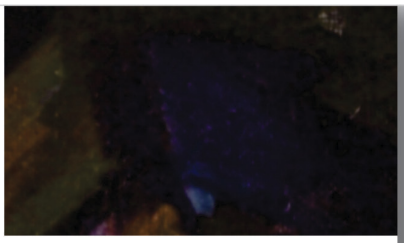

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CONTENT

ORGANIZATION OF WORK OF YOUNGER STUDENTS WITH INFORMATION PRESENTED BY VISUAL MEANS OF DIFFERENT DEGREES OF ABSTRACTION

Evgenii Alisov, Dmitry Kalinchenko
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Abstract. The article describes special educational and practical tasks designed to organize the work of younger students with information (its search, collection, processing, analysis, organization, transmission and interpretation), developed by the authors in accordance with the communicative and cognitive tasks. Tasks are presented in the logic of complicating visualization tools. Examples of tasks are given, as well as accompanying illustrative material for them (in the form of a table, column and line diagrams). The article reveals the pedagogical potential of each of the considered types of tasks in the context of the formation of information culture of younger students. The dynamics of the formation of knowledge, skills, and competencies of younger students, potentially achieved when using tasks, is shown. The work was carried out in line with the concept of developmental learning and goes beyond the methodology of teaching individual primary school subjects.

Keywords: primary school age, formation of information culture, types of information, working with information, visual AIDS.

Introduction. This research is carried out in the specific focus of solving the General problem of finding effective means of forming the information culture of primary school children.

The purpose of the study is to design and describe a system of special educational and practical tasks designed to organize the work of younger students with information.

Research problem:

- define a set of actions, the development of which is necessary for the work of younger students with information;
- build a hierarchy of visual AIDS used in primary school, in terms of increasing the degree of abstraction;
- prepare and describe specific examples of special educational and practical tasks designed to organize the work of younger students with information.

In recent decades, the problem of organizing the work of students with information is reflected in various scientific works of a wide profile. Given the ambiguity of the concept of information [15], scientists characterize this type of work in various activities of participants in educational relations [7, 12].

The starting point for solving this problem is the formation of information literacy [16], its level is correlated with information culture [6], giving the latter the status of a system-forming category [3]. The high level of information culture is considered as a key reference point in the information field [4], which determines the regularities of the formation of the information space [10].

The modern paradigm of the organization of the educational process in primary school, in the context of the formation of information culture [17], focuses on the methodological basis of the competence approach [5], designating information competence as "competence of the future" [19].

Taking into account the semiotic position in the consideration of competence [22], practical teachers consider not only the possibilities of individual subjects in the formation of information competence, but also give it a special educational value [14], in the aspects of developing independence and initiative, communication skills used in various situations and activities.

Much attention is paid to the professional readiness of primary school teachers to organize the work of younger students with information [1, 8], in particular, in the conditions of network

interaction [2, 13]. Age features of primary school age actualize the impact of computer games on educational activities [20, 21], requiring information security of the developing person [18, 23].

In scientific and methodological works, it is emphasized that in the process of organizing the work of younger students with information, it is necessary to include special educational and practical tasks, especially using a non-text form of presenting information (diagrams, tables, diagrams), questions for understanding, for understanding the goal [11].

Research materials and methods. The main method of developing a system of special educational and practical tasks was the method of pedagogical design [9]. Understood in a broad educational context, the method of pedagogical design was extrapolated to solve a specific applied problem of organizational support for the work of younger students with information.

Results and discussion. During the author's research, special educational and practical tasks were developed for younger students, aimed at searching and analyzing information for the purpose of its subsequent transmission. Tasks were developed in accordance with the types of information: text, numeric, audio, etc.They were included in the content of various academic subjects: Russian language, mathematics, the world around them, and became mandatory for performance during control tests.

The inclusion of students in the process of finding a solution allows them to form a General ability to solve the problem, by expanding knowledge about the problem itself and getting acquainted with new ways of solving it, develops cognitive interest, since the content of tasks is practice-oriented, related to the life situations of the younger student. Solving problems of searching and processing information, students experiment, observe, draw conclusions, developing research skills.

Performing such tasks allows you to learn to navigate the surrounding reality, get prepared for solving practical life situations and problems, learn to consider all available options and opportunities, make the right, optimal choice for this situation, and develop such qualities of thinking as variability and purposefulness.

For younger students, it is more convenient to search for information that is already presented in tables and figures, i.e. it does not have non-essential, secondary data.

Here is an example of a task. The table (table 1) shows the musical instruments that first-graders learn to play. The rows contain the names of children, and the columns contain musical instruments (piano, guitar, and flute). Next to the name of each first-grader, a mark is made in the desired column, indicating which musical instrument they are learning to play. Some first-graders learn to play several instruments.

Table 1. An example of the accompanying illustrative material for the task for younger students to work with text information, presented in the table.

	Piano	Guitar	Flute
Anna	*		*
Victor	*	*	*
Valentine	*		
Galina	*		*
Dmitry	*	*	
Elena	*		
Evgeniy	*		*
Elizabeth	*		
Igor		*	*
Irina	*	*	
Ludmila		*	*
Maria			*
Michael	*	*	

Nikolay		*	
Natalya	*		*
Olga	*		*
Peter		*	*
Sergei	*		*
Fedor		*	*

Students need to find information in the table by answering the questions: what musical instrument does most first-graders learn to play?; which musical instrument does more boys learn to play than girls? how many first-graders learn to play three musical instruments? Searching for answers to these questions involves a quantitative analysis of information. Performing similar tasks, younger students get experience in conducting research, constructing judgments on the basis of the particular facts.

Familiarity with the method of recording information in tabular form becomes the beginning of independent work on collecting information and processing it. You can ask younger students to conduct a survey among their classmates and find out, for example, what Pets they live with, what books they like to read, or what programs they like to watch. Students should enter the received data in a similar table and conduct analytical work and draw conclusions.

Such training tasks are of steady interest, because they are related to everyday life. For the formulation of a training task, it is important that it performs the function of a specific instruction that allows you to consciously master a particular action (in the full composition of its operations) with information. When performing such tasks, younger students gain experience in preliminary analysis of the content, translating it into a symbolic form, and correlating the results presented in the table with reality [3].

You can gradually complicate the instruction and display numeric information in the table. At the same time, students are also invited to review the table (table 2) and answer questions. However, the corresponding columns already contain quantitative data: the number of boys and girls who learn to play certain musical instruments. The first column lists musical instruments (piano, guitar, flute), the second column shows how many boys, and the third column shows how many girls are learning to play each instrument.

Table 2. An example of the accompanying illustrative material for the task for younger students to work with numerical information, presented in the table.

Musical instrument	Boys (number)	Girls (number)
Piano	5	8
Guitar	7	2
Flute	6	6

Students can be asked to answer the questions: how many boys are learning to play the flute? how many more girls than boys learn to play the piano?; which musical instrument does boys learn to play as much as girls?

Using a table with numeric data allows you to more accurately convey information about the object or phenomenon being studied. Students receive the necessary generalized data presented in an accessible, easy-to-understand form. Thanks to the table, younger students not only have the opportunity to quickly find and analyze information, they are introduced to the way of interpreting data (in a collapsed form), which creates the basis for moving to a higher degree of abstraction.

The work of searching for numerical information in tables is carried out throughout the initial training and should gradually become more complex. Creating a task system allows you to create targeted actions, and a wide range of options used during training has a positive effect on the acquisition of the necessary competencies that allow you to act effectively in non-standard situations.

The use of more complex means of recording information allows us to expand opportunities for creating new and improving existing methods and techniques for processing information. The data shown in the table can be presented in the form of a bar chart (figure 1) consisting of three pairs of rectangles, each pair shows the types of musical instruments, and the height of the rectangles corresponds to the number of first-graders learning to play these instruments.

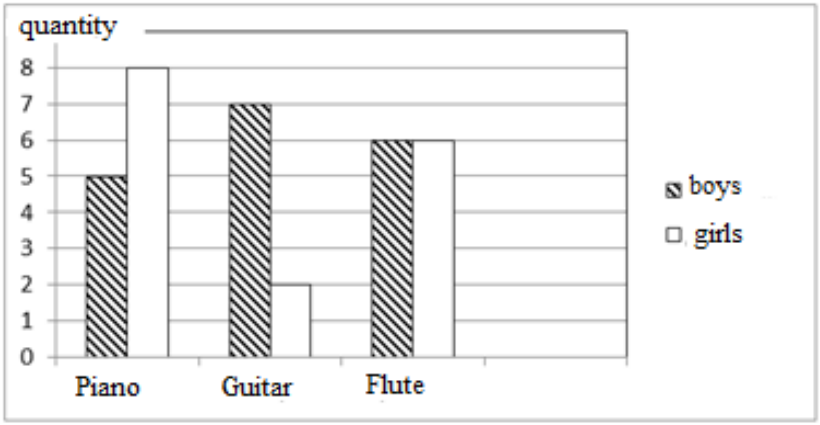

Figure 1. An example of the accompanying illustrative material for the task for younger students on working with information, presented in the bar chart.

The presentation of the same information using different degrees of abstraction of visibility allows younger students to form the ability to see not only the signs of the processed information, but also the specific properties of the means of its structuring. In the future, this will give students the opportunity to make a purposeful choice of how to process and interpret the information received, which will contribute to its deeper, systematic analysis.

A bar chart can be used not only in a ready-made form, but also to offer detailed instructions for performing actions to create it (with a sample). In the table (table 2), the number of boys and girls was indicated in columns, in the bar chart this vertical spatial arrangement remained, and these data formed rectangles. However, their number corresponds to the number of musical instruments (separately for boys and girls), and a horizontal line was required to indicate the number of first-graders. Here, younger students need to navigate the location of the data using the coordinate system. Combining indicators in two directions is a complex educational task that is performed by younger students under the guidance of a teacher. Determining the number of boys (or girls) vertically and the name of a musical instrument horizontally allows you to get accurate data. In addition, in contrast to the table, the bar chart immediately shows the value of the indicator, which allows you to answer the question (without resorting to arithmetic calculations): how much more (or less)?

The complexity of the information capture tool is also justified because the bar chart helps to prepare younger students for the perception of more abstract demonstration tools. In primary school, students also start using line charts to search for and process information.

So, younger students may be invited to consider a line chart (figure 2), which, as well as on the bar graph, the data is arranged in two directions: vertically specified number of pupils, and horizontally – names of musical instruments. The difference is that there are no rectangles, but there are points fixed at the same height as the upper border of the rectangles. These points are connected to each other, forming a polyline that has its own meaning. In this example, the solid line corresponds to the number of boys, and the dotted line corresponds to the number of girls. To visually confirm the common location of data in the bar and line charts, you can show students how the columns would be located here by lowering the perpendicular from the points to the horizontal, getting segments that resemble the usual rectangles for younger students. You can also

do the opposite by drawing broken lines (the same as in a line chart) on a familiar bar chart. Searching for common and different data locations on different information visualization tools allows you to better understand the functionality of the tools used, and expand the capabilities of students in making independent, informed choices.

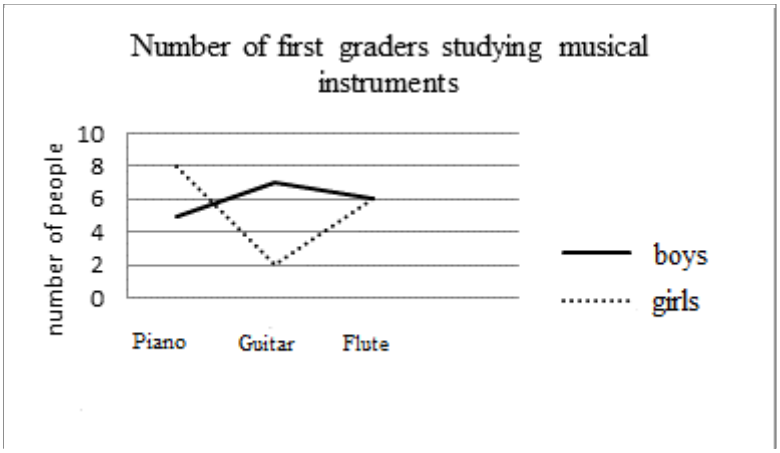

Figure 2. An example of the accompanying illustrative material for the task for younger students on working with information, presented on the line diagram.

Tasks that require you to find the information you need using a line chart may be similar to those that younger students performed when working with a table and a bar chart. You can also suggest determining which musical instrument the least number of girls learn to play?; which musical instrument is more often chosen by boys? etc.

You can display more information in a line chart than in a table or bar chart. For example, specify the number of boys and girls learning to play musical instruments, not one class, but several, using broken lines of different colors or hatching.

Systematic and purposefully organized training in the search and processing of information using visual means of varying degrees of abstraction contributes to the development of information activities of younger students. First of all, this is due to the fact that in the process of performing such educational and practical tasks, the development of thought operations (analysis, synthesis, comparison) takes place; skills of working with various ways of presenting information are developed; spatial representations are developed, and cognitive interest is formed. All this will contribute to the harmonious development of younger students, in accordance with the requirements of the modern information society, and will help their successful self-realization throughout their later life.

Conclusion.

1. Organizing the work of younger students with information is a specific direction for solving the problem of forming their information culture.

2. The actions that are necessary for younger students to work with information include: quantitative and qualitative analysis of information, translating it into a symbolic form, highlighting the characteristics of the information being processed, its specific properties and means of structuring, building a judgment on a specific factual material, and choosing a method for processing and interpreting the information received.

3. In the aspect of increasing the degree of abstraction, visual tools used in primary school for organizing students ' work with information can be presented in the form of a hierarchical chain: a table that requires working with text information – a table that requires working with numeric information – a bar chart-a linear chart. It is recommended to provide pedagogical support for the work of younger students with information in the given direction of complicating visual AIDS.

4. Special educational and practical tasks designed to organize the work of younger students with information should be practice-oriented, causing cognitive interest, related to the life situations of younger students (for example, in the described set of tasks contained information about teaching first-graders to play musical instruments), which will help them correlate the results of their work with reality.

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