Experimental training of children with attention deficit/hyperactivity disorder

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Abstract: Attention-deficit/hyperactivity disorder (AD/HD) negativelly affects the cognitive and psychomotoric spheres of the pupil's social behavior and social adaptation. The review of many studies states that pupils with AD/HD achieve worse learning results because of insufficiently functioning cognitive processess, such as attention, (work) memory, thinking, problem solving, language, small- and large- scale motorics. Behavioral features, exhibited with AD/HD, include low-frustration tolerance, temper problems, persistence, emotional liability, depression, peer rejection, poor self-concept and poor self-esteem. Because of insufficiency of the cognitive processes, the difficulties of social behavior and social adaptation, pupils with AD/HD more often have a dysfunction of pupils' role that manifests by learning difficulties and behavior problems. The manifestation of the disorder in the younger school age in the context of children's school activities and roles actualizes the exceptional interest of the educational science in the analyzed phenomenon. The search and construction of effective means of socio-educational help for AD/HD primary class pupils should be associated with coordination and adaptation of different effective educational methodologies of different conceptual origin. In order to develop cognitive, psycho-motoric abilities and social behavior of the group of primary class pupils with AD/HD (N=22), activities of supplementary education were organized after classes (their duration was 6 months). During the forming experiment, original methodologies were constructed and national and foreign researchers' educational methodologies were adapted and tested in new, specific conditions (methods of fairy-tales, correction of cognitive behavior, graphical-logical tasks, games in the sport hall). Even by relatively rare activities of supplementary education in a homogeneous group of children suffering from AD/HD positive changes of cognitive, psychomotoric sphere, social behavior and social adaptation were achieved.

Key words: AD/HD; fairy tales; cognitive behavioural training

1. Introduction

Attention-deficit/hyperactivity disorder (AD/HD) negatively affects the cognitive and psychomotoric spheres of the pupil's social behavior and social adaptation. Any extraneous stimulus prevents from concentrating, receiving information, carrying out tasks, inconveniences appear to memorize information, carry out the tasks requiring deep thinking operations and problem solving (Willcutt & Pennington, 2000; Teeter, 1998; Rennie, 2003; Zentall, 2005; Junod, et al., 2006). Children with AD/HD differ from the so-called "normally active" children by their movements that are less purposeful and possible difficulties of small-scale motorics (Barkley, 1995; DuPaul & Stoner, 2003).

Children with AD/HD are often impulsive, their behavior provokes dangerous and awkward situations among

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themselves and their contemporaries, parents, teachers. Social adaptation problems usually arise because children with disorder have weaker communication skills, and they are inclined to low self-assessment, and lack of self-confidence. These children are more aggressive, have improper social behavior, and more often feel themselves in unfavorable psychological conditions: fear, anxiety, depression, etc. (Barkley, 1998; Stormont, 2001; Demaray & Elliott, 2001; Greene, et al., 2002; Armstrong & Drabman, 2004; Lauth, et al., 2006; Leskauskas, et al., 2004; Bagwel, et al., 2006).

Research shows that globally about 7-10% of children suffer from AD/HD. This disorder manifests itself by sexual specificity, as this disorder happens 2-3 times more often among boys than girls (Teeter, 1998; Selby, 2006).

AD/HD often upstarts at the school age and manifests itself in the context of children's school activities. This factor explains the exceptional interest of educational science in the analyzed disorder and elimination of consequences. This disorder may develop and continue in later age causing psychological, social, physical problems. Therefore, early identification, evaluation of this disorder and urgent socio-educational help are very important.

AD/HD is considered to belong to neuro-biological disorders. Therefore, its clinical manifestation in different cultures should be identical[1]. Nevertheless, social and educational consequences of this disorder are rather specific, as they depend upon cultural environment: public values, social, economical situation, educational traditions at school, family and community.

1.1 Aim of the research

The research is to prepare and test by natural experiment (by organizing supplementary education in homogeneous groups) integral educational correctional methods that would help to develop primary class pupils' with AD/HD cognitive and psycho-motoric abilities and social behavior.

1.2 Research process

(1) Stage 1 (pre-test): Assessment of primary class pupils' with AD/HD cognitive, psycho-motoric sphere and social behavior was assessed;

(2) Stage 2: Quasi-experiment (two groups of primary class pupils with AD/HD);

(3) Stage 3 (re-test): After the educational experiment, the effectiveness of supplementary education was assessed before choosing the research instruments applied before the experimental training.

1.3 Research methods

(1) Testing—the research on pupils' attention and spatial thinking (original, i.e. prepared by the author of the article). The test consists of 72 primary features joined into 12 dimensions.

(2) Written questionnaire survey—assessment of learning and social behavior based on teachers' opinion (adapted according to Janowski, Fittkau, Rauer[2]). The questionnaire consists of 132 primary features joined into 16 dimensions.

(3) Oral questionnaire survey—the research on behavior and personality peculiarities based on pupil's self-assessment (adapted according to Wagner, Baumgartel[3]). The questionnaire consists of 129 primary features joined into 6 dimensions[4].

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[1] The criteria of AD/HD diagnostics exist globally: DSM-IV (American Psychiatric Association, APA, 2000), ICD-X (International classification of diseases), TLK-10 (international classification of 10 diseases, 1997).

[2] Testzentrale. Retrieved from http://www.testzentrale.de/?mod=detail&id=133.

[3] Test catalogue—Testzentrale. Retrieved 2007, from http://www.testzentrale.de/?mod=detail&id=293.

[4] The psycho-metric quality of the mentioned research instruments was tested din the normative base. The total number of the primary class pupils participating in the research is 361 (N=361). Sub-groups – primary class pupils with AD/HD and the children of the same age "mixed" population: $N_{\text{mixed population}}$=0.339, $N_{AD/HD}$=22. The psycho-metric quality of the research instruments was high (in the scale level Cronbach α reached from 0.52 to 0.96).

These tests allowed to measure 333 features (joined into 34 scales):

(1) Creative task applying the elements of project methodology—fairy-tale creation based on a visual stimulus (original, i.e. prepared by the author of the article). The fairy-tales created by the children were assessed according to 44 features that belong to 3 dimensions.

(2) Quasi-experiment.

2. Primary class pupils' with AD/HD experimental education by supplementary activities

2.1 Possibilities for fairy-tale practical application for reduction of AD/HD

Looking for the methods of the reduction of AD/HD or at least its compensation by psycho-pedagogical means, the scientific heritage of L. S. Vygotsky and his colleagues is of great significance. Here we mean the cultural historical tradition and the original experimental method—causal—genetic method. The most important role here is played by the concept of intermediate stimulation, the treatment of the relationship between higher psychical function phylogenesis and ontogenesis, the concept of higher psychical functions' systematic origin as well as the mentioned theories for teaching about interiorization, the closest development zone and the main activity at a certain age[5] (Lompscher, 1996; Merkys, 1996). These ideas make us realize that fairy-tale creation and role playing games are especially important for pre-school and younger school age children.

By actively participating (playing games) children will create fairy-tales—such actions ground L. S. Vygotsky's (1978) ideas that: "One of the most important presumptions for higher psychic functions is child's active performance at the limit of his abilities". The higher psychic functions can be developed indirectly. This role of mediation is played by cultural features: signs, symbols, language, teacher's help. Traditionally, children only listen to fairy-tales (fairy teller—listeners). With the teacher's help (providing the initial stimulus), children should actively create themselves. By this the learner's independent creative activity is actualized. In the process of fairy-tale creation, the role of mediators would be played by the characters, and created by the children themselves, the process of individual child's creation, collegial creative games. When creating a fairy-tale for a child, a cognitive challenge arises to create the plot of the fairy-tale, to empower the characters and manage this plot till the meaningful end. Actually, the means of artistic manifestation used by children in fairy-tales stimulate their symbolic and metaphoric thinking, evoke the intensive relationship of intellectual activity and emotions, and implement social roles, values, the models of moral behavior. Therefore, active fairy-tale creation is effective and a meaningful educational instrument from the point of view of cultural—historical theory. By educational means, it allows at the same time to actively form cognitive abilities, emotional value sphere and social behavior.

The exceptional educational potential of fairy-tale is emphasized by many authors (Oklender, 1997; Herm, 2004; Braziene, 2004, 2006), who do not associate directly their theoretical statements and hypotheses with the cultural—historical theory. According to them, fairy-tale telling develops an ability to concentrate, and the listening to the problems of the heroes of the fairy-tale; fairy-tale creation helps a child to unclose, outlive his problems; fairy-tale analysis and interpretation develops divergent thinking and motivates to see the causal behavior relations not only of the fairy-tale heroes' but those happening in real life. Fairy-tale performances not only develop imagination and metaphoric thinking, but also uphold the ability to feel another person and realize what is going on around. The ability to concentrate attention is also developed; children learn to adequately express their feelings.

Generalizing the thoughts of Lithuanian and foreign scientists about the influence of fairy-tales on child's

[5] Here the method of the experimental formation of higher psychic functions is meant.

personality, it is possible to state that they: (1) activate attention, as fairy-tales consist of subject lines that should be followed to meaningfully understand the essence of the fairy-tales; (2) develop memory, as fairy-tales stimulate memorization of prior events of the plot and associate them with the new ones; (3) develop thinking and decision making ability—with the help of language of symbols, fairy-tales manifest particular life problems. Therefore, by the personal experience, a child is stimulated to look for the best way of problem solution; (4) fairy-tales creation helps to develop verbal abilities, e.g. language fluency, number of words and sentences, complexity; (5) help to develop communication abilities, as the situation provided in the fairy-tales makes not only to listen but also to empathize with the problems of fairy-tale heroes. Fairy-tales also help to disclose what values and moral norms help to expect the happy end; (6) help to disclose the consequences of spontaneous and even aggressive behavior —fairy-tales show that angry behavior, a wish to harm comes to the end, as the one who wanted to harm another will suffer or even disappear from the fairy-tales; only moral and kind heroes will remain; (7) enhance self-esteem and motivation, as fairy-tales stimulate child's self-confidence, make him feel safe, show that a hero does not loose control meeting difficulties, but goes on and wins with the help of his spiritual powers. Fairy-tales also help to understand that in difficult situations it is necessary to concentrate and look for one's own powers (Braziene, 2004; Kerbelyte, 1997; Fisher, 2001; Arad, 2004; Zinkevic-Jevstignejeva, 1998).

Therefore, it is possible to state that application of fairy-tales is a "well-directed method with the unity of cognitive sphere, social adaptation and social behavior development". These arguments ground the possibilities of the fairy-tale methods when developing children's with AD/HD cognitive sphere and social behavior.

2.2 Possibilities of cognitive behavioral training when reducing AD/HD

Cognitive behavioral training or cognitive-behavioral techniques[6] are socio-educational means applied both in the school environment and at home. At school cognitive behavioral training is applied by teachers, whereas at home it is used by parents who have acquired knowledge how to perform it (Abrikoff, 1991; Teeter, 1998; Kirk, Gallagher & Anastasiow, 2000; Cooper &Bilton, 2002; Messurier, 2004).

Consistently applied cognitive behavioral training exercises help to soften social and educational consequences. This method of pedagogical intervention stimulates to look for consecution, purposefulness in one's own behavior, develop self-control and help to improve problem salvation skills (Gardill & DuPaul, 1996).

Cognitive behavioral training is for the learners with the problems of cognitive activity and behavior. Children with AD/HD also belong to this group (Teeter, 1998; Messurier, 2004; Zentall, 2005). The main goal of cognitive behavioral training is to develop cognitive abilities and social behavior. This educational means is grounded by positive environment maintenance, application of means and methods that help to concentrate attention, assess one's own behavior and to manage it.

2.3 Possibilities of relay-races (games) in educational practice when reducing AD/HD

Even in the times of antiquity, sport activity was considered as one of the most significant activities. Physical education is important for the development of personality. The antiquity philosopher Socrates (469-399 B.C.) wrote that body should be developed together with soul. This means that the balance between mental and physical exercises should be always and everywhere kept (Stonkus, 1998). S. Salkauskis (1991, p. 462) also states that "When developing human soul, it is necessary to look at the body and vice versa".

Contemporary researchers also acknowledge the harmony of body and soul development. As A. Dumciene

[6] The cognitive behavior correction in educational practice is not identified with the cognitive behavior therapy and psychotherapy that is applied in psychiatric practice and carried out by psychiatrists—people with special training.

and I. Tilindiene (2004) point out, the aim of physical education is to develop the powers of soul so that they would develop the body for spiritual purposes of life. Nevertheless, in order to achieve this harmony, supplementary conditions are necessary. According to V. Ivaskiene and J. Cepelioniene (2005), it is very important to fill the physical activity with social cultural content. In order to make physical exercises an effective means of human physical education, physical, moral, ethical and other components of culture must find their place.

L. S. Vygotsky paid much attention to the analysis of how it is possible to participate in child's development. This prominent scientist pointed out the Zone of Proximal Development (ZPD). This zone is determined between what a child can do on his own and what he can do being managed by somebody. Another important way of stimulating child's development is his active involvement into the activity predominating in his age period. L. S. Vygotsky (1978) stated that in every period of age children manifest different interests. In childhood, especially pre-school and early school age, the most important things are active games. These arguments disclose the importance of physical education for the versatile development of personality.

Children with AD/HD form a specific group. It is important to remember that they have low communication skills, lack of motivation and self-confidence. Harvey, G. Reid (1997) analyzed sport achievements of children with AD/HD and highlighted the differences between this and the control group of children. The researchers noticed that children with AD/HD have a weaker large-scale motorics and lower physical fitness. The other reasons determining insufficient physical (sport) achievements are as follows: insufficient efforts in seeking for result, low self-esteem and self-confidence (Harvey & Reid, 1997; Armstrong & Drabman, 2004).

Relay-races (games) also allow developing the features of cognitive sphere, such as attention, memory and thinking, as they: (1) stimulate concentration; (2) induce the processes of memorization; (3) help to understand the links between the quality of the fulfilled task and the gained result (Dumciene & Tilindiene, 2004; Ivanovas, 2000).

P. Ivanov's (2000) thoughts about the significance of physical activity ground the importance of this educational means in the education of children with AD/HD: (1) relay-races develop children's self-confidence and independence; (2) when playing, children get used to collective activity in order to achieve a goal, as even the naughtiest children follow the rules of the game and care about their friends; and (3) this educational means develops self-control.

Summing up, it is possible to state that relay-races (games) help to develop not only the psycho-motoric, but also the cognitive sphere. Cognitive processes, such as attention, memory, thinking, are necessary for participation in sport activity. Striving for successful result by participation in team activity create presumptions for the development of the sphere of social behavior.

2.4 Possibilities of graphical—Logical tasks in educational practice when reducing AD/HD

Pupils with AD/HD face the difficulties of the cognitive, psycho-motoric sphere. Graphical-logical tasks were chosen as the means of developing attention, working (short-term) memory, spatial thinking, and small-scale motion motorics. Graphical (developing the small muscles of the arm) and logical (stimulating thinking operations) tasks were matched. Graphical-logical tasks were prepared by the author of this article by supplementary using a methodological means (Straizys, 2005).

When performing the motions of the small muscles of arm—hand and fingers—the coordination of both the arm and eye is developed. The development of the small-scale motorics enhances the activity of encephalon cortex, linguistic processes, attention and memory improve. A child performing the tasks that develop the precision of arm motions is trying to concentrate, to keep attention as long as possible and to control his activity (Lithuanian Valdorf Pedagogy Centre, 2007; National Institute of Health Clinical Center, 2007).

Hand and fingers motions are developed by “drawing tasks” (drawing lines, zigzags, coloring ornaments, moving the pencil by the determined line, copying pictures, hatching areas in various directions), selection of figures (particular things), fiddling, node binding, hanger weaving, sewing, wood carving (Strazdiene & Adaskeviciene, 2001; Adaskevičiene & Birontiene, 2003).

Researchers state that by applying the tasks that improve fingers motions, children’s social skills are developed (Keller, 2001; Brazauskaite, 2005). This means also helps to develop self-control skills. Children are encouraged to notice their own (or friends’) mistakes, to self-assess (or assess others’) task fulfillment (Keller, 2001). The zone of palm motion projection and motoric linguistic zone are very close in the encephalon cortex. Researchers have proved that the development of the small-scale motorics positively affects oral motorics and pronunciation of (Kolcova, 1980, Ivoskuviene & Balciūnaite, 2002).

Currently in the western countries, information technologies are widely applied in developing children’s with AD/HD cognitive processes—attention, memory, spatial and logical thinking. The prepared software according to children’s age allows to achieve effective changes of cognitive processes (Klingberg, et al., 2005; Cogmed Working Memory Training, 2007).

Art therapy is one of the means of children’s with AD/HD development of emotional, physical, cognitive disorders. Though a person has inborn or gained disorders of development, compensational peculiarities of activity exist. The essence of art therapy determines its application both in clinical and pedagogical practice (Brazauskaite, 2005; Vaitkeviciene, 2005). Art therapy helps people with AD/HD of different ages to develop attention, form more positive self-esteem, control impulsiveness, “pour out” negative emotions (Safran, 2000).

It is important that graphical-logical tasks applied during the educational experiment with the children suffering from AD/HD that are based on “drawing motives”: drawing various lines, zigzags, ornaments, forms, coloring checks. The aim of these tasks is to develop attention, memory, small-scale motorics, spatial and logical thinking, stimulate self-control, assessment of one’s own and friend’s task fulfillment, develop collaboration skills. Figure 1 presents the examples of graphical-logical tasks.

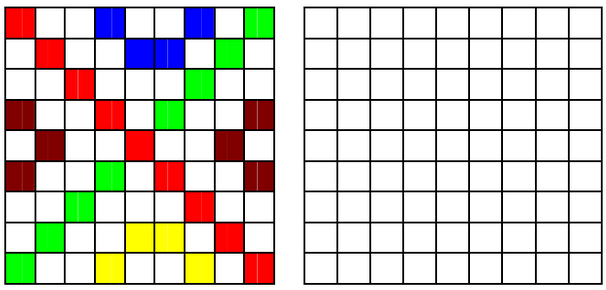

Figure 1 A task of covering checks by tones according to the given model

During the educational experiment, graphical-logical tasks for children with AD/HD were applied not only individually, but in pairs and groups. Work in pairs and groups helped not only to develop cognitive and psycho-motoric spheres, but social behavior, too. It is important to note that group work was performed by both groups during each session, when children sitting in circle[7] assessed one another’s works and selected three most prominent. The organizer (the author of the article) participated in supplementary education activities and assessment of works. Accoracy, fulfillment, correctness, the behavior during the process of work were the main assessment

[7] Vad. “Assessment Commission”.

criteria. These works were compared with the results of children's previous work, attention was paid to progress, children were encouraged to put more efforts in carrying out tasks not only during the activities of supplementary education, but everywhere in school environment "prizes" were awarded for the best works (different coin shape chocolates: 5 Litas coin for the 1st place, 2 Litas for the 2nd place, 1 Litas for the 3rd place. The rest of the children received "consolation prizes", a caramel candy for each child) (see Figure 2 and Figure 3).

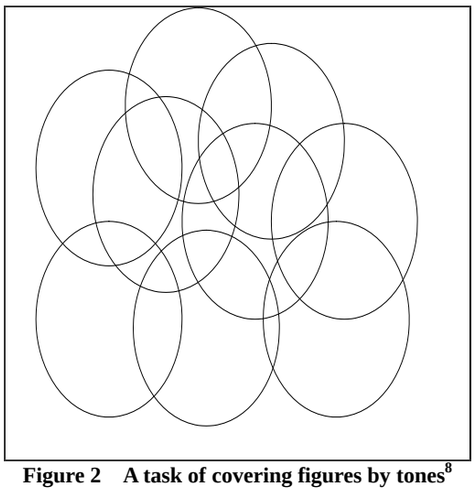

Figure 2 A task of covering figures by tones[8]

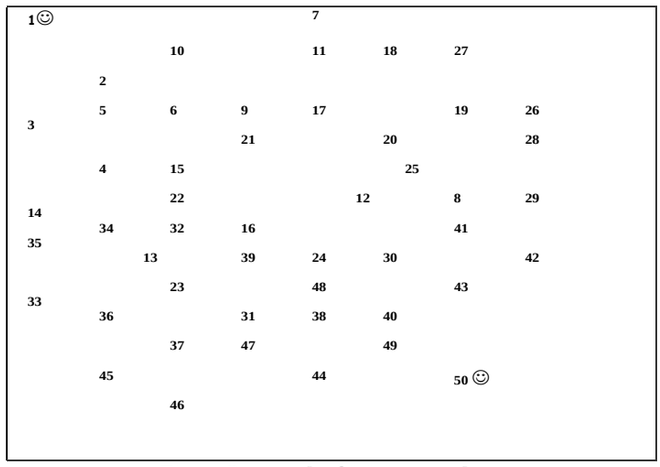

Figure 3 A task of joining numbers

2.5 Didactic—Methodological aspect of the school: the city of pyramids

The educational experiment with primary class pupils suffering from AD/HD was based on pedagogical humanism. The main principles of humanism realized during the educational experiment were as follows: (1) creation of safe and child friendly educational environment; (2) priority was given to assessment of one's own results and self-criticism , not criticism from the outside; (3) stimulation of self-cognition; (4) the uniqueness of every child was highlighted avoiding comparison of children (by differentiating them into "good" and "bad"); (5) physiological and spiritual maturation of child's personality; (6) strengthening of one's own abilities and self-expression; and (7) stimulation of trust and collaboration in a group work (Rogers, 1951; Butkiene & Kepalaite, 1996; Lepeskiene, 1996; Pukelis, 1998).

Cognitive behavior exercises and fairy-tale methods with primary class pupils suffering from AD/HD were chosen in the supplementary education school: the city of pyramids, as two different approaches helping to develop the cognitive, psycho-motoric sphere, social behavior and social adaptation. In order to strengthen educational influence, graphical-logical tasks and relay-races were chosen as supplementary education means in both experimental groups.

For experimental training integral educational means were chosen to develop AD/HD children's cognitive, psycho-motoric sphere, social behavior and social adaptation. Analyzing the effectiveness of each educational means, it is possible to state that fairy-tale methods were the most integral educational means, i.e. directed towards reduction of cognitive, psycho-motoric sphere problems (difficulties) and helping to develop social behavior and social

[8] Covering figures by tones was carried out in pairs. Every child became "a teacher" and prepared a task (to color figures by chosen colors). In another stage these prepared tasks were given to other children. The most important criterion was followed that the prepared task should not be given to the "teacher". The fulfilled tasks were returned to the "teachers" who assessed the correctness of their friends' tasks. The "teachers" loudly expressed their opinions.

adaptation. Fairy-tale methods were used to reduce primary class pupils' with AD/HD difficulties of attention, thinking, problem solving, memory, linguistic functionality, large and small scale motorics, motivation, self-assessment and reduce aggression, impulsiveness, disorganization. Cognitive behavior correction (exercises) were applied in order to reduce the above mentioned problems, except for development of small- and large- scale motorics. Graphical-logical tasks and relay-races were chosen to develop the cognitive sphere, i.e. to reduce the problems (difficulties) of attention, thinking, memory, psych-omotoric sphere, to reduce hyper-motoric activeness, to develop small- and large- scale motorics, social behavior and social adaptation (to develop social skills, enhance motivation, reduce aggression, impulsiveness, disorganization).

In both experimental groups the first activities were introductory. Emotional intellect developing games (in the group where cognitive behavior correction was applied) and dynamic meditation fairy-tales (in the group where fairy-tale methods were used) were chosen as the means stimulating AD/HD children's self-cognition and enhancing group saturation.

The basis of emotional intellect consists of recognition of one's own feelings and appropriate reaction. The games developing emotional intellect encourage a child to realize and manage one's own feelings, and to develop the abilities of emotional communication and cooperation in group. The background of emotional intellect consists of identification of one's own feelings and proper reaction (Goleman, 2001; Lyusin, 2006). Dynamic meditation fairy-tale activate imagination, help to relax and gain positive energy, allow imagining oneself and others in certain situations (Lepeskiene, 1996; Zinkevic-Jevstignejeva, 1998; Dumciene, 2001; Braziene, 2006).

The most important factors of the effect of the educational experiment were active participation in the activities of supplementary education and motivation of the children to participate in them. The following motivating means were chosen: "hearts" stimulating good behavior were given to children during each activity. Green or yellow hearts were given for coming and participation in the activities, red hearts were presented for perfect behavior during the activities. While delivering the red hearts, the factors (situations) of good behavior were mentioned for every child. If a child was naughty during the activities; he/she did not get a heart, but the factors (situations) of his/her improper behavior were mention in calm voice.

2.6 Organizational aspect of experimental training

As AD/HD is a disorder of neurobiological origin, it is important that a psychiatrist should confirm the diagnosis before making a purposeful group. Children's parents were informed about that it was decided to clear the time and the place of appointments with the psychiatrist. Parents voluntarily took their children to him in order to confirm or deny the diagnosis. The quasi-experiment was carried out with 22 primary class pupils who had their AD/HD diagnosis confirmed. The participants were at random divided into 2 groups. Activities were organized once a week: for the 1st group on Thursdays, for the 2nd group on Fridays. Children used to come to the activities on their own. Those who lived far away from school and children from the children's care home were taken to school by bus.

Forty activities were organized (20 for each group). One activity at the institution of pre-school education lasted for 90 minutes (1.5h). The general logic of the experimental training is presented further on.

Supplementary activities were organized for 22 primary class pupils with AD/HD. Two children stopped their participation, as one of them had art school activities at the same time; the other child who had grown in the children's care home was adopted. Therefore, 20 children out of 22 remained in the experiment. The fairy-tale methods on the basis of visual stimulus were applied first, therefore fairy-tales were told by 20 children with AD/HD. The number of children became lower during the period of tests. There was a big disaster, as one child got drowned in a pool close to his home. So all the other post-experimental test results reflect the data of 19 children.

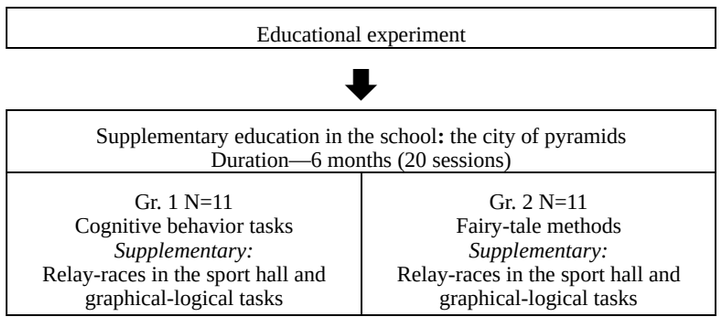

Figure 4 Scheme of educational experiment

3. The changes of the educational experiment according to the whole system of features

As the number of the experimental group participants was small, it was decided to increase the bias for assessment of changes up to the limit of 10%. Such limit might be considered as a tendency to reliability (Čekanavičius & Murauskas, 2003).

Table 1 The dynamics of features after the experimental education according to the research instruments

Scales/Primary item	Assessment	Mean	Mean difference	t	p
Assessment according to scales					
Attention and spatial thinking test					
Joining the sequence of numbers (easy tasks)	Pretest	4.72	+10.17	-2.31	0.033
	Retest	4.89			
Joining the sequence of numbers (tasks of medium complexity)	Pretest	4.33	+0.45	-2.43	0.026
	Retest	4.78			
Joining the sequence of numbers (complicated tasks)	Pretest	3.70	+0.70	-2.18	0.042
	Retest	4.40			
Filling checks by tones: fullness of filling	Pretest	2.20	+0.34	1.87	0.077
	Retest	2.54			
Filling checks by tones: accuracy of filling	Pretest	1.54	+0.55	-4.92	0.000
	Retest	2.09			
Filling checks by tones: regularity of filling	Pretest	3.82	+0.47	-1.91	0.073
	Retest	4.29			
Filling figures by tones: fullness of filling	Pretest	2.11	+0.42	-2.58	0.019
	Retest	2.53			
Filling figures by tones: accuracy of filling	Pretest	1.55	+0.41	-5.14	0.000
	Retest	1.96			
Filling figures by tones: regularity of filling	Pretest	4.22	+0.41	-3.55	0.002
	Retest	4.63			
Recognition of figure algorithm (easier tasks)	Pretest	3.98	+0.60	-2.76	0.013
	Retest	4.58			
Recognition of figure algorithm (more complicated tasks)	Pretest	3.55	+0.68	-2.64	0.016
	Retest	4.23			
Coloring tasks “Mosaic”	Pretest	2.12	+0.30	-3.92	0.001
	Retest	2.42			

(to be continued)

Changes of learning behavior and social behavior (assessment based on teachers' opinion)					
Attention and memory	Pretest	0.31	+0.05	-1.80	0.088
	Retest	0.36			
Learning motivation	Pretest	0.31	+0.07	-1.77	0.094
	Retest	0.38			
Social responsibility	Pretest	0.22	+0.13	-1.95	0.067
	Retest	0.35			
Cooperation behavior in group	Pretest	0.24	+0.09	-1.97	0.064
	Retest	0.33			
Constructive conflict solving	Pretest	0.22	+0.13	-3.00	0.008
	Retest	0.34			
Research on behavior and personality peculiarities based on pupils' self-assessment					
Extroversion	Pretest	2.66	-0.30	2.19	0.004
	Retest	2.36			
Assessment according to primary features					
Fairy-tale creation based on visual stimulus					
Pleasant feelings	Pretest	0.05	+0.25	-2.03	0.056
	Retest	0.30			
Determined wish (goal)	Pretest	0.15	+0.30	-2.04	0.055
	Retest	0.45			
Rational choice	Pretest	0.00	+0.15	-1.83	0.083
	Retest	0.15			
Power, aggression fighting with the evil	Pretest	0.00	+0.25	-2.51	0.021
	Retest	0.25			
Consistency of the fairy-tale parts	Pretest	1.70	+0.60	-4.48	0.000
	Retest	2.30			
The end of the fairy-tale (happy)	Pretest	1.10	+0.90	-4.72	0.000
	Retest	2.00			
Means of artistic expression	Pretest	0.15	-0.15	1.83	0.083
	Retest	0.00			
Symbols (metaphors)	Pretest	0.30	+0.30	-2.04	0.055
	Retest	0.60			
Personified language	Pretest	0.20	+0.15	-1.83	0.083
	Retest	0.35			
Complex sentences	Pretest	1.75	+3.05	-4.28	0.000
	Retest	4.80			
	Retest	2.36			

Notes: The symbol "-" means that in the group of AD/HD children, lower means were determined in comparison with the "mixed" group of primary class pupils. The symbol "+" means that the means were higher.

It is worth remembering that after the educational experiment primary class pupils with AD/HD were tested according to 34 scales[9], that were joined from 333 primary features (Table 1). The fairy-tales created by the children were assessed according to 41 primary features[10]. Statistically significant changes were fixed according

[9] (1) The research on attention and spatial thinking; (2) The research on behavior and personality peculiarities based on pupil's self-assessment; (3) Assessment of learning behavior and social behavior based on teachers' opinion.
[10] Creative task—fairy-tale creation based on a visual stimulus.

to 18 scales[11] and 10 primary features[12]. Therefore, according to quantitative methods, the total educational effect determined by the scale level reached whereas according to primary features—24%.

If compared what features determined the highest "increase" during the second testing, i.e. after the experimental training, evident results of attention and spatial thinking task fulfillment can be seen matching the level of statistical significance, when $p \leq 0.10$. For the fulfillment of attention and spatial tasks the functions of the cognitive sphere are important: attention, memory, logical and spatial thinking operations and hand small-scale motorics skills. In both groups during the supplementary education graphical-logical tasks were applied. They allowed to achieve purposeful changes of cognitive and psycho-motoric spheres. After the experimental training, there were no significant differences between groups assessing the results of attention and spatial thinking tasks.

In spite of a small number of participants of the group, favorable educational experiment changes with children's suffering from AD/HD cognitive, psycho-motoric sphere, social behavior and social adaptation were noticed, when assessing learning behavior and social behavior changes on the basis of teachers' expert assessment. Therefore, a conclusion can be made that organized supplementary education for primary class pupils with AD/HD helped to develop the following characteristics of positive social behavior and social adaptation: social responsibility, cooperative behavior in group, constructive conflict solving. The changes of the cognitive sphere—"attention and memory"—were also identified.

Positive changes of the educational experiment are shown by the content analysis of the fairy-tales created by children. After the educational experiment, statistically significant changes were determined according to the following characteristics reflecting positive psycho-social content of the fairy-tales: pleasant feelings, determined wish, rational choice. The end of the fairy-tale (happy or sad) is a very expressive moment of the fairy-tales created by children. The content analysis of the fairy-tales created by the children with AD/HD showed that after the educational experiment there were more fairy-tales with a happy end. The calculated means state that after supplementary education children used more positive and neutral sentences than negative when creating fairy-tales. The content analysis of the fairy-tales created by the primary class children with AD/HD helped to reveal that before the experimental education the indicator "aggression fighting with the evil" was found only after the experimental education was over. Though the mentioned category reflects a negative psychosocial content, a presumption can be made that children in their fairy-tales were inclined to fight with the evil using power.

After the pedagogical experiment children's fairy-tales became more fluent, i.e. gained a clearer plot. Children started using more complex sentences in their fairy-tales. It is worth mentioning that after the experimental education not only the syntactical structure of the fairy tales improved, but their literaturological content more metaphors[13], personifications[14] were used.

There were no distinct positive changes of the experimental training found according to the AD/HD children's behavior and personality peculiarities, based on self-assessment. The biggest and statistically the most significant difference of means between the first and the second tests was determined according to only one scale—"extroversion". A presumption can be made that the least effective methodologies in assessing AD/HD children's educational changes are the ones based on self-assessment. More positive changes were found

[11] (1) The research on attention and spatial thinking; (2) The research on behavior and personality peculiarities based on pupil's self-assessment; (3) Assessment of learning behavior and social behavior based on teachers' opinion.
[12] Creative task—fairy-tale creation based on a visual stimulus.
[13] E.g., "...this firewood was magic...".
[14] E.g., "...the bird says: where I am...".

according to behavior managing methodologies: attention and spatial thinking research and creative task – fairy-telling based on visual stimulus.

It is important to note that the experimental training was carried out according to two methodologies. Cognitive behavior correction (exercises) was applied for one experimental group, whereas fairy-tale methods were used in the other group. Graphical-logical tasks and relay-races (games) in the sport hall were applied in both groups. There were no significant differences that would allow stating that one of the applied experimental education methodologies—cognitive behavior correction or fairy-tale methods—helped to develop more purposefully the characteristics of the cognitive sphere and social behavior of the children with AD/HD.

4. Conclusions

(1) The system of educational methodologies for primary class pupils with AD/HD consisted of four different psycho-pedagogical means of conceptual origin. Their consistency allowed striving purposefully for educational unity of the children with the mentioned disorder according to cognitive and psycho-motoric abilities, social behavior and social adaptation.

Fairy-tale methods are a very integral educational means that at the same time develops attention, creative thinking, problem solving, memory, linguistic functionality, small and large-scale motorics, forms the concept of moral ideas, stimulates moral motivation, develops social interaction and social competence, reduce unfavorable psychological conditions, aggression, impulsiveness, faulty social behavior. Another method—cognitive behavior correction (exercises)—allows to reach purposefully for the same integral goals, except for the development of small- and large- scale motorics. Graphical-logical tasks were based on drawing motives: drawing different lines, ornaments, forms, check filling. The aim of these tasks was to develop attention, memory, small-scale motorics, spatial and logical thinking, to stimulate self-control, the assessment of one’s own and friends’ fulfilled tasks, to develop collaboration skills. Relay-races (games) in the sport hall help to develop not only the psycho-motoric, but also the cognitive sphere. Cognitive processes—attention, memory, and thinking—are actualized in team sport activity following the rules of the game. A very important moment in the work with the primary class pupils with AD/HD is not an individual, but a team manner of physical exercises and sport activity. The fact that a successful result is being tried to achieve in team activity, by correctly competing, admitting defeat, etc., create especially favorable conditions for the development of social behavior and social adaptation sphere.

(2) The educational experiment organized in natural conditions during supplementary education approved the effectiveness of the methodological system created during the research. Even relatively seldom organizing supplementary activities (once a week, total number of activities—20) in a homogeneous group of children with an AD/HD syndrome, it was possible to achieve positive changes of the cognitive, psycho-motoric sphere and social behavior. Statistically significant changes (the quantitative methodology is meant) were fixed according to 18 secondary scales (out of the 34 applied). The educational effect according to the project fairy-tale creation methodologies was determined according to 10 (out of 41) primary characteristics. After the cycle of the supplementary education activities, the fulfillment of children’s attention and spatial thinking tasks improved, teachers more favorably assessed pupils’ cognitive and social behavior characteristics, the children themselves were more self-critical towards their characteristics and behavior. After the supplementary education, in the fairy-tales created by the children with AD/HD positive psycho-social content became more distinct, there were more fairy-tales with a happy end (what was practically missing before the experiment), the language of

fairy-tales became more fluent, their syntactical structure improved. Though for both experimental groups alternative methods were applied, any statistical arguments unambiguously proving the advantage of fairy-tale methods or educational effect of cognitive behavior correction were not revealed.

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