

## РАЗДЕЛ V. ПЕДАГОГИЧЕСКАЯ ПСИХОЛОГИЯ

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### КОГНИТИВНЫЕ СТРАТЕГИИ ПРИНЯТИЯ РЕШЕНИЯ ШКОЛЬНИКАМИ И ИХ ВЗАИМОСВЯЗЬ С УСПЕШНОСТЬЮ ОБУЧЕНИЯ

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#### COGNITIVE STRATEGIES FOR DECISION-MAKING BY SCHOOL CHILDREN AND THEIR INTERCONNECTION WITH THE SUCCESS OF LEARNING

*Аннотация.* В статье представлены результаты исследования когнитивных стратегий принятия решения школьниками. Показано, что обучение школьников выбору эффективной когнитивной стратегии принятия решения может помочь повысить успешность обучения, определить для каждого индивидуальный образовательный маршрут. Разработана теоретическая модель, которая включает в себя когнитивные стратегии принятия решения, когнитивные стили личности, структуру учебной деятельности и определяет успешность обучения. Выявлена взаимосвязь между когнитивными стратегиями принятия решения и успешностью обучения, которая детерминирована особенностями возраста: самостоятельностью в принятии и удержании задачи, активностью в постановке цели и ее реализации, особенностью контроля над процессом и результатом исполнения, характером выбора одной из альтернатив в ситуации принятия решения. Результаты формирующего эксперимента выявили значимые различия в следующих когнитивных стратегиях принятия решения: «планирование решения проблемы», «принятие ответственности», «бегство — избегание»; позитивные изменения успешности обучения, улучшение его качества являются следствием использования личного портфолио, которые включают пять разделов, направленных на развитие успешной личности.

*Abstract.* The article presents the results of studying cognitive strategies of decision-making by school children. It is shown that teaching school children to choose the most effective cognitive strategy of decision-making can stimulate higher success of learning and direct every pupil onto his own educative route. Theoretical model including the following components: cognitive strategies of decision-making, cognitive styles of personality, learning activity structure — were developed. The definition of the concept “success of learning” was given. The interconnection between cognitive strategies of decision-making and success of learning was revealed. It is stated that it is determined by the age peculiarities: independence in accepting and retention of the task, activity in goal-setting and its implementation, specificity of controlling the process and the result of implementation, the way one of the alternatives is being chosen in decision-making situation. The results of the experimental work aimed at forming cognitive strategies of decision-making showed that there are significant differences in such strategies of decision-making as: planning the solution of the problem, taking responsibility, escape — avoidance. Positive changes in the success of learning, improvement of its quality are the consequence of using personal portfolio which has five sections aimed at developing a successful personality.

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*Ключевые слова:* выбор, когнитивные стратегии принятия решения, успешность обучения, школьники.

*Key words:* choice, cognitive strategies of decision-making, success of learning, school children.

The success of learning is determined by the interrelations between different parameters in the evaluation of the result of education: quality of knowledge, the level of formation of skills, development of abilities, value orientations, the degree of compliance of these parameters with the possibility and result of practical use in the life and career.

Compared with a large number of studies devoted to the decision process, the issue of cognitive strategies of decision-making by high schoolers in learning activities attracted little attention of the researchers.

A significant part of high school teens appear not to be prepared in their school life to take adequate decisions when they have to make a choice that should most tailored to the individual features of the personality. Such compliance determines the success of the school learning.

The present study focuses on the currently insufficient number of researches in cognitive strategies for the decision making in adolescent schoolchildren. Training the students to make choice of effective cognitive strategies for decision-making can help improve the success of learning for a student and to identify individual educational route.

**The objective of this research:** to identify the relationship of cognitive strategies of decision-making with the success of learning adolescent schoolchildren.

**The target of this research:** the cognitive sphere of a high schooler.

**The subject of this research:** cognitive strategies of decision making related to the success of learning.

**Methodological and theoretical basis** of this research are the concept of functional-level regulation of the decision making (T.V. Kornilova); the theory of cognitive styles of personality (M.A. Kholodnaya); assessment of student's learning activities (N.F. Kruglova); approaches to the assessment of training success (N.G. Alexeev, V.V. Davydov, N.A. Menchinskaya, Ya. A. Ponomarev, V. P. Simonov, B.D. Shadrikov and

others); model of self-organization of time management and life of teenagers (L. B. Schneider); conceptual framework and varied models of psychological support of the learning process (M.R. Bityanova, I.P. Slobodyanik, S.G. Shevchenko and others).

**Methods of research.** Theoretical analysis of psychological and educational literature references; conversation, observation; methods of cross sections and longitude; formative experiment, expert evaluation; statistical approach to the empirical data (average data.; Fisher's criteria; t-criteria by Student; methods : (1) «Test of free sorting of subjects» by Gardner (modifications by Kolga); (2) «Embedded figure» by G. Witkin; (3) «Comparing similar pictures» by J. Kagan (junior variation); (4) «Word-color interference» by Stroop; (5) «The procedure of differentiated result» by Obermeyer and Linvik, modified by us.

**The empirical framework of research.** The study was conducted among the school children of classes from 5<sup>th</sup> to 9<sup>th</sup> (10 — 15 y.o.). The experiment was attended by 140 students of high school and gymnasia, 37 teachers of primary school and subject teaches, 120 high schoolers participated in the longitude research of 5 years period, from 5<sup>th</sup> class to 9<sup>th</sup> class (10-16).

Theoretical analysis of the problem enabled us to create and substantiate the elements of a working model of the studied phenomenon.

The created theoretical model that includes cognitive styles of personality, implemented in the structure of training activities and revealed in certain cognitive strategies for decision making most fully reflects the system of elements that influence the success of learning.

The experimental work combined the five-years longitude (for tracing the changes during the transfer from early adolescence to older adolescence) and method of cross sections (for the study of micro-age dynamics: a comparison of these pupils in their fifth, sixth, seventh, eighth and ninth grades, i.e. 10-11 y.o., 11-12 y.o., 12-13 y.o., 13-14 y.o. 14-15 y.o. ).

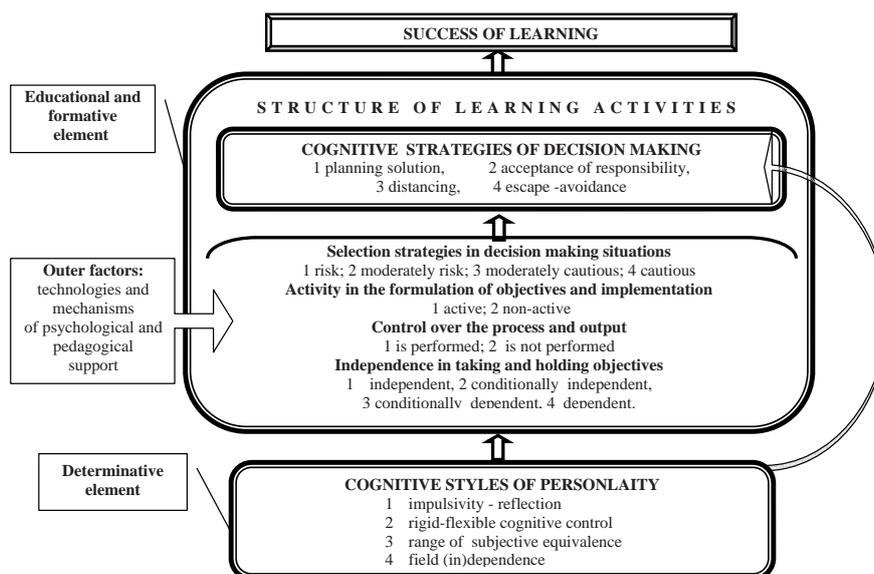


Fig. 1. Theoretical model of interrelation of cognitive styles of student's personality and the success of learning

Survey program included a study of: 1) cognitive styles of personality, 2) personal characteristics in a situation of decision making, and 3) the level of intellectual development, and served as the basis for the selection of cognitive strategies for decision making.

For the diagnostics of cognitive styles in the framework «Impulsiveness — reflexivity» we used 10 tables of J. Kagan's techniques, junior option [7].

Gymnasium classes for teens are characterised by the «reflective» style of response, general education classes show mostly the «impulsive» style; the second largest number are «reflective» and «slow / inaccurate» ones. In the gymnasium classes there was definitely less ( $p < 0,001$ ) number of the «slow / inaccurate» students; in the «fast / accurate» style no significant differences were found.

The difficulty of objective assessment in terms of «impulsivity-reflexivity» lays in the principle of separation of groups within the class of the median criterion, therefore the students with the same parameters the average time and total number of errors in different classes may be found in different groups.

We performed the combination of samplings from the gymnasium and general education classes. As a result, there was a change of the median criteria of the average response time and number of errors. Further, all high school students were

divided into the four mentioned groups, and then divided again in those grades as mentioned above (both in gymnasia and general school).

Comparing the results before and after the merger of groups of gymnasia and secondary school high-school classes, we consider it necessary to mention the sustaining trend in the prevalence of high-school students with the characteristics of «reflective» in gymnasia classes, and with the characteristics of «impulsive» style in general school classes. However, there were changes within the «fast / accurate» and «slow / inaccurate» ones. There was a significant difference ( $p < 0,01$ ) between all these groups in gymnasia and general school.

We used the technique of R. Gardner «The test of a free sorting objects», modified by V. Kolga for the diagnostics of style «range of subjective equivalence» [6, p. 61]

In the gymnasium classes significantly ( $p < 0,01$ ) prevail the «categorizers» (50%) — the high school students use strict and highly generalized sort criteria in combination with low amounts of variability of selected groups volumes, the «differentiators» rank second; in the general school classes — «detailisators» (47%) as they tend to combine the objects based on the situational or subjectively meaningful criteria.

We used G. Witkin's technique «embedded figures» [6 p., 47] for diagnostics of cognitive

types in the framework of cognitive style «field (in)dependence».

Among the high-school students in gymnasium classes there significantly prevail ( $p < 0,01$ ) the «mobile field independent» (high rate of learning and higher speed of assignments fulfillment). In general school the largest group is of «fixed field independent», the difference from the «mobile field independent» lays in the analytical cognitive images: tendency to detail and differentiate their educational experiences, orientating to relevant elements of the perceptual material.

Style «rigid — flexible cognitive control» was diagnosed with the test «word-color interference» (Stroop, 1935) [6 p., 68].

In the gymnasium classes there prevail the students relating to the pole «flexibility» — 40%, in the general school classes — «rigid» — 43%. Besides that, the students of gymnasium classes spend less time on fulfilling the tasks as compared to general school students. The obtained results prove the correlation of low interference (flexibility) and the prevailing field independence (Jencen, Rohver, 1966).

So, there were revealed the types of cognitive styles of personality, which are the heuristic tool for determining the success of learning; thus «flexible» show higher success in learning and field independence; the pole of rigidity correlates with lower success in learning; field independence correlates with analyticity in decision making; «analysts» base themselves primarily on explicit physical properties of objects, while the «synthetics» (wide range of equivalence) rely on hidden, extra values of objects.

We used the modified by us «The procedure of differentiated result» J.V.Overmeier, D. Linwick [8] to identify individual differences in behavior in a situation of decision making.

In accordance with the subjective evaluation of uncertainty of the choice conditions, the students are divided in four groups: «risky», «moderately risky», «moderately cautious», «cautious» [2].

In the gymnasium classes there prevail the groups of «cautious» (37%) and «risky» (28%), they are followed by «moderately cautious» and «moderately risky» (19% and 16% accordingly). In the general school classes the first place is with «risky»

(40%), then go the «moderately cautious» (23%), «moderately risky» (19%), «cautious» (13%).

The analysis of the results of the experimental study (fig. 2) reflects the individual and personal characteristics of the high school students influencing their success of learning.

In accordance with the mentioned criteria we distinguish following cognitive strategies for decision making [1]:

**1. «Planning solution» (independent/active)**

The high school students of this group are field independent, flexible, fast/accurate, moderately risky in decision making, independently take the task and hold it in the course of the task execution. They plan their actions independently before the start and stick to the plan. During the task execution they sometimes step aside in details, retaining the overall sequence of actions, necessarily achieve the target result. Ways of work are recognizable (conscious) and stable. The student obligatorily correct the noticed mistakes during their work and check the result. They do not need assistance, but if offered, can use it adequately. Successfully use all kinds of learning materials.

**2. «Acceptance of responsibility» (dependent/active).**

Students of this group are field independent, flexible, reflective, moderately cautious in decision making, as a rule, dependent, in the course if their work change their plan several times. It is noted some difficulty in the allocation of significant features, ways of work are recognizable (conscious) and stable, but insufficiently generalized. Due to their mistakes cannot always get the target result. With strengthening control and with offered assistance the students optimize and improve their activity very quickly and achieve positive results. They work successfully with oral materials.

**3. «Distancing» (independent/not active)**

The high school students of this group are filed dependent, rigid, impulsive, risky in the situation of decision making, try to plane their activity before the start of the work, but do not bring it to the end and as a rule violate the plan grossly. Have difficulty with in the allocation of significant conditions, seldom see and correct their mistakes independently, seldom check the result, need assistance and additional control over their activity.

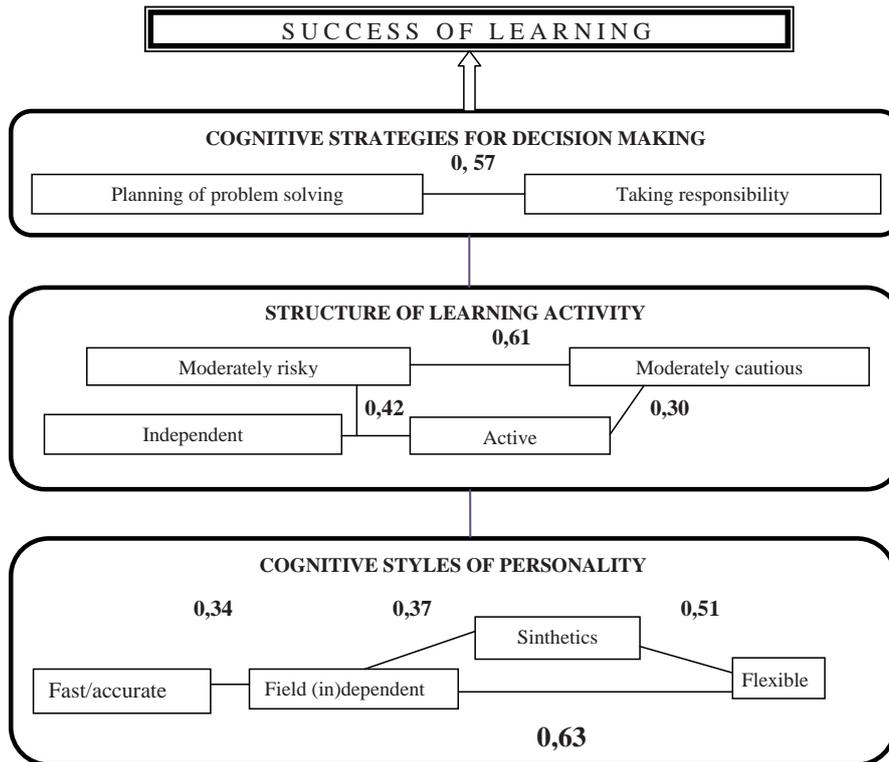


Fig. 2. Scheme of correlation (by t-criteria, Student)

**4. «Escape — avoidance» (dependent/not active)**

The high school students of this group are filed dependent, rigid, slow/inaccurate, cautious in decision making, characterized by undirected independence, cannot plan their activity, need significant time and support for orientation in setting and finding ways to execute the task. Students form ineffective and largely illustrative

ways of working, need assistance and step-by-step arrangement of their activity, not always realize it and often unable to use it. Successfully carry out work only with visual teaching materials.

The results of the experimental study on the dynamics of cognitive strategies of decision making are presented in the Table 1.

Table 1

**The results of the experimental study (by  $\phi$ -criteria, Fisher)**

	5th grade	6th grade	$\phi$	6th grade	7th grade	$\phi$	7th grade	8th grade	$\phi$	8th grade	9th grade	$\phi$
«escape — avoidance»	33	40	0,98	40	38	0,28	38	43	0,68	43	41	0,27
«planning of problem solving»	35	28	1,03	28	21	1,12	21	16	0,90	16	25	1,55
«taking responsibility»	20	17	0,54	17	18	0,18	18	26	1,34	26	24	0,32
«distancing»	32	35	0,43	35	43	1,10	43	35	1,10	35	30	0,73

Note: \* —  $p < 0,05$ ; \*\* —  $p < 0,01$ ; \*\*\* —  $p < 0,001$

The effectiveness of the program of psychological-pedagogical support of was assessed by comparing the experimental and control groups [4]. The result of the program was manifested

by changes which occurred in the experimental group (general school and gymnasium classes) as compared to the control group (general school and gymnasium classes).

The process of teaching students to make a successful decision in all life situations is based both on general psychological principles and on psychological support of students' behavior which promotes effective decision making affecting the success of the individual in any activity. This enabled to distinguish the mechanisms of psychological and pedagogical support enhancing the success of learning.

*I Mechanism for matching teacher's psycho-pedagogical knowledge and skills with student's cognitive strategies for decision-making .*

*II Mechanism for matching teaching task with student's cognitive strategies for decision-making.*

*III Mechanism for synergistic effect of learning group.*

The structure of psychological-pedagogical support of includes: a theoretical basis (goal setting, a concept adequate to the goals of a particular technology, the hypothesis of its implementation, the planned result); procedural part of the (process), which is presented as a process map — description of process in the form of step-by-step sequence of actions with indication of intermediate result in each unit of technological chain, of the used ways, criteria and means of diagnostics, variants for correction.

The formation of cognitive strategies for decision making which improve learning success: «planning solution» and «acceptance of responsibility» has the following technological chain: provision of information on the basics of decision-making process in the educational activ-

ity — involving the students in the practice of effective decision making — awakening experience the joy of success and disappointment the decision of non-constructive options — gaining confidence in the actions — independent and informed choice of position or action, characterized by the lack of «riskiness» — drafting memos which provide the students with modes of action in various situations in the classroom.

Stages of development of psychological-pedagogical support of successful learning:

1. Identification of cognitive discrepancy between the subjects of the educational process reducing the success of learning.
2. support for the successful interaction between the subjects within the various groups, development of autonomy, leadership qualities of students, prevention and removal of psychological overload of students and teachers, assessment of the effectiveness of the model of psychological and pedagogical support.
3. psychological education, education, examination. It is necessary to implement a program of psychological support for students' personal growth, professional development of the teachers.
4. timely adjustment of educational itinerary for the students.

In the course of psycho-pedagogical support there were implemented all necessary steps and the following results were obtained (Table 2).

Table 2

The result of experimental study (by  $\phi$ -criteria, Fisher)

	experimental	control	$\phi$
<b>Before the experiment</b>			
«escape –avoidance»	19	22	0,58
«planning solution»	14	11	0,68
«acceptance of responsibility»	9	15	1,38
«distancing»	18	12	1,27
<b>After the experiment</b>			
«escape –avoidance»	4	18	3,49**
«planning solution»	22	12	2,05*
«acceptance of responsibility»	28	18	1,89*
«distancing»	8	14	1,43

Note: \* —  $p < 0,05$ ; \*\* —  $p < 0,01$ ; \*\*\* —  $p < 0,001$

We analysed the changes in learning success of the students after the completion of the program of psychological-pedagogical support. There occurred positive shifts in learning success both in the experimental and control groups. The changes were marked mainly in the gymnasium class: the average score increased by 0.2 score, the level of education stayed the same and marked as 100%, quality of learning increased from 48% to 56% in gymnasium class and from 35% to 42% in general school class.

During the experimental work all the hypotheses put forward were confirmed.

The conclusion summarizes the main findings of the research and formulates the main outputs.

1. Theoretical analysis of the psychological and pedagogical sources showed that insufficiently studied cognitive strategies for decision making of school students do not lead to the success in learning.
2. There has been worked out a theoretical model which includes cognitive strategies for decision making, cognitive types of personality, teaching activities structure and determinates the success of learning.
3. There was found out the interconnection between the cognitive strategies for decision making and the success of learning which is determined by the characteristics of age: by independence in taking and holding the task, by activity in setting the goal and its realisation, by control over the process and the result of performance, by the nature of selecting one alternative in the situation of decision making.
4. There were determined the conditions and there was detected the dynamics of formation of cognitive strategies for decision making of the high school students from uncertain unstable to the determined and efficient which influences the success of learning; there were distinguished four types of cognitive strategies for decision making which have different interrelations with the success of learning.
5. There was produced the program of specially designed and organised psycho-

logical-pedagogical support significantly promoting the intensive formation of cognitive strategies for decision making which positively affect the success of education.

6. The results of the formative experiment brought out the significant differences in the following cognitive strategies for decision making: «planning solution», «acceptance of responsibility», «escape — avoidance»; the positive changes in the success of learning and the improvement of its quality are the consequences of using the personality portfolio consisting of five sections aimed at the development of successful personality [5].
7. Based on the program of psychological-pedagogical support of learning process, the participants of the educational process — students, parents, teachers — were offered the recommendations allowing to work out certain cognitive strategies for decision making in the educational activity.

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