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Diagnostic support for the development of logical thinking of primary school students

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Abstract. The current State Standard of General School Education of the Kyrgyz Republic establishes the main goal of primary school – the formation of educational universal actions, among which cognitive ones are of particular importance, including logical ones (analysis, synthesis, comparison, generalisation, abstraction). Increasing their level in students actualises the process of developing logical thinking, an integral part of which is diagnostics and diagnostic support for its implementation. The purpose of the article was to select and substantiate diagnostic support for the development of logical thinking in primary school students and to test it. The study involved methodological approaches (competence, activity) and methods of scientific knowledge, including theoretical (analysis of psychological and pedagogical literature), empirical (experiment, observation, measurement, comparison, description) and mathematical (statistical processing of experimental results). A pedagogical experiment was conducted to identify the advantages of diagnostic methods for individual logical operations and logical thinking in general during a fact-finding experiment using the example of determining the level of development of logical universal learning activities in primary school students of state-funded school No. 8 and the private school Bright in Bishkek. Based on the analysis of statistically processed results of the experiment, the following conclusions were made: the initial level of logical thinking is not the same among primary school students and for many of them it is insufficient for successfully achieving the final results required by the educational State Standard; the greatest advantages for implementing the ascertaining experiment were possessed by the method of F. Carter and K. Russell with the corresponding diagnostic tools; for the formative (developmental) experiment, diagnostic methods of individual logical operations were preferable, the features of the properties of which allow combining logical (training) five-minute sessions and monitoring elements in lessons

Keywords: logical operations; diagnostics; diagnostic tools; cognitive universal educational activities

■ INTRODUCTION

In the context of globalisation and the desire for a single educational space, society, rejecting “knowledgeable graduates”, needs “skillful, creative graduates” who are characterised by a high level of non-standard, logically thought-out solutions and self-development of cognitive processes. And in the current State Educational Standard of General School Education of the Kyrgyz Republic (2022), mental

education in primary school implies the formation and development of universal educational actions (UEA). They include cognitive, regulatory, personal, communicative actions. Each of them also has a complex structure. Thus, in the structure of cognitive UEA, the following are distinguished: general educational EA, problem setting and solution, logical EA. For successful completion of logical UEA,

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students must master the basics of logical thinking, learn to build conclusions based on the generalisation of the information received, independently draw conclusions, substantiate their judgments and independently seek a solution to the emerging problem (Soldatova & Lavrova, 2019; Shmeleva *et al.*, 2020).

It follows from the analysis of psychological and pedagogical literature that the development of logical and other cognitive skills and actions is most productively carried out in primary school age. It is at this age that the school student has the greatest reserves for the development of cognitive processes (Di Martino *et al.*, 2024). When entering school, the leading activity for children is learning. At the same time, they begin to participate in new types of interpersonal relationships, which is accompanied by the development of new psychological qualities, the formation of UEA.

Quite a large number of scientific studies have been devoted to the consideration of the essence of different types of UEA and their formation, among which are Zh. Charnetskaya (2019), E. Chirkova (2019) and others. The work of A. Gutsko (2020) reveals the results of studying the conditions, means and methods of forming logical UEA, which involve appropriate mental operations and logical thinking. The study by N. Usupova & Zh. Abdyraeva (2022) noted that pedagogical education plays a key role in the development of Kyrgyzstan, determining both the education of citizens and the success of various areas of the country's life. The authors examine the history of pedagogical education in the republic and emphasise the need for its deep modernisation in the context of globalisation. In the system of higher pedagogical education of the Kyrgyz Republic, the problem under study is currently given special attention, since the success of reforms in the educational sphere directly depends on the high-quality training of teaching staff and their activities aimed at the formation of UEA, including logical EA and logical thinking in students.

From the analysis of the above works, it follows, explicitly or implicitly, that the formation of any type of UEA largely depends on the high-quality methodological training of teaching staff, on the level of their proficiency in professional competencies that correspond to modern social values (Bida *et al.*, 2019; Tovkun & Lohvytska, 2025). Despite the large body of research on the problem of the formation of all types of universal learning activities and logical ones in particular, many of its aspects still remain insufficiently studied. For example, little attention has been paid by scientists and practitioners to the issues of diagnostics and monitoring of UEA. This fact has been noted by many scientists, including L. Peterson *et al.* (2016) in a teaching aid that describes diagnostic procedures and keys for processing the obtained data, and contains materials for the practical implementation of a comprehensive diagnosis of the levels of development of UEA (regulatory, communicative, cognitive) of primary school students. The study by Sh. Pashayeva (2021) also proves the need to expand opportunities and improve diagnostic support for the learning process. The author argues that due to lack of time

in lessons, schools often neglect diagnostics of the level of UEA, and therefore suggests using “five-minute logical sessions” as a means of development and a tool for diagnosing logical UEA. The advantage of “five-minute logical sessions” is that they allow teachers to follow the curriculum, improve the level of students’ performance of individual logical operations and simultaneously track changes in the ability to perform them in the process of educational activities without creating overload.

Based on the above, the contradictions characteristic of modern education are highlighted between the needs of society for logically thinking and active individuals and the insufficient effectiveness of the educational process for their development in primary school, as well as the interest in diagnosing their level in the formation of logical thinking in primary schoolchildren and the insufficient elaboration of the possibilities of practical implementation of these issues in the UEA of state and private schools. The identified contradictions allowed for the formulation of the purpose of this study: to select and justify diagnostic methods with appropriate diagnostic support for determining the level of individual logical operations and logical thinking in younger schoolchildren and to conduct a comparative analysis of the possibilities and preferences of their diagnostic support based on the results of a pedagogical experiment.

■ MATERIALS AND METHODS

To achieve this goal, theoretical methods were used, including the analysis of scientific and theoretical literature on pedagogy and psychology, which made it possible to establish the expediency of choosing diagnostic methods and diagnostic support for the formation of logical thinking and its individual components necessary to perform logical UEA required by the State Standard of General School Education of the Kyrgyz Republic (2022). The study of diagnostic methods and their capabilities allowed them to be classified by purpose and place of application. It was found that some of them are aimed at determining the level of mastery of a single logical operation by a schoolchild, while others help to determine the level of development of several operations and logical thinking in general. The comparison method allowed for the establishment of the advantages of some of these methods and the preparation of the necessary diagnostic tools for their use in carrying out a particular stage of the experiment. At the same time, the functions of pedagogical diagnostics (controlling (evaluative), developing, informational, corrective, stimulating, predictive) were noted. From the standpoint of these diagnostic functions, the possibilities of logical five minutes were justified to identify the level of mastery of a logical operation by a student and simultaneously develop the skills to perform this operation, that is, to increase this level. Due to the fact that universal learning activities were based on the principles of the competence paradigm, competence-based and activity-based approaches were used in the study.

In addition, empirical (testing, questionnaires, pedagogical experiment) and mathematical methods (statistical

processing of results) were used, which made it possible to determine the level of development of skills to perform logical UEA in primary school students. Diagnostic support was developed for the experiment, including, among other things, diagnostic tools. It included: answer sheets, forms with questionnaires or tests (subtests), tables with assessment criteria and with the distribution of points by levels of mastery of each of the six logical operations, as well as a layout of a summary multifunctional table for entering the general results of testing (questionnaires). Experimental work was carried out in 2024 in class 4a of the state-funded Secondary School No. 8 with the participation of 25 students and in class 4a of the private school Bright with the participation of 22 students. In addition to the authors, teachers N. Mgoeva (Secondary School No. 8) and V. Eralieva (Bright School) participated in the assessment of the level of logical thinking and individual logical operations among students. The analysis of the statistically processed experimental results allowed for the statement that the use of diagnostic methods chosen by the authors with prepared didactic and diagnostic equipment is one of the ways to solve the problem of the formation of logical thinking and its components. The pedagogical expert was familiarised with the Code of Ethics of the American Sociological Association (2018) and the European Commission's guidance note on ethics and data Protection (2021).

■ RESULTS AND DISCUSSION

A great contribution to the solution of the problem under study was made by the author N. Menchinskaya (1989), who believes that the leading role in the development of logical thinking belongs to purposeful and systematic education and training in logical operations with a systematic approach to the pedagogical process. Despite the large layer of research in this area, there is still no unambiguous definition of this concept. Adhering to the vision of N. Menchinskaya (1989), R. Nemov (2018), and others, logical thinking is defined as the ability and skill of primary school students to independently perform simple logical operations. From this point of view, the structure of the concept of "logical thinking" includes: analysis, synthesis, comparison, classification, abstraction, generalisation.

Modern development of society and changes in the education system put forward new requirements for the process of personnel training. In the context of the implementation of educational standards of the Kyrgyz Republic, the main goal of primary school is the formation and development of universal educational actions (UEA). Among them, logical UEA are of particular importance, since they contribute to the development of school students' thinking abilities and their logical thinking. Table 1 provides brief ideas of scientists about the essence of the components that make up the concept of "logical thinking" and represent logical operations.

Table 1. Brief description of logical operations

No.	Logical operation	Definitions of logical operations
1	Comparison	Comparison of objects and phenomena with the aim of finding similarities and differences between them. "We know any object only by equating it with something and distinguishing it from something" (Ushinsky, 1974).
2	Analysis	The dismemberment of an object, mental or practical, into its constituent elements, followed by their comparison (Nemov, 2018).
3	Synthesis	Restores the whole dismembered by analysis, revealing more or less essential connections of the relationship of the elements identified by analysis. "Analysis and synthesis are the common denominators of the entire cognitive process" (Rubinstein, 1989).
4	Abstraction	Abstraction is the selection, isolation and extraction of one aspect, property, and moment of a phenomenon or object, essential in some respect, and its abstraction from the rest (Rubinstein, 1989).
5	Generalisation	"Generalisation is the rejection of individual features while preserving common ones with the disclosure of essential connections" (Blonsky, 1935).

Source: developed by the authors

It follows from the Table 1 that all logical thinking operations are closely interconnected, and their effective formation is possible only in a complex. For formation, as for any other process, appropriate conditions are necessary. One of the main pedagogical conditions for the implementation of the process of formation and development of logical thinking is the organisation of complex monitoring of school students' achievements using appropriate methods for diagnosing the level of mastery of logical operations. Diagnostics is an accurate definition of the results of the process, with the help of which it is possible to determine the achievement of the set goals. In this case, the results are considered taking into account the methods of their achievement, both the trends and the dynamics of the process are identified.

Currently, there are a significant number of diagnostic methods for determining the level of logical thinking and its constituent components. For example, the "Definition of Concepts" method establishes the level of mastery of the ability to abstract. The ability to generalise and concretise can be determined using the "Sequence of Events" method. The "Exclusion of Concepts" method allows for checking the ability to perform three operations (analysis, synthesis, and classification). With the help of L. Chuprov's (2009) "Inference by Analogy" method, the ability to compare is tested. Using the method of P. Carter & K. Russell (1998), it is possible to establish the level of development of six logical operations. The method A. Zak (1995) is able to assess the level of formation of the logical operation "comparison". From the above, it is clear that there are several

methods for assessing the level of each of the logical operations: some methods are aimed at checking the level of mastery of one logical operation, others – several.

The authors of this article tested the features and advantages of the last three of the above-mentioned diagnostic methods in a pedagogical experiment. They developed and tested diagnostic support for using each of them and demonstrated their importance in developing logical thinking and individual logical operations. In addition to a description of the diagnostic itself and a model of the protocol for its implementation, the diagnostic support included diagnostic tools, including a school student's answer sheet to

questions in a questionnaire or test, forms with test tasks, tables with evaluation criteria and distribution of points by levels of mastery of a logical operation, as well as a model of a summary multifunctional table for recording test results. Thus, Table 2 shows a fragment of a student's answer sheet to six test tasks by P. Carter & K. Russell (1998), used in the experimental work.

To carry out diagnostics in accordance with the methodology of P. Carter & K. Russell (1998), the diagnostic toolkit prepared by the authors of the article, in addition to the answer sheets (Table 2) intended for distribution to school students, includes Table 3 for assessors.

Table 2. Answer sheet for determining the level of logical thinking and each logical operation (fragment)

Full name of the school student _____ Class __ Secondary school _____		
Name of the subtest	The purpose of the subtest	The content of the subtest
First subtest	Identifying the level of development of the ability to conduct analysis. School students must find the original number based on the anagram data.	Task 1. Find an anagrammatic pair of numbers in parentheses. Underline this number: 1) 4792 (4748, 7492, 9265); 2) 3964 (1269, 3962, 4369); 3) 8614 (6841, 1452, 8154); 4) 3521 (3529, 2151, 1325); 7415 (7417, 4175, 4165).
Second subtest	Identifying the level of development of students' abilities to highlight the essential, the main thing, that is, the ability to abstract.	There is one word before the brackets and 5 words in the brackets. Find the 2 words written in parentheses that are most significant for the word in front of the parentheses. Underline these words: ■ division (class, dividend, pencil, divisor, paper); ■ cube (angles, wood, stone, drawing, side); ■ ring (diameter, sample, roundness, seal, door); ■ problem (condition, medal, doctor, question); ■ addition (sum, paper, victory, money, addend).

Source: developed by the authors based on the diagnostic methodology of P. Carter & K. Russell (1998)

Table 3. Distribution of points by levels, by subtest purpose, by criteria

No.	Purpose of the subtest	HL	AA	AL	BA
1	Theoretical analysis (anagram)	5	4	3	2
2	Highlighting the essential	5	4	3	2
3	Conducting a comparison	5	4	3	2
4	Carrying out classification	5	4	3	2
5	Carrying out a generalisation	5	4	3	2
6	Drawing an analogy	5	4	3	2
Overall test result for each level (assessment criteria)		25-30	19-24	13-18	7-12

Note: HL – high level, AA – above average, AL – average level, BA – below average

Source: developed by the authors based on the diagnostic methodology of P. Carter & K. Russell (1998)

Table 3 shows that the answers to the tasks of each subtest are assessed on a five-point scale in accordance with the methodology of P. Carter & K. Russell (1998). Each level corresponds to a range of six points, which generally determines the assessment criteria for checking the work completed by younger students. When checking and

assessing the work from the answer sheets for the entire test, the points were first calculated for the correct answers to each task from each subtest. The results of the checked work were entered into a summary Table 4 prepared according to the template, indicating the points scored and the corresponding level of mastery of the logical operation.

Table 4. Summary table of testing results of 4a grade students of Secondary School No. 8 in Bishkek (fragment)

School student's name	Subtest 1		Subtest 2		Subtest 3		Subtest 4		Subtest 5		Subtest 6		Overall result	
	Points	Level	Points	Level	Points	Level	Points	Level	Points	Level	Points	Level	Points	Level
1. Elnur	3	AL	3	AL	0	LL	3	AL	2	BA	3	AL	14	AL

Table 4. Continued

School student's name	Subtest 1		Subtest 2		Subtest 3		Subtest 4		Subtest 5		Subtest 6		Overall result	
	Points	Level	Points	Level	Points	Level	Points	Level	Points	Level	Points	Level	Points	Level
2. Adilet	5	HL	1	BA	0	LL	5	HL	2	BA	4	AA	17	AL
3. Bayel	2	BA	2	BA	0	LL	3	AL	3	AL	2	BA	12	BA
4. Marika	2	BA	2	BA	2	BA	3	AL	2	BA	0	LL	11	BA
5. Ademi	4	AA	1	LL	1	LL	3	AL	3	AL	5	HL	17	AL
6. Aibike	2	BA	2	BA	1	BA	3	AL	2	BA	0	LL	10	BA
7. Aelina	5	HL	4	AA	1	LL	2	BA	3	AL	4	AA	19	AA
8. Isa	2	BA	2	BA	1	BA	3	AL	2	BA	0	LL	10	BA
9. Islam	4	AA	3	AL	0	LL	4	AA	2	BA	2	BA	15	AL
10. Isabella	3	AL	1	LL	1	BA	2	BA	2	BA	1	LL	10	BA

Note: HH – high level, AA – above average, AL – average level, BA – below average, LL – low level

Source: developed by the authors based on the diagnostic methodology of P. Carter & K. Russell (1998)

The analysis of the contents of Table 4 highlights the broad possibilities of this method and the multifunctionality of the table. From the information on the horizontal lines, the level of proficiency in each of the 6 logical operations is determined for each school student, indicating the score, and the overall level of logical thinking is established based on the overall result (see the far-right column of Table 4). In addition, the analysis of the data in Table 4 by vertical columns allows for the determination of the degree of mastery of each of the six logical operations by all school students and distribute them into five subgroups with the corresponding level of logical thinking or a particular logical operation (high, above average, average, below average, low). For example, Elnur, according to the first, second, fourth, sixth subtests and logical thinking,

falls into the subgroup with the average level (Table 4). While, having gaps in mastering the logical operation of generalisation (fifth subtest), he ends up in the subgroup with a low level and needs additional support from the teacher. Based on the statistical processing of the data from Table 4, students of grade 4a of Secondary School No. 8 were distributed into 5 subgroups by the level of logical thinking (Table 5). Moreover, schoolchildren from the subgroups with a low and below average level clearly need additional help and support from the teacher.

Table 6 provides similar results for comparison of the diagnostics of logical thinking of school students from the private international school Bright using the diagnostic support described above according to the method of P. Carter & K. Russell (1998).

Table 5. Distribution of school students from grade 4a of Secondary School No. 8 into subgroups by level of logical thinking (ascertaining experiment)

The group number with the name of the level	Number of school students in subgroups	Percentage of school students in subgroups
1. High level (HL)	1	4%
2. Above average (AA)	3	12%
3. Average level (AL)	8	32%
4. Below average (BA)	9	36%
5. Low level (LL)	4	16%
Total	25	100%

Source: developed by the authors based on the diagnostic methodology of P. Carter & K. Russell (1998)

Table 6. Distribution of pupils of class 4a of the Bright school by levels of logical thinking during the ascertaining experiment

Group number with level name	Number of school students in subgroups	Percentage of school students in subgroups
1. High level (HL)	1	5%
2. Above average (AA)	4	18%
3. Average level (AL)	8	36%
4. Below average (BA)	6	27%
5. Low level (LL)	3	14%
Total	22	100%

Source: developed by the authors based on the diagnostic methodology of P. Carter & K. Russell (1998)

A comparative analysis of the data from Tables 5 and 6 shows that the level of logical thinking in private school students is higher, since the subgroups with a level above average and high in the class from the Bright school made up 23% in percentage terms, and in the class of Secondary School No. 8 – 16%. But still, the subgroups with a low and below average level make up 41% in the class of the Bright school. This indicates that private school teachers also need to look for ways to improve the level of logical thinking.

When using the diagnostic method of A. Zak (1995), which allows determining the level of mastery of the “comparison” operation by school students, a diagnostic

tool was also prepared. In this case, cards with his 22 exercise-tasks and memos with recommendations of A. Zak on the rational sequence of solving the exercises with an indication of their numbers, on the possibility of replacing artificial words with real ones in the exercises, as well as answer sheets were prepared and distributed to the school students. For those checking the students’ answers, the diagnostic tool contained cards with evaluation criteria and table layouts for recording the results of the check. After statistical processing of the data of the summary table with the results of checking the answer sheets, the school student were divided into subgroups in accordance with the level of formation of the ability to compare (Table 7).

Table 7. *Distribution of students by levels of mastery of the logical operation “comparison” in the ascertaining experiment*

Number of school students			
	High	Average	Low
In class 4a of Secondary School No. 8	5 (20%)	9 (36%)	11 (44%)
In the 4 th class of the private school Bright	5 (23%)	7 (23%)	10 (45%)

Source: *developed by the authors based on the diagnostic method of A. Zak (1995)*

In addition, in the above classes, diagnostics were carried out using the L. Chuprov method (2009), which also allows for determining the level of comparison skills. After statistical processing of the results, it was found that the subgroups with low and below average levels in percentage terms amounted to 56% in class 4a of Secondary School No. 8, and 45% in class 4a of the Bright school. From a comparative analysis of these results and the data from the contents of Tables 5, 6, 7 it follows that the results of diagnosing the level of mastery of the logical operation “comparison” using the three methods differ insignificantly (within 10%). Therefore, there are grounds for using one of them in the control experiment.

The conducted research confirms the key role of diagnostic support in the process of development of logical thinking of primary school students in the context of formation of universal educational actions regulated by the State Educational Standard of the Kyrgyz Republic. The obtained results of the ascertaining experiment clearly demonstrate heterogeneity of the initial level of formation of logical operations in primary school students, which emphasises the need for targeted and systematic work on development of this sphere of cognitive activity. The revealed advantage of the P. Carter & K. Russell (1998) methodology in the framework of ascertaining diagnostics is due to its complex nature, allowing assessing the level of proficiency in all basic logical operations and logical thinking in general.

At the same time, an analysis of the diagnostic capabilities of techniques focused on evaluating individual logical operations indicates their potential value for the implementation of the formative stage of learning. In particular, as S. Vorovshchikov (2010) notes, the use of “logical five minutes” based on the diagnosis of proficiency in a particular logical operation seems to be an effective tool for integrating developmental exercises into the learning process without additional workload and with the ability to

quickly monitor student progress. This approach allows for a combination of learning and assessment, contributing to a more informed assimilation of logical thinking techniques (Sundeeva & Sorokina, 2017). A comparative analysis of the results obtained in public and private schools revealed certain differences in the initial level of logical thinking, which may be due to different educational approaches and socio-cultural factors. This aspect requires further study to identify the most effective strategies for developing logical thinking in various educational contexts. The findings open up prospects for developing scientifically based methodological recommendations for the introduction of effective diagnostic support into the practice of primary education in the Kyrgyz Republic.

CONCLUSIONS

The study aimed at the scientific and theoretical substantiation and practical implementation of diagnostic support for the formation of logical thinking of primary school students from the standpoint of the requirements of the current State Standard of School General Education of the Kyrgyz Republic allows for a number of conclusions to be drawn. When determining the theoretical foundations of the study, it was established that the State Standard of School General Education of the Kyrgyz Republic designated the formation of UEA as the main goal of primary education. Among the different types of UEA, cognitive EA are of greater importance, which include logical EA that require the successful formation of logical thinking and the ability to perform logical operations. An integral part of the formation of logical thinking and the logical operations included in it is pedagogical diagnostics, which performs, along with the control, developing and stimulating functions. To use diagnostic methods in the educational process, the development of diagnostic support is justified, an integral part of which is a diagnostic tool.

The advantage of the diagnostic method of P. Carter & K. Russell and the diagnostic support developed for its implementation, consisting in the ability to determine the level of mastery of each logical operation and logical thinking in general by school students, and in its use at the ascertaining stage of the experiment, has been experimentally proven. Among the advantages of the diagnostic support of diagnostic methods aimed at determining the level of one logical operation, a more detailed study of the mastery of each of its components by school students is noted. From the analysis of the results of the ascertaining experiment conducted in Secondary School No. 8 and the private international school Bright it follows that the initial level of development of logical thinking in school students is heterogeneous and in many of them is insufficient for the effective formation of UEA. Moreover, it is noted that the level of logical thinking in students in grade 4a of the Bright school students is higher, despite the presence of school students with a low level of its formation. The revealed facts confirm the necessity of conducting a

formative experiment, the main purpose of which is to increase the level of logical thinking of students, using diagnostic support for determining the level of individual logical operations and “logical five-minute exercises”. Further research can be aimed at studying the influence of the developed diagnostic support and the system of “logical five-minute exercises” on the dynamics of the development of logical thinking of primary school students in the long term, as well as identifying optimal forms of integrating diagnostic procedures into the educational process, taking into account the specifics of various subject areas.

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Кенже мектеп окуучуларынын логикалык ой жүгүртүүсүн өнүктүрүүдө диагностикалык колдоо

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Аннотация. Кыргыз Республикасынын Мамлекеттик жалпы билим берүү стандарты башталгыч мектептин негизги максатын – билим берүүчү универсалдуу аракеттерди калыптандырууну белгилейт, алардын ичинен логиканы (анализ, синтез, салыштыруу, жалпылоо, абстракциялоо). камтыган таанып-билүү иш-аракеттери өзгөчө мааниге ээ. Окуучулардын таанып-билүү деңгээлин жогорулатуу, логикалык ой жүгүртүүнү өнүктүрүү процессин ишке ашырууда анын ажырагыс бөлүгү болгон диагностика жана диагностикалык колдоо болуп саналат. Макаланын максаты – башталгыч класстардын окуучуларынын логикалык ой жүгүртүүсүн өнүктүрүү үчүн диагностикалык колдоону тандоо жана негиздөө жана аны текшерүү. Изилдөөгө методологиялык ыкмалар (компетенттүүлүккө негизделген, ишмердүүлүккө негизделген) жана илимий билимдин ыкмалары, анын ичинде теориялык (психологиялык-педагогикалык адабияттарды талдоо), эмпирикалык (эксперимент, байкоо, өлчөө, салыштыруу, сыпаттоо) жана математикалык (эксперименттик натыйжаларды статистикалык иштетүү) камтылган. Аныктоочу эксперименттин жүрүшүндө Бишкек шаарынын №8 мамлекеттик бюджеттик мектебинин жана «Жаркын» жеке менчик мектебинин башталгыч класстарынын окуучуларынын мисалында логикалык универсалдуу окуу иш-аракеттеринин өнүгүү деңгээлин жеке логикалык операцияларды жана жалпы эле логикалык ой жүгүртүүнү диагностикалык методдордун артыкчылыктарын аныктоо максатында педагогикалык эксперимент өткөрүлдү. Эксперименттин статистикалык жактан иштелиген жыйынтыктарын талдоонун негизинде төмөнкүдөй корутундулар чыгарылды: башталгыч класстын окуучуларынын логикалык ой жүгүртүүсүнүн баштапкы деңгээли бирдей эмес жана алардын көбү үчүн билим берүүнүн Мамлекеттик стандартында талап кылынган акыркы натыйжаларга ийгиликтүү жетишүү үчүн жетишсиз; Тактоо экспериментин жүргүзүү үчүн эң чоң артыкчылыктарга Ф.Картердин жана К.Расселдин тиешелүү диагностикалык куралдары менен методдору ээ; Формативдик (өнүктүрүү) эксперимент үчүн жеке логикалык операциялардын диагностикалык ыкмалары артыкчылыктуу, алардын өзгөчө касиеттери логикалык (тренингдик) беш мүнөттүк сессияларды жана сабактардагы мониторинг элементтерин айкалыштырууга мүмкүндүк берет

Негизги сөздөр: логикалык операциялар; диагностика; диагностикалык каражаттар; таанып-билүү универсалдуу окуу иш-аракеттери

Диагностическое обеспечение развития логического мышления младших школьников

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Аннотация. Действующим Госстандартом школьного общего образования Кыргызской Республики установлена главная цель начальной школы – формирование учебных универсальных действий, среди которых особую значимость имеют познавательные, включающие в том числе логические (анализ, синтез, сравнение, обобщение, абстракция). Повышение их уровня у учащихся актуализирует процесс развития логического мышления, неотъемлемой частью которого является диагностика и диагностическое обеспечение для ее осуществления. Целью статьи был выбор и обоснование диагностического обеспечения развития логического мышления младших школьников и его апробация. В ходе исследования были задействованы методологические подходы (компетентностный, деятельностный) и методы научного познания, включая теоретические (анализ психолого-педагогической литературы), эмпирические (эксперимент, наблюдение, измерение, сравнение, описание) и математические (статистическая обработка результатов эксперимента). Проведен педагогический эксперимент по выявлению преимуществ методик диагностики отдельных логических операций и логического мышления в целом при констатирующем эксперименте на примере определения уровня сформированности логических универсальных учебных действий у учеников начальных классов госбюджетной школы №8 и частной школы «Брайт» в городе Бишкек. На основе анализа статистически обработанных результатов проведенного эксперимента сделаны выводы: исходный уровень логического мышления не одинаков у младших школьников и у многих из них недостаточен для успешного достижения конечных результатов, требуемых образовательным Госстандартом; наибольшими преимуществами для осуществления констатирующего эксперимента обладает методика Ф. Картера и К. Рассела с соответствующим диагностическим инструментарием; для формирующего (развивающего) эксперимента предпочтительны методики диагностики отдельных логических операций, особенности свойств которых позволяют совмещать на уроках логические (тренинговые) пятиминутки и элементы мониторинга

Ключевые слова: логические операции; диагностика; диагностический инструментарий; познавательные универсальные учебные действия