

## STUDYING MATHEMATICAL SUBJECTS TO STUDENTS AS AN INDEPENDENT WORK

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**Abstract:** *At present one of the highest indicators of any country's development and competitiveness is the presence of highly educated (skilled) and competent specialists in various fields of human life, who should solve contemporary matters of national security, economics, politics, public health and education. Consequently, there arises a question (problem) on training such specialists who acquire not only common and specific knowledge, skills and abilities of their professional activity, but also possess distinctive capabilities to exact and natural sciences having critical, creative, non-typical thinking. In connection with this, the problem of quality improvement becomes urgent especially training teachers of mathematics who could satisfy the main requirements of up-to-date education. The future of the country will depend on those specialists who can proudly carry on their shoulders acquired and systematized knowledge today. In order to educate and train such specialists it is necessary not only to create new methodologies in education and training but also perfect, modernize already existing technologies. In the process of the study, theoretical presentations on the role of independent work in education at the present stage were investigated with the help of methods activating functions of right/left cerebral hemispheres, their efficacy in the limits of education system development is demonstrated; methodological requirements for the arrangement of independent works at studying mathematical disciplines by activating right/left cerebral hemispheres are worked out.*

**Keywords:** functioning of right/left brain hemispheres, independent work, mathematical subjects.

During relatively short history of human brain research, scientists not once went back to the matter of functions in its various fields. More vividly it was manifested in attempts to divide physic functions of a person in accordance with real physical division of a brain into right and left halves. Asymmetry in functions of hemispheres initially was discovered in the 19<sup>th</sup> century when the attention was paid to different consequences in injury of left and right brain halves.<sup>1</sup> In subsequent years, clinicians confirmed repeatedly the character of behavior infringement, that happens owing to such injuries.<sup>2</sup>

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<sup>1</sup> M. A. Fedorov, *Theory and methodological support of educational formation of independent activity of students in high school*. Dis ... Doctor. ped., Science, Orel, 2011, pp. 43-46.

<sup>2</sup> B. Hendron, The information exchange. in *Primary Dental Journal*, year IV. No. 1, 2015, pp. 37-39; N. G. Bondar, *The Development of Perception in Junior Adolescents as a Condition for*

The interest to the problem of functional asymmetry considerably arose after first operations on brain splitting performed in the 60<sup>s</sup>. This caused sharp growth of research number, aiming at revealing differences in hemisphere functions and trying to estimate their importance for a person's behavior. Considerable attention was paid to the matter of possible links of these differences with such diversity phenomena as lack of ability to education, psychic illness and peculiarities of cognitive processes at representatives of various cultures.<sup>3</sup> The problem of functional asymmetry has become disputable at least by two reasons. First, accepted data-base was not always mono-semantic: sometimes researches directed to solve one and the same problem gave contradictory results. Second, temptations to put forward hypotheses and conclusions going out far from the limits of factual data.<sup>4</sup> Right and left brain hemispheres provide indivisible work of the organism but control opposite sides of a person's body, each hemisphere fulfilling its definite functions and having its own specification.<sup>5</sup> The work of the right and left hemispheres is asymmetrical but interconnected. The left brain hemisphere is responsible for logical operations, account (numeration), and order of succession but the right brain hemisphere perceps forms, general contents based on intuition, imagination, and creativity. The right hemisphere considers facts, details received from the left hemisphere collecting them into the united whole and integral picture.

The left hemisphere intends to analyses, logical sequences, details, and causal-consequent relations. The right hemisphere realizes orientation in the space, perception of an integral picture, fixes forms and emotions of a person's face.<sup>6</sup>

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*the Improvement of Their Educability*: PhD abstract, St. Petersburg, 1999, p. 16; V. A. Ayrapetyants, „White Opening of an interdisciplinary seminar on functional brain asymmetry”, in *Questions of Psychology*, no. V, 1979, pp. 187-188.

<sup>3</sup> V. A. Ayrapetyants, *Features functional asymmetry of the brain of healthy children*. In *Asymmetry of the brain and memory*: Coll. scientific works. Ushchino, NCBI, 1987, pp. 81-92.

<sup>4</sup> A. S. Zenkin, V. M. Kirnyaev, F. P. Pilgaev, A. P. Lasch, *Independent work of students: guidelines*, Saransk, ANI, 2009, p. 35.

<sup>5</sup> V. V. Krajewski, *Pedagogical research methodology: A guide for the teacher-researcher*, Samara, Publishing house GPI. 1994, pp. 115-134.

<sup>6</sup> M. Mion Pop, A. F. Tacea, Innovation possibilities in the field of education and training staff competencies development microexpressions-„the voice of truth” in the socio-educational environment. in *Mediterranean Journal of Social Sciences*, V (2014), no 22, p. 545-547.

Roger Sperry<sup>7</sup> from California Technological Institute thinks that each hemisphere of a patient with the splitter brain acquires independent consciousness.<sup>8</sup> He has stated the hypothesis that surgical split of a brain divides the mind into two separate conscious spheres. Such hypothesis, naturally, leads the idea of possible existence of doubled consciousness in the intact brain at definite conditions. Other researches underlined the meaning of differences between hemispheres. They stated that these differences are vividly displayed in traditional opposition of the mind to intuition, research to arts, logics to mysticism. As Robert Ornstein,<sup>9</sup> a psychologist, considers, investigations of a brain show that these contradictions are not simple reflection of a culture or philosophy. It was supposed that lawyers and artists employ various brain hemispheres in their work and that these differences are displayed even in their activities not related to their professions.<sup>10</sup> Other researchers broadened this hypothesis, stating that each person maybe referred to „left-hemisphere” or „right-hemisphere” type, depending on which hemisphere directs the basic part of a person’s behavior.

Joseph Bogen, a neurosurgeon, participating in researches of brain sick patients, supposes that the study of inter-hemisphere differences has a considerable importance for the problems of education. He states that contemporary emphasis, in the system of education, on acquisition of verbal skills and development of analytical thinking stipulate neglect to the development of significant non-verbal abilities. He states that in these circumstances one half of the brain is „starving” and its potential investment into a person’s development is ignored on the whole.

## Materials and methods

The following methods of research were used in the study: systematic analysis, comparative analyses, synthesis, comparison, generalization, deduction modeling, scientific methodological analysis of the educational material content, observation, questioning, interviewing,

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<sup>7</sup> N. Neudecker, F. R. Esch, T. Schaefer, S. Valussi, „Message Reframing in Advertising”, in *Psychology and Marketing*, year XXXI, no. 11, 2014, pp. 946-957.

<sup>8</sup> Á. Fernández-López, M. J. Rodríguez-Fórtiz, M. L. Rodríguez-Almendros, M. J. Martínez-Segura, „Mobile learning technology based on iOS devices to support students with special education needs”, in *Computers & Education*, no. LXI, 2013, pp. 77-90.

<sup>9</sup> V. D. Glaser, *Vision and thinking*. Leningrad, Nauka, 1985, pp. 118-123.

<sup>10</sup> O. A. Efremova, *Customization of training as means of formation of communicative competence of students*. Dis. Ekaterenburg, 2002, pp. 54-59.

pedagogical experiments, quantitative and qualitative methods in considering the results of the research under study.

It is known that children of 9-10 years of age acquire prevailing right hemisphere. Functional activity of hemispheres in persons of male sex are more polar character, the dominance of this or that hemisphere may be defined by 6-7 year of age. Girls up to 13 years of age preserve definite brainplasticity, equivalence of hemisphere halves.<sup>11</sup>

At investigating channels of information reception, we have proceeded from the fact that the information comes into our brain through *basic perception channels: eyes, ears, hands and legs*. All organs of sense are important for education, but it's necessary to take into consideration that informational body organs used asymmetrically, for instance, one hand is preferred to another, one eye to another one, one hear to the second one. Our symmetrically disposed sense organs are „fixed” for different hemispheres. A each hemisphere percept and threat information differently there appear differences in the perception of the world and types of thinking. Definition of asymmetry-dominants allows us to clear up styles of thinking realized by learners and gives the opportunity to arrange effective interaction.<sup>12</sup>

It's known that a *leading eye* catches the object first that's why its accommodation (adaptability to clear vision of objects) is faster. The object is perceived by a leading eye as large and contrasting. The asymmetry of eyes allows us to say about involving brain concrete structures into the act of perception of the environment: it's well-known that differences in the field of vision of normal persons reflect the asymmetry of their brain for defining a leading eye there were employed simple tests.

1. On the bend of the folded sheet of paper one should cut out a semicircle with the diameter about 3 cm and, unbending the received circle, lay it on the table at the distance of 30-40 cm. Sitting at the table, take a sheet with a slot and keep it before eyes so as to see a cut out circle through the slot in a sheet. That eye will be considered leading, when closing it; the circle is not seen by another eye.

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<sup>11</sup> N. V. Startseva, *Organizational-pedagogical conditions of training of future teachers work independently with the use of information and communication technologies*. Dis.... candped. Science, Samara, 2007, pp. 6-20.

<sup>12</sup> L. I. Studenikina, *Pedagogical conditions of efficiency of the use of e-learning elements in the university training of students (in the mathematical training material)*. Dis... candped. Science, Voronezh, 2007, pp. 109-114.

2. It's necessary to keep a thumb of a stretched hand directing it onto a vertical line of an interior (door, window frame, picture frame, etc.) and fix both eyes on it. Without moving the thumb and the head, one should close one eye, then open it, then close another eye. That eye which keeps the form of the vertical object on the same line with the finger is a dominant. While closing that eye the form is displaced.

3. Take a sheet of paper, make a hole in the center with the diameter 2-2,5 cm. A student should keep the sheet at the distance of stretched hand and look at you. That eye you see is leading (Friedlander test).

4. Take a pencil. „Take aim” choosing the target and look at it with both eyes through the tip of a pencil. Close one eye, then another eye. If the target is replaced at the closed left eye, then the left eye is considered to be leading and if vice versa, then the right eye (test).

Eyes, a thumb of a stretched hand and an object are on the same line, in spite of the fact that we watch by both eyes. Information gets into the brain mostly from one eye. The second eye serves to create a volumetric picture. When we detach (disconnect) a leading eye, the source of information is another eye and visually we observe replacement of the object aside.<sup>13</sup>

A leading eye, sometimes, maybe of a larger size, it takes aim, focused in the direction of the observed object, whereas a driven eye looks like refocused. After some training it is possible, in some cases, to define for certain a leading eye at outward observation, including photos.

According to K. Hannoford,<sup>14</sup> the following ways of defining a *leading ear* may be used:

-if to imagine that there are people behind the wall who talk about you. If you may come to the wall and enclose your ear so as to hear what they have told. That ear you have enclosed to the wall is considered to be leading.

-lie down on the floor, on your stomach and notice which ear you raise to hear sounds around you that ear is considered to be leading.

-hand a definite person a sea-shell or an empty cup. Ask a person to listen to sounds of a shell or a cup and notice which ear they enclose

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<sup>13</sup> E. Mehoudar, J. Arizpe, C. I. Baker, G. Yovel, „Faces in the eye of the beholder: Unique and stable eye scanning patterns of individual observers”, in *Journal of Vision*, year XIV, no. 7, 2014, pp. 55-64.

<sup>14</sup> N. D. Nikandrov, „On activation of educational”, in *Vestnikysshbeishkoly*, no. VIII, 1983, pp. 26-31.

to a shell or a cup to hear sounds. That ear you usually enclose to a telephone pipe is considered to be leading.

We suggest the following methods very acceptable for the educational process. You may start speaking about something interesting for a companion but gradually reducing speech loudness. Watching a companion, you can settle which ear he turns to you that ear is considered to be leading.

A leading ear is usually of a largersize, it may be easily noticed at the outward observation. You can also measure the size of the ear with the help of a ruler.<sup>15</sup>

Students with acoustic perception possess a leading ear on the other side of a dominating hemisphere and prefer acoustic presentation at getting new or critical information. There exists a definite asymmetry in nervous links going from each ear to the brain hemisphere. Nervous fibers going from the right ear to the left hemisphere are thicker than nervous fibers going from the left ear to the left hemisphere. Due to such asymmetry the right ear initially sends information into the left hemisphere whereas the left ear initially sends information to the right hemisphere. That is why persons with gestalt hemisphere (right) and opposite dominating ear are the mean listeners of metaphors, histories, dialects and emotional information.

Persons with logical dominants (left hemisphere) and dominating opposite ear are excellent listeners for detailed or linear way of presenting information.<sup>16</sup>

Important information in a realized way of thinking is given by *hands*. They send information into the brain through touching and movement. Hands are the means of expression of acquired knowledge via gesture and letters. Hands are intensively included into human communication (contact)as in oral, so in kinetic expression. For defining a leading hand,we have used the following tests (Luria):

One should offer a person a pencil or a pen on the level of their mid body part (on the waist level). That hand which will touch a pen or a pencil is considered to be a dominating hand in force.

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<sup>15</sup> T. I. Collegiate, „Assessment of student workload as part of the European system of credits”, in *Higher Education Today*, no. VI, 2009, pp. 9-13.

<sup>16</sup> K. A. Quinn, H. E. Rosenthal, „Categorizing others and the self: How social memory structures guide social perception and behavior”, in *Learning and Motivation*, year XLIII, no. 4, 2012, pp. 247-258.

One should cross hands on the chest in the „Napoleon pose”. The hand, from elbow to wrist, occurring above will be leading. If you change position of your hands, you will feel discomfort as you are a left-hander or a right-handed.<sup>17</sup>

Interlace fingers of your hand several times. The thumb of the hand which will occur above, that hand is considered to be leading at exercising trifle movements.

*Legs* are also controlled by opposite hemispheres. A person with a dominant leg opposite to a dominant brain hemisphere is capable to adroit movements.

In our study we have used the following methods in defining a leading leg. A leading leg is that leg which is pushed off while jumping, with the help of which you left the step or an armchair, kick a ball or that leg to which you transfer the burden (a heavy load) in order not to fall.

When a dominating leg is on the opposite side of a body from a logical hemisphere, a person will strive for fulfilling more planned moments. Such people successfully follow instructions of the type: step-by-step in sports, dancing and other kinds of active movements but may have lack in movement spontaneity.

If a leading leg is opposed to the gestalt hemisphere, movements will be more spontaneous, free in forms and directed by the rhythm. But such people may have difficulties in following step-by-step instructions.

When a dominating leg is on the same side of the dominating hemisphere (limited movement), then under stress such people may have difficulties in movements. Persons with such profile will find out that in conditions of stress, first of all, they have tendency to stand stock-still and are not able to exercise immediate physical action. They can feel themselves paralyzed or experience awkwardness leading to injuries, ragged knees or something worse.

In contrast to persons with dominating hemisphere opposed to a dominant leg they will continue to act under stress but their efforts may be non-productive and wasted all for nothing.

During the period of gaining knowledge or stress, non-dominating hemisphere tends to reduce its functions radically allowing a dominant hemisphere to take care about basic demands. Such state of depressed

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<sup>17</sup> S. M. Seitova, G. O. Kozhasheva, Y. N. Gavrilova, R. Tasbolatova, G. S. Okpebaeva, G. T. Kydyrbaeva, A. Z. Abdykarimova, „Peculiarities of Using Neuro-Linguistic Programming Techniques in Teaching”, in *IEJME-Mathematics Education*, year XI, no. 5, 2016, pp. 1135-1149.

functioning in one in one hemisphere is called a one-sided condition. The state when both hemispheres function at the same time is called an integrated condition and this is the key to the highest level of logical reasoning and creativity.<sup>18</sup>

During the stress only a hand and a leg of an opposite leading hemisphere will effectively participate in treating the information. At the same time there will be observed limits in access to feelings and functions of physical movements that dominate on the same side of the body as dominating brain hemisphere. If, for instance, all educational components-eyes, ears, hands, legs and brain hemispheres, dominate on the right side, such a profile will be fully limited in a one-sided condition. During the stress such a person is unable to have access to a major part of audiovisual information and has difficulties in thin motor functions communication. Such learners are not able to see details and they should have time to sit in silence and solitude for inner treatment(consideration) of information. As they have difficulties of averbal plan, vision and hearing under stress they often get definition as „inability” students or they require specialized training and finally, they get, quite often, much more stress that may immortalize their one-sided condition. In contrast to this, a profile where a leading hemisphere is on the opposite side of a leading sensory passage gives full sensor-motor access. Here a leading hemisphere controls a leading hand and a leg, get information from a leading eye and ear.<sup>19</sup> Even under stress a person with such a profile can have an access to audio-visual information and can bind details by means of a language. Such types of learners are usually keen on tests on the assessment of verbal (oral) and mathematical abilities. Those learners whose right hemisphere is not active at stress periods may experience difficulties in understanding figurative, rhythmical or emotional ways of training. They may have awful vision of the picture that reduce their awareness of the information.

*Each hemisphere* develops and considers information specifically logical hemisphere (usually from the left side) deals with details, parts, language consideration and linear analysis. In contrast to this gestalt-hemisphere (usually on the right side) considers information as a whole

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<sup>18</sup> K. A. McCusker, J. Harkin, S. Wilson, M. Callaghan, *Intelligent assessment and content personalisation in adaptive educational systems*. In 2013 12th International Conference on Information Technology Based Higher Education and Training, ITHET, 2013, pp. 223-232.

<sup>19</sup> R. Bandler, J. Grinder, *The structure of magic*, London, Real People Press, 1976, p. 80.

or globally, in comparison with linear treatment. This hemisphere deals with forms, rhythm, emotions and intuition.

Terms „logical hemisphere” instead of „left” and „gestalt hemisphere” instead of „right” are used only because some people’s hemispheres transposed and consider logical actions on the right side but gestalt actions - on the left. In order to differentiate them functionally but not topographically, terms „logical” and „gestalt” are employed but not a left and right hemisphere.

Callous body between hemispheres acts as a superfast way allowing exchanging information and considering: linear detailed-logical hemisphere, a generalized form-in gestalt hemisphere.<sup>20</sup> At good connections between brains hemispheres there appear unified thinking. The more both hemispheres are activated, the more links are formed via a callous body. The more connections, the faster the information treatment and much more reasonably we are able to act. It is necessary to use both brain hemispheres in order to be a real expert in some field. During the stress or gaining new knowledge there exists a certain level of a hemisphere dominant and people will always prefer logical or gestalt treatment.

Logical hemisphere considers information out of parts up to the whole by a linear way. This hemisphere deals with language parts (alphabet, words, syntax, and pronunciation) and should be examined as a language hemisphere. It also deals with a linear way, with numbers and prefers education techniques to a new step-by-step skill. A learner with a logical dominant usually acquires more advantage in our today’s education system and oriented to a language.<sup>21</sup>

Gestalt hemisphere treats information out of the whole by parts in the form of context. This hemisphere functions through a form, rhythm, movement, emotion and intuition. This hemisphere should be considered as creative consciousness because of its curious, spontaneous nature. A learner with gestalt dominant won’t acquire advantage in our educational system.

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<sup>20</sup> R. Y. Il’yuchenok, A. L. Finkel’berg, I. R. Il’yuchenok, L. I. Aftanas, *The interaction of the brain hemispheres in humans: Installation, processing of information*, Novosibirsk, Nauka, 1989, pp. 14-24.

<sup>21</sup> H. T. Kahraman, S. Sagirolu, I. Colak, *Development of adaptive and intelligent web-based educational systems*. In 4th International Conference on Application of Information and Communication Technologies, AICT2010, 2010, pp. 227-230.

## **Results and discussion**

The goal of independent student's work is the acquisition of methods in gaining knowledge and getting skills of independent analysis of social phenomena and processes and also reinforcement of research basics in practical activities.

Commonly there two types of I. S. W.: at lectures, in the process of conducting practical, seminar and laboratory classes (i.e. in classrooms) and the work out of academic classes.

Out of class independent students' work render an effective influence on the formation of personality—future specialist and is planned by a student himself. Every student himself defines the regime of his work and measure of his labor, the time spent for acquiring content for each subject. He fulfills extra class academic work by personal, individual program (plan) depending on his level of training, disposed time and other times. At present the problem of access to the information that has existed earlier is actively replaced by another: the search of necessary data in the huge sea of information. In connection with this the task is set: to develop communicative skills, abilities to get information out of various sources, consider them, keep, and exchange it with the help of modern computer technologies.

Thus, structurally I. S. W. may be divided into two parts: arranged by a teacher and independent work that is arranged by a student at his discretion without any direct control from the teacher's side, including preparation to lectures, laboratory and practical classes, tests, colloquiums, etc.

It is necessary to note that arrangement of I. S. W. is first of all the ability to optimize the process of combining these two parts. ISW arranged by a teacher should compose not less than 20% of the time given to independent work according to the teaching program. Distribution of hours for I. S. W. in every discipline arranged by a teacher is approved by research-methodological council of courses and specialties. It is supposed that arrangement of independent works should be provided for all disciplines of the academic plan.<sup>22</sup>

Forms of arranged independent students' work controlled by a teacher are suggested by departments, who work out Syllabifor disciplines. They may establish other forms, not mentioned above if they

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<sup>22</sup> W. S. Cook, „A Comparative Analysis Between the Nile Valley's Liberal Arts Tradition and the Development of Western Education”, in *Journal of Black Studies*, year XLV, no. 8, 2014, pp. 683-707.

are accepted by the research methodological council in professional directions (specialties).

If to discuss the significance of the forms of independent works the attitude to them is different especially overseas. For example, in Netherlands there exists a definite basic academic (educational) text book for each subject taught in any Netherland university which is chosen by especially expert commission on competitive basis.<sup>23</sup> After approving the text book as basic by the course, all students of the university, studying the course are recommended to buy it. Thus, classes on each subject are conducted by a concrete textbook that allow using various forms of independent students' work actively.

For example, the study of each new theme of the course starts, as a rule, from independent introduction of students with the planned material.

We have distinguished the following main types of motivation for independent students work by the technology of neuro-linguistic programming:

1. *External motivation*-dependency of professional career on the study results at the university. This factor works not so effectively but the solution of the matter has the tendency to be seen in future.

2. *Internal motivation*-inclination of a student, his abilities to study at the university. It may be governed at the period of pre-university training by fulfilling tests at choosing the specialty, grounded recommendation at defining educational direction, etc.

3. *Process (educational) material*. It is manifested by a student's understanding that the work he exercises is useful. There should be a psychological tuning of a student to the importance of his work as in the aspect of professional training, so in the aspect of extending mental outlook, erudition of a specialist. It is necessary to demonstrate and in some cases to prove that the results of I. S. W. will help him to comprehend better the lecture material, laboratory tests, etc. We can get great effect from I. S. W. when it is included into the project or course paper as a component part, more over effective if it a part of a diploma project taking into account a dominating channel of information

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<sup>23</sup> S. Mann, A. Vrij, E. Nasholm, L. Warmelink, S. Leal, D. Forrester, „The Direction of Deception: Neuro-Linguistic Programming as a Lie Detection Tool”, in *Journal of Police and Criminal Psychology*, year XXVII, no. 2, 2012, pp. 160-166.

perception, it may be carried out at the initial level of education - on the first or second year of study.<sup>24</sup>

Assessment of I. S. W. should not be an objective point for a teacher, but it should be a motivating factor for a students' educational activity. It is necessary to include results of I. S. W. into current progress index, into examination cards, tests because a student's G. P. A. depends on the score; his final score and, consequently, his scholarship and its rate. Moral interest is significant for most of the students in the form of public acknowledgement (it's pleasant to be the first at the faculty, specialty, in the group).

The principal thing is the intention to study, to set the purpose at junior years: I. S. W. is for extending and strengthening knowledge and skills acquired by a student at traditional forms of classes but at senior years I. S. W. should stipulate a student's abilities of creative potential. Task of I. S. W. may bear individual or complex character. But control of I. S. W. execution, I. S. W. reports should be only individual.<sup>25</sup>

Conditions of independent students' work efficacy imply the following requirements:

1. Maintenance of correct combination of bulky auditorium and individual work.

2. Methodologically correct arrangement of a student's work in class and out of class.

3. Maintenance of a student by necessary methodological materials, allowing a student to see the information on an applicable „language” with a view to turn the process of independent work into the creative process.

4. Control under arrangement and course of independent works and measures, encouraging a student for a qualitative fulfillment of tasks. These requirements in this or that form should be applied to the first three conditions; the control must be not administrative but a competent didactic term that can influence positively on I. S. W. effectiveness.

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<sup>24</sup> T. Shevtsova, „Modern problems of optimization of independent work of students. Scientific notes”, in *Electronic Journal of the Kursk State University*, no. IV, 2010, pp. 18-21.

<sup>25</sup> T. Magaard, „NLP: En new age-teknisk management fashion”, in *Religionsvidenskabeligt Tidsskrift*, no. LXIII, 2015, pp. 60-86.

## **Conclusion**

The first requirement consists in the necessity of optimal structuring of an educational program not only in the sense of sequent study of separate courses, but a reasonable correlation of class and out-of-class works. A great role is played by correct distribution of laborintensiveness of various types of individual works such as course projects, reports, calculation-graphical works, and other tasks taking into consideration a dominating channel of information perception.

The second requirement is methodologically rational agreement of works. It is important to insert elements of technology into relations between a teacher and a student gradually. If the first years a teacher possesses an active creative position, a student is often driven, at senior years the sequence should be directed to stimulating a student to work individually, strive actively for self-education. Fulfillment of tasks for individual works must teach to think, to analyze, to consider terms, to put tasks, to solve occurring problems and should be written on „the language of perception”, i. e. the process of individual work should gradually turn into creative. In this case methods and techniques may be of great help. As a rule, a student solves the set tasks with great interest whether it is a course of diploma project, test tasks, various types of home tasks, individual tasks (i. e. taking into account dominating hemisphere and a learner's leading representative system). In the process of solving tasks, a student acquires to essence of the subject deeper, studies literature, and searches optimal ways of solution. This is interest motivation. After such steps there should be motivation of students to study in the form of manifesting interest to the work on the side of course mates and teachers (teacher's consultations, information about a „student's rating” on fulfilled tasks, etc.).

The third requirement is the maintenance of students by corresponding educational-methodical literature. At present universities cannot fully supply a student by necessary published literature. Taking into account these requirements, it should better recommend the transition to electronic editions, lectures of teachers engaged in involving methods of activating right/left brain hemispheres functioning into the education system that is partially being realized nowadays. But the transition to such way of communication with a student demands serious development.

Moreover mathematical education was and is one of the grounds in professional education of a specialist in any profile. The university

course of mathematical disciplines compose the basics of a student's fundamental training, it also provides the formation of integral mathematical approach to the analyses of objects and processes in all fields of specialists' research knowledge. At studying mathematical disciplines students should get an idea about mathematics as a special way of world cognition, about generalization of its concepts and provisions; to develop logical and algorithmic thinking; to acquire basic methods of investigation, solution of mathematical tasks of theoretical and practical character, necessary for the study of common research and specified disciplines; to work out skills to widen mathematical knowledge individually and conduct mathematical analyses for applied tasks. In the process of studying mathematical disciplines it is necessary to educate a student's high mathematical culture, sufficient for application of mathematical apparatus in future labor activity; to form skills of automation in numerical, symbolic, graphic calculations with the help of modern computer mathematical systems; to teach to construct mathematical models of various technological processes; to design planning matrix and conduct experiments; to construct linear and non-linear models; to accept decisions after constructing models. Thus, the principal result of studying mathematics at present is not only mathematical knowledge as such but also the ability to realize them in their labor activity, at considering concrete professional problems and also to acquire new mathematical knowledge applying contemporary educational technologies.