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PEDAGOGICAL SUPPORT DURING THE TRANSITION TO MIDDLE SCHOOL

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Abstract

Transition to middle school is one of the critical moments of the educational process, because it is associated with significant changes in the conditions, nature and content of learning. It is generally recognized that the organization of transition implies diversified pedagogical support for students, an essential part of which is the organization of repetition of subject material from the elementary school curriculum. This support element is especially important for students who lag behind in mastering the primary level program and are not quite ready to absorb new, more complex learning content. A psychological view of the transitional situation leads to the conclusion that the main goal of repetition at this stage should be student actualization and deeper comprehension of the concepts, models, and schemes that constitute the core of the subject content, while the main obstacle is the formalization of knowledge as a natural consequence of systematic training in solving large arrays of practical-specific tasks. The creation of transitional training modules in the form of a selection of problems and tasks, stimulating students to address the conceptual foundations of actions, is proposed. Ways of introducing elements of novelty into the content of lessons, i.e., implementing the "repetition without repetition" principle, are proposed. The arithmetic module prepared for testing is briefly described.

Keywords: Repetition, transition, training module

1. Introduction

The transition from primary to secondary school is, according to most theorists and practitioners, one of the critical stages in the general education system. As the analysis of relevant studies shows (Jindal-Snape et al., 2019), many children in this period of school life experience some negative phenomena: increased anxiety, decreased interest in learning, decline in academic performance, increase in the number of disciplinary violations, absenteeism. Researchers agree that the criticality of this transition is undoubtedly connected with difficulties of adaptation of school pupils to new conditions of activity: establishment of personal contacts with new peers and teachers, assimilation of more adult system of relations, getting used to more strict daily rounds, dense schedule and new disciplinary requirements, acceptance of greater difficulty of educational programs, etc.

At this point, three directions can be distinguished in the transition problem. One of them is aimed at improving the quality of subject learning and socio-psychological preparation of elementary school students as a basic prerequisite for a successful transition to the next level. The second direction emphasizes the facilitation of the transition by stretching the process of introducing new conditions over time. Thus, there is a practice to get acquainted in advance (sometimes informally) with new peers and with each of the new teachers, trial classes in new classrooms, gradual introduction of new disciplinary requirements, etc. Finally, the third direction involves the prompt organization of multidirectional psychological and pedagogical support as part of the transition period (Howard & Johnson, 2004).

While we generally support this broad approach to the problem, we believe that the desire to encompass the full range of factors that need to be considered in the transition to middle school must be complemented by an in-depth focus on the most significant ones. Among those factors critical to a successful entry to middle school is students' mastery of program content at the elementary level. For example, our recent research has shown that individual differences in the pace and quality of subject educational content mastery by school pupils when the programs are oriented towards average indicators regularly lead to a group of students who, by the end of primary educational stage, have not quite reached the level of academic achievement needed to successfully transit to the next, basic stage (Khakhalina, 2020; Khakhalina & Nezhnov, 2021; Nezhnov et al., 2013).

The traditional way to solve this problem is to cultivate a grade repetition system. However, this practice, first, is too wasteful of a child's life time: not all D-students need an entire year of classes to complete the elementary level curriculum. And second, delaying a student in any grade distances him/her from his/her age cohort in one way or another, which seriously interferes with the course of personal development.

In view of the above it is reasonable to assume that the retention in grade is a measure of last resort, which can be applied only with a balanced and coordinated decision of all interested parties (parents, psychologist, teacher, and student). At the same time, the question of improving pedagogical support for struggling students, helping them fit into the regular rhythm of the school educational process, should be raised more deliberately.

2.   Problem Statement

Two main lines of support for students in mastering learning content can be identified in the pedagogical literature. The first is a differentiated approach to learning while maintaining the overall pace of the curriculum. The implementation of this approach for struggling students involves identifying a group of such students and organizing close supervision and guidance of this group as well as of individual students in order to stimulate and facilitate learning activities. In practice, however, this approach is very laborious for the teacher, which limits its full application and ultimately leads to the establishment of a hidden form of separate education that sets different goals of different merit for different children. And in this case, the general education, the meaning of which is to ensure equality of people in terms of basic cultural abilities (reading, counting, elementary logical thinking), risks ceasing to be such already at the level of elementary school.

The second line of pedagogical support in the educational process is established in the traditional principle of systematic repetition of material, one point of which is a final repeat of a completed course (such as arithmetic or grammar of the native language) at the beginning of fifth form. This line of support covers all students and, in some combination with elements of a differentiated approach, is supposed to ensure the junction of the primary and basic levels. However, experience has shown that the issue of some children lagging behind in mastering the curriculum by the end of elementary school is still quite acute. It is proved at least by the demand for private tutoring, which at the level of 4th-5th forms, where the problem of entering a HEE is still barely visible on the distant horizon, usually pursues a quite modest goal - to lead a child away from the range of academic failure.

But tutoring can by no means be seen as an option for a systemic solution. Firstly, such services are not available to everyone; secondly, they are often reduced to superficial coaching for solving typical problems, which in the long run only aggravates the difficulties of students. Therefore, in our opinion, the solution to the problem should be sought in the way of improving the educational process at the transition to middle school, and first of all - the model of repetition of the learnt material at the beginning of the 5th form. We believe that the potential of this link in the educational process is far from exhausted, and with some modernization it can give a more significant effect.

Analysis of modern methodological developments in the organization of repetition of educational material at school allows us to state that the understanding of this task among pedagogues is relatively homogeneous. Thus, it is traditionally noted that repetition is a necessary element of the educational process, as it ensures the preservation and consolidation of the obtained knowledge and skills. In addition, according to the general opinion, repetition with a certain organization leads to the achievement of many other educational outcomes: it promotes further progress of the student in the subject, understanding of the content at a new level, revealing the structure of the subject, its connections with other subjects, expanding and understanding the range of practical applications of the mastered concepts, formulas and schemes, etc. All this, as a rule, is supplemented by the fact that during repetition there is also a development of the whole set of cognitive functions: attention, different types of memory and thinking. Thus, the entire set of learning functions is attributed to repetition, and it itself acts as a multi-purpose action. As for the principles of organizing repetition, most of the developments state that it is necessary

to repeat the most important and difficult things, that repetition should not copy the previous learning (different perspective of the content, different teaching methods, updated didactic materials, etc.), and that repetition should move along the line of systematization and generalization (Danilova & Nurtazaeva, 2019; Sergeeva, 2017; Tsyplenkova, 2017; Umanskaya, 2017).

In general, the described approach is not particularly objectionable. However, a more detailed examination of methodological developments reveals that they are based on very mechanistic ideas about the nature of the educational process, which do not take into account the psychological specifics and interconnection of its individual links.

In this context, it is important to note that methodologists and teachers are not clearly aware that actions to comprehend and master the conceptual content and actions aimed at developing skills to quickly solve test tasks are psychologically opposite. In other words, progress in understanding the material and consolidation of what is understood in the form of practical skills negate and inhibit each other and cannot be productive when they intersect. In addition, modern teaching methods clearly lack an understanding of the internal dynamics of the educational process and its time base. In particular, the fact that the process of understanding and mastering new conceptual material largely takes place spontaneously outside of teaching, and its main results, as a rule, are delayed, is not taken into account. Therefore, when planning students' mastering or reconstruction of some theoretical content, it makes sense to take into account the real time perspective of this process.

Lack of attention of methodologists to psychological aspects of learning has a direct consequence of setting educational goals as independent of each other and mechanical combination or convergence in time of differently directed learning activities without taking into account their internal connection. We believe that a more thorough psychological examination of the problem of repetition of educational material is an obvious reserve for increasing the effectiveness of the relevant methodological developments. This is especially important for the organization of repetition at the transition to middle school, where the subject of reconstruction and comprehension is extremely voluminous subject content, on the basis of which the child is to make a step to a higher educational level.

3.   Research Questions

When we set the task of re-designing the learning process at the transition to middle school, we proceeded from the fact that the existing principles of its organization do not sufficiently take into account the systemic nature of academic and subject competences, as well as the logic and time frame of their formation. This is partly justified by the fact that these issues have not yet received sufficient coverage in the psychological and pedagogical literature. At the same time, the available theoretical background and some research data allow us to outline a number of theses which provide a preliminary basis for moving forward in solving the problem of supporting students at the transition to middle school.

According to current didactic ideas, the process of appropriating learning content is decomposed into several stages, each resulting in a certain qualitative level of appropriate competence (Lerner, 1980). Numerous attempts have been made to construct a level model of appropriation (Bloom, 1956; Lerner, 1980, etc.). A psychological approach to solving this issue is presented in the provisions of Vygotsky (1982) on the basic stages of appropriation of sign structures. These provisions are elaborated in the SAM

model of assessment of learning and subject competences, which distinguishes three levels of subject content appropriation: formal, reflexive, functional (Nezhnov, 2018; Nezhnov et al., 2018).

Numerous studies, including large samples, have found that in comprehensive schools in the Russian Federation by the end of 4th form, about half of students reach the reflexive level of mastery of subjects such as mathematics and Russian language (Nezhnov et al., 2009; Khakhalina & Nezhnov, 2021; Lvovskaya & Nezhnov, 2021). It was also found that by the eighth to ninth form this level of mastering the elementary school curriculum is spontaneously achieved by the vast majority of students (Nezhnov et al., 2013). All of this allows us to record this level (level of understanding) as a realistic comprehensive norm, and to consider it as a target level for elementary school. The same data suggest that the achievement of the reflexive level of mastery of the subject material is a condition for successful inclusion in the educational process of the middle school.

The subject activity (competence) of the reflexive level is the ability to orient oneself in the corresponding subject field (arithmetic, linguistic, etc.) relying on the use of theoretical concepts as means of meaningful analysis and modeling the inner structure of task situations. Cultivation of this ability and is the main task of teaching in elementary school. At the same time, according to modern didactic guidelines, an essential part of learning processes is training in solving the main types of practical tasks, the consequence of which is gradual formalization of the subject action, leading to the fact that the theoretical way of developing a solution is replaced by using external cues and proved algorithms.

Formalization simplifies and facilitates practical action, makes it more economical and faster (which can positively influence test results), but the conceptual orientation in a task is being extremely reduced and goes into a state of latency. By the end of elementary school the effects of formalization accumulate and as a result there is, in the words of Elkonin (1989), the known psychologist, "a closure of the functional system" (p. 511) which prevents the next step in mastering the subject.

4. Purpose of the Study

Based on the above theses, we think that one of the means to support the learning activity of school pupils in the transition to middle school might be specially designed modules for repeating the material in the main disciplines, the main sense of which is to create conditions for actualization and reflexion on the conceptual kernel of the mastered subject content by students.

5. Research Methods

Creating conditions for actualization and deeper mastering of the conceptual layer of the subject by students implies the problem-and-task organization of the educational process. That is, the student's main working pattern is productive, because comprehension of subject content occurs, as a rule, not in the course of recalling, but on the basis of reconstruction and testing of means and ways of action. Thus, the basis of the module should be a selection of problem tasks, around which the learning activity, guided by the teacher, is built. More specifically, the purpose of the selection consists in directing the activity of the student to disclose the internal structure of task situations and reconstruction of concepts as means of modeling. During the work within the module the student should advance in distinguishing the object and

its model, encounter the variability of their possible representations, gain experience of their correlation and construction of a subject action on this basis. In this connection, a valuable addition can be the expansion of the range of graphic modeling tools, playing with the peculiarities of their means and possibilities of their use for analyzing different task situations.

It is worth to particularly note that the nature of children's learning activity envisaged in the transitional module is not compatible with any rush. This means that when designing the module, it is necessary to provide some time allowance, taking into account the circumstances. Technically, the selection of material for the transitional module is determined by the need to cover as fully as possible the conceptual framework of the academic discipline - the main relations that constitute the content of the subject. However, the set of tasks should be compact, and the tasks should be mainly difficult, so as to aim the student at understanding the material, full comprehension of subject connections and relations, rather than practicing speedy methods of problem solving. If the time frame for implementing the module is limited for some external reasons, it is obvious that the content of the module should be reduced, focusing on what carries the greatest conceptual load and is difficult to master.

According to the principle of "repetition without repetition", the module should spotlight the learning material from a new angle, which can be achieved in different ways. As an example, we can name the shift in the focus of the tasks from the achievement of some subject results to the analysis and reflexion of the actions themselves - their bases, means, and possible options. Another example is the organization of repetition in the context of further progress in the subject: introduction of new objects, means, and methods of action, etc. Other ways of introducing elements of novelty into lessons are also possible.

6. Findings

For the time being, these guidelines are implemented in a transitional module on arithmetics, which is a collection of tasks provided with methodological instructions for teachers and explanatory texts for students. The module is developed based on many years of experience in teaching mathematics in elementary schools according to the system of Elkonin - Davydov et al. (2019a, 2019b, 2019c, 2019d). This primarily refers to the deployment of children's objective activity action, which determines the meaning of mathematical concepts, and its setting in a variety of graphic and sign models.

The main concept considered in this module is the concept of natural number. The main novelty of the module in comparison with the traditional content of elementary school curricula in arithmetic is that the natural number is considered not only as a number obtained by counting, but also as a result of defining quantities, which provides a basis for the subsequent introduction of other types of real numbers. This representation of the natural number is modeled on a coordinate line. All arithmetic operations with natural numbers are considered in terms of relations between quantities. As a result, the module presents a description of the system of natural numbers in the context of defining quantities and provides a model for similar construction of other systems of numbers (ordinary and positional fractions, positive and negative numbers).

The novelty of the content for children who studied in elementary school according to the curricula based on the definition of quantities, is achieved through the use of tasks for direct reflexion on the

action, and through some progress in the content. Namely, within the module, on the basis of actualization of the initial (expanded) forms of objective action, new model means (notations, arrow schemes, graphic models) are introduced, which give an opportunity to organize the activity of students in "discovering" the concepts included in the 5th and 6th forms curriculum, on the basis of specification of those which are already mastered. One of these opportunities to go beyond the elementary school curriculum - the introduction of positional (systematic) fractions - is implemented in the module under discussion.

A special place in the proposed module takes the concept of a complete number scale. It is presented as a model that uniformly reflects all actions with all kinds of numbers studied in the school curriculum (i.e., real numbers). Therefore, initially it has gaps, the filling of which should give children guidance to the construction of new types of numbers and actions with them.

The module is focused on the development of the concept of a complete number scale. However, the model tools introduced within this progress, can be further used as a means of analyzing conditions and finding solutions to a variety of word problems. A separate module can be devoted to the consideration and detailed play with this field of possibilities.

The developed version of the module is designed for 30 lessons. It is supposed to be introduced in the first quarter of the fifth study year.

7.   Conclusion

Modules based on the principles we have outlined are supposed to advance all students in their understanding of the material they have learned and to prepare them for grasping new things. Moreover, the struggling students will have an opportunity to move closer to the reflexive level of mastering the material driven by the implementation of expanded objective actions, which facilitates their further progress in the subject. Those conceptual links that they were unable to realize at a younger school age may be accessible to them when they are older and have accumulated experience in learning activities. We can also expect that the specified modules, by delaying in time the encounter with the new, more complex learning content of the high school curriculum, will make it easier for children to adapt to the new environment and routines of life at the new level. Taken together, this should increase the readiness of school pupils to master the next part of the curriculum and reduce the number of students whose performance drops irreversibly when they move on to the middle level of education. Testing these assumptions is the next step in our research.

References

Bloom, B. S. (Ed.). (1956). *Taxonomy of Educational Objectives. The Classification of Educational Goals. Handbook 1: Cognitive Domain.* Longmans, David McKay.

Danilova, N. A., & Nurtazaeva, R. R. (2019). Vidy i sposoby realizatsii povtoreniya na urokakh matematiki [Types and methods of implementation of repetition in math lessons]. In G. Yu. Gulyaev (Ed.), *Fundamental'nye osnovy innovacionnogo razvitiya nauki i obrazovaniya: sbornik statej IV Mezhdunarodnoj nauchno-prakticheskoj konferencii. Fundamental'nye osnovy innovacionnogo razvitiya nauki i obrazovaniya* [Fundamental foundations of innovative development of science and education: collection of articles of the IV International Scientific and

Practical Conference. Fundamental foundations of innovative development of science and education] (pp. 174-177). Nauka I Prosveshchenie.

Davydov, V. V., Gorbov, S. F., & Mikulina, G. G. (2019d). *Matematika 4. Uchebnik 4 klass* [Mathematics 4. Textbook 4th grade.]. Binom.

Davydov, V. V., Gorbov, S. F., Mikulina, G. G., & Savelieva, O. V. (2019a). *Matematika 1. Uchebnik 1 klass* [Mathematics 1. Textbook 1st grade]. Binom.

Davydov, V. V., Gorbov, S. F., Mikulina, G. G., & Savelieva, O. V. (2019b). *Matematika 2. Uchebnik 2 klass* [Mathematics 2. Textbook 2nd grade]. Binom.

Davydov, V. V., Gorbov, S. F., Mikulina, G. G., & Savelieva, O. V. (2019c). *Matematika 3. Uchebnik 3 klass* [Mathematics 3. Textbook 3rd grade]. Binom.

Elkonin, D. B. (1989). *Izbrannyye psikhologicheskiye trudy* [Selected psychological works]. Pedagogika.

Howard, S. & Johnson, B. (2004). Transition from primary to secondary school: possibilities and paradoxes [Paper presentation]. The EERA Annual Conference, Melbourne, Australia.

Jindal-Snape, D., Cantali, D., MacGillivray, St., & Hannah, E. (2019). Primary-Secondary Transitions: A Systematic Literature Review. *Scottish Government.* https://www.gov.scot/publications/primary-secondary-transitions-systematic-literature-review/

Khakhalina, O. M. (2020). *Otsenka uchebnykh dostizheniy uchashchikhsya na perekhode v osnovnuyu shkolu* [Assessment of educational achievements of pupils during the transition to middle school]. Avtorskij klub.

Khakhalina, O. M., & Nezhnov, P. G. (2021). Otsenka uchebnykh dostizheniy uchashchikhsya na perekhode v osnovnuyu shkolu [Assessment of educational achievements of pupils during the transition to middle school]. In Lvovsky, V. A. (Ed.), *Sbornik materialov III s'ezda trenerov-tekhnologov deyatel'nostnyh obrazovatel'nyh praktik. III s'ezd trenerov-tekhnologov deyatel'nostnyh obrazovatel'nyh praktik* [Collection of materials of the III congress of trainers-technologists of activity educational practices. The III congress of trainers-technologists of activity educational practices] (pp. 186-201). Avtorskij klub.

Lerner, I. Y. (1980). *Protsess obucheniya i yego zakonomernosti* [The learning process and its regularities]. Znanie.

Lvovskaya, A. N., & Nezhnov, P. G. (2021). Issledovaniye svyazi mezhdu predmetnymi i metapredmetnymi obrazovatel'nymi rezul'tatami [Investigation of the connection between subject and meta-subject educational results]. In Lvovsky, V. A. (Ed.), *Sbornik materialov III s'ezda trenerov-tekhnologov deyatel'nostnyh obrazovatel'nyh praktik. III s'ezd trenerov-tekhnologov deyatel'nostnyh obrazovatel'nyh praktik* [Collection of materials of the III congress of trainers-technologists of activity educational practices. The III congress of trainers-technologists of activity educational practices] (pp. 158–168). Avtorskij klub.

Nezhnov, P. G. (2018). *Testy SAM v obrazovatel'noy praktike* [SAM testing in educational practice]. Avtorskij klub.

Nezhnov, P. G., Frumin, I. D., Hasan, B. I., & Elkonin, B. D. (Eds.). (2009). *Diagnostika uchebnoy uspeshnosti v nachal'noy shkole* [Diagnostics of educational success in primary school]. Otkrytyj institut "Razvivayushchee obrazovanie".

Nezhnov, P. G., Gorbov, S. F., & Sokolova, O. V. (2018). *Diagnostika uchebno-predmetnykh kompetentsiy* [Diagnostics of educational subject competencies]. Avtorskij klub.

Nezhnov, P. G., Kardanova, E. Yu., & Ryabinina, L. A. (2013). Issledovaniye protsessa prisvoyeniya uchebnogo soderzhaniya [The Academic Content Acquisition Process Study]. *Educational Studies Moscow, 4,* 168-187.

Sergeeva, S. A. (2017). Sushchnost' ponyatiya "produktivnoye povtoreniye" [The essence of the concept of "productive repetition"]. In S. S. Chernov (Ed.), *Nauka v Rossii: perspektivnye issledovaniya i razrabotki: sbornik materialov I Vserossijskoj nauchno-prakticheskoj konferencii. Nauka v Rossii: perspektivnye issledovaniya i razrabotki* [Science in Russia: Prospective research and development: collection of materials of the I All-Russian Scientific and Practical Conference. Science in Russia: Prospective research and development] (pp. 40-43). Centr razvitiya nauchnogo sotrudnichestva.

Tsyplenkova, N. B. (2017). *Organizatsiya povtoreniya uchebnogo materiala* [Organization of repetition of educational material]. https://multiurok.ru/files/orghanizatsiia-povtorieniia-uchiebnogho-matieriala.html

Umanskaya, M. A. (2017). *Obzor tipov urokov: urok aktualizatsii znaniy i umeniy (urok povtoreniya)* [Overview of the types of lessons: the lesson of updating knowledge and skills (repetition lesson)]. https://www.informio.ru/publications/id3636/Obzor-tipov-urokov-urok-aktualizacii-znanii-i-umenii-urok-povtorenija

Vygotsky, L. S. (1982). Myshleniye i rech' [Thinking and speech]. In V. V. Davydov (Ed.), *Sobranie sochinenij v 6-I tomakh. Tom 2. Probleny obshchej psikhologii* [Collected works: In 6 vols. Vol. 2. Problems of general psychology] (pp. 5-361). Pedagogika.