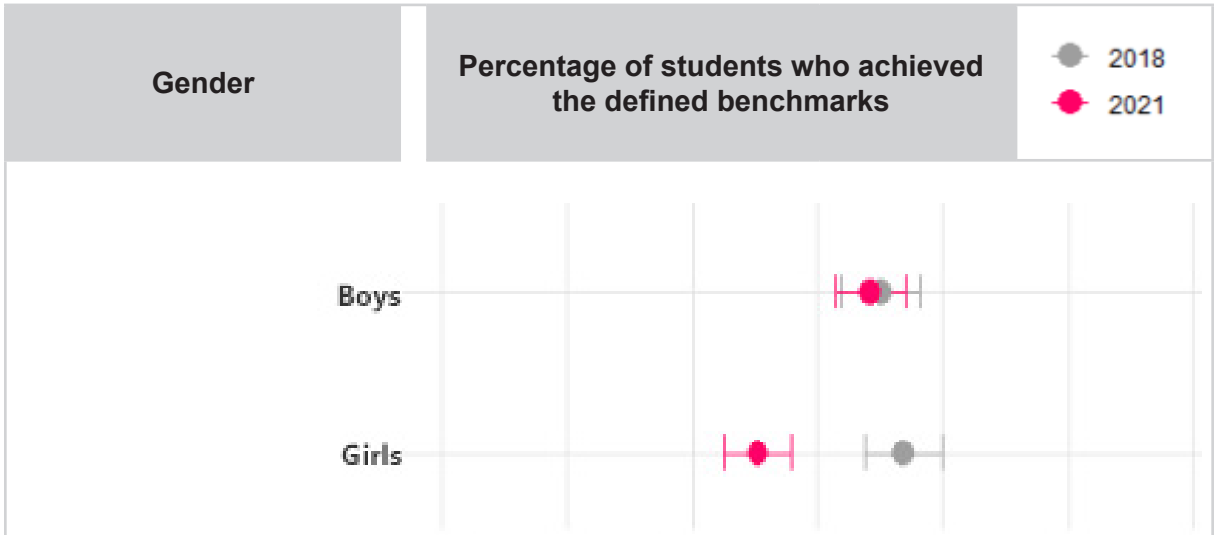


Year of study	The percentage of students who achieved the defined benchmarks		
	High (230)	Medium (200)	Base (170)
2021	15.9	51.6	83.3
2018	16.9	56.0	87.0

The proportion of Year 4 students who demonstrated a high level of mathematical competency, that means being able to apply mathematical knowledge to solve problems that go beyond the standard ones, cover less familiar and novel situations and are presented in more complex contexts, and being able to work purposefully with the problem and use well developed skills to reason and draw conclusions, to use information from both one and several sources, decreased over three years from 16.9% to 15.9%, and the share of primary school graduates who did not pass *the low (base) benchmark of mathematical competency* increased by 3.7%. In 2018, 13% of students who completed primary education did not possess basic mathematical proficiency and skills, i.e. they had significant problems solving the simplest problems related to known real life situations, and in 2021, the share of such primary school graduates became 16.7%.

Over three years – from 2018 to 2021 – a negative trend was observed in developing mathematical competency based on the gender of primary school graduates (see Table 3). While the mean score in the Mathematics test for boys did not change significantly between 2018 and 2021, the mean score for girls decreased by 5.9 score points.

Table 3 – Mean performance in Mathematics in the 2018 and 2021 cycles of NEMSQPE, by students' gender (with a confidence interval)



	Mean Score 2018	Mean Score 2021
Girls	203.5 (0.78)	197.6 (0.72)
Boys	202.6 (0.80)	202.2 (0.72)

At the same time, the type of settlement and the type of school did not result in a significant difference in the score points obtained by students in the Mathematics test in 2018 and 2021.

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THE LEVEL OF DEVELOPMENT OF YEAR 4 STUDENTS' READING COMPETENCY IN UKRAINE

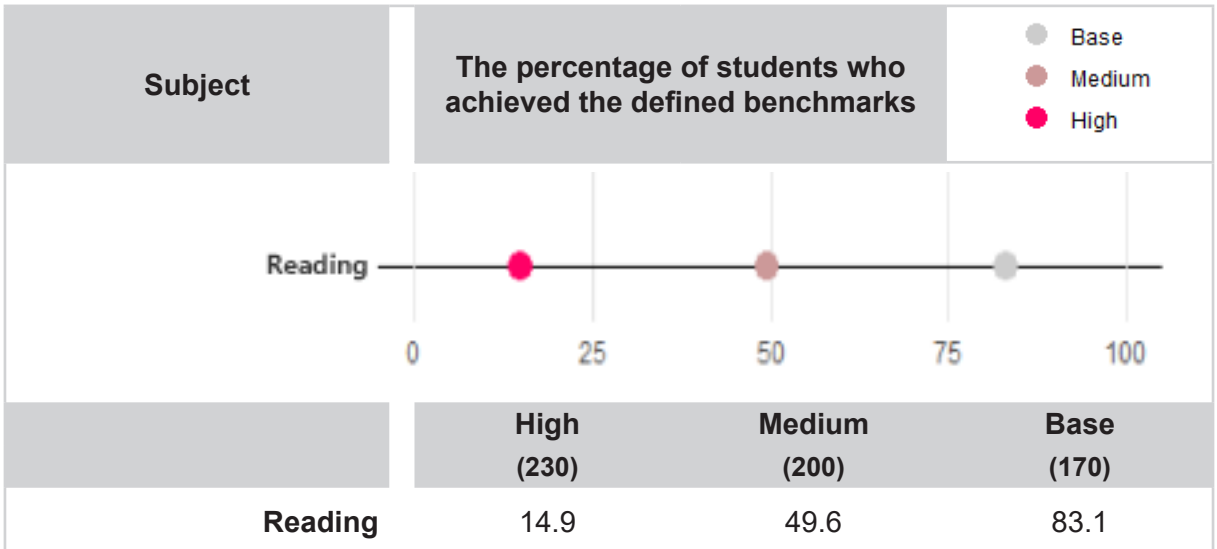
The results of the Reading test of the students participating in the main study of the second cycle of NEMSQPE (see Table 4) showed that 14.9% of the primary school graduates achieved the high benchmark, 49.6% achieved the medium one, and 83.1% achieved the base one.

Thus, 16.9% of students who completed the primary school course in 2021 have the pre-basic level of Reading competency, i.e. they mostly have significant difficulties in reading even working on simple texts on topics known from life, in particular utilitarian-practical experience.

The low (base) level of reading competency
Working with a **literary text**, a primary school graduate demonstrates the ability to retrieve clearly and directly stated information about the place, time, actions and feelings of the characters, the main events, to draw simple conclusions about the connection between events, the cause and purpose of the characters' actions, to summarize information from the text for determining its topic, evaluating actions, behavior of characters, and plausibility of events if the text is on a familiar, uncomplicated topic. By working with an **informational text**, a graduate of primary school is able to retrieve actual, specific information given in various formats, in particular on maps, in tables, the main important details in descriptions of objects, in lists, to draw simple conclusions about cause-and-effect relationships, sequence of actions, determine the main features of similarities and differences of subjects, evaluate the usefulness, reliability of information if the subject of the text is well known.

The high level of reading competency
Reading a **literary text**, a primary school graduate demonstrates the ability to navigate the entire text, retrieving information about significant actions, moves, feelings, signs of characters, to draw conclusions about cause-and-effect relationships, motive, purpose of actions and moves of characters, to interpret the reason for changes in attitudes, the characters' feelings, the development of the characters' feelings throughout the text, to determine the theme, the main idea of the text, connecting them with the title, fragments from the text, to analyze some specific features of the characters' language, to evaluate the authenticity of the depicted, citing evidence from the text, to identify means of expressing the author's attitude to the characters, and to read between the lines. Working with an **informational text**, a primary school graduate is able to extract significant information and important details from both a continuous text and other formats (tables, diagrams, figures, lists) relying on the text to draw conclusions about the logic of explanation, justification, and cause-and-effect relationships, to connect information provided in different formats, to evaluate the validity of conclusions, the functionality of parts of the text, graphic elements, the appropriateness of certain linguistic means used by the author as well as their effect.

Table 4 – Achieving the benchmarks of the development of reading competency by primary school graduates



Subject	High (230)	Medium (200)	Base (170)
Reading	14.9	49.6	83.1

Taking into account the gender of the students participating in NEMSQPE (see Fig. 4), we must state that girls demonstrate a higher level of reading competency than their male peers: the mean scores for boys (195.2) and girls (202.3) are significantly different.

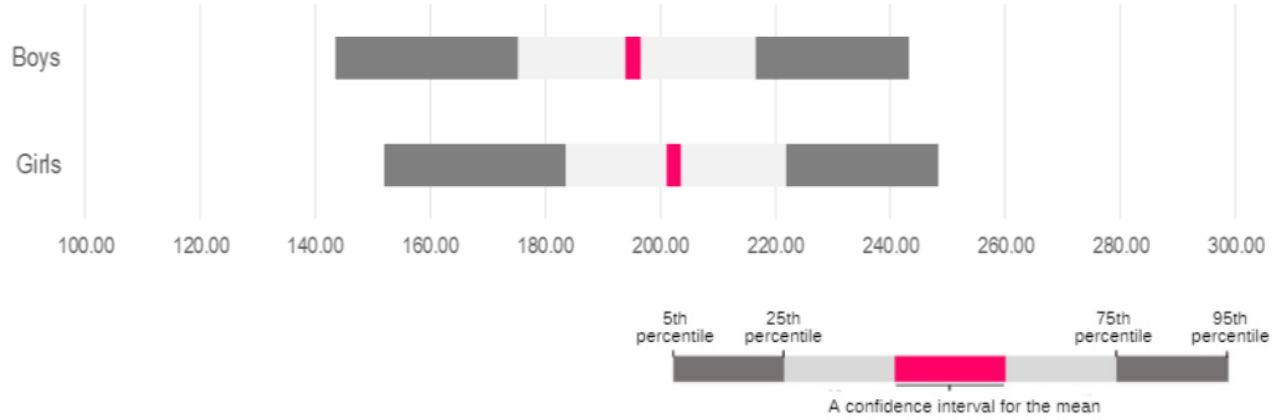


Figure 4 – The distribution of score points, by gender of the students (Reading)

The mean score in Reading for the participants who live in different types of areas also differ in some cases (see Table 5). Thus, there is a statistically significant difference between the learning outcomes of students who get primary education in villages and those of students who study in schools located in settlements of other types. For example, the learning outcomes of Year 4 students who completed primary education in villages is 6.6 score points lower than those of their peers who studied in large towns, and 17.4 points lower than those of the students who studied in city primary schools.

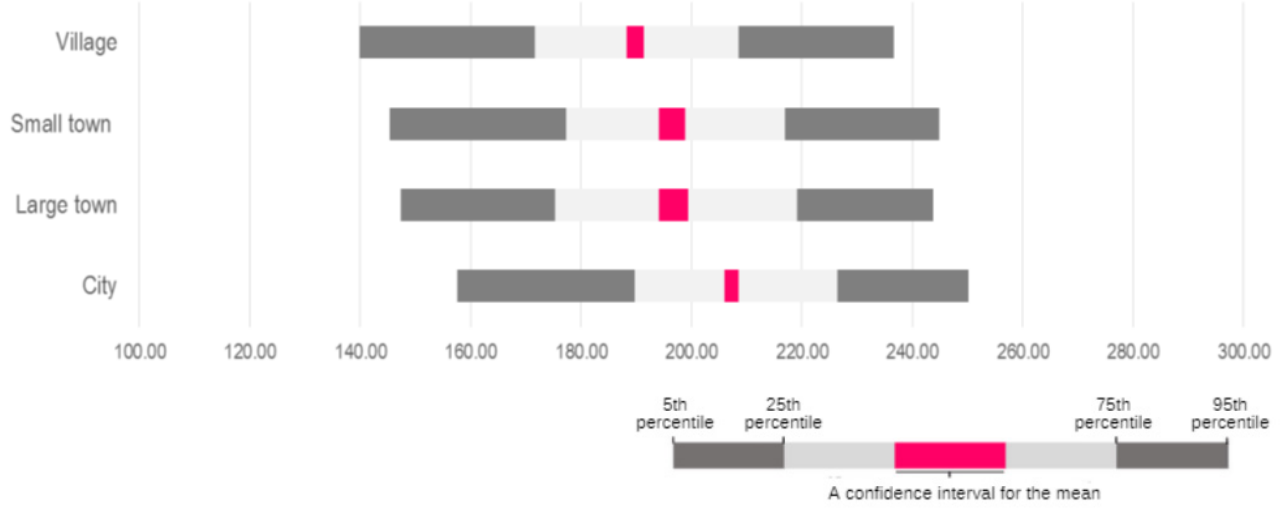


Figure 5 – The distribution of students' score points, by the type of settlement where the school is located (Reading)

The differences in Reading test results are also observed depending on the type of school in which primary school graduates studied in 2021 (Fig. 6). The mean score for students who attended general education schools (195.9) is 13.6 score points lower than the mean score for the Year 4 students who attended gymnasiums or lyceums (209.5). There is also a statistically significant difference between the mean scores for students attending specialized schools and students attending gymnasiums and lyceums: the mean score for the former was higher by 4.5 score points.

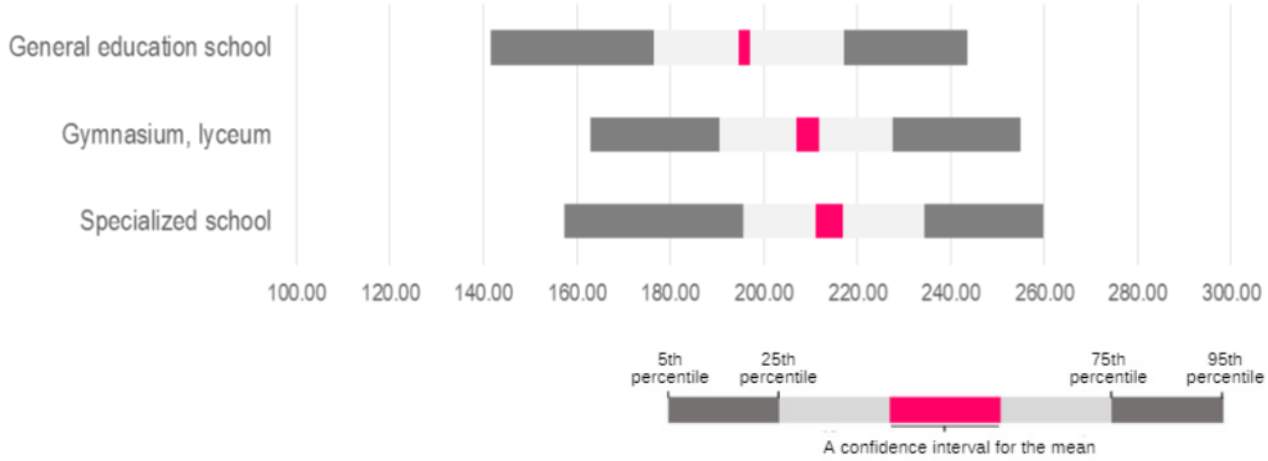


Figure 6 – The distribution of students' score points, by the type of school (Reading)

Comparing the mean scores of primary school graduates in 2018 and 2021, it can be concluded that the level of Reading competency of primary school graduates decreased during the abovementioned period (see Table 5).

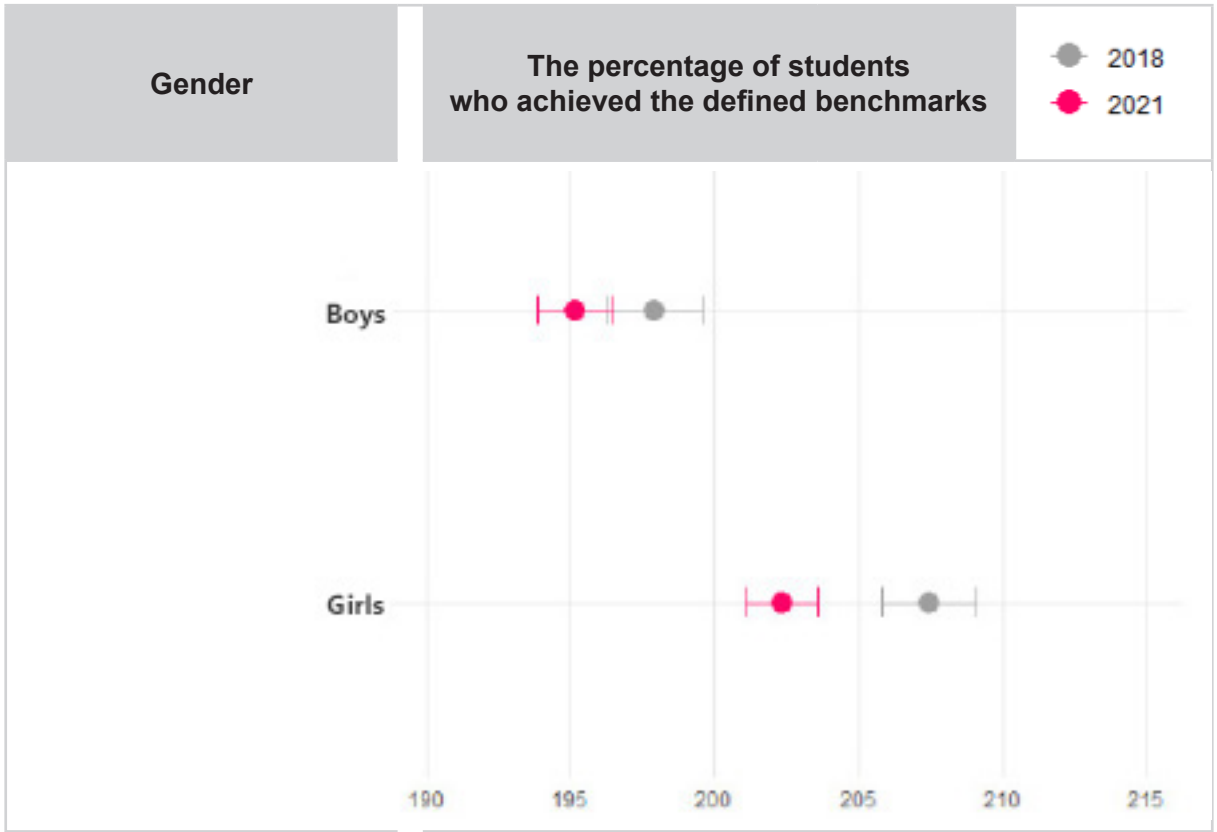
The mean score for Year 4 students in 2021 (198.7) is significantly lower than the mean score for their predecessors in 2018 (202.6). In addition, the share of Year 4 students who performed at a high level of reading competency decreased from 17.5% in 2018 to 14.9% in 2021. However, the share of primary school graduates who did not pass the base benchmark of reading competency increased over three years from 13.2% to 16.9%, i.e. by 3.7%.

Table 5 – Achieving the defined benchmarks of reading competency by primary school graduates in the 2018 and 2021 cycles of NEMSQPE

Year of study	The percentage of students who achieved the defined benchmarks in Reading		
	High (230)	Medium (200)	Base (170)
2021	14.9	49.6	83.1
2018	17.5	55.6	86.8

In terms of primary school graduates' gender, the data show (see Table 6) that the mean score in the Reading test for boys did not change significantly between 2018 and 2021. At the same time, the girls' performance decreased significantly (from 207.5 to 202.2, i.e. by 5.3 points).

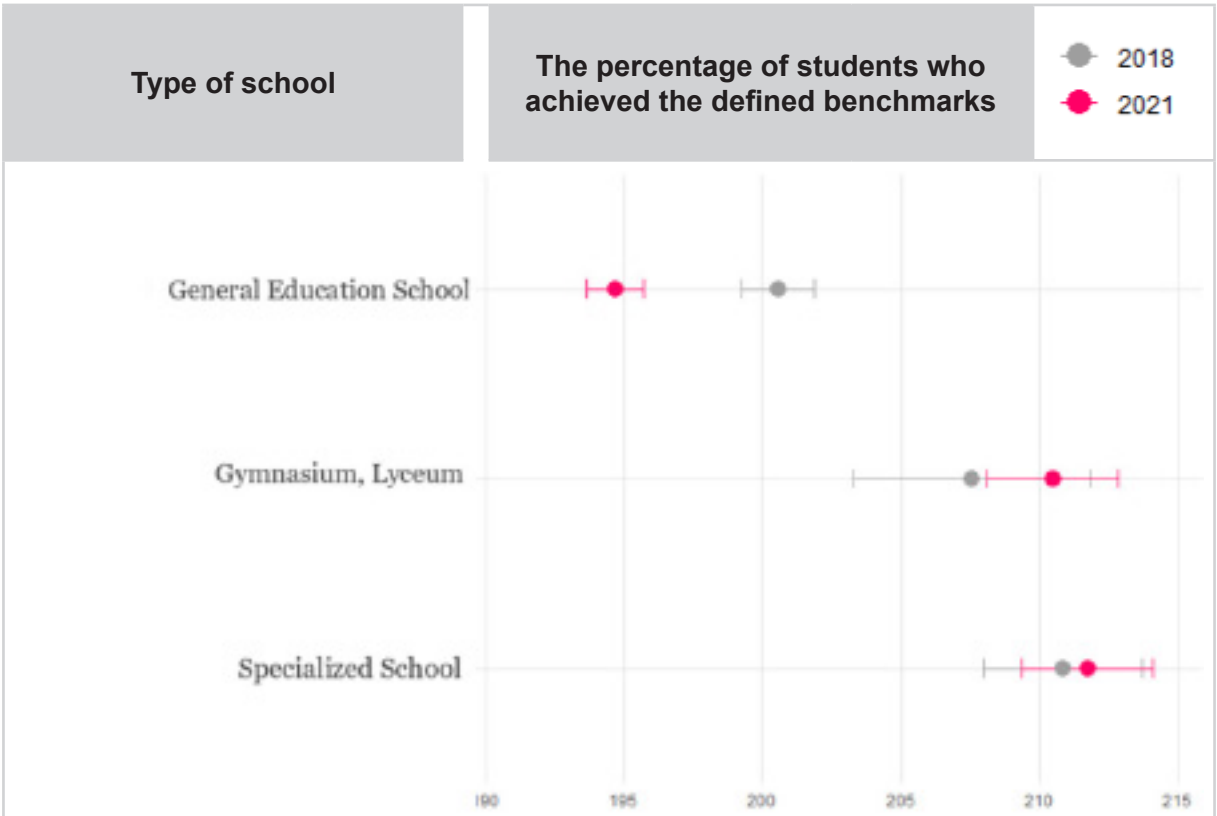
Table 6 – Mean performance in Reading in the 2018 and 2021 cycles of NEMSQPE, by the gender of the students (with a confidence interval)



	Mean score 2018	Mean score 2021
Girls	207.5 (0.83)	202.3 (0.63)
Boys	197.9 (0.83)	195.2 (0.66)

There is also a certain trend in the Reading performance of primary school graduates depending on the type of school (Table 7). Thus, the mean score on the Reading test of Year 4 students who got their primary education in gymnasiums, lyceums, and specialized schools in 2021, compared to the mean score of similar categories of students in 2018, did not change significantly, but the result of the Reading test of students who attended general education schools significantly decreased over a three-year period – from 200.6 in 2018 to 194.7 in 2021, that is, by 4.6 points.

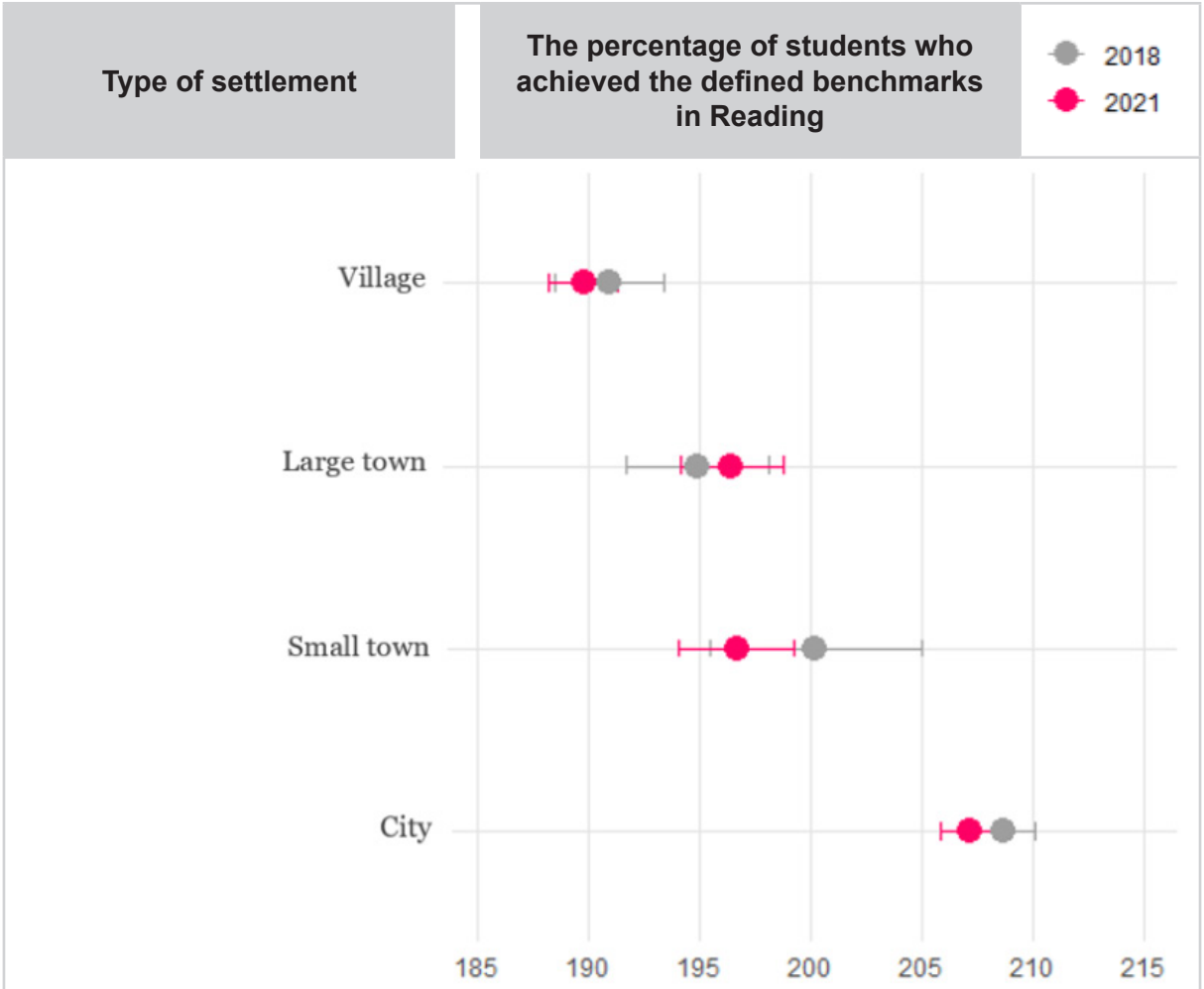
Table 7 – Mean performance in Reading in the 2018 and 2021 cycles of NEMSQPE, by the type of school (with a confidence interval)

Type of school	The percentage of students who achieved the defined benchmarks	
		
	Mean score 2018	Mean score 2021
General education school	200.6 (0.66)	194.7 (0.52)
Gymnasium, Lyceum	207.6 (2.19)	210.5 (1.22)
Specialized school	210.9 (1.47)	211.8 (1.21)

In contrast to previous data, where significant changes are observed between 2018 and 2021, the mean scores obtained by primary school graduates on the Reading test in 2018 and 2021 do not differ significantly for each type of settlement (Table 8).

Table 8 – Mean performance in Reading in the 2018 and 2021 cycles of NEMSQPE, by the type of settlement where the school is located (with a confidence interval)

Type of settlement	The percentage of students who achieved the defined benchmarks in Reading	
	Mean score 2018	Mean score 2021
Village	190.9 (1.24)	189.8 (0.78)
Large town	194.9 (1.65)	196.4 (1.19)
Small town	200.2 (2.42)	196.7 (1.34)
City	208.7 (0.73)	207.2 (0.68)



Although there is a certain fall in the results of primary school graduates in Reading between the first and second cycle of NEMSQPE, the problems faced by younger schoolchildren as readers remain relatively ”stable”. So, in both 2018 and 2021, primary school graduates found it more difficult to work:

- with informational rather than literary texts, that reflects the traditional school's understanding of teaching Reading as Literary Reading and not reading all the variety of text materials relevant to children;

- with plotless or mixed texts than with plot texts, that is partly due to the fact that plot texts are usually fiction while plotless texts are informational;
- on the analysis and evaluation of the form and content of texts than on retrieving information clearly presented in texts;
- with abstract information in texts than with concrete, empirically known to children;
- with information that is scattered throughout the text than with information at the beginning of the text or information presented in a structured way (in tables, diagrams);
- with tasks that involve providing one's own answer, rather than choosing from among the proposed options, etc.

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DISTANCE LEARNING AND PERFORMANCE OF PRIMARY SCHOOL GRADUATES

Due to introduction of the additional questionnaires within NEMSQPE 2021, it was possible to collect valuable data that shed light of objectivity on how the COVID-19 pandemic-related **distance learning** affected the performance of primary school graduates.

WHAT THE STUDENTS SAY

During the quarantine period, 43.7% of Year 4 students studied less than 3 hours a day, and 38.7% – from 4 to 5 hours a day. Fewer students (12.2%) studied for 5–6 hours a day, and extremely rarely students spent 7–8 or more than 9 hours a day studying (3.3% and 2.2%, respectively).

The most common way for students to communicate with their teachers during distance learning was through messaging and video communication in Zoom. Somewhat less often, students used messages and video in Google Classroom to communicate with their teacher, and least often they communicated using e-mail messages and in person, without any technical means.

During periods of distance learning, students often completed tasks from the textbook assigned by the teacher, attended online lessons organized by the school (and students living in cities did this more often than residents of villages and towns). Also quite often, students did tests of different types and additional tasks assigned by their teachers, did practical exercises and assignments on the Internet, and watched lessons or educational materials prepared by other teachers on the Internet. At the same time, teachers rarely used individual approach to students: 57.5% of Year 4 students reported in the questionnaires that they never or almost never experienced it. Also, students rarely studied any learning materials or did any tasks without their teacher telling them to do so (independently or with parents or tutors).

Among the surveyed Year 4 students, 38.6% agreed with the statement that during distance learning, new topics in academic subjects were most often explained to them by their parents, and 15.8% admitted that it was difficult for them to complete tasks because the teachers did not explain anything to them. 33.1% of students reported that during distance learning they were assigned more tasks than usual. Fewer students (23.0%) agreed that it was difficult for them to complete the tasks sent by teachers due to difficulties in working with a computer or tablet. Almost the same number of students agreed with the statement that they were not able to study remotely because they did not have the Internet or had poor connection, and that it was difficult for them to complete assignments because their computer (tablet) did not work well. Students from rural areas primarily faced such difficulties, that is, students from villages and towns had worse (albeit slightly) conditions for distance learning than their peers from cities. Separately, it should be noted that the absolute majority of students (77.6%) agreed that studying at school is better than at home, and only 22.4% of Year 4 students disagreed or rather disagreed with this.

During full-time offline learning, the most teachers spent 7 to 10 hours a day working. A total of 80.2% of primary school teachers worked this way, while half of them (40.1%) indicated that they worked 8 hours a day. During the distance learning period, 21.8% of teachers spent 8 hours a day on work, and almost the same number of respondents (20.6%) spent 10 hours a day. Along with this, a total of 28.1% of teachers worked 11 or more hours a day during distance learning periods, while only 7.5% of teachers spent this amount of time on work during offline (face-to-face) learning.

Almost every surveyed teacher (a total of 97.8%) often or very often used a computer, laptop or tablet with the Internet access to work during distance learning periods at home. Also, the absolute majority of teachers often or very often used a phone or smartphone with the Internet access. Technical means without access to the Internet (computers, laptops or tablets in the educational institution and at home, as well as phones / smartphones) were used significantly less often by teachers.

From the teachers' point of view, calls, messages and video communication in Viber, Telegram, WhatsApp and other messengers were the most effective for distance learning. The participants rated the effectiveness of communication using messages and video communication in Zoom and Google Classroom quite high, and for many teachers, the opportunities provided by the websites of educational institutions were effective. 34.1% of respondents highly appreciated the capabilities of the Moodle, Google Meet, Microsoft Meet and Discord systems, although almost the same number of primary school teachers (35.7%) did not use such programs at all in their work. For a significant number of teachers, it was effective to keep in touch with students by sharing information in Google Drive, as well as communication by means of regular phone calls. Posting information on the teacher's online blog (and 47.9% did not do this at all), communication using Facebook or other social media, e-mailing and regular SMS turned out to be the least effective for distance learning.

The absolute majority of teachers often or very often conducted lessons online (76.6% and 15.6%, respectively). In addition, teachers constantly provided Year 4 students with exercises from textbooks and communicated with their students individually (via video communication, phone / smartphone or directly without technical means). Quite often, teachers provided their students with self-developed exercises, and also conducted testing or assigned tests online. 45.1% of the surveyed teachers often and 16.8% very often provided tasks for completing independently, and approximately the same number of teachers (in total) provided children with videos of lessons or educational materials made by other teachers on the Internet to study. Somewhat less often than other tasks, teachers provided their students with practice exercises, tasks available on the Internet (for example, on YouTube), and even less often – videos from the All-Ukrainian Online School.

Primary school teachers highly appreciated the quality of methodological support they received from schools during the distance learning periods, as well as the level of skills they have developed in using special programs and technical tools. The participants of the study rated the quality of computer equipment and Internet connection in their workplaces during distance learning periods quite high, as well as the level of students' engagement in

the distance learning processes (attending online-classes, working on class assignments, doing homework and tests). The teachers also positively assessed the quality of educational content available for use during distance learning periods, and the quality of technical support they received from schools during this period. In general, primary school teachers assess the level of parents' involvement in the educational process during distance learning periods positively. However, teachers of Year 4 students rate the quality of computer equipment and the Internet access at students' homes as well as their level of self-learning skills the least positively. In addition, they give the lowest rates to the level of students' motivation to learn remotely.

The majority of teachers (54%) believe that in the 2020/2021 academic year, the organization of distance learning in their school has improved significantly, compared to the previous academic year. However, despite this, teachers are convinced that the introduction of distance learning has had a negative impact on their students' performance.

This conviction is confirmed by statistical data (see Figs. 7 and 8). Both in Mathematics and in Reading, the performance of those Year 4 students who studied remotely for less than one month and those who studied in this mode for 1–2 months differ insignificantly. In Mathematics, the mean score of the first group is 200.4 while the second group scored 199.5, and in Reading – 201.4 and 198.4, respectively. Thus, the difference between the two groups is only 0.9 score points in Mathematics and 3 score points in Reading. However, elementary school students who studied remotely for 3–4 months performed noticeably worse: 192.8 score points in Mathematics and 194.5 score points in Reading. Thus, the latter scored 7.6 points in Mathematics and 6.9 points in Reading less than their peers who studied remotely for less than one month.

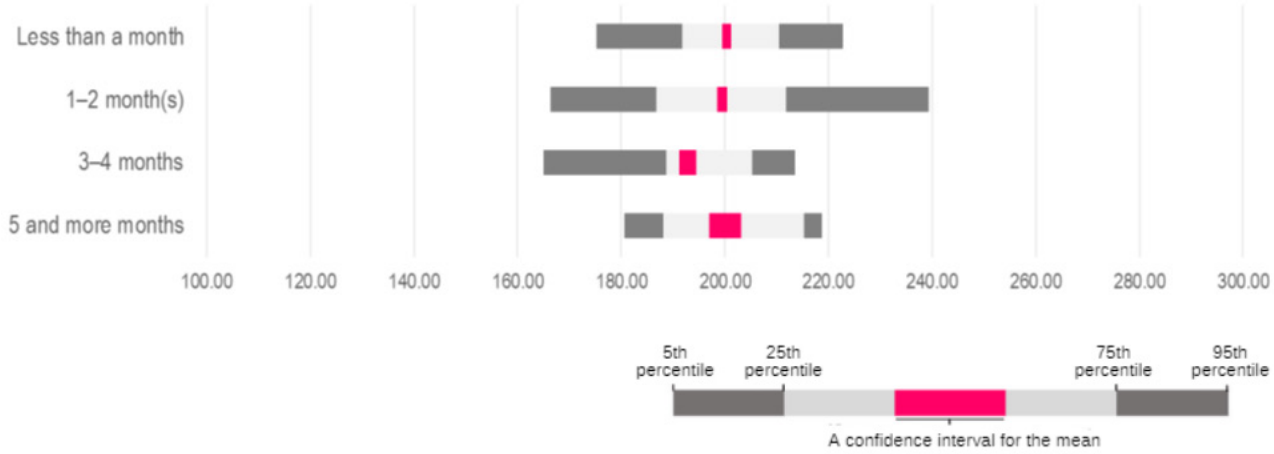

Figure 7 – The distribution of primary school graduates' score points in Mathematics, by the duration of distance learning in the 2020/2021 academic year

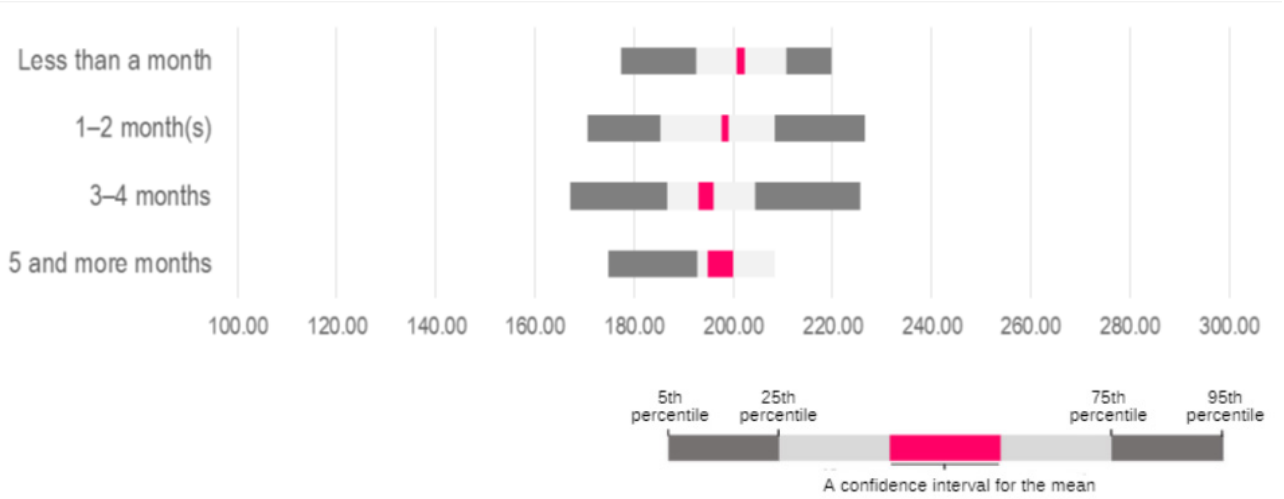

Figure 8 – The distribution of primary school graduates' score points in Reading, by the duration of distance learning in the 2020/2021 academic year

A certain relationship can be traced between the students' performance in Mathematics and Reading tests and the ways teachers carry out the educational process during distance learning periods. Thus, the mean score in Mathematics of those students whose teachers often or very often taught them online was 14.2 points higher than of those students whose teachers did it rarely, never, or sometimes. In Reading, this difference is 5.5 points and that is not so significant. Besides, students whose teachers often or very often communicated with them individually scored 5.9 points lower (in Mathematics, the difference is not significant – only 1.4 points). Somewhat lower (by 4 points) results in Reading were also scored by those students whose teachers less often than others provided them with videos of lessons or educational materials of other teachers on the Internet.

The monitoring data also show that students who attended online classes frequently (every day or almost every day or several times a week) have higher mean scores than those who rarely did so (the difference is 8.8 points in Mathematics and 4.8 points in Reading).

Learning outcomes of younger students could certainly be influenced by the conditions under which they worked during distance learning. The data received indicate that the mean scores of the students who had certain technical difficulties during distance learning (did not have a computer / tablet / smartphone) or their device was faulty, did not have sufficient skills to work on a computer or tablet, did not have the Internet at home or the connection was poor), is somewhat lower compared to the mean scores of their peers who did not have such difficulties. The difference is 5.3 to 8 score points in Mathematics and 5.2 to 7.5 score points in Reading. Those students who agreed or were more likely to agree with the statement *"During distance learning, it was difficult for me to complete the tasks because the teacher did not explain anything"* scored lower. The difference in performance between them and those who disagreed with the abovementioned statement is 8.1 score points in Mathematics and 5.2 score points in Reading. In addition, the results in Mathematics are 5.1 score points lower for those students who agreed with the statement *"During distance learning, new topics in academic subjects were most often explained to me by my parents*". In Reading, this difference is only 3.1 score points.

Photo of the Press Service of the Ministry of Education and Science of Ukraine

GENERAL CONCLUSIONS

I. Mathematical competency of primary school graduates

- *From 2018 to 2021, the level of mathematical competency of primary school graduates decreased. On the average, Year 4 students scored 3.1 score points lower in Mathematics in 2021 than in 2018.*

- *The share of primary school graduates who achieved a high level of mathematical competency has decreased by 1% over three years, while the share of Year 4 students who did not pass the base benchmark in mastering Mathematics has increased by 3.7%.*

- *The results of testing Mathematics demonstrated a difference in performance depending on the gender of Year 4 students, which was not noticed in the 2018 cycle: boys' mean score is 4.6 points higher than girls' corresponding one. At the same time, boys' performance did not change significantly over three years, but girls' achievements decreased in 2021 compared to 2018 by 5.9 score points.*

- *The performance of students studying in general education schools (195.9 points) and their peers from gymnasiums, lyceums, and specialized schools (209.5 and 214.0 points, respectively) differs significantly. At the same time, the mean score of students from general education schools in 2021 turned out to be 4.6 score points lower compared to the corresponding indicator in 2018, and the performance of students from other types of educational institutions did not change significantly over three years.*

- *Students who live in cities have significantly higher mean score in Mathematics than their peers from schools in other types of localities: the difference ranges from about 8 score points (large towns) to almost 17 points (villages). At the same time, the performance of students from different types of localities in the Mathematics based on tests over the three years – between 2018 and 2021 – remained almost unchanged.*

II. Reading competency of primary school graduates

- *Over three years that passed since the first cycle of NEMSQPE, the level of reading competency of primary school graduates decreased. The mean score students performed in the Reading test in 2021 is 3.9 score points lower than the mean score performed by Year 4 students in 2018.*

- *The share of Year 4 students who demonstrated a high level of reading competency decreased from 17.5% in 2018 to 14.9% in 2021, on the contrary, the share of primary school graduates who did not achieve the base benchmark of reading competency increased over three years, from 13.2% to 16.9%.*

- *Girls performed better than boys in Reading. However, the mean score in Reading test for boys did not change significantly between 2018 and 2021, and mean score for girls decreased by more than 5 score points.*

- *The mean scores in the Reading test for Year 4 students who completed their primary education in gymnasiums, lyceums, and specialized schools are significantly higher than for those of their peers who studied in general education schools. At the same time, the performance of the latter decreased by 4 score points over three years, which is not observed among those students who attended schools of other types.*

- *The performance in Reading of Year 4 students who studied in villages is more than 6 score points lower than of their peers who studied in large towns, and more than 17 points lower than of those primary school students who studied in cities. At the same time, the mean scores of primary school graduates for the Reading test in 2018 and 2021 do not differ significantly for each type of settlement.*

III. Distance learning and primary school graduates' performance

- *During the forced quarantine periods within the 2020/2021 academic year, Year 4 students usually spent 3 to 5 hours a day studying, almost every day they communicated with their teachers using Zoom, as well as Viber, Telegram, WhatsApp or other messengers, very often completed tasks from textbooks, attended online classes organized by their schools, as well as did tests of different types.*

- *In turn, primary school teachers worked an average of 8–10 hours a day during the distance learning period, constantly conducted online lessons, provided their students with exercises from textbooks, and also communicated with them individually. For teaching students, teachers most often used technical means like computers, laptops, tablets (at home or in an educational institution), telephones or smartphones with the Internet access. According to the primary school teachers, various messengers like Viber, Telegram, WhatsApp, etc., as well as the Zoom and Google Classroom applications, were the most effective for distance learning.*

- *During distance learning, new topics in educational subjects were most often explained to students by their parents. In addition, during that period, children were given more tasks than usual, and often the tasks were difficult for them to complete due to the lack of explanations from their teachers.*

- *Students from rural areas, as well as Year 4 students who studied in general education schools, somewhat more often than their peers, had to deal with factors that complicated the process of learning in a distance format.*

- *Primary school teachers positively assessed the quality of methodological support they received from educational institutions, their own level of skills in using special programs and technical tools, as well as the quality of computer equipment and the Internet communication in the place where they worked. At the same time, the surveyed teachers were somewhat dissatisfied with the level of their students' self-learning skills, as well as the level of their motivation for distance learning.*

- *Despite the fact that the organization of distance learning in schools in the 2020/2021 academic year, according to the surveyed teachers, has improved compared to the previous academic year, most teachers still tend to believe that the transition to this learning mode has negatively affected the performance of their students. Indeed, as the data show, long-term study outside school had negative effects on primary school students' level of development of reading and mathematical competencies: the difference between the mean scores of the students who studied remotely for 3–4 months and the mean scores of their peers who studied remotely less than one month is 7.6 score points in Mathematics and 6.9 score points in Reading.*

- *In order to avoid the negative impact of distance learning on primary school students' performance and help them to achieve their best results in the field of Mathematics and Reading, a number of factors are important, in particular, the regular online lessons conducted by teachers and, accordingly, the regular attendance of these lessons by students (especially for studying the learning material in Mathematics), teachers' presentation of the new learning material with the necessary explanations to the students, as well as access to appropriate technical resources and sufficient skills to work with them.*

You can find more details about the results of the main study of the second cycle of NEMSQPE2021 in the full report on the website of the Ukrainian Center for Educational Quality Assessment.