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Development of Higher Mental Functions in First-graders During the School Year Depending on the Intensity of Educational Activities

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ABSTRACT

The relevance of the investigated problem is caused by the fact that most children who start to study do not have a good level of higher mental functions. It leads to difficulties at school and health problems. The article aims at estimating the level of higher mental functions and the degree of educational motivation development among first-graders depending on the intensity of educational activities. The leading methods used to investigate the problem are methods of mental function evaluation of younger students. The article reveals the effect of educational activities, including intensive activities, on the development level of higher mental functions of first-graders. The results prove that the level of spatial visualization ability and short-term auditory rote memory of first-formers taking 3- or 4-year primary education program increases; and these changes are greater among students taking 3-year primary education program. This education system also contributes to increase of short-term auditory memory and semantic voluntary attention (primarily among boys). Intensive educational activities (1-3 system) provide greater motivation and efficiency of training activities than less intensive educational activities (1-4 system). The article is of practical value to educational activities managers, primary school teachers and school psychologists.

KEYWORDS
Higher mental functions, adaptation to the training load, the intensity of educational activities, first graders.

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Introduction

The issue of the training load intensity is one of key problems in physiology and health education activities (Kuchma and Stepanova, 2002; Stepanova, 2003). Due to innovative changes in school education and its organization variations the issue of optimal volume of educational load without any negative impact on students' health

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is not solved yet. This is reflected in the fact that until 1969 there was a 4-year primary education in the Soviet Union, then a 3-year programme, and since 2000 the primary education has been carried out according to a 4-year programme. At the same time there is no information about advantages of a 4-year programme in comparison with a 3-year primary education; and the information about the dynamics of indicators characterizing the state of the first-graders, taking a 3-year program, is lacking and often contradictory (Gritsinskaya, Gordiets, and Galaktionova, 2001; Kuzmina and Tarantushenko, 2005). In the 2000-2001 school year a 3-year primary education was replaced with a 4-year system in Russian schools. This allowed us to take advantage of the unique situation: to research the influence of educational activities with different intensity level (classes on the basis of a 3-year and 4-year programmes) on development of higher mental functions and their dynamics under common conditions of the educational process.

Literature Review

When a child enters the school, he or she should master new forms of speech activity – reading, writing, coherent speech. Development of brain mechanisms is of great importance as they provide specific speech activity. In a 7-year-old child there are some progressive changes in cellular and fibrous structures of speech zones and frontal cortex programming speech activity. However, basic mechanisms are immature yet due to the lack of a clear hemispheric specialization. The level of speech development in 6-7-year-old children is determined by the analyzer systems and structures of the second brain unit. In particular, immature analyzer systems (motor functions and sensory and motor integrations) cause disruption of phonetic and phonemic perception; immature structures of the second (operational) brain unit lead to violations in sound differentiation and articulation. At the same time maturity of the cerebral cortex and activating system of the brain does not influence sound pronunciation ability and phonetic and phonemic perception significantly (Dubrovinskaya, Farber and Bezrukikh, 2000).

Getting high marks is a key factor when a child enters school. It is important for personal development of a student, and children successful from the beginning have higher level of this motive. These children have higher motivation for achieving success and avoiding failures. Motivation to avoid failures is usually accompanied with anxiety, fear of grading, and it leads to negative emotional colouring of educational activity (Kulagina, 1999).

The start of schooling causes significant changes in thinking; it becomes abstract and generalized. Maturity of spatial visualization ability is the basis of successful education and its transition to a verbal form (Priluchnaya, 2002). The ability to think logically and the beginnings of abstract thought are due to activation of cortico-cortical associative connections and complete formation of bonds of the frontal cortex with other brain units (Kirpichev, 2002).

Contradictory information about thinking development in the first grade is presented in special writings. L.L. Ryseva and M.V. Zlokazova (1998) have found out that 87% of first-graders in Kirov have a high level of verbal and logical thinking; 7.4% of first-graders have a medium level, and 5.6% of first-graders are characterized with a low level. A.I. Belykh, N.V. Zvyagina and T.S Koposova, (2001) examined primary school students in Arkhangelsk with John Raven's colour matrix and found out that 3.8-12.5% of children had a high level; 21.7-38.4% had

a good level; 44.4-56.9% had a medium level, and 17,2-27,2 % of children had a low level. We believe that first-graders in Kirov have the same level of spatial visualization ability (the prerogative of the right hemisphere) as their peers in the European North of Russia.

Primary school students have mostly involuntary attention. It is immature in a 7-8-year-old child (Dubrovinskaya, Farber and Bezrukikh, 2000). Voluntary attention is formed at the age of 3-10, and more intensively at the age of 6-7 (Farber and Dubrovinskaya, 1997).

There is lack of data about the dynamics of attention level in primary school children. During this period attention span increases twice; there is also growth of stability, switching ability and distribution (Farber et al., 2000). O.V. Tulyakova (2004) and E.V. Chetverikova (2004) used Tuluz-Peron Test and found out that both boys and girls of the first grade in Kirov increased the test speed while maintaining accuracy during the school year. It indicates the growth of attention level.

Physiological bases of memory are one of the problematic issues of physiology and psychophysiology (Tsirkin and Trukhina, 2001). Age-related aspects of memory processes pose a challenge as well. However, schooling requires a high level of voluntary memorization of the training information, and its volume constantly grows.

Aim of the Study

The aim of our study was to examine the influence of educational activities of varying intensity on the higher mental functions first graders.

Research questions

The overarching research question of this study was as follows: What is the degree of the influence of intensive educational activity on the psychological status of first grader?

Method

The Scope and Methods of Research

Throughout the school year, the dynamics of higher mental functions of 37 boys and 42 girls of three first grades of Kirov school № 58 was studied. One class (Group A, 10 boys and 14 girls) had a 3-year programme and 25-hour educational load per week. Two other classes (Group B, 27 boys and 28 girls) had a 4-year programme and 22-hour educational load per week.

At the beginning of the school year all students were assessed on the basis of 8 indicators: the purity of sound pronunciation, coherence of speech, phonemic hearing and perception, visual perception, spatial visualization ability; voluntary attention, visual and auditory memory, and motivation for educational activity. In February and May the visual perception, spatial visualization ability, voluntary attention, as well as mechanical and semantic memory were assessed (4 indicators).

Spatial visualization ability was estimated with John Raven's colour matrix modified by T.V. Rozanova (1978); short-term visual and auditory memory was assessed according to the Memory Type procedure (Ilyina and Paramonova, 1998). The Evaluation of Mechanical Memory and the Meaningful Memorization Ability Test was

used for assessing short-term mechanical and semantic memory (Almanakh of psychological tests, 1996); and the Graphic Dictation Test was used to assess voluntary attention (Rogov, 1995). Speech ability was assessed with different tests: sensory speech at the level of phonemic hearing with Write in Circles Test (Ilyina and Paramonova, 1998), motor speech was assessed on the basis of sound pronunciation purity (Ilyina and Paramonova, 1998), and Vitslak's test was used for assessing speech coherence (Almanakh of psychological tests, 1996). Motivation for educational activity was assessed with the Identification of a Student's Position Test (Gutkina, 1998).

Data, Analysis, and Results

Characteristics of Higher Mental Functions in First Graders Entering School

Spatial visualization ability. At the beginning of the school year the level of spatial visualization ability in all first-graders was 21.82. According to T.V. Yegorova's classification (1973) this value indicates that the development level of the examined students is below the average (17-22.9).

The average indicator for the girls from Group A at the time of school entering was 28.36 (T. 1); for the girls from Group B it was 21.12; for the boys from Group A it was 28,21, and for the boys from Group B it was 18.11 ($p_{Б\text{-}А}<0,05$). Thus, boys from Group A initially had a higher level of spatial visualization ability than boys from Group B; this indicator for girls from both groups was equal. Both boys and girls had the same level of spatial visualization ability.

Voluntary attention. At the beginning of the first grade the level of voluntary attention in all students was 2.72. It is a high indicator as according to the classification (Rogov, 1995) a high level is 3 points, a medium level is 2 points, and a low level is 1 point.

At the time of school entering girls from Group A had an average 2.92 indicator (T. 1); for girls from Group B it was 2.64; for boys from Group A it was 3.0, and for boys from Group B it was 2.59 ($p_{В\text{-}А}<0,05$). Thus, boys from Group A initially had a higher level of voluntary attention than boys from Group B; this indicator for girls from both groups was equal. Both boys and girls had the same level of voluntary attention.

Short-term auditory memory. This indicator was assessed only at the beginning of the school year. The first-graders were to repeat words (out of 10, no apparent logical connection between them).

The average indicator was 5.94, i.e. students could repeat up to six words. According to M.N. Ilyina's and L.G. Paramonova (1998) classification it is a medium level of short-term auditory memory (4-7 points in the classification). So, at the time of school entering girls from Group A had 6.50 points for a short-term auditory memory indicator; for girls from Group B it was 5.62; for boys from Group A it was 6.29, and for boys from Group B it was 5.82. Thus, at the time of school entering students had the same level of short-term auditory memory. There were no gender differences either.

Short-term visual memory. The average indiator for all children was 5.89 points. According to M.N. Ilyina's classification it is a medium level of short-term visual memory (4-7 points in the classification). Table 1 reveals that at the time of school entering girls from Group A had 6.00 points for a short-term visual memory indicator; for girls from Group B it was 5.48; for boys from Group A it was 6.14, and for boys from Group B it was 6.14. Thus, at the time of school entering students had the same

level of short-term visual memory. There were no gender differences either (Ilyina and Paramonova, 1998).

Table 1. The Level of Higher Mental Functions in First-Graders at Different Educational Activity Intensity.

Indicators	Group A						Group B					
	Boys (n=8)		Girls (n=13)		All students (n=21)		Boys (n=21)		Girls (n=23)		All students (n=44)	
	M	m	M	m	M	m	M	M	M	m	M	M
1. Visual perception and spatial visualization ability (John Raven's colour matrix; average, points)												
September	28,21	2,55	28,36	3,00	28,31	2,07	18,11	1,70*	21,12	2,04	19,50	1,32*
February	27,41	1,40	29,09	0,74	28,48	0,70	26,29	0,79 S	26,69	0,65 *S	26,49	0,51 *S
May	31,35	0,47 F	31,37	0,52 F	31,36	0,35 F	30,24	2,08 S	29,35	0,66 F S	29,74	0,97 F S
2. Voluntary attention (the Graphic Dictation Test; average, points)												
September	3,0	0,01	2,92	0,08	2,95	0,05	2,59	0,13*	2,64	0,12	2,61	0,09*
February	2,78	0,22	2,29	0,27 S	2,48	0,19 S	2,46	0,16	2,69	0,11	2,58	0,10
May	2,80	0,13	2,67	0,16	2,72	0,11	2,38	0,11*	2,75	0,10▲	2,57	0,08
3. Memory:												
A) short-term auditory memory, average (points)												

S - difference with the test in September 2000 is authentic, p<0,05

F - difference with the text in February 2001 is authentic, p<0,05

Sound pronunciation. 68.1 % of all first-graders had standard sound pronunciation. 92.3 % of girls from Group A had standard sound pronunciation; for girls from Group B this indicator was 68%; for boys from Group A it was 77.8%, and for boys from Group B it was 50.0%. Thus, there were less children in Group B with correct sound pronunciation than in Group A (it is characteristic mostly of girls and all children: 59.6 % and 86.4% correspondingly). There were no gender differences.

Speech coherence. The average indicator of speech coherence for all children at the time of school entering was 2.63 points (T. 1, 2). According to the classification (Almanakh of psychological tests, 1996) it is above average (1 point indicates a low level, 2 points stand for a medium level, and 3 points indicate a high level of speech coherence). Girls from Group A had an average 2.92 point indicator; for girls from Group B it was 2.67; for boys from Group A it was 2.88, and for boys from Group B it was 2.35. All children from Group B had lower speech coherence that first-graders from Group A (2.51 and 2.90 correspondingly). Besides, all girls had higher level of speech coherence than boys (2.76 and 2.48 correspondingly). Thus, we may speak of two regularities: 1) the level of speech coherence is initially lower in Group B than in Group A (it is true for all children and for boys); 2) girls have a higher level of speech coherence than boys (it is true for all girls).

Phonemic hearing. At the beginning of the first grade the level of phonemic hearing for all children was 2.80 points (T. 1, 2). According to the classification (Ilyina and Paramonova, 1998) it is a high level of phonemic hearing (in the classification 1 point stands for a low level, 2 points indicate a medium level, and 3 points show a high level). Girls from Group A had an average 2.92-point indicator; for girls from Group B it was 2.78; for boys from Group A it was 2.75, and for boys from Group B it was 2.76. Hence, at the time of school entering phonemic hearing was equally developed in all children and there were no gender differences (2.83 for girls and 2.76 for boys). Indicators of Groups A and B were almost similar (2.77 and 2.86 correspondingly).

Generally, we revealed that 1) first-graders from both Groups had the same level of phonemic hearing. However, children from Group B had a lower level of speech coherence (boys) and sound pronunciation (girls). 2) Girls and boys had the same level of sound pronunciation and phonemic hearing (it is true for Groups A and B), and girls had a higher level of speech coherence than boys (it is true for Group B).

Thus, children from Group A had been admitted to Grade 1 having passed a special psycho-pedagogical selection and had a higher level of spatial visualization ability (mostly boys), voluntary attention (boys), sound pronunciation purity (girls and all children), and speech coherence (boys and all children). However, they did not differ from Group B students in phonemic hearing, short-term auditory and visual memory. There were no gender differences in higher mental functions development (with the exception of speech coherence level which is higher among girls).

Student's internal position, or motivation for educational activity. The research was carried out at the beginning of the school year (in September). It revealed a low level of motivation for educational activity as only 54.8% of children had a generated position of a student (T. 1, 2). 90.9 % of girls from Group A had motivation for educational activity; for girls from Group B this indicator was 50%; for boys from Group A it was 71.4%, and for boys from Group B it was 37.5%. There were no true differences between children from Group B and Group A (43.2% and 83.3%).

Thus, motivation for educational activity was similar for both groups, and there were no gender differences.

Table 2. The Level of Higher Mental Functions in First-Graders

Indicators	Both Groups					
	Boys (n=29)		Girls (n=36)		All students (n=65)	
	M	M	M	M	M	M
1. Visual perception and spatial visualization ability (John Raven's colour matrix; average, points)						
September	20,05	1,64	23,53	1,78	21,82	1,23
February	26,53	0,68 S	27,45	0,53 S	27,04	0,42 S
May	30,57	1,47 F S	29,95	0,51 F S	30,22	0,70 F S
2. Voluntary attention (the Graphic Dictation Test; average, points)						
September	2,70	0,10	2,74	0,09	2,72	0,06
February	2,54	0,13	2,56	0,12	2,55	0,09
May	2,50	0,09	2,72	0,08	2,62	0,06
3. Memory:						
А) short-term auditory memory, average (points)						
September	5,93	0,33	5,94	0,29	5,94	0,22
Б) short-term visual memory, average (points)						
September	6,14	0,32	5,67	0,27	5,89	0,21
В) short-term auditory mechanical memory, average (points)						
February	2,08	0,30	2,07	0,28	2,08	0,20
May	3,78	0,35 F	3,43	0,27 F	3,59	0,22 F
Г) short-term auditory semantic memory, average (points)						
February	6,14	0,40	6,21	0,37	6,18	0,27
May	6,22	0,45	7,12	0,31	6,71	0,27
4. Student's generated internal position, % (Gudkina's test)						
September	45,2	8,94	64,5	8,59	54,8	6,32
5. Standard sound pronunciation, %						
September	58,1	8,86	76,3	6,90	68,1	5,61
6. Speech coherence (Vitslak's subtest), average (points)						
ptember	2,48	0,10	2,76	0,08▲	2,63	0,07
7. Phonemic hearing and perception (Write in Circles Test), average (points)						
September	2,76	0,08	2,83	0,06	2,80	0,05

Notes: * - difference with Group A is authentic, p<0,05; ▲ - difference with boys is authentic, p<0,05; S - difference with the test in September 2000 is authentic, p<0,05
F - difference with the text in February 2001 is authentic, p<0,05

Dynamics of Higher Mental Functions Development in First-Graders

The analysis of higher mental functions dynamics and progress was carried out in the second half of the school year as during the first half of the school year there was adaptation of children to educational load and they were not graded by the teacher.

Spatial visualization ability. In February the average indicator was 27.04 points; in May it increased to 30.22 points. We see the growth of the spatial visualization ability level during the school year in all first-graders.

The girls from Group A had the following average spatial visualization ability indicator in February and May: 29.09 and 31.37 correspondingly; for the girls from

Group B it was 26.69 and 29.35. So, during the education process in Grade 1 the girls from both Groups increased the level of spatial visualization ability. In the second half of the school year this indicator was much higher among the girls from Group A than the girls from Group B which shows the stimulating effect of the intensive educational activity.

The boys from Group A had the following average spatial visualization ability indicator in February and May: 27.41 and 31.35 correspondingly; for the boys from Group B it was 26.29 and 30.24. Thus, during the education process in Grade 1 the boys from Group A greatly increased the level of spatial visualization ability. This indicator also grew among the boys from Group B (primarily from September to February), but it did not reach the level of the boys from Group A. There were no gender differences in both Groups.

Voluntary attention. The level of voluntary attention in February and May was 2.55 and 2.62 points correspondingly which indicates that the level of voluntary attention did not grow.

The girls from Group A had the following indicators: in February it was 2.29 and at the end of the school year it was 2.67. We see decline of a voluntary attention level in the middle of the school year, and by the end of the school year it was restored. As for the girls from Group B in February this indicator was 2.69, and at the end of the school year it was 2.75. Thus, during the school year the level of voluntary attention among girls from both Groups was constant. We could not find any reliable differences between the girls from both Groups. So, educational activity, even more intensive, does not raise the level of voluntary attention among girls.

The boys from Group A had the following indicators of voluntary attention: in February it was 2.78 points, and at the end of the school year it was 2.80. The boys for Group B had 2.46 and 2.38 points correspondingly. So at the end of the school year the boys from Group B had a lower level of voluntary attention than the boys from Group A. Throughout the school year this indicator in both Groups was stable. Thus, the level of voluntary attention both among boys and girls cannot be increased with educational activity, even when it is more intensive.

So, educational activity, even more intensive, does not raise the level of voluntary attention among girls and boys. Furthermore, it leads to temporary decrease of voluntary attention among girls though they are considered to be more diligent than boys. There were no gender differences revealed.

Short-term auditory mechanical memory and its dynamics in the second half of the school year. The research was carried out in the second half of the school year (in February and May 2001). In February (T. 2) an average indicator of short-term auditory mechanical memory was 2.08 points; i.e. the children could repeat only two pairs out of ten. According to the classification (Almanakh of psychological tests, 1996) it is a low level of this memory in first-graders (1-3 points). In May this indicator increased to 3.59 points which shows the growth of short-term auditory mechanical memory level during the second half of the school year. This indicator for the girls from Group A in February was 1.43 points and in May it became 4.14 points; this indicator for the girls from Group B was 2.38 and 3.07 points correspondingly. The same indicator for the boys from Group A was 1.22 and 4.30 points, and for the boys from Group B it was 2.36 and 3.58 correspondingly.

Hence, in all groups (with the exception of the girls from Group B) the level of short-term auditory mechanical memory increased by the end of the school year; as for the girls from Group B it did not change. It means that educational activity, and primarily intensive educational activity, contributes to development of mechanical memory. Gender differences were not revealed. Thus, we believe that 1) the selection of students for a 3-year primary education programme was not based on their level of mechanical memory (in Group B it was higher than in Group A); 2) both systems lead to higher level of mechanical memory; however, a 3-year system is more effective; 3) according to these indicator girls in both Groups did not have any advantage over boys as their indicators were similar.

Short-term auditory semantic memory and its dynamics in the second half of the school year. The research was carried out in the second half of the school year (in February and May 2001). In February (T. 2) an average indicator of short-term auditory semantic memory was 6.18 points; i.e. the children could repeat six pairs out of ten. According to the classification (Almanakh of psychological tests, 1996) it is a medium level of this memory in first-graders (4-7 points). In May it was 6.71 points which indicates that the level of semantic memory did not change significantly during the second half of the school year.

This indicator for the girls from Group A in February was 5.71 points and in May it became 7.21 points; this indicator for the girls from Group B was 6.45 and 7.07 points correspondingly. The same indicator for the boys from Group A was 5.78 and 8.00 points, and for the boys from Group B it was 6.25 and 5.54 correspondingly. So, educational activity does not lead to the development of semantic memory, though intensive educational activity may contribute to the growth of this indicator (boys). As a rule, by the end of the school year girls have higher level of semantic memory than boys (Group B).

Discussion and Conclusion

Features of Higher Mental Functions in First-Graders at the Time of Admission to School

In a 7-year-old boys tend more than girls to neurotic reactions, delayed psychomotor and mental development, including speech development (Belykh, Zvyagina and Koposova, 2001). Boys master motor speech than girls. E.V. Rybak and A.V. Pyatkov (1999) did not reveal any gender differences concerning speech functions. E.V. Chetverikova (2004) used a standard speech therapy procedure to examine 1000 first-graders in the city of Kirov in 2001/2002 school year and found out that 65.1% of children had a good level of speech development, including 28.1% of children with high level of speech development. She also determined that boys had higher level of speech coherence than girls. 24.2% of boys and 21.1% of girls had problems with phonemic hearing (Tulyakova, 2004).

According to our findings at the beginning of Grade 1 50%-92.3% of children had a good level of sound pronunciation; though in Group B this indicator is lower than in Group A. It may be explained by special selection of children to this class. Speech coherence was at a medium level in both Groups; though in Group B this indicator is lower. Boys tend to have lower speech coherence level than girls. The level of phonemic hearing was rather high in both Groups, and we did not reveal any group and gender differences. Our findings on the absence of sex differences for this indicator are consistent with O.V. Tulyakova's (2004) results.

Thus, the children examined in our research do not differ from all children in Kirov by the level of speech development. The following fact is important for our research: Group A had higher level of motor speech (on the basis of sound pronunciation and speech coherence indicators) than group B; but both Groups did not have any differences in sensory speech development (on the basis of phonemic hearing). It is obvious that higher level of motor speech in Group A contributed to more successful mastering of the curriculum under a 3-year programme conditions (Svinar, 2008).

According to our findings all children entering school have similar level of motivation for educational activity. We did not find out any gender differences in relation to formation of school motivation, as it is presented in O.V. Tulyakova's research.

Dynamics of Higher Mental Functions in First-Graders

Spatial visualization ability. We have found out that training in the first grade increases the level of spatial visualization ability of all children regardless of their sex and the applied methods of teaching (a 3- or 4-year system). Group A and Group B had different levels of spatial visualization ability at the beginning and throughout the school year (it was lower in Group B). However, a 3-year system was more effective as it significantly raised the level of thinking throughout the school year. As for a 4-year system it did not increased this level during the last three months of training. According to L.S. Vygotsky (1984) spatial visualization ability becomes verbal and logical in primary school age, and this process is directly connected with speech development. So, we believe that intensive educational activity contributes to development of spatial visualization ability. Educational activity might influence development of other types of thinking in the same way (Svinar, 2008).

It is stated in literature that boys have lower level of spatial visualization ability and verbal thinking, including 7-8-year-old boys. According to O.V. Tulyakova (2004) boys of the first grade in Kirov (n=295) have lower level of speech and creative thinking than girls (n=350): indicators for logic thinking are 5.03 and 5.49 correspondingly; for speech thinking they are 7.31 and 7.78 points correspondingly. This is consistent with the idea (Belykh and others, 2001) that 6-8-year-old boys have lower level of mental development than girls. However, boys are better at tasks that require spatial orientation, tend to have analytical and synthetic thinking (Chechueva and Mazur, 1999).

We did not reveal any gender differences concerning spatial visualization ability development. Apparently, a relatively small sample of observations did not allow us to identify gender differences.

In general, we can say that throughout the school year the level of spatial visualization ability increases, primarily in Group A. It reflects a positive effect of intensive educational activity on thinking development. Besides, the intensity of educational activity in Group A was really higher than in Group B. Gender differences in dynamics of thinking development were not revealed (Svinar, 2015).

Voluntary attention. Development of voluntary attention in 6-7-year-old children is due to specialization of cortical zones in particular cognitive operations. The maturation of the frontal cortex contributes to the formation of regulation mechanism of the ascending activating influence of the reticular formation and the limbic system. Now children may focus attention on the

information component of the environment, assess information attributes of objects; the role of thalamo-cortical connections in the focus organization increases (Klimesch, 1999), the importance of semantic information analysis grows (Grigoryeva, 2002). Primary school children do not have hemispheric dichotomy peculiar to adults; modal specific functional association in children are formed bilaterally, and the right hemisphere similar to the left one is involved in the organization of any focused attention (Dubrovinskaya, Farber and Bezrukikh, 2000). This shows immaturity of functional specialization of hemispheres.

We used the Graphic Dictation Test to assess the level of attention and revealed that this level did not increase during the first school year, and the girls from Group A had a lower indicator in the middle of the school year. We may explain this controversy by different procedures used. The Graphic Dictation Test requires the sense of direction in the plane. This key factor is not developed in first-graders yet. So, we can agree that the level of voluntary attention grows, but this procedure does not determine it. However, it is worth mentioning that the procedure used revealed the negative effect of intensive educational activity on the level of voluntary attention development (Girls, Group A).

Short-term auditory mechanical and semantic memory and its dynamics in the second half of the school year. Ability to store the increasing amount of information is provided by the inclusion of new brain mechanisms in the process of memorizing (Dubrovinskaya, Farber and Bezrukikh, 2000). Memory becomes more informative. During this period a child becomes deeply aware of the mnemonic problem. A child masters' new forms of memorization techniques (Kulagina, 1999). During this period there is a transition from immediate memory, characteristic of preschoolers, to memorization influenced by particular semantic tasks; and memorization requires reflection of the material, rather than its formal repetition (Kulagina, 1999; Dubrovinskaya, Farber and Bezrukikh, 2000).

There are various assessment procedures of short- and long-term memory, and there is no universally recognized procedure. Probably for this reason, the literature on the level of children's memory is limited. 6-7-year-old children are known to repeat correctly only 5.4 symbols; i.e. the level of short-term memory is extremely low (Dubrovinskaya, Farber and Bezrukikh, 2000).

Thus, the level of spatial visualization ability and short-term auditory rote memory of first-formers taking 3- or 4-year primary education program increases during the second half of the school year under the influence of educational activities. These changes are greater among students taking 3-year primary education program. This education system also contributes to increase of short-term auditory memory and semantic voluntary attention (primarily among boys). Intensive educational activities (1-3 system) provide greater motivation and efficiency of training activities than less intensive educational activities (1-4 system).

Implications and Recommendations

Implications and recommendations for future studies are as follows: Under the influence of educational activity of first-graders involved in the program 4 years of primary education, increases the level of development of visual-figurative thinking and short-term auditory rote memory. When training on a 3-year program, these changes are more pronounced; at the same time under this system

of learning increases the level of development of auditory semantic short-term memory and voluntary attention.

The content of the article will help educational institution principals in the educational process in an elementary school, as well as it will be of great use to primary school teachers and school psychologists.

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