

Comprehension of Educational Texts by Students in Grades 4-8 as an Indicator of their Ability to Learn[□]

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ABSTRACT

Background. As part of the “ability to learn” problem, which is relevant for modern schools, the specific characteristics of school students’ comprehension of educational texts were studied. The analysis revealed that the problems students have in comprehending educational texts have not been sufficiently researched from the standpoint of activity psychology. The existing studies only deal with the activity aspect through a detailed description of the actions required to ensure comprehension of the texts and their structure, but do not “grasp” the general meaning of the actions associated with students’ comprehension of the orienting purpose of the educational texts. The clearest specific orienting purpose (*i.e.*, the concept definition) of educational text is substantiated in the studies of the formation of concept recognition (the recognition action), where behind the “comprehension” of the definition lies the ability to recognize the objects that are described by it.

Objective. To research the students’ ability to identify the orienting purpose of educational texts (standard educational texts and definitions of concepts) as a component of the ability to learn.

Design. A sample of school students in grades 4 to 8 ($N = 280$), were evaluated on the following parameters: 1) the ability to work with concepts’ definitions (tasks to evaluate the quality of concept recognition formation, based on the diagnostic principles proposed by N. Talyzina); 2) the ability to highlight the educational text’s key idea (the technique by O. Malskaya and A. Sidelnikova “Selection of main sentences” modified for grades 4–8); 3) the ability to structure the text (the task of highlighting paragraphs and naming them); and 4) two GIT subtests (“Following instructions” and “Number series”).

[□] This article is a modified version of a previous paper by Sidneva, A.N., Stepanova, M.A., Plotnikova, V.A. (2021). Osobennosti ponimaniia uchebnykh tekstov shkol’nikami 4–8 klassov kak pokazatel’ ikh umeniia uchit’sia [Comprehension of Educational Texts’ by Students in Grades 4-8 as an Indicator of their Ability to Learn]. *Vestnik Moskovskogo Universiteta. Seriya 14. Psikhologiya* [Lomonosov Psychology Journal], 3, 288–319. <https://doi.org/10.11621/vsp.2021.03.14>

Results. It was demonstrated that comprehension of definitions significantly and positively correlates with comprehension of educational texts. It was also revealed that the level of development of both the ability to work with definitions, as well as with standard educational texts, does not increase significantly after the 4th grade, and up to the 8th grade there is a “failure” in these parameters, despite the smooth positive dynamics of other intellectual abilities.

Conclusion. The ability to see the orienting purpose of any educational text and extract from it the elements of the orienting basis of the subject actions performed, in our opinion, is a key factor in its comprehension and the psychological basis for developing the ability to learn.

Keywords: Ability to learn, text comprehension, recognition action, school students, Activity approach, orienting purpose

Highlights:

- Comprehension of educational texts, assessed through the ability to highlight their key idea and structure them, is significantly and positively related to the comprehension of definitions, as diagnosed on the basis of the recognition action.
- From grades 4 to 8, the developmental level of logical skills increases; however, after the 4th grade, a rapid decline is detected in the comprehension of educational texts, as well as in the level of recognition action.
- The ability to perceive the orienting purpose of an educational text is a key factor for its comprehension and for creating the psychological basis for the ability to learn.

АННОТАЦИЯ

Актуальность. В рамках актуальной для современной школы проблемы умения учиться исследовались особенности понимания детьми текстов учебного содержания. Анализ показал, что проблема понимания учебных текстов недостаточно разработана с позиций деятельностной психологии, поскольку в существующих исследованиях деятельностный аспект выражается лишь в детальном описании действий, обеспечивающих понимание текстов, и их структуры, однако данными работами не «схватывается» общий смысл этих действий, связанных с пониманием учащимися ориентировочного назначения учебных текстов. Наиболее четко ориентировочное назначение особого типа учебного текста - определения понятия - обосновано в исследованиях формирования действия подведения под понятие (ДПП), где за «пониманием» определения стоит умение распознавать объекты, которые им описываются.

Цель работы: исследование умения учащихся выявлять ориентировочное назначение учебных текстов (стандартных учебных текстов и определений понятий) как компонента умения учиться.

Методики и выборка. На выборке школьников 4-8 классов (N=280) была проведена: 1) оценка сформированности умения работать с определениями понятий (задачи на оценку качества сформированности ДПП, разработанные на основе принципов диагностики, предложенных Н.Ф.Талызиной), 2) оценка умения выделять главное в учебном тексте (модифицированная для 4-8 классов методика О.Е.Мальской и А.А. Сидельниковой «Выбор главных предложений»), 3) оценка умения структурировать текст (задача на выделение абзацев и их озаглавливание), 4) два субтеста ГИТ («Исполнение инструкций» и «Числовые ряды»).

Результаты и выводы. Было показано, что понимание определений значимо и положительно коррелирует с пониманием учебных текстов. Также было выявлено, что уровень сформированности как умения работать с определениями, так и со стандартными учебными текстами значимо не растет после 4 класса, и до 8 клас-

са наблюдается «провал» по этим параметрам, несмотря на плавную позитивную динамику по отдельным интеллектуальным способностям.

Ключевые слова: Умение учиться, понимание текстов, действие подведения под понятие, школьники, деятельностный подход

Ключевые положения:

- Понимание учебных текстов, оцениваемое через умение выделять в них главное и структурировать, значимо и положительно связано с пониманием определений, диагностируемых на основе действия подведения под понятие.
- От 4 до 8 класса растет уровень развития логических умений, однако после 4 класса обнаруживается резкое снижение в понимании учебных текстов и умении подводить под понятие.
- Умение воспринимать учебный текст в его ориентировочном назначении являются ключевым фактором его понимания и психологической основой для организации процесса формирования умения учиться.

RESUMEN

Introducción. Dentro de la problemática actual de la habilidad para aprender en la escuela, se investigaron las características de comprensión de textos educativos por parte de los niños. El análisis reveló que el problema de comprensión de los textos educativos no está suficientemente desarrollado desde un enfoque de psicología activa, ya que en las investigaciones existentes, el aspecto de la actividad se expresa solo en la descripción detallada de las acciones que aseguran la comprensión de los textos y su estructura, pero estos trabajos no captan el significado general de estas acciones relacionadas con la comprensión por parte de los estudiantes del propósito indicativo de los textos educativos. El propósito orientativo de un tipo especial de texto educativo, la definición conceptual, se justifica más claramente en las investigaciones sobre el desarrollo de la acción de subsumir un concepto (ASC), donde la «comprensión» de una definición implica la habilidad de reconocer los objetos que se describen en ella.

Objetivo: investigar la habilidad de los alumnos para identificar el propósito aproximado de los textos educativos (textos educativos estándar y definiciones de los conceptos) como componente de la habilidad para aprender.

Diseño. Se realizó en la muestra de estudiantes de 4° a 8° grado (N=280): 1) evaluación de la habilidad para trabajar con definiciones de conceptos (tareas para evaluar la calidad de la ASC desarrolladas sobre la base de los principios de diagnóstico propuestos por N.F. Talyzina), 2) evaluación de la habilidad para identificar lo principal en el texto educativo (método modificado de O.E. Malskaya y A.A. Sidelnikova por los estudiantes de 4° a 8° grado «Selección de las oraciones principales»), 3) evaluación de la habilidad para estructurar el texto (tarea de selección de párrafos y títulos), 4) dos subpruebas del TIG (Test de Inteligencia Grupal) («Ejecución de las instrucciones» y «Series numéricas»).

Resultados y conclusiones. Se mostró que la comprensión de las definiciones se correlaciona significativa y positivamente con la comprensión de los textos educativos. También se encontró que el nivel de desarrollo tanto de la habilidad para trabajar con definiciones como de los textos educativos estándar no aumenta significativamente después del 4° grado, y se observa una «caída» en estos parámetros hasta el 8° grado, a pesar de la dinámica positiva gradual en habilidades intelectuales separadas.

Palabras clave: Habilidad para aprender, comprensión de textos, acción de subsumir un concepto, estudiantes, enfoque de la actividad

Destacados:

- La comprensión de los textos educativos, evaluada a través de la habilidad para identificar lo principal y estructurarlos, está significativa y positivamente relacio-

nada con la comprensión de las definiciones, diagnosticada sobre la base de la acción de subsumir un concepto.

- Del 4° al 8° grado, se desarrolla el nivel de habilidades lógicas, sin embargo, después del 4° grado se evidencia una disminución marcada en la comprensión de los textos educativos y la habilidad de subsumir un concepto.
- La habilidad para percibir un texto educativo en su propósito orientativo es un factor clave en su comprensión y la base psicológica para organizar el proceso de formación de la habilidad para aprender.

RESUME

Origines. Dans le cadre du problème de la compétence de l'apprentissage actuel pour l'école moderne on a étudié des particularités de la compréhension écrite des textes pédagogiques par les enfants. L'analyse a montré que le problème de la compréhension écrite des textes pédagogique n'est pas suffisamment élaboré du point de vue de la psychologie de l'activité du fait que dans les études existantes l'aspect actionnelle ne s'exprime que dans une description détaillée des actions qui assurent la compréhension écrite des textes et de leur structure, mais ces travaux ne « saisissent » pas le sens général de ces actions liées à la compréhension par les élèves de la destination indicative des textes pédagogiques. L'objectif le plus clairement indicatif d'un type particulier de texte pédagogique - la définition d'une notion — est étayé par des études sur la formation de l'action de recognition de concept (AR), où derrière la « compréhension » de la définition se cache la capacité de reconnaître les objets qu'elle décrit.

Objectif. Le but de ce travail est d'étudier la capacité des étudiants à identifier la finalité approximative des textes pédagogiques (textes pédagogiques standards et définitions de concepts) en tant que composant de la capacité d'apprendre.

Méthodes. Sur la base d'un échantillon d'écoliers de la 4e à la 8e année (N=280), les éléments suivants ont été réalisés : 1) évaluation du niveau de développement de la capacité à travailler avec des définitions de concepts (tâches pour évaluer la qualité du développement d'action de recognition de concept (AR), développées sur la base des principes de diagnostic proposés par N.F. Talyzina), 2) l'évaluation de la compétence mettre en évidence l'essentiel dans un texte pédagogique (méthode d'O.E. Malskaya et A.A. Sidelnikova, modifiée pour la 4e à 8e année, « Sélection des phrases principales »), 3) l'évaluation de compétence à structurer le texte (tâche de souligner les paragraphes et de les titrer), 4) deux sous-tests d'intelligence de groupe (« Suivre les instructions » et « Séries de numériques »).

Résultats et Conclusions. Ce travail a montré que la compréhension des définitions est corrélée de manière significative et positive à la compréhension des textes pédagogiques. Il a également été révélé que le niveau de développement de la capacité à travailler avec des définitions et avec des textes pédagogiques standard n'augmente pas de manière significative après la 4e année, et jusqu'à la 8e année, il y a une « chute » dans ces paramètres, malgré le progressif et positif dynamique des capacités intellectuelles individuelles.

Mots-clés: Compétence d'apprentissage, compréhension de textes, action de recognition de concept, écolier, approche actionnelle

Points principaux:

- La compréhension des textes pédagogiques, évaluée à travers la compétence à en souligner l'essentiel et à les structurer, est liée de manière significative et positive à la compréhension des définitions diagnostiquées sur la base de l'action de recognition de concept.
- De la 4e à la 8e année, le niveau de développement des compétences logiques augmente, cependant, après la 4e année, on constate une forte baisse de la compréhension des textes pédagogiques et de la capacité de recognition de concept.

- La capacité de percevoir un texte pédagogique dans son objectif est un facteur clé de sa compréhension et la base psychologique pour organiser le processus de formation de la capacité d'apprendre.

Introduction

The Federal State Educational Standards currently being implemented in the Russian Federation assign a significant role to meta-subject educational results, among which general educational skills (universal learning actions) stand out. These skills include: 1) “the ability to accept and maintain the goals and objectives of educational activities;” 2) “the ability to look for means of implementing educational activity;” 3) the ability “to master the methods of solving problems of a creative and exploratory nature;” 4) the ability “to plan, control and evaluate educational activities according to the task and the conditions for its implementation;” 5) the ability “to use sign-symbolic means to present information;” etc. (Federal State Educational Standard for Primary General Education, 2010; Asmolov et al., 2010). Ability to learn (learning-to-learn), was also one of the eight key competencies recommended by the European Parliament and the Council of the European Union back in 2006 to implement the concept of “Lifelong learning” (Key competences..., 2007). A detailed development of the ability to learn the general structure, identify the main components of this skill, and trace the trajectory of its development from elementary school to higher education, is an extremely urgent task of applied psychological research at the moment.

The digitalization of the educational process that is actively taking place in the modern world and became especially relevant during the COVID-19 pandemic, involves, in many aspects, students' independent work with texts available on the Internet on various platforms. Moreover, this work involves different types of texts, ranging from the simplest definitions of concepts to quite complex descriptive or explanatory texts. Yet, the possibility of learning effectively via receiving “ready-to-use” information is directly related to its comprehension. What place do the skills associated with comprehension of educational texts occupy in the general structure of the ability to learn and what psychological mechanisms are behind such comprehension? Are such skills being developed in schools?

In our research, we relied on approaches to the study of learning and the ability to learn developed in line with the Cultural-historical and Activity paradigms, especially the ideas developed within the Activity theory of learning framework (ATL) by N. Talyzina (Talyzina, 2001; Talyzina, 2018) and the theory of educational activity and developmental education by D. Elkonin, V. Davydov, and their colleagues (Davydov, 2002). Based on this framework, we formulated this study's main hypothesis, which is that the general meaning of any actions related to comprehension of educational texts is that the students must “extract” the orienting basis of the specific actions (solving problems or answering questions) from the content. How effectively a student transforms the text into guidelines for his/her actions will characterize his/her ability to learn from educational texts.

Comprehension of Educational Texts in the Structure of the Ability to Learn

The ability to learn, generally speaking, can be defined as students' mastery of certain methods for effectively carrying out the learning process (Malskaya, 1981; Talyzina, 2018; Sidneva, 2010). These methods can be divided into two groups. The first group includes learning skills that are specific to a particular subject area, but also basic for work in other areas (for example, the ability to read, write, information competence components, etc.); these are often called primary skills (see, for example, Friedman, & Kulagina, 1993). The second group of skills represents generalized skills that ensure the learning process arrangement as a whole. Among the skills of the second group, three main types are distinguished: 1) educational and informational (ways of working with information that ensure comprehension of oral and written messages, modeling, memorization and reproduction, etc.); 2) educational and logical (logical strategies that facilitate the independent search for new knowledge and solutions to new specific tasks); and 3) ways to manage one's own learning activities or metacognitive skills (planning, control, evaluation, time management, etc.)¹.

The skills that ensure comprehension of educational texts are educational and informational. The peculiarities of the skills that ensure the process of comprehension are described differently depending on the theoretical model chosen by the researchers. Thus, from the cognitive psychology point of view, the text comprehension process is the active construction of mental models — both the model of the text itself and the model of the situation that it describes; the effectiveness of constructing the latter is determined by the reader's prior knowledge (Kintsch, 1998; Snow, 2002). There are four types of factors, the consideration of which leads to an improvement in the quality of text comprehension: 1) the sociocultural context; 2) the reading process arrangement itself (teaching various comprehension strategies); 3) the text's characteristics; and, finally, 4) the reader's psychological characteristics (Wooley, 2015, pp. 27–32).

However, the central role among these factors, from the cognitive psychology point of view, is played by the purpose of reading, which determines what exactly the reader is trying to understand from the text (Freebody & Luke, 1990). Overall, the skills that determine how effectively an educational text will be understood are described within cognitive psychology as both cognitive (for example, formulating questions, summarizing, clarifying the meaning of unclear words, etc.) and metacognitive (planning, the ability to monitor comprehension (monitoring) of what was read, control) strategies (Wooley, 2015). However, more and more attention is beginning to be paid to the goals for which educational texts are being read.

Over the last 20 years, along with cognitive and metacognitive processes that ensure the comprehension process, the possibility of using texts to solve real life problems — *i.e.*, reading literacy — has begun to be actively studied. According to

¹ The possibility of including general knowledge (and actions with it) specific to particular subject areas in the structure of the ability to learn is discussed both in Russian research (for example, as part studies in line with the third type of orientation basis and the theoretical thinking formation), and in international research, where cognitive skills are discussed in the context of the structures of subject knowledge and skills (Glaser, 1988).

the authors of this framework (OECD, 2010), reading literacy is a person's ability to understand and use written texts, think about them, and engage in reading to achieve his/her goals, expand knowledge and capabilities, and participate in social life (*ibid.*). This functional aspect of educational texts' comprehension (namely as means) brings this approach closer to the activity approach (Zukerman, & Erma-kova, 2003).

Actually, the Activity approach toward comprehension of educational texts was developed by various authors in Russian psychological research. Thus, in the studies by I. Ilyasov, I. Usacheva, N. Galatenko, I. Korotaeva, etc., effective work with text involves identifying specific actions, the presence of which allows the reader to improve their comprehension (Ilyasov, & Galatenko, 1988; Usacheva, 1990). These authors believe that in a situation of information assimilation while reading, the reader must have formed a program of activity that includes mastery of educational actions of two kinds: 1) comprehending the material from the text and 2) taking action to put the information into practice. To effectively assimilate material from text, the student must develop such actions of comprehension as: 1) thematization (*i.e.*, selecting the message topics and assigning them to logical types of content — for example, facts, theories, methodology, etc., — which underlie the search for the key idea in the text); 2) systematization of the material (establishing logical relationships between fragments of content); 3) planning, as well as recording, the content (taking notes, drawing up schemes, etc.); and 4) mastering (consolidating) the material (Usacheva, 1990). The control part is designed to ensure monitoring of the entire process of content assimilation while reading. For each of these types of actions, a specific orienting basis was developed, and the formation stages were described (see, for example, Korotaeva, 2000). This approach differs from the cognitive one by a detailed description of not only the skills themselves that ensure texts' comprehension, but also their structure and formation.

What is common to both theoretical models described above is that the text comprehension serves as a process of “moving” the content inside the mind, (*i.e.*, “appropriation”) through building a mental model/structure/distinguishing types of content, etc. For this purpose, the student is offered various methods, strategies, and other means of comprehension. However, if we keep in mind the fact that the goal that the reader sets for himself/herself plays a fundamentally important role in the comprehension process, the formation of specific actions for text comprehension can be considered as teaching students to independently set such special goals (for example, the goal of searching for knowledge in the text about facts and explanation of these facts already changes the process of working with the text). The establishment of the semantic connections in a text, as the research shows, is also significantly improved in a situation where students are required to ask questions about a given text (either independently or based on a generalized list of questions) (King, 1994; Korotaeva, 2000; Oleinikova, 2012).

Most consistently, from our point of view, this analysis of students' use of text as a means of their own activity is implemented in studies conducted in line with the educational activity and developmental learning theory of V. Davydov and his colleagues (Davydov, 2002; Zukerman et al., 2011). In these studies, text serves as

a means of providing educational modeling while unfolding educational activities, and in this sense, its comprehension requires developed conceptual thinking in a given field of knowledge and cannot be formed outside this context (Chudinova, & Zaitseva, 2014).

In the research by V. Vysotskaya and her colleagues, also carried out in line with developmental education (Vysotskaya et al., 2020), the condition for a full comprehension of education texts is their specially developed content. The educational texts offered to children describe the purposeful transformation of natural material through human activity (“from ear of wheat to loaf,” “from stem to shirt,” “from ore to iron”). This gives students the opportunity to model the process of creating a thing needed by a person (what came out, came out of what, how it came out), and such modeling occurs on the basis of analysis and transformation of the text itself (*ibid.*, p. 98). The model creation process, thus, mediates the texts’ comprehension, generating those questions, the answers to which will be purposefully sought for in the text.

In our opinion, the facts mentioned above demonstrate the need to consider text comprehension in a significantly different context — not as a special activity for the ready-made knowledge assimilation, but as an orienting part of individual substantive actions to search and extract the required orienting keypoints from the text.

The Recognition Action and Educational Texts’ Comprehension

For us, the “model” action that comprises the essence of working with educational texts in the logic of the ATL (Activity theory of learning) is *recognition action* (Talyzina, 1955; Galperin, & Talyzina, 1957). It is possible to identify two key characteristics of such action, which allow us to look at the psychological mechanisms of educational text comprehension from a slightly different angle.

The first characteristic can conventionally be called the ability to “see” the orienting purpose behind an educational text. In studies of the formation of the recognition action conducted by P. Galperin and N. Talyzina (Galperin, & Talyzina, 1957), it was shown that following the formation, children began to relate differently to any new definition for them; they considered it an orienting function from the point of view of whether it would allow them to recognize the objects it describes or not. Therefore, they could immediately identify the text elements’ “orienting purpose” — those questions that the text answers and those tasks that can be solved with its help. In fact, they immediately saw those actions for which the content specified by the definition would serve as guidelines.

The other side of “recognition action” is the reliance on the characteristics specified in the definition. This means turning to this text when searching for answers to questions, solving problems, etc. The formation of such support in relation to the “recognition action” occurs through encouraging students to be sure to use the action’s orienting basis for recognition in the process of systematic stage-by-stage formation. It is obvious though that this characteristic cannot always be formed simply. In the studies by P. Galperin, it was demonstrated that the gap between knowledge and application can be resolved if the attributes proposed in the scheme of the orienting basis of action are not simply included in the method of solving the problem;

rather, a situation is arranged for the children to realize the need to use exactly such, and not any other attributes, due to their conscious assimilation of the function (of the role) of these units in the system (Galperin, 1985; Aidarova, 1968; etc.).

However, this does not change the core point: a student who knows how to recognize a concept is guided precisely by the definition when solving problems, and not by naive concepts. Based on our assumptions, a student who knows how to learn from educational texts from the perspective of the ATL, will obviously: a) in the process of working directly with such a text, correlate its content with possible actions (cognitive or practical), *i.e.*, guidelines for which can be extracted from it, and b) rely on such given knowledge in the process of solving specific problems.

We decided to test our assumptions empirically. To do this, we chose classes in which work with educational texts should already be well developed, since the students had begun to study the fundamentals of the natural sciences and therefore were predominately using textbooks. These students were in grades 4 to 8.

Purpose and Hypotheses of the Study

Our main research goal was to study students' comprehension of educational texts depending upon their orienting purpose. From our point of view, this skill should manifest itself most clearly in the ability to effectively work with concept definitions (*i.e.*, choosing an action adequate to the definition and recognize a concept), and, more indirectly, in the ability to highlight the main idea in a standard educational text and structure it. Additionally, we wanted to examine whether and how exactly these skills changed with age and the transition from grade to grade.

Research Hypotheses

1. The ability to rely on educational texts as guidelines for specific subject actions gradually develops, while growing up.

1A. The ability to choose an action adequate to the concept's definition improves from 4th to 8th grade.

1B. The ability to recognize a concept improves from 4th to 8th grade.

1C. The ability to highlight the text's main idea improves from 4th to 8th grade.

1D. The ability to structure text improves from 4th to 8th grade.

2. The ability to work with concepts' definitions effectively and the ability to comprehend educational texts are significantly and positively associated.

2A. The ability to choose an action adequate to a concept's definition is positively associated with the ability to highlight the text's main idea.

2B. The ability to choose an action adequate to a concept's definition is positively associated with the ability to structure a text.

2C. The ability to recognize a concept is positively associated with the ability to highlight the text's main idea.

2D. The ability to recognize a concept is positively associated with the ability to structure a text.

Methods

Assessment of the Ability to Work with Concept Definitions

The basic principles of constructing tasks for such an assessment (rather than for formation purposes) are described in detail in the studies by N. Talyzina (Talyzina, 2001; Talyzina, 2018). We took two concepts from two different areas that have relatively clear characteristics (the “straight line” concept from mathematics and the “mammal” concept from biology). These concepts were also chosen due to the fact that students of the selected age group (grades 4–8) are likely to have everyday analogues (this will provoke a lack of orientation towards a given definition). In addition, these concepts’ definitions have clear attributes that will allow them to be recognized.

We took the definition of a straight line from Talyzina’s works (Talyzina, 1955), where the defining feature was coincidence with a stretched thread². The definition sounded like this: “The line will be straight if it completely **coincides with the stretched thread.**” We especially highlighted the main feature in large letters so that students could not miss it.

As for the concept of “mammal,” we used the same attribute that is given in biology textbooks: that these animals feed their young with milk. The definition was “Mammals are animals that **feed their young ones with milk.**”

The students were asked to read the definition, and then were given two types of tasks, one on the ability to identify an adequate action, and the other on recognizing a concept.

The first type of task assessed the extent to which the student could choose an action that was adequate to the concept’s definition. The question sounded like this: “This definition best allows one ... (choose no more than two correct answers),” and then several types of actions were listed:

- **to depict** the object of the concept (“depict a mammal” / “draw a straight line”);
- **to classify** this concept (“tell what lines there are” / “tell what types of mammals there are”);
- **to recognize** whether an object belongs to the concept or not (“determine whether a certain line is straight” / “determine whether a given animal is a mammal”): CORRECT option;
- **to distinguish (to recognize) not only this concept, but also close to it** (“distinguish between a straight line, a ray, and a segment” / “distinguish between mammals, fish, and birds”);
- **to distinguish (to recognize) objects described by a concept from those not described by it** (“distinguish direct from non-direct” / “distinguish a mammal from a non-mammal”): CORRECT option;
- any **random action associated with a concept** (“stretch a thread” / “talk about your pet”).

² This definition is not the main one for textbooks on mathematics in elementary school and, later, geometry, in which the straight line is introduced as an undefined, basic concept, however the version of the definition we have chosen allows us to clearly recognize the straight line among other types of lines (Talyzina, 1955).

The participants received two points for this parameter if they identified both correct answers and one point if they identified only one.

The second type of task assessed how well the students could recognize a concept: whether he/she justified their answer (in “recognizing a concept” type of tasks) with features from the definition. For each definition, 10 “recognizing a concept” types of tasks were presented, which varied in subject, logical, and psychological (visual/conceptual variations) characteristics (Talyzina, 2018). So, for example, for the “straight line” concept, tasks were proposed that included not only images of lines (straight lines in vertical, horizontal positions, broken lines and curves, dotted lines), but also a verbal description of these lines (for example, “A line with a width of 2 mm and a length of 15 mm, completely coinciding with the stretched thread” or “Red line”).

For mammals, short texts were offered about different animals, which indicated (or did not indicate) whether the animal feeds its young ones with milk. The tasks with missing/extra conditions included either a picture of an animal without text, or no indication of whether or not the mother feeds her young with milk, or something related to milk (but not related to a mother feeding her young one with milk). For example, a “Milk snake is a small, graceful, agile snake, from 35 cm to 1.4 m long, with a slightly pointed shiny head and bulging black eyes. The milk snake hunts at night. Its main food is rodents, most often mice and rats.”

Thus, among the proposed 10 tasks for each definition, there were six standard “recognizing a concept” type of tasks and four provocative ones (with missing or extra features, or a discrepancy between what is written in the task and the drawing of the object).

That said, we assessed two parameters: 1) the ability to recognize the concept (correct answers) (on a scale from 1 to 10 for all 10 tasks), and 2) reliance on relevant features (the number of tasks in which the participant justifies his/her answer with the features specified in the definition).

This methodology for assessing concept recognition had already been used by us previously (see Sidneva et al., 2020) and shown a sufficient degree of validity and reliability.

Assessment of the Educational Text Comprehension

To evaluate the ability to understand an educational text, we used a specially designed standard educational text in biology on the “Lichens” topic, which we had previously tested in 4th grades (Sidneva et al., 2020). This text contained 16 sentences, half of which were essential (concept definitions, the explanation of processes), and the rest were irrelevant (*c.f.*, “Lichens are unique organisms”, “Lichens play an important role in nature,” etc.). In compiling this text, we relied on the methodology developed by O. Malskaya and A. Sidelnikova in 1984 for senior schoolchildren and students (Sidelnikova, 1984).

Based on the number of essential sentences selected (from a scale from 0 to 8), we evaluated the children’s ability to **highlight the key idea in an educational text**. We also asked the participants to structure the text: to identify the main semantic parts in it, name them, and write down the sentences’ numbers that are included in

each. This **ability to structure a text** was assessed on the basis of coincidence with the normative structure (three paragraphs that consisted of 2, 8, and 6 sentences, respectively). A point was assigned for highlighting each part (the quality of each part's heading was not evaluated) and also for each correctly marked sentence in that part (the maximum was therefore 19 points).

Assessment of the Intellectual Development Parameters

In addition, we evaluated several intellectual development parameters that could potentially be related to the main variables we measured:

- 1) The instructions' execution. We used subtest No. 1 of the group intellectual test GIT (Burlachuk, Morozov, 1989), which is aimed at identifying the speed of comprehending simple instructions and implementing them;
- 2) The ability to find logical patterns. We used subtest No. 5 of the group intellectual test GIT — “Number series” (Burlachuk, Morozov, 1989), which measures the ability to find logical patterns in mathematical information.

Sample

The study involved 280 school students from grades 4 to 8 from two public schools in Moscow, 107 boys and 173 girls (average age 11.25 years). The general characteristics of the sample are given in *Table 1*.

Table 1

Distribution of respondents by grade, age and gender

Grade	Number	Boys	Girls	Age
4th grade	112	52	60	10.07
5th grade	81	28	53	11.05
6th grade	43	14	29	12.02
7th grade	19	5	14	13.05
8th grade	25	8	17	14.06

Descriptive statistics

Descriptive statistics based on results of the evaluation are presented in *Table 2*.

In *Table 2*, the predominance of low values for the ability to recognize a concept is noteworthy; on average, the students used features from the given definition in 2.16 tasks out of 10 for the “straight line” concept (standard deviation 2.49), and in 4.9 tasks out of 10 (standard deviation 3.2) for the concept of “mammal.” Apparently, many students are not accustomed to relying on definitions when answering questions or solving problems. In the case of the “straight line” concept, 37.1% of the students did not rely on the definition in any of the 10 tasks, and in the case of the “mammal” concept, 17.1% of the students did not do so.

It is also obvious that when operating with the “mammal” concept, it was easier for the children to recognize the concept, which is confirmed by statistical analysis ($p < 0.001$, T-test for related samples). However, we found a significant correlation between the quality of the recognition action for these two concepts ($R = 0.46$, $p < 0.001$, Pearson correlation coefficient), which means that, as a rule, a child who does not rely on the definition in the case of the “straight line,” with a high degree of probability will not rely on definition when operating with the concept of “mammal.” This fact later allowed us to combine these data into a common parameter — **the ability to recognize a concept**.

Table 2

Descriptive statistics on the studied parameters

	N	Minimum	Maximum	Mean	Standard deviation
The ability to choose an adequate action (CAA)					
“Straight line” (from 2)	195	0	2	1.16	0.72
“Mammal” (from 2)	195	0	2	1.45	0.63
CAA general (from 4)	195	0	4	2.6	1.09
Recognition action (RA)					
“Straight line” (from 10)	280	0	9	2.16	2.49
“Mammal” (from 10)	280	0	10	4.9	3.2
RA general (from 20)	280	0	19	7.1	4.87
Reading comprehension					
Choosing key idea (from 8)	280	0	7	3.9	1.23
Ability to structure (from 19)	195	0	19	13.4	5.93

As for choosing an adequate action, the situation here was similar, although the distribution was not so strongly weighted toward low values. An adequate action (recognition) when comprehending a definition was chosen significantly more often when working with the definition of a mammal ($p < 0.001$, T-test for linked samples). At the same time, the correlation between the ability to identify an adequate action for a given definition between the concepts “straight line” and “mammal” was significant, equal to 0.31 ($p < 0.001$), which again gives us grounds to combine the results into a common parameter — **the choice of an adequate action**. Analysis of the data obtained also shows that from 19% (in the case of the “straight line” concept) to 7.6% (in the case of the “mammal” concept) of the sample could not choose the action that lay behind the definition (the action of recognition), but chose other actions (depict/classify or random action).

Both parameters (the ability to recognize a concept and the choice of an adequate action) were significantly and positively correlated with each other ($R = 0.321$ at $p < 0.001$), which obviously indicates that these parameters are closely related.

Hypotheses Testing

1. Differences in the studied parameters depending on the grade in school

The most unexpected result for us was that both the choice of an adequate action and the ability to recognize a concept did not increase smoothly from 4th to 8th grade. Neither hypothesis 1A (“The ability to choose an action adequate to the concept’s definition improves from 4th to 8th grade”), nor hypothesis 1B (“The ability to recognize a concept improves from 4th to 8th grade”) was confirmed.

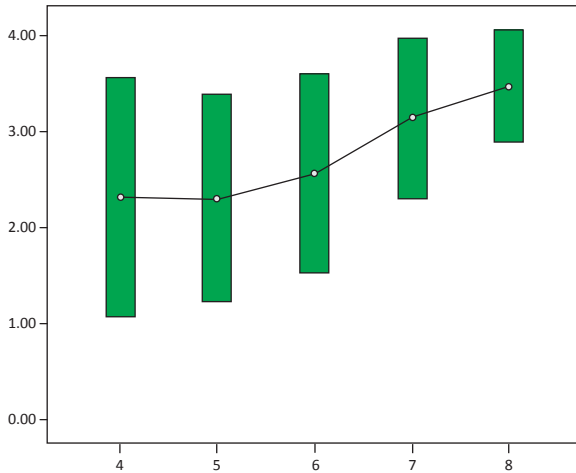


Figure 1. Ability to choose the appropriate action in different grade

Note. $N = 195$; scale from 0 to 4; $X =$ grades; $Y =$ means and standard deviations

Figure 1 shows the means and standard deviations change for **the choice of an adequate action**. We found significant differences between grades in choosing an adequate action for the proposed definition (ANOVA, $p < 0.001$) only starting with grades 7 and 8; there was no significant growth until grade 7, while there were no significant differences between indicators in grades 7 and 8 (T-test for independent samples, $p = 0.16$). We did not find any gender differences for this parameter; boys chose adequate action at the same level as girls (T-test for independent samples).

Figure 2 shows the change in means and standard deviations for **the ability to recognize a concept**.

The variance analysis showed the presence of significant differences by grade (ANOVA, $p = 0.001$): 4th-graders performed significantly worse than all other students on concepts recognition tasks ($p < 0.001$). However, there were no significant differences between the 5th, 6th, 7th, and 8th grades (differences between grades 5 and 8 are significant at the trend level $p = 0.053$). Therefore, judging by the obtained data, 8th-graders **just as rarely use the characteristics specified in the definition when solving problems** as students in the 5th, 6th, and 7th grades do. The crucial thing here is that, as in the case of choosing an adequate action, we still do not observe a gradual increase in the indicator.

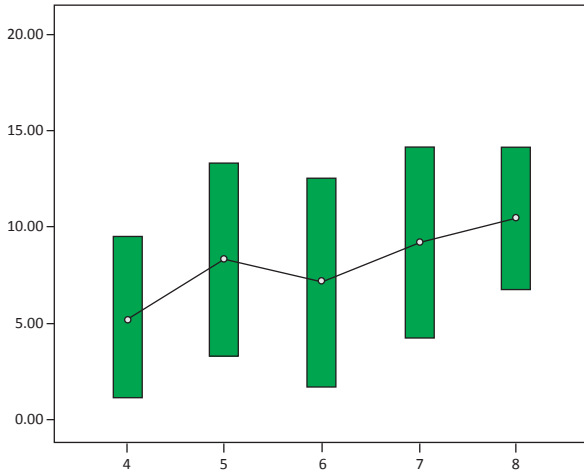


Figure 2. Concept recognition ability in different grades
Note. $N = 280$; scale from 0 to 20; $X =$ grades; $Y =$ means and standard deviations

Also differences by gender were discovered for this parameter: on average, boys performed worse than girls (T-test for independent samples, $p < 0.01$).

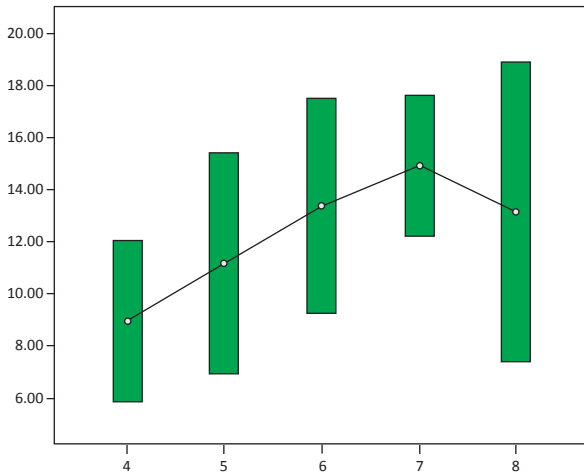


Figure 3. Ability to follow the instructions in different grades
Note. $N = 148$; scale from 0 to 20; $X =$ grades; $Y =$ means and standard deviations (GIT-test, subtest 1)

Is it possible that the students from the same school year in our sample did not differ much in intellectual development level and therefore showed similar results on concept recognition? To test this assumption, we compared our data on comprehension on concept definition with the results of two subtests of the GIT test: “Following the instructions” (subtest No. 1) and “Number series” (subtest No. 5) (Burlachuk, &

Morozov, 1989). We identified significant correlations: the ability to choose an action adequate to the definition correlated with the execution of instructions ($R = 0.4$ at $p < 0.001$, $N = 148$), and the ability to recognize a concept correlated both with the execution of instructions ($R = 0.33$ at $p < 0.001$, $N = 148$), and the ability to find logical patterns ($R = 0.41$ at $p < 0.01$, $N = 53$). That is, the better children were able to work with definitions, the better they followed instructions and found patterns in a numerical row. However, the dynamics by grade in terms of the instructions' execution level was much smoother; there was only an insignificant decrease in the 8th grade, which can be explained by the smaller number of students in this class; there were only 25 of them (see *Figure 3* and *Figure 4*).

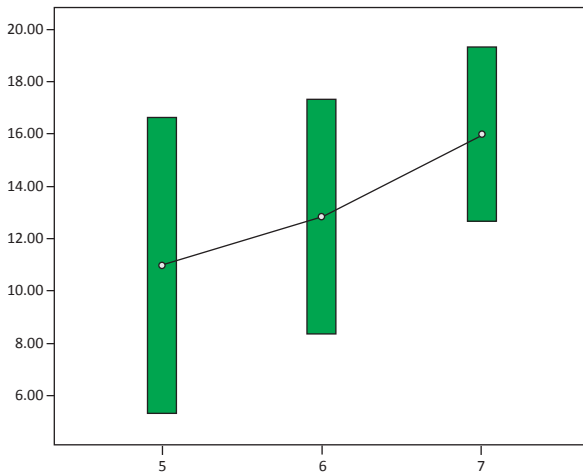


Figure 4. Ability to find logical patterns in different grades

Note. $N = 53$; scale from 0 to 20; $X =$ grades; $Y =$ means and standard deviations (GIT, subtest 5)

Thus, the results mentioned above can be explained not by the students' intellectual abilities, but by their ability to work with concept definitions, and this skill remained approximately at the same level from 4th to 8th grade.

The descriptive statistics on the quality of work with a standard educational text in the sample as a whole did not show anything unexpected; on average, the students selected about four main sentences out of eight correctly, and scored 13 out of 19 points on the text-structuring quality assessment (see *Figure 5*). But an analysis of the changes in these two parameters with age shows a similar picture as with on the ability to work with definitions. In terms of identifying the text's key idea, no fundamental changes occurred from 4th to 8th grade; in fact, fourth-graders highlighted the main idea as often as eighth-graders (ANOVA, $p = 0.16$). Girls also identified the text's main idea significantly better than boys did (T-test for independent samples, $p < 0.05$).

There were differences in text structuring between students of different grades, but they appeared only in grades 7 and 8; there were no differences between grades 4, 5, and 6 (T-test for independent samples, $p < 0.05$) (see *Figure 6*). The figure also

shows a slight decrease in grades 5 and 6 compared to grade 4, but statistically, grades 5 and 6 differed from grade 4 only at the trend level. Therefore, hypotheses 1C (“The ability to highlight the text’s main idea improves from 4th to 8th grade”) and 1D (“The ability to structure text improves from 4th to 8th grade”) are also not confirmed.

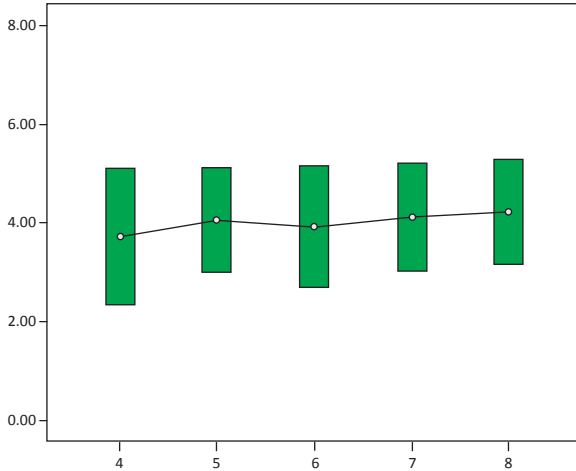


Figure 5. Ability to highlight the main idea in the text in different grades

Note. $N = 280$; scale from 0 to 8; $X =$ grades; $Y =$ means and standard deviations

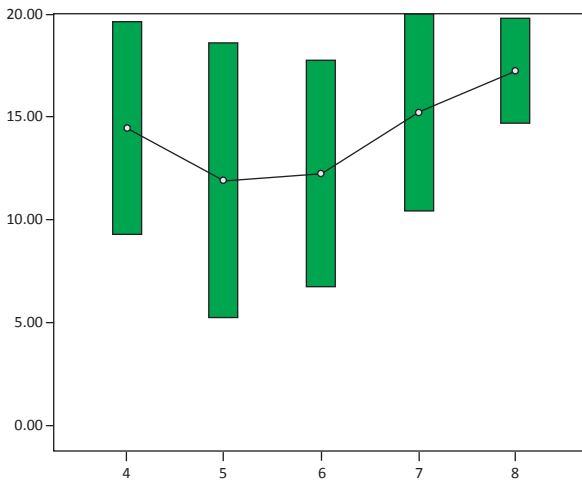


Figure 6. Ability to structure the text in different grades

Note. $N = 195$; scale from 0 to 19; $X =$ grades; $Y =$ means and standard deviations

So, we can conclude that Hypothesis 1 (“The ability to rely on educational texts as guidelines for specific subject actions gradually develops, while growing up”) is not supported by our data.

2. Associations between the parameters of working with definitions and text comprehension

According to Hypothesis 2 (“**The ability to work with concept definitions effectively and the ability to comprehend standard academic texts are significantly and positively associated**”), we expected to see significant interrelations between the quality of working with definitions, on the one hand, and the quality of working with holistic educational texts, on the other. The results of the correlation analysis are presented in *Table 3*.

Table 3
Intercorrelation between the characteristics of recognition action and text comprehension

		The ability to choose an adequate action	Recognition action	Reading comprehension (choosing key idea)	Reading comprehension (ability to structure)
The ability to choose an adequate action	Pearson Correlation		.321**	.111	.337**
	Sig. (2-tailed)		0.000	0.123	0.000
	N	195	195	195	195
Recognition action	Pearson Correlation	.321**		.241**	.374**
	Sig. (2-tailed)	0.000		0.000	0.000
	N	195	280	280	195
Reading comprehension (choosing key idea)	Pearson Correlation	.111	.241**		.268**
	Sig. (2-tailed)	0.123	0.000		0.000
	N	195	280	280	195
Reading comprehension (ability to structure)	Pearson Correlation	.337*	.374**	.268**	
	Sig. (2-tailed)	0.000	0.000	0.000	
	N	195	195	195	195

Note. *. Correlations are significant at $p < 0.05$ (2-way). **. Correlations are significant at $p < 0.01$ (2-way).

Table 3 demonstrates that in the sample as a whole, indeed, the students who knew how to recognize concepts worked better with educational texts; at least they better distinguished the sentences that were essential for comprehension from the unimportant ones, and also they structured the text better. Thus, hypotheses 2C (“The ability to recognize a concept is positively associated with the ability to highlight the text’s main idea”) and 2D (“The ability to recognize a concept is positively associated with the ability to structure a text”) were confirmed. The only connection not found was between the ability to highlight the text’s main sentences and the ability to “see”

the action behind the definition. However, this connection remains if we exclude the oldest students (eighth graders) from the sample. Thus, hypothesis 2A (“The ability to choose an action adequate to the concept’s definition is positively associated with the ability to highlight the text’s main idea”) was fully confirmed, and 2B (“The ability to choose an action adequate to the concept’s definition is positively associated with the ability to structure a text”) was partially confirmed.

This means that there is reason to assume that working with educational texts, as well as concept recognition, requires the ability to identify the questions that this educational text answers, and the ability to rely on the text’s elements when answering these questions. And we have reason to believe that Hypothesis 2 (“The ability to work with concepts’ definitions effectively and the ability to comprehend standard academic texts are significantly and positively associated”) is generally confirmed.

Discussion

One of the important results of our research is the fact that after the transition from primary school to the secondary level, students’ work with educational information (such as concept definitions, and educational texts) does not fundamentally change (up to the 7th grade), despite the fact that the level of individual parameters of the children’s intellectual development gradually increases. It turns out that if a child demonstrates a low text comprehension level in the 4th grade, then, most likely, by the 7th grade his/her level will not have increased much or would have remained at the same low level! A longitudinal study could provide a more precise answer to this question; however, our data segments already allow us to draw such a conclusion.

Our results are confirmed by the difference in the Russian results on two international comparative studies — the PIRLS for the 4th grade and PISA for the 8th grade (OECD, 2010). While fourth-graders have been in the top 10 for the last 15 years in their ability to understand text, as measured by the PIRLS test, the level of reading literacy in grades 8-9 in Russia according to PISA is catastrophically low (OECD, 2010: Mullis et al., 2009). In 2011, these results were verified by G. Zukerman and colleagues on a sample of more than 3,000 people (Zukerman, Kovaleva, & Kuznetsova, 2011) The authors of the study created a diagnostic methodology that combines the PIRLS and PISA approaches, and it turned out that two years of study in a Russian middle school (5th and 6th grades) does not change anything in the ability of schoolchildren to understand informational texts. No differences with the 4th grade were detected; they appeared only in the 9th grade, but, as noted by the authors, the increase in reading literacy “over five years of study is very insignificant” (*ibid.*, p. 123). In the authors’ point of view, the problem may lie in the fact that if the first stage of the reading literacy development (learning to read) is successful (*i.e.*, children feel comfortable working with written texts), then the second stage (reading for learning or reading in its functional sense) “fails,” and the dynamics of reading literacy development slow down (*ibid.*, p. 147).

What is the matter? It would seem that it is during the transition to secondary school that educational information texts begin to acquire key importance; teachers of history, geography, and biology are constantly asking students to read a paragraph

from a textbook and answer questions as homework. In our opinion, which is supported by this study's data, the most important condition for resolving this problem is to teach students a slightly different "perception" of any newly acquired knowledge — perceiving it as guidelines for action, which obviously presupposes the ability to "see" these actions and, when performing these actions, "transform" the acquired knowledge into real guidelines. Judging by our data, Russian children in grades 4-6 have great difficulty with this kind of transformation.

This assumption is supported by the significant associations we obtained between text comprehension (assessed on the basis of highlighting the key idea and structuring) and the ability to recognize a concept, in which the ability to see a future action and use key characteristics of the definition are crucial. There is also evidence in the scientific literature that the identification of meaning in a text is significantly improved when students are required to ask questions about the text (either independently or based on a list of questions) (King, 1994). In fact, asking questions encourages students to identify actions for which the knowledge given in the text will become orienting, which will contribute to their comprehension.

Modern cognitive research, carried out in line with the evidence-based approach in education (see, for example, Brown, Roediger III & McDaniel, 2014), shows that attempts to learn by relying only on repeated reading of educational texts (even with underlining of key words) are not effective, and it is much more productive to learn through active actions (not rehearsing and memorizing, but attempts to reproduce and search for answers to questions in a given text). This can also be explained from the perspective of the activity approach, as text comprehension will be carried out fundamentally differently when the student is searching for answers to questions rather than simply trying to "read" or "understand."

In general, we think that instead of trying to teach some other knowledge or actions (meta-knowledge, meta-actions, and/or specific practical actions) so that a student can apply subject knowledge obtained through texts to solving problems, it is necessary to teach students to perceive any newly acquired knowledge differently. They need to perceive educational texts precisely as guidelines for certain practical or cognitive actions, to highlight these actions, and, naturally, to try to carry them out. In this manner the emphasis is on restructuring the learning process toward activity-based mediation.

Conclusion

This study demonstrated that 10–15-year-old Russian school students experience difficulties in comprehending educational texts, and these difficulties do not decrease with the transition from grade to grade. The obvious answer is the need for special work aimed at developing the students' ability to work with text. But that raises the question of the appropriate method for such work. This issue, in our opinion, can be resolved only by relying on the psychological mechanisms of the educational text comprehension process. Our research has shown that the success of comprehension texts is closely related to the success of comprehension of concept definition, the psychological mechanism of which has been very well studied in psychology, based

on the principles of the Activity approach. The ability to see any educational text's orienting purpose and extract from it the basic elements for the action, in our opinion, is a key factor in its comprehension and the psychological basis for developing the ability to learn.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgements

The study was supported by the RFBR grant No. 19-013-00717 "Orientation to a given knowledge as an indicator of the ability to learn from schoolchildren."

References

- Aydarova, L.I. (1968). Formirovanie nekotorykh ponyatii grammatiki po tretemu tipu orientirovki v slove [Formation of some of the concepts of grammar in the third type of orientation in the word]. In P.Ya. Gal'perin and N.F. Talyzina (Eds.) *Zavisimost' obucheniya ot tipa orientirovki* [Dependence of teaching on the type of orienting activity] (pp. 42–80). Moscow: MGU Publ.
- Asmolov, A.G. (2010). *Formirovanie universal'nykh uchebnykh deistvii v nachal'noi shkole: ot deistviia k mysli* [Formation of universal educational actions in primary school: from action to thought]. Moscow: Prosveshchenie.
- Brown, P.C., Roediger, III, H.L., & McDaniel, M.A. (2014). *Make it stick*. Harvard University Press. <https://doi.org/10.2307/j.ctt6wprs3>
- Burlachuk, I.F., & Morozov, S.M. (1989). *Slovar'-spravochnik po psikhologicheskoy diagnostike* [Dictionary of psychological diagnostics]. Kiev, USSR: Nauk Dumka.
- Chudinova, E.V., & Zajceva, V.E. (2014). Uchebnoe modelirovanie i ponimanie teksta [Educational modeling and text comprehension]. *Kul'turno-istoricheskaja psihologija* [Cultural-historical psychology], 1, 44–53.
- Davydov, V.V. (2002). *Vidy obobshcheniia v obuchenii* [Types of generalization in learning]. Moscow: PIRAO publ.
- Freebody, P., & Luke, A. (1990). "Literacies" programs: debates and demands in cultural context. *Perspect*, 5, 7–16.
- Fridman L.M., & Kulagina, I.Ju. (1993). *Formirovanie obshcheuchebnykh umenii u shkol'nikov* [Formation of general educational skills among schoolchildren]. Kemerovo.
- Gal'perin, P.Ya. (1966). Psikhologiya myshleniya i uchenie o poetapnom formirovanii umstvennykh deystvii [Psychology of thinking and theory about the gradual formation of mental actions]. In E.V. Shorohova (Ed.), *Issledovaniya myshleniya v sovetskoy psikhologii* (pp. 236–277). Moscow: Nauka.
- Gal'perin, P.Ya. (1985). *Metody obuchenii i umstvennoe razvitie rebenka* [Teaching methods and mental development of the child]. Moscow: MSU publ.
- Gal'perin, P.Ya. (2002). *Lektsii po psikhologii* [Lectures on psychology]. Moscow: MPSI publ.
- Gal'perin, P.Ya., & Talyzina, N.F. (1957). Formirovanie nachal'nykh geometricheskikh poniatii na osnove organizovannogo deistviia uchashchikhsia [Formation of initial geometric concepts based on the organizational action of students]. *Voprosy psihologii* [Issues of Psychology], 1, 28–44.
- Glaser, R. (1988). Cognitive science and education. *International Social Science Journal: Cognitive Science*, 40(1), 21–44.
- Hautamäki, J. et al. (2002). *Assessing learning-to-learn: A framework*. Helsinki
- Il'yasov, I.I., & Galatenko, N.A. (1988). *Samostoyatel'naya rabota s knigoy* [Independent work with the book]. Moscow: MSU publ.

- Key competences for lifelong learning: European Reference Framework* (2007). Luxembourg: Publications Office of the European Union. Retrieved from <http://hdl.voced.edu.au/10707/285153>
- King, A. (1994). Autonomy and question asking: The role of personal control in guided student-generated questioning. *Learning and Individual Differences*, 6(2), 163–185. [https://doi.org/10.1016/1041-6080\(94\)90008-6](https://doi.org/10.1016/1041-6080(94)90008-6)
- Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. New York: Cambridge University Press.
- Korotaeva, I.V. (2000). *Ispol'zovanie priema sistematizacii teksta u starsheklassnikov i studentov* [The use of the method of systematization of the text in high school students and students]. PhD diss. Moscow: MSU publ.
- Mal'skaya, O.E. (1981). *Analiz struktury i formirovaniya dejatel'nosti uchenija* [Analysis of the structure and formation of the learning activity]. PhD diss. Moscow: MSU
- Mullis, I.V.S., Martin, M.O., Kennedy, A.M., Trong, K.L., & Sainsbury, M. (2009). *PIRLS 2011. Assessment Framework*. TIMSS & PIRLS International Study Center, Lynch School of Education, Boston College.
- OECD (2010). *PISA 2009 Framework: Key competencies in reading, mathematics, and science*. Paris: OECD. <https://doi.org/10.1787/9789264062658-en>
- Oleynikova, E.V. (2012). *Vlijanie podhoda k ucheniju na ponimanie uchebnyh tekstov* [The influence of the approach to teaching on the comprehension of educational texts]. PhD diss. Moscow. MSU.
- Podol'skij, A.I. (1987). *Formirovanie umstvennogo deistviia: nauchnaia abstraktsiia i real'nost'* [The formation of cognitive action. Scientific abstraction and reality]. Moscow: MSU publ.
- Posner, G.J. et al. (1982). Accommodation of a scientific conception: toward a theory of conceptual change. *Science Education*, 66(2), 211–227. <https://doi.org/10.1002/sce.3730660207>
- Sidelnikova, A.A. (1984). *Osobennosti osoznaniya uchebnoy deyatel'nosti* [Features of awareness of educational activities]. Undergraduate Thesis. Moscow: MSU
- Sidneva, A.N. (2010). *Sravnitel'nyj analiz podhodov k sodержaniju i formirovaniyu umenija učit'sja* [Comparative analysis of approaches to the content and formation of the ability to learn]. PhD thesis. Moscow, MSU.
- Sidneva, A.N., Vysotskaya, E.V., Korotaeva, I.V., Mozharovsky, I.L., & Shinelis, V.A. (2020). How Do Primary Schoolchildren Use Concept Definitions in Recognition Tasks? Orientation Towards Given Knowledge in Two Different Educational Systems. *Psychology in Russia: State of the Art*, 13(2), 29–64. <https://doi.org/10.11621/pir.2020.0203>
- Snow, C.E. (2002). *Reading for comprehension: Toward a research and development program in reading comprehension*. Santa Monica: Rand Corp. Retrieved from https://www.rand.org/pubs/monograph_reports/MR1465.html
- Talyzina, N.F. (1957). K voprosu ob ovladenii nachal'nymi geometricheskimi poniatiiami [On the question of mastering the initial geometric concepts]. In *Materialy soveshchaniia po psikhologii* [Proceedings of the meeting on psychology]. Moscow: APN RSFSR Publ.
- Talyzina, N.F. (2001). *Pedagogicheskaia psikhologiya* [Educational psychology]. Moscow: Akademia.
- Talyzina, N.F. (2018). *Deiatel'nostnaia teoriia ucheniia* [Activity theory of learning]. Moscow: MSU publ.
- The Federal State Educational Standard (FSES) of primary general education (2009). Retrieved from https://kpfu.ru/docs/F2009061155/FGOS.NOO_23_10_09_Minjust_3_1_.pdf
- Usacheva, I.V. (1990). *Samostoiatel'naia rabota studentov s knigoi. Uchebno-metodicheskoe posobie* [Independent work of students with a book. Educational and methodological manual]. Moscow: MSU publ.
- Vysotskaja, E.V., Lobanova, A.D., Janishevskaja, M.A., & Hrebtova, S.B. (2020). Introduction to the natural sciences: a view from the cultural history of mankind. *Psichologicheskaja nauka i obrazovanie* [Psychological Science and Education], 25, 5, 95–108. <https://doi.org/10.17759/pse.2020250508>
- Woolley, G. (2011). *Reading Comprehension: Assisting Children with Learning Difficulties*. Springer Netherlands. <https://doi.org/10.1007/978-94-007-1174-7>
- Zukerman, G.A., & Ermakova, I.V. (2003). Razvivaushchie efekty sistemy D.B. Ėl'konina — V.V. Davydova [Developmental effects of the system of D.B. Elkonin — V.V. Davydov]. *Psichologicheskaja nauka i obrazovanie* [Psychological science and education], 8(4), 56–73.

Zukerman, G.A., Kovaleva, G.S., & Kuznecova, M.I. (2011). *Pobeda v PIRLS i porazhenie v PISA: sud'ba čitatel'skoj gramotnosti 10–15-letnikh škol'nikov* [Victory in PIRLS and defeat in PISA: the fate of reading literacy of 10–15-year-old schoolchildren]. *Voprosy obrazovanija* [Education Issues], 2, 123–151.

Original manuscript received September 15, 2023

Revised manuscript accepted November 13, 2023

First published online December 30, 2023

To cite this article: Sidneva, A.N., Stepanova, M.A., Plotnikova, V.A. (2023). Comprehension of Educational Texts by Students in Grades 4–8 as an Indicator of their Ability to Learn. *New Ideas in Child and Educational Psychology*, 5(3–4), 20–42. DOI: 10.11621/nicep.2023.0502