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LEARNERS' ACHIEVEMENTS AND CHALLENGES IN MATHEMATICAL INFORMATION PROCESSING AT PRIMARY SCHOOL

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Abstract

The informational literacy of primary school learners contributes immensely to their performance in class. Corresponding information processing skills are a combination of subject specific skills and universal ones, acquired by school learners from different studies.

The informational literacy is regarded as a set of the following abilities: to process information from different sources, to find the way in the flow of various data coming from the learning environment and daily situations, and to assess the reliability and sustainability of the data received.

The article outlines and describes the most essential informational abilities pertinent to successful performance of a primary school learner; analyses achievements of Russian primary school learners and challenges they face in information processing. Then the article describes certain results of tasks accomplished by Russian learners under the international comparative TIMSS (TIMSS – Trends in Mathematics and Science Study) test aimed at the assessment of their informational ability to solve subject tasks. The article also covers the learners' achievements and difficulties in acquiring certain informational skills. Finally, the article presents several guidelines for development of informational literacy of primary school learners.

Keywords: Planned learning results, information processing skills, information literacy, primary school learner, quality assessment, successful teaching.

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1. Introduction

A decade ago a primary school learner was not aware of gadgets, did not use the Internet, did not play games using an ipad, i.e., his informational environment was less busy and diversified. However, children of that age were willingly involved in playing active games with peers, many of them enjoyed reading. Due to the technological advancement the information means change both the content and the form of its presentation. Nowadays it is customary that every child in the class has a mobile phone, children exchange messages with each other, and can find in Internet the information required for a presentation in class.

Obviously, it is a positive development as far as people are driven by the technical advancement, however, risks of the pedagogical incaution related to the use of new informational means lead to the violation of the formula "do no harm!"

The problem of the development of informational literacy of primary school learners is emphasized as matter of topical interest by the Federal State Educational Standard of Primary General Education of 2009, which indicates that at this learning stage the learner should acquire skills such as "the application of various methods of search, collection, comprehension, analysis, compilation, transmission, and interpretation of information in compliance with communicative and cognitive purposes…" (Federal'nyj gosudarstvennyj obrazovatel'nyj standart nachal'nogo obshhego obrazovanija, 2015, p.9).

2. Problem Statement

One of the priorities at the primary school is the formation of grounds for the informational culture of learners: they study to find the way in the incoming flow of information, apply it to solve various tasks at studies and in daily situations, analyze and assess the data received, present it in different ways and styles.

2.1. Informational literacy

The article emphasizes that the informational literacy of a contemporary learner includes not only the ability to obtain and use data from different informational sources, but also to apply safely (for psychological and physical health) the informational and communicational technologies and gadgets to solve learning tasks and resolve life situations.

As far as the bases of informational literacy include the ability to work with different ways of the presentation of information, the authors suggest to use the definition of "information" as "the knowledge (specific and generalised data)" regarding materials, events, facts of environment perceived by the human (in this contexts – by the primary school learner) for certain purposes (communication, education, analysis, assessment, etc." ("Universal'nye uchebnye dejstvija", 2016, p. 61).

2.2. Description of informational learning activities

The analysis of informational literacy elements demonstrates that its formation is based on the formation of the set of subject activities and operations of a generalised nature, which are not directly linked to the specific content of a school subject studied by a learner. We stress that the generalization of

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an activity is caused, first, by the indifferent relation to the subject content, and second, by the possibility of the transfer of this activity to any other content.

3. Research Questions

The article considers certain groups of informational activities, analyses their influence on the successful performance of the primary school learners, and outlines some guidelines for a teacher focused at the improvement of the informational literacy of Russian school learners.

4. Purpose of the Study

To describe primary school learners' information literacy as a set of the following features: desire to enhance one's awareness of information tools; ability to find the way in the incoming flow of information from learning and life experience, evaluation of the reliability, sustainability and preciseness of information, the information processing skills that enable the efficient use of the acquired information.

5. Research Methods

The article is based on the analysis of results of the regional research on education quality for several Russian regions, in particular, the results of final and diagnostics tests in mathematics. The material was prepared by the Center for Educational Quality Assessment of the Institute for Strategy of Education Development of the Russian Academy of Education, the Center for Educational Quality (under V.F. Soldatov) of the Academy of Public Administration of Moscow Region. The tasks for the regional tests were designed by K.A. Krasnyanskaya, M.I. Kuznetsova, and O.A. Rydze. The research also includes Russian students' results of certain tasks taken from the TIMSS (Trends in Mathematics and Science Study) international test that was offered to primary school learners in 2015 ("Mezhdunarodnoe issledovanie po ocenke", 2017).

6. Findings

Three sets of information processing skills were highlighted:

- the readiness to use the information source (based on the example of the text of a mathematical task);
- the ability to understand and present information in different styles (a table, a scheme, etc.);
- the readiness to evaluate the reliability and the sustainability of the input data or processed information.

The classification of skills was supported by an experimental study on the Gymnasium in Troitsk conducted by the members of the Primary Basic Education Centre (under N.F. Vinogradova) of the Institute for Strategy of Education Development.

6.1. The readiness to use the information source (based on the example of the text of a mathematical task)

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This universal action presumes that a primary school learner can read thoughtfully (Zuckerman, 2013; Vinogradova, 2017), understands the role of information contained in the text of a task, thinks over and retains data necessary to accomplish the task (Vinogradova, 2017). Russian monitoring studies of the performance of the primary school graduates and TIMSS-2015 tests demonstrate that learners are most efficient with tasks which contain texts similar or identical to texts they studied in class. These tasks do not contain new information, therefore, the learner is able to demonstrate the understanding and the correct use of the texts, and reproduce the way the task is accomplished, that corresponds to the relevant text.

For example, the mathematical test given to the school learners of 4th class in one of the Russian regions (Kovaleva, & Krasnyanskaya,, 2017) contained a logical task: "Misha writes down the sequence of numbers 480, 420, 360, 300,.. under a certain rule. What number he will write down next?"

More than 80% of eight thousand school learners performed this task successfully. All of them understood the text correctly, established the proper mathematical relation between the numbers and indicated the correct answer "240" upon reasonable judgement that it follows the text "480, 420, 360, 300,.." It should be noted that amongst 20% of school learners that failed, approximately 8% understood the text correctly, however, they made a calculation mistake. At is also notable that according to results of international tests TIMSS-2015, more than 96% of Russian school learners establish the relation between the text record of a number and the numerical record, and more than 95% can highlight in the texts the features of a set of certain objects and take them into account for the next set with a similar description.

The typical mistakes the primary school learners make when working on the source of information (above all, the texts of mathematical exercises) are as follows.

First, it is a partial use of information. Children often face difficulty when trying to highlight all data (information) in the texts of tasks which they accomplish during studies. Hence, Russian tests conducted in 2017/2018 school year, as well as TIMSS-2015 tests demonstrated that its challenging for learners to figure out a number that contains four preset features.

The task: "This number is less than 5000. Each figure in the record of this number is even. All figures in the record of this number are different. Which biggest number has all those three features?" (Mullis, Martin, Ruddock, O'Sullivan, & Preuschoff, 2014, p.14). This task and the similar one was successfully accomplished by 29% and 44% learners respectively. It is notable, however, that many learners were able to highlight the information in the text, as two or three features were found out by additional 24% of participants in the Russian tests, and by 32% - in the international tests.

Second challenge is a poor interpretation of information given by the source (working out a conclusion, a statement, or a response). For example, where a task requires two or more responses, primary school learners indicate one response (though the correct one). Do such mistakes make necessary additional efforts of a teacher to prevent them? No doubts. Is there a need in a special work on that or would it be enough to add some emphases to learning courses, e.g., mathematics? The Federal State Educational Standard of Primary General Education lists the following obligatory skills: thoughtful text reading, acceptance and retaining of studied tasks, the use of signs and symbols as means to present information; the application of different ways to organize, transmit and interpret the information, etc. (Federal'nyj gosudarstvennyj obrazovatel'nyj standart nachal'nogo obshhego obrazovanija, 2015, p.9).

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Thus, such work is presumed to be carried out within a learning course and is an integral part to finding a response to any program task when studying mathematics. The following tools are applied for that purpose:

- Special tasks and exercises aimed at the understanding and application of knowledge regarding specifics of different learning technics, finding a proper direction for the investigation and the search of necessary data. Starting from the first year a child learns how to work with learning tools – the manual and the workbook, which are the main sources of information used by the learner for the accomplishment of tasks. The learner acquires the essential knowledge of how to distinguish and understand conditional signs and marks on a page or in the text of the task; how to prospect steps to accomplish the task, how to control whether the results correspond to the objective, requirements and instructions given in the text of a task. In class the teacher proposes children, if necessary, to look for additional sources of information: dictionaries, reference books, videos and TV broadcasts, newspapers and magazines for children of the age in question.
- Focused work with the texts of tasks as a specific form of the content disclosure. For example, junior school learners have to distinguish in the text the key information from the data of minor importance, as well as to word questions, related to the text, or answer questions.
- The application of tools aimed at the improvement of the motivation of learners: the use of a problem (contradictions, new facts) which is of interest to a child of that age: the integration of the studied text to the teacher's presentation and discussions.
- The creation of conditions for a possible transfer of the work results to a new situation. For example, it is advisable to use tasks which contain the following phrases to involve learners: "How the response will change, if…", "How would you word the task, which also has to account for this condition…", "Is that possible to resolve the task under these conditions?" etc.

6.2. The ability to understand and present information in different styles: the situation analysis and the description of the study

This skill is based on the following achievements of a junior school learner:

- The knowledge of particularities of reading different types of the presentation of information (a table, a scheme, other models);
- The full and correct understanding of contents of a table, a drawing, other model; highlighting key points, necessary to accomplish the task;
- The comparison of options to present a response and the selection of the best one.

It is notable that junior school learners in Russia demonstrated high score results of tests TIMSS-2015, which check working skills in relation to tables, diagrams, and data presented otherwise. More than 94% of fourth graders (4% improvement compared to 2011) were able to read a diagram that contained information regarding the height of a child during the age from 10 to 14 years and establish the age when the height increased most. According to Russian studies (for example, those conducted by the Moscow Center for the Quality of Education) learners demonstrate high score results in tasks for the reading and

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the choice of specific data in a table (over 95%), on a diagram (87%). This is the evidence that the school learners are successful in thoughtful reading and the reproduction of specific models.

However, Russian school learners were less successful (approx. 59%) in TIMSS-2015 tests, which presented data in texts, tables and diagrams. The correct accomplishment presumed that upon the information is highlighted, certain studied actions are preformed (the choice of conditions, the search of data, the establishment of the compatibility, the record of all possible solutions). Failed learners included, first, those who were not able to establish relations between data in tables and data in diagrams, and second, those who did not fulfil one condition: to highlight all objects that have the given feature (they indicated only one or two out of three). We emphasize that one of the studies performed by the Institute for Strategy of Education Development focused on finding out whether children were able to highlight and use the key features of information, necessary for the accomplishment of the task.

The study had three stages.

Under the first stage the objective was to find out if children are ready to the accomplishment of the task. The fourth graders had to read the text and answer relevant questions.

The task text: the box is full of cubes of the same size (Picture 1).

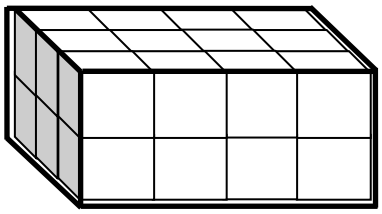

Figure 1. Picture 1

Answer the questions:

1) What information regarding cubes can be obtained from the text?
2) What information can be obtained from the picture?
3) Is it correct that cubes in the box are of the same size? Prove it.
4) Which number is greater: the number of cubes or the number of parallelepipeds?
5) Is it correct that the number of cubes is more than 8? Explain the answer.

The text of the task had some specifics: the information necessary to prepare the response, was both in the text and in the picture.

As discussed with school learners and teachers, children face difficulties when trying to respond questions 2, 4 and 5. They lack experience in the analysis of information presented in pictures. It is notable that, according to teachers, same learners do not have challenges when analyzing pictures at lessons in literary reading or the environmental (science) studies. In our view, the reason for this issue is that children do not have a solid experience of the analytical work with pictures. The manual on mathematics and technologies there is no methodological framework that would enable the perception, analysis and evaluation of pictures. The answers to the fourth question led to the conclusion that children face difficulties in distinguishing parts in the whole and in making relations between the whole and the part. Teachers indicated that if the situation is visualized (for example, a cube is put beside a

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parallelepiped, or a cube is put in a box which has a form or parallelepiped), children do not have difficulties making a comparison. The explanation of the response to question five demonstrated that even those learners who understand that there are more than 8 cubes, cannot interpret information received from the picture to use it in the text of an explanation.

Under the second stage the objective was to check the successful performance by fourth graders of the following task: "The box is full of cubes of the same size (Picture 1). What is the number of cubes in the box?". This task was included in the test on mathematics. 48% of 8,000 learners accomplished the task successfully. This is the evidence that they can "read", highlight, compare, apply information given in a text and in a picture. The most common mistake (made by 22% of respondents) concerned the establishment of the number of cubes which are well seen (responses "5 cubes", "8 cubes", "12 cubes"), and counting squares (response – "26 cubes"). However, cubes which were not seen within the parallelepiped were not taken into account, though they filled it in and this was a condition of the task. All mistakes indicate the difficulties in the extraction and the use of key information when working on the task.

The third stage of the study had the objective to prevent typical difficulties while working on the information of the task text. The analysis of mistakes demonstrated that the work in groups, as one of the types of learning, could contribute to their elimination, as the learner has more opportunities to present the own view and compare it to the views of others: children take more initiative, they are open to the search of new solutions and the presentation of their own achievements. At the end of the school year the third graders received the task for the group work, which proved the hypothesis that the extraction and the use of all information contained in the task is possible for the investigation, finding and the presentation of the response. The description of how the learners performed this task is presented below.

The conducted study demonstrated that mistakes and difficulties related to partial or incorrect use of information in the text of the task could be prevented and eliminated, for example, while working in groups during a lesson.

What type of work should be carried out by the primary school teacher to prevent and overcome typical difficulties related to the work with information, presented in different styles?

Below we list several types of tasks aimed at the work with information presented in different styles:

- The search of specific data in the text and its presentation according to the prescribed style (the set of words and features, in a table, in a picture or a scheme, etc.). For example, a task on the environmental (science) study: read the text, find the information, related to an animal, fill in the table using that information.
- Filling in of a template (a table, a diagram or a scheme) based on the text read. For example, read the story by N.Krasilnikov "The last mushroom". Pay attention to the change of the emotional status of the author looking at the autumn view, fill in the scheme.
- Answers to questions presented in the text obviously (or hidden ones). The task (2nd grade). "Mark ☑ the tasks which are resolved by using the subtraction. ☐ The height of Peter is 90 cm. Dima is 10 cm shorter than Peter. Write down the height of Dima. ☐ The height of Peter is 90 cm. Peter is 10 cm taller than Dima. Write down the height of Dima." The learners should

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mark both tasks. Under the first task the word "shorter" points out to the subtraction and the relation between numbers is presented obviously. Under the second task the need to subtract is "hidden" behind the indirect (not obvious) wording of the relation.

- Summarizing the information given at the same time on a picture, in a table, in different parts of a text; establishing the compatibility between the study text and other forms of the presentation of the information taken from that text. Many tasks of similar nature are included in TIMSS tests (Mullis, Martin, & Foy, 2016), in foreign publications for school learners (Hoffer, Lainwand, & Musser, 1991). Over recent years, more and more of such tasks are included in Russian manuals (Matematika: 3 klass, 2016; "Okruzhayushhij mir", 2017) and materials for final tests (Matematika: Standartizirovannye materialy dlya itogovoj attestacii, 2013). First of all, these tasks are designed based on different life situations: "In a supermarket", "In a park", "In a library", etc. Learners gather information presented on a picture (goods prices, the number of visitors in the park, genres of books on a shelve), add information to the tables – a bill-table, a schedule-table, a book list; outline statements, etc.

6.3. The readiness to evaluate the reliability and the sustainability of the input data or processed information.

This component of the informational literacy is necessary for a school learner capable of self-teaching. The learning process under which the learner does not reproduce rules and algorithms set as a direct sample, and, instead, takes an active role in their "opening", construction and check, presumes the development of the readiness to ask questions important for the self-control: "Is the answer I received real?", "How could I check the results?", "Whose opinion on this issue could I agree?"

Let us consider the learning situation in which the learner, together with his classmates, learns to evaluate and check results of his work. For this purpose, we use the above example of the task regarding cubes in the box.

This task was given to third graders for the group work at the mathematics lesson in the end of the school year. The choice of the group work model was intentional, as the task presumes that learners may have different views, answers, approaches to explaining the result, ideas to present them. The teacher was aware of results of the study described above, which demonstrated that children face difficulties where they have to highlight conditions of the task, presented in different styles, make mistakes when reading a picture, omit data, never use a picture as a basis to explain the response, etc.

The task comprised of three parts. The first part – answers to the questions related to the text of the task, the second part – the accomplishment of the task (learners had to write down the response and describe the way it was produced); the third one – a presentation in class proving the correctness of the response.

The study demonstrated that as a result of the group discussion the learners who could prove their analysis and actions with the information from the text or the picture, came to the right response and were able to prove its correctness:

"The text says that the box should be full, and if we calculate the cubes on the bottom, it will not be full".

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"Misha, you calculate squares instead of cubes. Look, you can see three sides of this cube, while that is one cube".

"I suggest we do the following: let us draw a big box-parallelepiped and draw cubes as shown on the picture. I and Katya draw, you count".

During the group work two groups of third graders decided to make a model using cubes, corresponding to the conditions of the task. This turned to be possible, as far as the manual they use included the work with unfolding and models of geometric configurations; in addition, they resolve similar tasks in technology lessons. The learners took cubes of the same size and built two "floors" comprising of 12 cubes – as seen on the picture. Then they presented in class their actions and reasoning.

It is notable that while working on different parts of the task, children demonstrated difficulties in handling the information, that were familiar to the teacher, however, they overcame them during the group discussions. This is the evidence that for the purposes of development of the functional (including informational) literacy, the issue of the choice of the organizational forms for the learning process has to be examined under a separate study.

The informational literacy is built during the learning process and its development in many aspects depends on the learner's motivation, his readiness for the self-assessment and the self-control of own achievements, overcoming the challenges. This is pointed out by Russian and foreign examiners of the quality of primary school education (Lompscher, 1999; "Novoe v ocenke", 2007; Issues and Methodologies in Large-Scale Assessments, 2008; Fook, 2010; Vinogradova, 2017). Thus, the English pedagogue J.Fook (Fook, 2010) emphasizes that the ability to apply critical thinking to reasoning and results leads to the better motivation.

7. Conclusion

Under Russian primary school education, the informational skills are a combination of the subject specific and universal actions for different learning courses. This prompts for building the learning process in a way that each lesson could contribute to development of such skills by junior learners.

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References

Federal'nyj gosudarstvennyj obrazovatel'nyj standart nachal'nogo obshhego obrazovanija: tekst s izm. i dop. (2015). M-vo obrazovanija i nauki Ros. Federacii. M.: Prosveshhenie. [in Rus]

Fook J. (2010). Beyond reflective practice: reqorking the 'critical' in critical reflection. In Y. Bradbury, N. Frost, S. Kulminster, M. Zukas (Eds.). *Beyond Reflective Practice: New approaches to professional lifelong learning* (P. 37-51). London: Routledge.

Hoffer, A.R., Lainwand, S.J., Musser, G. L. (1991). Mathematics in Action. New York, NY: Macmillan/McGraw-Hill School.

Issues and Methodologies in Large-Scale Assessments. (2008). IERI Monograph Series. Vol.1. Hamburg: IEA-ETS Research Institute.

Kovaleva, G.S., & Krasnyanskaya, K.A. (2017). i dr. Rezultaty` vypolneniya diagnosticheskix rabot po matematike, russkomu yazyku i chitatelskoj gramotnosti uchashhimisya 5-x klassov respubliki Tatarstan. Proekt «Issledovanie gotovnosti i adaptacii uchashhixsya 5-x klassov k obucheniyu v osnovnoj shkole». – M.: Centr ocenki kachestva ISRO RAO. [in Rus.]

Lompscher J. Motivation and activity. European Journal of Psychology of Education. 1999. N 1. P.11-21

Matematika: Standartizirovannye materialy dlya itogovoj attestacii: 4 klass: Posobie dlya uchitelya (v komplekte s elektronnym prilozheniem) / G.S.Kovaleva. K.A.Krasnyanskaya, O.A.Rydze. M., SPb.: Prosveshhenie. 2013. 60 p. + CD-ROM/. [in Rus.]

Matematika: 3 klass: uchebnik dlya uchashhixsya obshheobrazovatelnyx uchrezhdenij : v 2 ch. Ch. 1 / [S.S. Minaeva, L.O. Roslova, O.A. Ry`dze] : pod red V.A. Bulycheva. M.: Rossijskij uchebnik. 2016. 144 p. [in Rus.]

Mezhdunarodnoe issledovanie po ocenke kachestva matematicheskogo i estestvennonauchnogo brazovaniya. Publikacii. (2017). [Elektronnyj resurs]. Retrieved from: http://www.centeroko.ru/timss15/timss15_pub.htm (data obrashheniya: 05.09.2018). [in Rus.]

Mullis, I.V.S, Martin, M.O., Foy, P. (2016). TIMSS 2015: International Results in Mathematics. TIMSS & PIRLS International Study Center.

Mullis, I.V.S., Martin, M.O., Ruddock, G.J., O'Sullivan, C.Y., Preuschoff, C. (2014). TIMSS & PIRLS International Study Center.

Novoe v ocenke obrazovatel'nyh rezul'tatov: mezhdunarodnyj aspekt. (2007). (Littl, A., Lokhed, M.Je., Chajnapa, V. et al.; M.S. Dobryakova, Trans.). M.: Prosveshhenie. [in Rus.]

Okruzhayushhij mir: 4 klass : uchebnik dlya uchashhixsya obshheobrazovatel`ny`x uchrezhdenij : v 2 ch. Ch. 1,2. (2017). M.: Rossijskij uchebnik. 2017. 128 p. [in Rus.]

Universal'nye uchebnye dejstvija kak rezul'tat obuchenija v nachal'noj shkole: soderzhanie i metodika formirovanija universal'nyh uchebnyh dejstvij mladshego shkol'nika. (2016). Pod red. N.F. Vinogradovoj. M.: FGBNU «Institut strategii razvitija obrazovanija RAO». 2016. 224 p. [in Rus.]

Vinogradova, N.F. (2018). Funkcional'naya gramotnost' mladshego shkol'nika: k postanovke problemy. *Nachal'noe obrazovanie*, 6, 3-13. [in Rus.]

Zuckerman, G.A., Kovaleva, G.S., Kuznetsova, M.I. (2013). Between PIRLS and PISA: The advancement of reading literacy in a 10–15-year-old cohort. *Learning and Individual Differences*, 26, 64–73.