



Столыпинский
вестник

Научная статья

Original article

УДК 740

DOI 10.55186/27131424_2022_4_9_1

**FORMATION OF TYPES OF PLANNING AND REFLECTION IN
SCHOOLCHILDREN OF THE FOURTH GRADE**

**ФОРМИРОВАНИЕ ВИДОВ ПЛАНИРОВАНИЯ И РЕФЛЕКСИИ
У ШКОЛЬНИКОВ ЧЕТВЕРТОГО КЛАССА**

Zak Anatoly Zalvanovich, leading researcher, Psychological institute of the Russian academy of education. Russia, Moscow.

Зак Анатолий Залманович, ведущий научный сотрудник Психологический институт Российской академии образования, Россия, Москва. e-mail: jasmin67@mail.ru

S u m m a r y

The article discusses the characteristics of planning (holistic, partial, initial level) and reflection (internal, meaningful and external, formal) among younger students (fourth grade). Based on the material of two author's methods with the participation of 105 schoolchildren, it is shown that planning, formed at a holistic level, is a condition for the implementation of acts of internal reflection in solving problems.

Аннотация

В статье рассматриваются особенности планирования (целостного, частичного, исходного уровня) и рефлексии (внутренней, смысловой и внешней, формальной) у младших школьников (четвертый класс). На материале двух

авторских методик с участием 105 школьников показано, что планирование, сформированное на целостном уровне, является условием осуществления актов внутренней рефлексии при решении задач.

Keywords: primary school graduates, planning characteristics, reflection characteristics, “Duck movement” method, “Exchange” method.

Ключевые слова: выпускники начальных классов, характеристики планирования, характеристики рефлексии, методика «Передвижения утки», методика «Обмены».

1.Introduction

The Federal State Educational Standard for Primary General Education, adopted in 2010 [7], contains provisions orienting the practice of teaching in the primary grades of school towards the achievement by children of various kinds of meta-subject educational results, including cognitive ones. Such results are associated, in particular, with the formation of the ability to plan and with the development of the initial forms of cognitive reflection.

An analysis of works devoted to the study of thought processes in the study of the peculiarities of solving creative problems by schoolchildren shows that, when elucidating the role of reflection in creative thinking, researchers focus on two of its types [6]. One of them is associated with mental operations that provide a solution to the problem, the other type is associated with the characteristics of the student solving the problem. It seems to us that such an approach provides for consideration of the solution of creative problems in two aspects: productive and operational. At the same time, less attention of scientists is directed to how a person acts in solving creative problems, what operations he performs in this case, related, in particular, to understanding the way of his own actions.

Insufficient, in our opinion, attention to the cognitive aspect of solving creative problems leads to the fact that psychologists do not always reveal the grounds constituting the characteristics of reflection acts, acts of a person turning to his own actions when achieving the desired result. Such grounds are either essential, necessary

connections of data available in the content of the proposed problems, or unimportant, secondary connections.

When a person, carrying out his actions to achieve the required result, takes into account the significant data connections contained in the condition of the problem, then the correct result will be obtained in a wide range of different conditions. When he takes into account only secondary, non-essential melon relationships, then the correct result will be obtained only in a very limited number of conditions.

Within the framework of this approach [1, 2], it is accepted that, when studying the process of achieving a result, it is not enough to note that a person performed acts of reflection. It is necessary to indicate the grounds that determine the nature of these acts: important, significant connections in the content of the task or unimportant, secondary.

We also assumed [3], when the development of a method for achieving a result is determined by important connections in the content of the task, then the acts of reflection will be internal (meaningful), meaningful, and when the development of a method is determined by unimportant, secondary connections, then the acts of reflection will be external, insufficiently meaningful .

It should be noted that both internal and external acts of reflection are carried out through actions that link the method of achieving the result with the nature of the content of the problem proposed for solving. This kind of binding actions are performed only mentally, because when solving a problem, a person either tries familiar way of solving it, or develops a new way.

In works related to the study of actions in children in an internal, mental form, two types of implementation of plans for solving problems were studied [4, 5]. In a number of cases, the child programmed his decision in such a way that each action was planned and carried out by him separately, without connection with other actions necessary to solve problems. This approach to programming actions in solving problems is characterized as partial planning.

In other cases, the child first developed a plan for the implementation of all the necessary actions to solve problems, and only then proceeded to their implementation.

Thus, before performing the first action, the child knew which action he would perform last. This approach to programming actions in solving problems is characterized as holistic planning.

The above provisions on the types of reflexive actions and types of planning formed the basis of an experimental study in which 105 fourth-graders took part.

The purpose of our work was to clarify the nature of the relationship between the types of reflexive actions and types of planning in the course of solving problems.

We assumed that if a child can carry out a holistic planning of solving problems, then this means that he has the ability to perform meaningful reflexive actions, but if he can only partially plan the solution of problems, then this means that he has the ability to perform only formal reflex actions.

2. Materials and methods

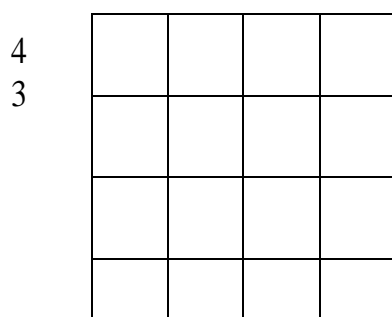
The study included two series of experiments: in the first series, the type of planning was determined when solving problems - integral or partial planning, in the second series - the type of acts of reflection that functioned in solving the proposed problems - internal or external reflection.

2.1. Contents of the first series of experiments

In the first series, we used the tasks of the Duck Movement methodology developed by us. To study planning, the methodology is designed in such a way that the main tasks gradually become more complex in terms of the number of actions and do not have a general principle of solution.

A group experiment on the material of the tasks of the “Duck Movement” methodology was carried out as follows.

While the children write their names on the task forms, the class organizer draws a square playing field of 16 cells or cells on the board (fig. 1):



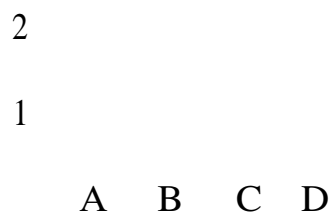


Fig. 1. Playing field

Children are told that each cell in this square has a name that comes from a combination of a letter and a number. Next, the organizer of the lesson first points to the four corner cells of the playing field (A1, G1, A4, G4), then to other cells, and the children answer by naming the indicated cells.

After the children have mastered the names of the cells of the field, they are told that a magic duck is moving through the cells. She takes different steps in turn: one step directly into the next cell (for example, from A1 to A2 or from A1 to B1), and the other - obliquely, for example, from A1 to B2. She cannot move the same way twice in a row and cannot jump over squares.

Next, the children are invited to hold the duck around the playing field in such a way that they name the cells, observing the rule of duck movements.

Then the content of the problem with two movements of the duck is depicted on the board: “First, the duck was in cell A1 (this is the initial cell). Then she took a step into some unknown cell. This cell is intermediate - it is indicated by an empty square. And from this unknown cell, she took a step into cell B3, the last one”.

Simultaneously with the presentation of the content of this task, the following characteristics of it are depicted on the board - the initial cell, the intermediate (unknown) and the final one (fig.2):

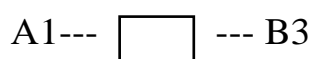


Fig. 2. The problem with two movements of the duck

“In this problem, you need to find out which cell the duck got into with one step from the initial cell A1, in order to then get to the final cell B3 with its second step.”

After discussing the possible correct steps of the duck - to cells A2, B2 and C1 - a cell is selected from which the duck can get to the final cell B3 with the second step (cell A2 is chosen, for example, although cell B2 is also suitable), and the solution is written down: “The answer is needed write to an empty cell”(fig.3):

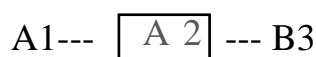


Fig. 3. Solving the problem with two movements of the duck

“In problems where the duck takes two steps (two actions), one intermediate cell is unknown and its name is written in an empty square, as we did on the board.

In problems with three movements of the duck, you need to find two cells (fig. 4), - after solving their designations, they are written in two free rectangles (fig. 5) ”:

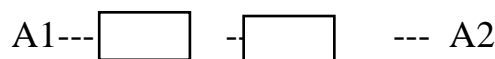


Fig. 4. Characteristics of the problem with three movements of the duck

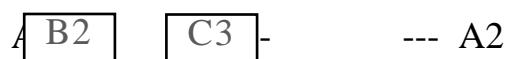


Figure 5. Solving the problem with three movements of the duck

In problems where the duck makes four movements, you should find three unknown cells (fig. 6) and write down the corresponding designations in free rectangles (fig. 7) ”:

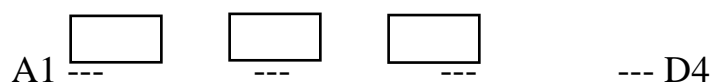


Fig. 6. Characteristics of the problem where the duck moved four times

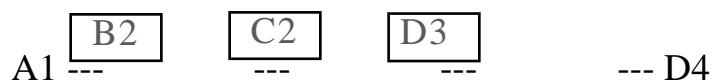


Fig. 7. Solving the problem where the duck moved four times

Then the children are told: “First, solve the preparatory problems and write down in the free figures the names of the cells you are looking for, applying the rule of movements of a duck that does not make the same movements twice.”

Next, the teacher, moving around the class, points out to the children the mistakes in the movements of the duck and after that suggests: “Start solving the main problems.”

Preparatory problems

1.A1--- --- B3 (2 actions)

2.B1--- --- C1 (2 actions)

Main problems

1.A4 --- --- --- ---D4 (3 actions)

1.C1 --- --- --- ---B4 (3 actions)

1.B1 --- --- --- ---A1 (3 actions)

1.B2 --- --- --- ---C3 (4 actions)

1.C4 --- --- --- ---C2 (4 actions)



1.A4 --- --- --- ---B3 (4 actions)

Fig. 8. Conditions of the two preparatory and six main problems

If the child successfully solved only two preparatory tasks and did not solve any of the main tasks, or solved not only the preparatory, but also any task with three actions, this means that the child has only an initial level of planning and no partial planning has been formed.

If the child successfully solved two preparatory tasks, as well as two or three tasks with three actions and one task with four actions, then this means that the child has formed partial planning.

If the child successfully solved two preparatory tasks, three tasks with three actions and two or three tasks with four actions, then this means that the child has formed a holistic planning.

The correspondence of these tasks to the objectives of the study was that some of them could be solved only at a partial level of planning, i.e. the structure of these tasks made it possible to plan and perform each executive action separately, without connection with the others.

Other tasks could not be solved with the help of this level of planning: it was necessary to outline all the actions as a whole, and only after the development of a general plan could they be carried out. These tasks were constructed in such a way that at first glance, different options for the first action seemed correct, but in fact only one option was correct.

2.2. Contents of the second series of experiments

In the series of experiments of our study, the experimental situation was used in two parts. In its first part, the subject was asked to solve three (four) tasks related to two classes or two subclasses of the same class. In the second part, after the successful solution of the problems, it was proposed to group them [3].

If the subject combined tasks on the basis of the similarity of external signs of their conditions or, on the contrary, considered the tasks different on the basis of differences in secondary, perceived signs, then it was assumed that he pointed to the external grounds for his actions. This meant that when solving problems, there were acts of external, formal reflection.

If the subject united tasks on the basis of their belonging to the same class (or subclass), relying on a single way to solve them, then, thus, his actions were determined by internal grounds. This testified to the functioning of acts of internal reflection in solving problems, to the allocation by the subject in the content of tasks of the initial relations that determine the construction of a successful action.

The children were asked to solve the problems of the methodology developed by us "Mutual exchange of signs".

At the beginning of the lesson, the organizer of the lesson depicts the condition of the problem on the board:

ZVG --- VZG

Then he says: "The letters on the left must be changed in one step so that they are located as on the right. One action is a mutual exchange of places of any two letters. In this problem, the solution is to swap the letters "Z" and "B".

The solution is the following:

ZVG --- VZG

1)VZG

After that, the organizer of the lesson depicts on the board the conditions of the second task, where the desired location must be obtained from the original one in two stages:

DMRS --- MDSR

The solution to this problem is analyzed collectively (first, the letters D and M change, and then P and C) and then written on the board:

DMRS --- MDSR

1)MDSR, 2) MDSR

At the same time, the organizer of the lesson specifically draws the attention of the children to the fact that only two letters change places in one action, and the rest are rewritten without changes.

Further, it should be clarified that in the first action (and, accordingly, in the second), you can also swap the other two letters, first C and R, and then D and M:

1)MDSR, 2) DMSR

After that, the children are given sheets with preparatory and main tasks.

Preparatory tasks

1. MLR --- LMR (one action).

2. S G N R B --- G S B R N (two actions).

Main goals

1. N D B G T L --- D N G B L T (3 actions).

2. C G S B T F --- B T F C G S (3 actions).

3. M L K Z X D --- L M Z K D X (3 actions).

Opinions

1. All main tasks are of the same type.

2. All the main tasks are different.

3. The main tasks of the 1st and 2nd are of the same type, the 3rd is different from them.

4. The main tasks of the 1st and 3rd are of the same type, the 2nd is different from them.

5. The main tasks of the 2nd and 3rd are of the same type, the 1st is different from them.

* * *

The organizer of the lesson says: “Look at the sheet. At the top are the 1st and 2nd preparatory problems, in the middle are the main problems 1, 2, 3, 4, 5 and 6. Now solve the preparatory problems. Write the solution as on the board.

Passing through the class, the teacher checks the solution of preparatory tasks, given that children often make mistakes without changing two letters at once in one action.

After completing the test, the children are told: “Now solve the main problems. After that, choose from five opinions about these problems one that you think is the most correct, and mark its number. Specify why you chose this opinion about the tasks”.

It should be noted that among the main tasks, the first and third are built according to the same principle: only neighboring letters are interchanged, and the second task is built according to a different principle: the letters that are in two are interchanged: the first with the fourth, the second with the fifth and the third with sixth. Here the fourth opinion about tasks is correct.

If the children, having correctly solved the three main tasks, chose the fourth opinion about the tasks, then this indicates that in solving them they carried out acts of internal reflection, generalizing the method for solving the first and third tasks as built on a single principle.

Other opinions about tasks related to grouping based on external features indicate the absence of acts of internal reflection in the solution.

If not all the main tasks are solved correctly, then it cannot be said whether acts of internal or external reflection took place when solving problems. In such cases, it was believed that there were no acts of reflection in solving problems.

3.Results

As noted, 105 students of the 4th grade took part in the study. At the same time, for technical reasons, they were divided into four groups: group A (26 students), group B (27 students), group C (24 students) and group D (28 students).

The data obtained in group experiments using "Duck movements" and "Mutual sign exchange" are presented in the table.

Table.

The number of children who are characterized by a holistic, partial and initial level of planning, as well as acts of internal, external reflection and its absence (in%).

4th	Types of planning	Acts of reflection
-----	-------------------	--------------------

grade students	Holistic	Partial	Initial level	Internal	External	Absence of reflection
Group A(26 st.)	53,9	34,6	11,5	38,5	42,3	19,2
Group B(27 st.)	48,1	37,1	14,8	29,6	48,2	22,2
Group C(24 st.)	50,0	37,5	12,5	33,3	45,9	20,8
Group D (28 st.)	46,4	35,8	17,8	28,6	46,4	25,0
Groups A,B, C, D (105 st.)	49,5	36,2	14,3	32,4	45,7	21,9

Consideration of the data presented in the table creates grounds for a number of statements.

Firstly, it is noteworthy that in different groups of fourth-graders there is a different number of children who, when solving the problems of the “Duck Movement” methodology, carried out integral and partial planning, and also showed the initial level of planning (it is enough to compare, for example, the results of groups A and D).

A similar difference is observed between the groups of children who performed acts of internal and external reflection in solving the tasks "Mutual exchange of signs".

Secondly, as the results obtained and the analysis of the protocols for solving problems show, all the children who performed acts of internal reflection in solving the problems "Mutual exchange of signs" 32.4% of the students (34 people) completed a holistic planning in solving problems for the movement of a duck. This means that indeed, as expected, the ability to carry out integral planning is a necessary condition for the implementation of acts of internal reflection.

At the same time, it is also important to note the fact that, as follows from the analysis of the protocols for solving problems, an insignificant part of the children - 34.6% of students (18 people), among those who carried out holistic planning, solving problems, 49.5% of students (52 people), performed acts of external reflection.

These facts allow us to assert that integral planning is a necessary but not sufficient condition for the implementation of acts of internal reflection.

A number of conditions can be considered that could conceivably contribute to ensuring that all children who have the opportunity to carry out holistic planning can perform acts of internal reflection.

Firstly, one of these conditions may be the form of actions in which it is proposed to solve problems - subject-effective (associated with operating real objects), visual-figurative (associated with operating images of objects) or verbal-sign. (associated with the operation of words and all sorts of signs and symbols).

In a number of experimental studies [6], it was shown that when solving problems in a verbal-sign form, the identification of the content of problems important, significant for achieving the desired result of relations is carried out by children less often than when solving in a visual-figurative form and, moreover, in a object-effective form.

Therefore, it can be assumed that if the solution of the problems of the "Mutual exchange of signs" methodology is organized not in a visual-figurative form (as it was in our study), but in an objective-effective form, when it will be possible to operate with cards with signs, and not just their images (i.e., when, according to the rules of the exchange of signs, it will be possible to move cards), then there will be more children who perform acts of internal reflection when solving problems.

In further research, it is planned to use tasks that can be solved in a object-effective form.

Secondly, the complexity of the proposed tasks, related, in particular, to the number of actions that need to be performed to solve the problem, can also affect the ability of children to carry out acts of internal reflection.

It can be assumed that if students solve the problems of "Mutual exchange of signs" with not three, but two actions, then there will be more children performing acts

of internal reflection. In further studies, we plan to give children tasks of the "Mutual exchange of signs" technique, which can be solved in two steps.

Thirdly, another important condition affecting the ability to perform acts of internal reflection when solving problems is the age of students. As shown in our studies [3], the older the students, the more among them those who are able to perform acts of internal reflection.

In the future, we plan to offer the same tasks of the "Mutual Sign Exchange" methodology that were used in our study to students in the fifth and sixth grades.

4. Conclusion

Thus, the study made it possible to establish new facts characterizing the relationship between planning and reflexive actions in solving problems.

It is shown, on the one hand, that the ability of fourth-grade students to carry out integral planning when solving problems is a necessary condition for their performance of acts of internal reflection (since, as the study showed, all children who carried out such acts had holistic planning).

On the other hand, this possibility also acts as an insufficient condition, since some of the students, among those who were able to carry out holistic planning, carried out acts of not internal, but external reflection.

In general, it should be noted that the facts found in the study expand the understanding of developmental and educational psychology about the features of the development of mental abilities of younger students, in particular, about the presence of different relationships between types of planning and types of reflection in primary school age.

Literature

1. Davydov V.V. Lectures on general psychology. – Moscow.: Academy, 2005.
2. Davydov V.V. Lectures on educational psychology. – M: Academy, 2006.
3. Zak A. Z. Thinking of a junior schoolchild. – St. Petersburg: Assistance, 2004.

4. Isaev E. I. Planning as a central component of theoretical thinking // Psychological and pedagogical research, 2010, Vol.2, No. 4. p.p. 148 – 156.
5. Ponomarev Ya. A. Psychology of creativity and pedagogy. Moscow: Pedagogy, 1976.
6. Semenov I.N. The trend of psychological development of thinking, reflection and cognitive activity. М.: MPSI; - Voronezh: Publishing House of NPO "MODEK", 2000.
7. Federal State Educational Standard of Primary General Education / Bulletin of Education of Russia. 2010. No. 2. pp. 10 – 38.

Литература

1. Давыдов В.В. Лекции по общей психологии. – М.: Академия, 2005.
2. Давыдов В.В. Лекции по педагогической психологии. – М.: Академия, 2006.
3. Зак А.З. Мышление младшего школьника. – Спб.: Содействие, 2004.
4. Исаев Е.И. Планирование как центральный компонент теоретического мышления // Психологические и педагогические исследования, 2010, том.2, №4, С.148 – 156.
5. Пономарев Я.А. Психология творчества и педагогика. М.: Педагогика, 1976.
6. Семенов И.Н. Тенденция психологического развития мышления, рефлексии и познавательной активности. М.: МПСИ; - Воронеж: Изд – во НПО «МОДЕК», 2000.
7. Федеральный государственный образовательный стандарт начального общего образования // Вестник образования России. 2010, №2, С.10 – 38.

© Зак А.З., 2022 Научный сетевой журнал «Столыпинский вестник»
№9/2022

Для цитирования: Зак А.З. ФОРМИРОВАНИЕ ВИДОВ ПЛАНИРОВАНИЯ И РЕФЛЕКСИИ У ШКОЛЬНИКОВ ЧЕТВЕРТОГО КЛАССА// Научный сетевой журнал «Столыпинский вестник» №9/2022