IRSTI 35.14.07

**Tussupbekova G.A.*, Ablaikhanova N.T., Tuleuhanov S.T.,
Ursheeva B.I., Ablaikhanova N.**

Al-Farabi Kazakh National University, Kazakhstan, Almaty,
*e-mail: gulmira.274@mail.ru

DEVELOPMENT OF VERBAL-LOGICAL THINKING AMONG STUDENTS IN THE EDUCATIONAL PROCESS

This article discusses the developed methodology for determining the criteria and levels of development of verbal-logical thinking among students in the learning process. The experimental work was carried out in three stages: at the first stage, students were questioned and tested to identify the state of the problem of the development of verbal-logical thinking; at the second experimental stage, a verifying experiment was conducted: input tests to identify the motivational, cognitive and praxeological characteristics of verbal-logical thinking. At the third stage, a structural-content model for developing students' verbal-logical thinking in the learning process was developed and tested through the implementation of business games, situational assignments, and training. Development of verbal-logical thinking of students is facilitated by the implementation of the following pedagogical conditions: the inclusion of students in activities to solve professional problems and the organization of joint development and implementation of scientific works, the creative application of knowledge, manifested in the ability to solve non-standard educational problems.

Key words: verbal-logical thinking, teacher, student, vocational training, competence-based approach.

Тусупбекова Г.А.*, Абылайханова Н.Т., Тулеуханов С.Т.
Уршеева Б.И., Аблайханова Н.

Әл-Фараби атындағы Қазақ ұлттық университеті, Қазақстан, Алматы қ.,
*e-mail: gulmira.274@mail.ru

Оқу үрдісінде студенттердің сөздік-логикалық ойлау әрекеттерін дамыту

Бұл мақалада студенттер арасында сөздік-логикалық ойлаудың даму критерийлері мен деңгейлерін анықтау әдістемесі қарастырылған. Эксперименттік жұмыс үш кезеңде жүргізілді: бірінші кезеңде оқушылар ауызша-логикалық ойлауды дамыту мәселесінің жай-күйін анықтау үшін сауалнама жүргізді және сыналды; екінші эксперименттік кезеңде тексеру-эксперимент жүргізілді: ауызша-логикалық ойлаудың мотивациялық, когнитивтік және праксиологиялық ерекшеліктерін анықтау үшін сынақтар жүргізілді. Үшінші кезеңде студенттердің оқу процесінде ауызша-логикалық ойлауды дамытуға арналған құрылымдық-мазмұндық үлгі іскерлік-ойындарды, жағдайлық тапсырмаларды және оқытуды енгізу арқылы әзірленген үлгімен сыналды. Студенттердің ауызша-логикалық ойлауды дамыту келесі педагогикалық жағдайларды жүзеге асыру арқылы жеңілдетіледі: студенттерді кәсіби проблемаларды шешуге бағытталған іс-шараларға қосу және ғылыми жұмыстарды бірлесіп әзірлеуді және жүзеге асыруды, шығармашылық қолдануды стандартты емес білім беру проблемаларын шешу қабілеті.

Түйін сөздер: сөздік-логикалық ойлау, педагог, студент, кәсіби педагогика, құзіреттік тәсіл.

Тусупбекова Г.А.*, Абылайханова Н.Т., Тулеуханов С.Т.,
Уршеева Б.И., Аблайханова Н.
Казахский национальный университет им. аль-Фараби, Казахстан,
г. Алматы, *e-mail: gulmira.274@mail.ru

Развитие словесно-логического мышления у студентов в учебном процессе

В данной статье рассматривается разработанная методика по определению критерия и уровня развития словесно-логического мышления у студентов в учебном процессе. Экспериментальная работа проводилась в три этапа: на первом этапе проведены анкетирование и тестирование студентов с целью выявления состояния проблемы развития словесно-логического мышления; на втором опытно-экспериментальном этапе проведен констатирующий эксперимент: входные тесты на выявление мотивационных, когнитивных и праксиологических характеристик словесно-логического мышления. На третьем этапе разработана и апробирована структурно-содержательная модель по развитию словесно-логического мышления студентов в учебный процесс посредством реализации деловых игр, ситуационных заданий, тренингов. Развитию словесно-логического мышления студентов способствует реализация следующих педагогических условий: включение студентов в деятельность по решению профессиональных задач и организация совместной разработки и реализации научных работ, творческого применения знаний, проявляющихся в умении нестандартно решать учебные проблемы.

Ключевые слова: словесно-логическое мышление, педагог, студент, профессиональная подготовка, компетентностный подход.

Introduction

The modern situation in education dictates the new requirements to training of students of higher educational institutions which are that acquisition only of express knowledge is not enough to be a competitive graduate, it is necessary to develop such abilities of the person which the greatest degree realize her identity and verbal-logical thinking potential. It finds the reflection in a number of the key normative and legal documents providing regulation of updating of educational process in higher education institution by which we were guided when tutoring future bachelors of pedagogical education [1, 2].

Training of the competent, qualified graduate who, is capable not only to put into practice knowledge, skills becomes a main goal of higher education, but also to make original and nonstandard decisions in the situations arising in professional activity.

Development of verbal-logical thinking of future bachelors of pedagogical education demands scientific justification and a methodological support owing to poor study, a theoretical and practical significance. The higher education got by students provides not only development of knowledge, skills, it gives the actual chance of professional verbal-logical thinking self-realization of graduates. In this regard development of verbal-logical thinking of future bachelors of pedagogical education became especially relevant. The relevance of the studied subject is reasoned with importance of a problem in the social and pedagogical, scientific and pedagogical and practical plan and its poor readiness for training of future bachelors of pedagogical education.

The analysis of the studied literature allowed to note that general-theoretical and methodological bases of development of the verbal-logical thinking beginning in the person are opened in V.I. Andreyev, V.I. Zagvyazinsky, I.G. Kaloshinoy, A.N. Leontyev, S.L. Rubenstein's works. Various aspects of university education are considered in S.I. Arkhangelsky's works, E.S. Zaire Bek, by N.V. Kuzmina [3, 4].

Besides, in the modern science the idea of studying of verbal-logical thinking as development mechanism is proved, the structure and content of verbal-logical thinking educational cognitive activity (I.Ya. Lerner, P.I. Pidkasisty) are characterized, questions of development of the person, her verbal-logical thinking self-realization in verbal-logical thinking education (M.M. Zinovkina, V.G. Ryndak, A.V. Hutorskoy) are considered [5].

Researches of the whole direction in psychology of the verbal-logical thinking known under the name "verbal-logical thinking", were conducted by the following foreign scientists: J. Gilford, S. Mednik, K. Taylor, E. Item Torrance [6, 7].

Traditionally it is considered that verbal-logical thinking of future bachelors of pedagogical education develops by itself when mastering express disciplines and disciplines of specialization. However, developing only an art and abilities, it is possible to prepare the competent, but not verbal-logical thinking graduate. In this regard, to us sees necessary to reveal pedagogical conditions on development of verbal-logical thinking of future bachelors of peda-

gogical education as this problem remains insufficiently studied.

Research objective – to develop, prove and to experimentally check pedagogical conditions of development of verbal-logical thinking of future bachelors of pedagogical education, to realize and check their effectiveness in the course of the experienced and experimental work.

Material and methods of researches: general-theoretical – the analysis of philosophical, psychological and pedagogical literature, studying and synthesis of pedagogical experience and scientific and methodical literature on a research problem, creation of hypotheses, pedagogical model operation; empirical – questioning, testing, a conversation, observation, diagnostics of level of verbal-logical thinking, a pedagogical experiment; statistical – the determination of reliability of coincidence and distinctions of characteristics of verbal-logical thinking confirmed with methods of mathematical statistics.

The experienced and experimental work was carried out at department of biophysics and biomedicine of Al-Farabi Kazakh National University. Shared in a research 131 students studying in the directions of preparation pedagogical education – Biology (5B011300). Number of students in control group – 25 people, in the experimental group 1 – 27 people, the experimental group 2 – 25 people, the experimental group 3 – the 26th person, the experimental group 4 – 28 people.

The research was conducted during the period from 2012 to 2015 and consisted of three stages:

At the first stage – theoretic-search on the basis of the analysis of scientific literature original positions of a research are defined, the state-of-the-art review of scientific sources and normative documents on training of students of the direction Pedagogical education, specialties "Biology" is carried out; the experience of teaching express disciplines and disciplines of specialization which developed at the university is generalized, the levels of development of verbal-logical thinking of future bachelors of pedagogical education are revealed, questioning and testing of students and teachers for the purpose of identification of a condition of a problem of development of verbal-logical thinking of future bachelors of pedagogical education are carried out.

At the second stage – the experienced and experimental the theoretical position was defined and are developed a conceptual framework of a research; the criteria and indexes characterizing the levels of development of verbal-logical thinking of future bachelors of pedagogical education the technique of their diagnostics is defined. The stating stage of experienced experimental work is carried out: entrance tests for identification motivational, cognitive and praxiological of characteristics of verbal-logical thinking.

At the third stage – generalizing experienced approbation in educational process of pedagogical conditions of development of verbal-logical thinking of future bachelors of pedagogical education was carried out, the main results of a research were systematized, generalized and described, the qualitative and quantitative analysis was carried out them.

Results and discussion

For measurement of level of formation of verbal-logical thinking of future bachelors of pedagogical education we picked up and adapted particular criteria and indicators: the motivational and valuable criterion consists of the following indexes: interest in verbal-logical thinking tasks; needs for self-realization; motivation of tutoring in higher education institution. The cognitive criterion included such indicators as volume of the acquired knowledge, intelligence of the acquired knowledge, speed of realization of control tasks. We refer ability to deviate in thinking from traditional schemes to indexes of praxiological criterion; ability to switch quickly from one task for another; ability to produce the remote associations; ability to apply the gained knowledge in practical converting activities. For diagnostics of level of verbal-logical thinking in a diagnostic part of the experienced and experimental work the Diagnostics of Nonverbal Verbal-logical thinking test (short version of the test of Torrance), S. Mednik's test "Diagnostics of verbal verbal-logical thinking" adapted by A.N. Voronin, the measuring technique of the motivation developed by T.I. Ilyina consisting of 3 scales ("Acquisition of knowledge", "Mastering a profession" and "Obtaining the diploma"), testing for the level of knowledge of V.P. Besplatko was offered students.

As indexes of divergent criterion we after S. Mednik [8] mark out fluency of thinking as abilities to propose large number of solutions of an objective and to switch quickly from one task for another; originality of thinking as abilities to deviate in thinking from traditional schemes and to produce the remote associations. For measurement of indexes of verbal-logical thinking we offered evaluation criteria.

Students with a high level of fluency of thinking are characterized by ability to unmistakably propose large number of solutions of an objective. They always show ability to switch quickly from one task

for another and quickly adapt in the difficult situations.

Students are not always capable to solve problems with the average level of fluency of thinking in various ways, they can have some difficulties when switching from one task for another and also they need larger amount of time for adaptation in the difficult situations.

Students are capable to solve educational problems with low level of fluency of thinking only in one traditional way, they experience the considerable difficulties when switching from one task for another and do not show ability to adapt in the difficult educational situations.

Further we will characterize criteria for evaluation of originality of thinking of future bachelors of pedagogical education. Under originality of thinking the highest level of development of not sample thinking of students which is characterized by ability to deviate in thinking from traditional schemes, to produce unusual answers and the remote associations is understood by us.

Diagnostics of originality of thinking was determined by us by extent of manifestation by the student of the following abilities:

– ability to deviate in thinking from traditional schemes;

– ability to produce the remote associations.

Diagnostics of a motivational component of verbal-logical thinking was determined by us by extent of manifestation by the student:

– interest in verbal-logical thinking ways of development of material;

– needs for self-realization.

– the motivation of tutoring in higher education institution was determined by the express technique developed by T.I. Ilyina consisting of 3 scales ("Acquisition of knowledge", "Mastering a profession" and "Obtaining the diploma").

At the stating stage of an experiment was it is defined that the low level of originality of thinking which is shown in poor formation of such indexes as ability to deviate in thinking from traditional schemes is characteristic of most of students, that is thinks of students convergently, on a template.

There are some difficulties and with producing unusual answers, students are not always ready to consider a problem or a task from the unusual party, to apply nonconventional approaches to the decision. As for ability to produce the remote associations, for students presents particular difficulty unusually to use problem elements, to apply nonstandard ways of the decision.

According to us, such low level of formation of indexes of originality of thinking is bound to poor motivation to tutoring of students.

According to data of diagnostics of motivational and valuable characteristics of students which is carried out by us at the beginning of the experienced and experimental work, it is possible to draw a conclusion that this criterion is insufficiently created at future bachelors of pedagogical education. Not all students show interest in verbal-logical thinking activity. Due to the low level of motivation, junior students, especially the first, reluctantly participate in verbal-logical thinking activity and cannot perform padding (verbal-logical thinking) tasks. As for the need for self-realization, at students it is poorly developed, in our opinion, it is bound to the fact that it is necessary to create conditions for development in the student of a steady tendency to manifestation of subjective qualities in a professional field of activity, to aspiration to self-creation. The motivation to tutoring in higher education institution at students also at a low level, and as showed a research, in the course of tutoring it constantly decreases, that is, first-year students show the greatest interest in tutoring which practically disappears to older years.

At the beginning of the experienced and experimental work students needed a large number of time for realization of tasks, but despite the considerable time expenditure the quantity of correctly performed control tasks was on an average and even low level.

The carried-out analysis of formation of criteria of verbal-logical thinking of future bachelor of pedagogical education showed that at most of students control and the experimental groups low level of both verbal, and nonverbal verbal-logical thinking.

Thus, it was established that the structure control and the experimental groups on the level of verbal-logical thinking of students is approximately identical, that is selection of control group is identical to selection of the experimental.

At the beginning of the experiment students hardly could state variance or doubt reliability of studied, agreed in opinion that data of the textbook need to trust. Proposed solutions of problem situations which corresponded to algorithms, to the famous students, original decisions practically did not move forward, students did not rely and did not staticize own life experience.

As a result of the experimental occupations aimed at development of verbal-logical thinking, students gradually began to use nonconventional, interesting ways of the decision from the point

of view of singularity, attracted a maximum of knowledge to resolution of conflicts, learned to reveal a contradiction in a condition of a problem situation, began to fall into more consciously educational activity.

It was established that at introduction to a training material of problem situations at students with low level of verbal-logical thinking assimilation of the main maintenance of the studied phenomenon is observed.

Selection of an inconsistency of lines or signs of the considered phenomenon is characteristic of students with the average level of verbal-logical thinking.

Students with a high level of verbal-logical thinking show abilities to find contradictions in a situation condition, to consider an object in changes, to resolve situations with an unknown algorithm of action. At students with a high level of verbal-logical thinking abilities to give several ways of a way out that speaks about development of fluency of thinking as one of indexes of verbal-logical thinking are formed.

It was offered to students of the experimental and control groups to answer questions of the questionnaire used at the beginning of the experiment. Results of questioning of students showed that by the end of an experiment there were changes in indexes between students of the experimental and control groups: students of the experimental groups began to give preference to tasks with an unknown way of permission, to problem situations [9]. Desire to learn new became one of motivational aspects of studying of a training material. Students of control groups had no essential changes in above-mentioned parameters.

Table 2 – Formation of levels of verbal-logical thinking at the end of the experienced and experimental work

Groups	Value of coefficient of volume of the acquired knowledge	Value of coefficient of speed of realization of tasks	Value of coefficient of intelligence of the acquired knowledge	Value of coefficient of use of knowledge on to practice	GPA	Level
Control	0,8	0,9	0,8	0,8	1	Average
1- group	0,9	0,8	0,8	0,8	1	Average
2- group	0,8	0,8	0,8	0,85	1	Average
3- group	0,8	0,85	0,8	0,8	1	Average
4- group	0,9	0,85	0,9	0,85	1	Average

From table 2 it is visible that the level of knowledge of students considerably grew: students showed generally average level, and in the 4th group – the level of formation of knowledge is closer to high. The submitted data demonstrate that there (the 4th group) where all 3 pedagogical conditions in total were applied, the best results are achieved.

Having analysed all indicators, it is possible to draw a conclusion that the level of verbal-logical thinking of future bachelors of pedagogical education increased in all groups, including, and in control group, however it is absolutely insignificant as there occupations were conducted on traditional system without the pedagogical terms offered by us. In the experimental groups, especially in the 4th group, we see the significant increase in level of indexes of verbal-logical thinking of future bachelors of pedagogical education as the number of the students having low level of verbal-logical thinking decreased while the number of the students who are at the average and high levels of verbal-logical thinking considerably increased, and in the experimental group (the 4th group) even most of students (51,7%) showed a high level of verbal-logical thinking.

By results of the carried-out experienced and experimental work in control group there were minor positive changes in the level of formation of verbal-logical thinking: the number of students with high (from 2,9% to 5,8%) and the average level of verbal-logical thinking increased (from 25,7% to 34,2%) and the number of students with low level decreased (from 71% to 60%). More essential changes happened in the experimental group 1 where 2 of 3 pedagogical terms offered by us were applied (first and second).

At the beginning of the experienced and experimental work at most of students low level of verbal-logical thinking (66,9%) which after carrying out the forming experiment considerably decreased (27,7%) prevailed, the number of students with an average increased (from 24,1% up to 48,2%) and high (from 10,4%) verbal-logical thinking level considerably increased to 24,1%. Also positive changes are observed also in the 2nd group where we applied the first and third pedagogical condition.

The number of students with low level of verbal-logical thinking was reduced from 64,3% to 25%, and the number of students with an average and high level of verbal-logical thinking increased more, than twice. In a percentage ratio it looks as follows: at the beginning of the experienced and experimental work 28,6% of students had an average level of verbal-logical thinking, and at the end of the experienced and experimental work at 50% the experimental group 3. The high level of verbal-logical thinking increased from 7,1 up to 25%.

The analysis of levels of verbal-logical thinking of students demonstrates that the pedagogical terms offered by us give positive dynamics of all criteria of verbal-logical thinking. To each age the level of verbal-logical thinking is characteristic. Owing to the fact that the age of students is 17-22 years becomes apparent, for students of this age the average level of verbal-logical thinking is sufficient for their personal development.

The complex of techniques of the experienced and experimental work chosen by us allowed to trace dynamics of development of verbal-logical thinking of future bachelors of pedagogical education in higher education institution in the course of realization of set of pedagogical conditions. Introduction of these pedagogical conditions covered all main forms of activity of students: educational, nonlearning and research [10].

For the purpose of realization of a technique of development of verbal-logical thinking the following changes were made to vocational training of future bachelors of pedagogical education: various pedagogical technologies, such as situational tasks, business games are injected. In extracurricular activities the technology of complex development of the verbal-logical thinking person of the student and activization of his verbal-logical thinking due to preparation and holding various master classes organized by students for school students, participation in such actions as “Open Day”, “Student’s spring”, “A debut of the first-year student”, “The best academic group”, social events, the Olympic Games, competitions, the organization of art exhibitions was also carried out. In research activity there was an updating of verbal-logical thinking potential of future bachelors of pedagogical education in the form of academic year projects, articles and reports of scientific conferences, reports on practicians, theses promoting formation of cognitive activity and professional verbal-logical thinking.

Results of diagnostics demonstrate positive dynamics of levels of verbal-logical thinking in the experimental groups on comparison of control. Statistical data processing allows to consider the carried-out experienced and experimental work rather successful, original positions of the made hypothesis as confirmed.

Conclusions

On the understanding of the role of practical action as the initial step in the development process of all higher forms of thinking of students, a concept of “step-by-step formation of mental action” is constructed. Verbal and logical – the highest level of development of thinking students. This kind deals with the concepts of objects and phenomena, it completely flows in the internal plan and it is obligatory for it to rely on a clearly perceived situation. Such thinking of students is carried out according to certain laws, which leads to true solutions to the problems discussed. Most often in the role of laws are the rules of the logic of thinking of students.

In our study, we consider verbal and logical thinking as a separate aspect of the study of creativity, as a potential, an internal human resource, because the study of verbal and logical thinking as one of the aspects of creativity helps to observe the complexity and ambiguity of its manifestations.

At the ascertaining stage of the experiment, the majority of students have a low level of verbal and logical thinking, manifested by insufficient formation of such indicators as the ability to deviate from the traditional thinking schemes, that is, students think convergently, according to the template.

As a result of experimental studies aimed at the development of verbal and logical thinking, students gradually began to use non-traditional, interesting ways of solving from the point of view of originality, attracted maximum knowledge to resolve contradictions. Have learned to identify contradictions in the problem situation, have become more conscious of learning activities. It was found that the introduction of the teaching material problem situations in students with a low level of

verbal and logical thinking observed assimilation of the main content of the phenomenon under study. As a percentage, it looks as follows: at the beginning of experimental work, the average level of verbal and logical thinking was 28.6% of students, and at the end of experimental work 50% experimental group 3. The high level of verbal and logical thinking increased from 7.1% to 25%.

For development of verbal and logical thinking the technique of realization of pedagogical conditions of experimental work on the basis of which the following changes in professional training of future bachelors of pedagogical education covering all main forms of activity of students educational, extra-curricular and research were made is developed and introduced: various pedagogical technologies, such as situational tasks, problem methods of training are entered. Students actively participated in research activities: writing term papers, preparing reports at conferences, writing reports on educational and industrial practices. Verbal-logical thinking of students was also reflected in the preparation and conduct of various workshops organized by students for students, participation in various extra-curricular activities, social events, competitions, contests, organization of art exhibitions.

Thus, the study is theoretically proved and experimentally confirmed that the creation of pedagogical conditions contribute to a focused development of verbal-logical thinking of the future bachelors of pedagogical education.

At the same time, there is no doubt that the research work done does not exhaust all aspects of the problem of developing the creativity of future bachelors. In particular, it is quite relevant to further study the complex of other pedagogical conditions for the development of verbal-logical thinking of university students. Also, it seems quite promising to consider the influence of active teaching methods on the development of verbal-logical thinking of university students, the development of motivation for creative activity, and the development of students' theoretical readiness for creative activity.

References

1 Boden, M.A. Computer models of verbal-logical thinking //Handbook of verbal-logical thinking. Cambridge University Press, 2009. – P. 351-372.

2 Рассказов Ф.Д. Современные проблемы организации научно-исследовательской деятельности студентов в вузах: научное издание // Педагогическое образование и наука. – 2009. – №9. – С. 18-22.

3 Архангельский С.И. Учебный процесс в высшей школе, его закономерные основы и методы. – М.: Высшая школа, 1980. – 368 с.

4 Андреев В.И. Педагогика творческого саморазвития. Инновационный курс. – Казань: Изд-во Казан. ун-та, 2008. – Кн. 2. – 318 с.

5 Зиновкина М.М. Креативные технологии образования // Высшее образование в России. – № 3. – 2009. – С. 101 – 104.

6 Guilford J. P. Creative Talents / J. P. Guilford. – New York, 2006. – P. 12-18.

7 Taylor C. Various approaches to and definitions of verbal-logical thinking / C.Taylor// Sternberg R., Tardif T. (eds.). The nature of verbal-logical thinking. – Cambridge: Cambr. Press, 2010. – P. 99-126.

8 Шнипова А.Р. Развитие словесно-логического мышления учащихся средствами творческих проектов: автореф. дис….канд. пед. наук: 13.00.01/А.Р. Шнипова; М-во образования Рос. Федерации, Челяб. гос. пед. ун-т. – Челябинск: [б.и.], 2006. – 22 с.

9 Torrance E.P. The nature of verbal-logical thinking as manifest in the testing /E.P. Torrance // Sternberg R., Tardif T. (eds.).The nature of verbal-logical thinking. – Cambridge: Cambr. Press, 2010. – P. 43-75.

10 Wallach M.A A new look at the creativity-intelligence distinction // Wallach M.A, Kogan N.A. J. Personality. – 2005. – V. 33. – P. 348-369.

References

Andreev V.I. (2008) Pedagogika tvorcheskogo samorazvitija. Innovacionnyj kurs. [Pedagogy of creative self-development. Innovation course]. Kazan': Izd-vo Kazan. un- ta, Kn. 2. 318.

Arhangel'skij S.I. (1980) Uchebnyj process v vysshej shkole, ego zakonomernye osnovy imetody. [The educational process in the higher school, its logical foundations and methods]. – Moskow, Vysshaja shkola, 368.

Boden, M.A. (2009) Computer models of verbal-logical thinking. *Handbook of verbal logical thinking.* – Cambridge University Press, 351-372.

Zinovkina M.M. (2009) Kreativnye tehnologii obrazovanija // Vysshee obrazovanie v Rossii. [Creative technologies of education // Higher education in Russia]. 3, 101-104.

Guilford J. P. (2006) Creative Talents. – New York, 12-18.

Rasskazov F.D. (2009). Sovremennye problemy organizacii nauchno-issledovatel'skoj dejatel'nosti studentov v vuzah: nauchnoe izdanie. [Modern problems of the organization of research activities of students in universities: a scientific publication] //Pedagogicheskoe obrazovanie i nauka. 9, 18-22.

Taylor C. (2010). Various approaches to and definitions of verbal-logical thinking Sternberg R., Tardif T. (eds.). The nature of verbal-logical thinking. Cambridge: Cambr. Press, 99-126.

Torrance E.P. (2010). The nature of verbal-logical thinking as manifest in the testing. Sternberg R., Tardif T. (eds.). The nature of verbal-logical thinking. Cambridge: Cambr. Press, 43-75.

Shnipova A.R. (2006) Razvitie slovesno-logicheskogo myshlenija uchashhihsja sredstvami tvorcheskih proektov: [Development of verbal-logical thinking of students through creative projects] avtoref. dis.…kand. ped. nauk: 13.00.01/ M-vo obrazovanija Ros. Federacii, Cheljab. gos. ped. un-t. Cheljabinsk, 22.

Wallach M.A (2005) A new look at the creativity-intelligence distinction. In Wallach M.A, Kogan N.A. J. Personality. 33. 348-369.