

Recent Technologies to Improving Social and Communication Skills in Children with ASD: Systematization of Approaches and Methods

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Received: June 16, 2015

Accepted: July 9, 2015

Online Published: September 30, 2015

doi:10.5539/mas.v9n11p38

URL: <http://dx.doi.org/10.5539/mas.v9n11p38>

Abstract

New technologies of formation and development of social and communication skills in children with autism spectrum disorders are analyzed in this article. A systematic review summarizes the most effective and verified interventions to support of socialization of children with ASD: Applied behavior Analysis (ABA); cognitive-behavioral training (CBT); social stories method; social skills training (SST). We pay special attention to virtual technologies and video modeling. These methods provide the ability to teach social skills to children with ASD more efficiently and in a psychologically safe way. Problems and prospects of using virtual technologies for children with ASD needs are discussed. The specificity of Russian practical experience and researches in development of heuristic technologies of teaching social skills to persons with ASD is described: animal-assisted therapy, somatosensory correction, art therapy and folk forms of intervention. On the basis of analytical work it is concluded that authors of various methods and technologies forgot the necessity to verify their interventions. Effectiveness and usefulness of most methods haven't been proven. Today there is an urgent need for determination of their empirical validity.

Key words: socialization, social skills, social communication, autism spectrum disorders, social learning, virtual reality, teaching children with ASD, inclusion, Russian experience of psychological and social support to children with ASD.

1. Introduction

Symptomatology of autism spectrum disorders (ASD) is extremely diverse and it is manifested at different levels of intellectual and language development, starting from early childhood and it's maintained throughout a person's life (Lebedinskij, 1985; Travis & Sigman, 1998; Nikol'skaja, Baenskaja, & Libling, 2007; Baron-Cohen, 2009; Melillo & Leisman, 2009).

Key features of autism spectrum disorders were first described on the basis of 11 clinical observations of American physician L. Kanner. He used the term "syndrome of infantile autism", which he defined primarily as a triad of symptoms: inability to purposeful use of speech for communication, stereotypical behavior, deep and persistent difficulties in expressing own emotions and understanding emotions of other people (Kanner, 1943).

Asperger's syndrome was named for its discoverer, G. Asperger. It is similar to the syndrome of infantile autism, because it is also characterised by severe impairment of social interaction, low empathy, narrowness of interests, and in addition, physical awkwardness. The difference from infantile autism is that in Asperger's, there is significant preservation of speech and intellectual functions (Klin, Pauls, Schultz, & Volkmar, 2005).

Currently, autism and Asperger's syndrome are combined into "autism spectrum disorders" diagnosis. The Diagnostic and Statistical Manual of Mental Disorders of the fifth revision, DSM-V, adds two more kinds of disorders to ASD: child disintegrative disorder and non-specific pervasive developmental disorder (Autism spectrum disorder, 2013).

Regardless of the differences in symptomatology of disorders, combined in specified diagnostic category, each of them involves continuing impairment of development of communication and social skills, such as:

- Desire of the child to avoid eye contact with peers and adults;

- Limited ability to understand the meaning and interpretation of perceived information on verbal and nonverbal levels, which leads to deterioration of ordinary use of speech in interactions with other people, even in presence of preservation of intellectual and speech functions.
- Inability to inform other people about own emotions and inability to understand other people's emotions.

In addition, although it is not present clearly in the diagnostic criteria of DSM-5, some researchers identify the developmental delay of a child's ability to recognize the presence of other people's beliefs other than their own as one of the most important features of autism (Baron-Cohen, 2009). The results of experimental studies have also shown that even in cases when children with ASD are able to gradually form a sufficiently stable and relatively adequate interaction with familiar adults, their interaction with their peers is still problematic, both in childhood and throughout adulthood (Travis & Sigman, 1998; Orsmond, Krauss, & Seltzer, 2004).

The etiology of ASD was studied for a long time in close connection to genetic factors. However, it turned out that to date none of the identified genes is a key to the development of ASD in general. Genetic abnormalities that define specific communication impairments in autism, are also not yet identified (Vinogradova, 2014).

Recent studies produced evidence that deficiency of central nervous system, reduced amount of white matter, in particular, or, in other words, less than normal number of structural and functional connections between cortical areas, is the basis of violations of social functions for people with ASD. These data have been summarized in terms of the theory, known as the "underconnectivity theory" (Just, Cherkassky, Keller, Kana, & Minshew, 2007; Melillo & Leisman, 2009).

In Russian psychology ASD is treated as a special, biologically based type of mental dysontogenesis - distorted mental development. Agreeing with Western colleagues regarding the main symptomatology of ASD, Russian researchers emphasize that all key disorders in ASD can be divided into two groups: one of them is related to the failure of regulatory systems (activating, instinctive-affective), the other is related to the deficit of analyzer systems (gnostic, speech, motor systems) (Lebedinskij, 1985; Lebedinskaja, 1994).

More recent studies conducted in Russia showed that autistic disorders are associated with primary deficiency of affective sphere, which subsequently leads to breakdown in communication and socialization difficulties (Nikol'skaja, Baenskaja, Libling, 2007; Baenskaja, 2008).

Thus, despite some differences in the understanding of etiology and symptomatology of autism spectrum disorders, it should be noted that results of almost all conducted clinical-psychological and experimental studies to date suggest that shortage of social and communication skills, verbal and non-verbal means and methods of communication should be recognized as the main target of social and rehabilitation work with autistic children.

In this article we attempt to analyze and systematize the most heuristic advanced approaches to socialization and psycho-social rehabilitation of children with ASD.

2. Technologies of Development of Social and Communication Skills in Children with ASD

Recent studies clearly show that without specially designed programs of socialization, without systematic support of development of social skills in children and adolescents with ASD, there are significant limitations in communication in comparison to neurotypical children (Hughes et al, 2011), it is difficult for them to keep in touch with their peers (Humphrey & Symes, 2011), the level of their social competence is significantly reduced (Stichter, Randolph, Gage, & Schmidt, 2007; Knott, Dunlop, & Mackay, 2006), it is difficult for them to communicate in different social situations with other people. Violations in social communication in children with ASD entail emotional problems: loneliness (Lasgaard, 2010), lack of close and friendly relations with their peers (Beresford, Tozer, Rabiee, & Sloper, 2007), high anxiety and depression (Strang et al 2012).

Various approaches and technologies are used in the process of socialization of children with ASD. The most effective and promising interventions in support and education of children with ASD, which are widely used in different countries, will be later reviewed in the article.

Cognitive-behavioral training (CBT) takes one of the leading positions in the formation of social skills in autistic people. This intervention is used in emotions self-control training, in development of self-control and impulse control, in behavior improvement. Cognitive behavioral therapy may be helpful for reducing anxiety and eliminating depression in autistic people, because it can change rigid, negative attitudes and beliefs. Cognitive-behavioral techniques contribute to the reduction of such behaviors of children with ASD as obsessions, tantrums or outbursts of anger, anxiety to the situation of social interaction. Based on numerous studies this intervention can be considered promising in development of social skills. For example, researchers have shown that CBT was more effective intervention than treatment-as-usual (TAU). This technology allowed

to form social skills more effectively and contributed to intensification of interaction of autistic children with their peers (Wood, Fujii, Renno, & Van Dyke, 2014).

Today one of the most effective methods of correction of autism in Russia and other countries is the method of applied behavior analysis (ABA). This kind of intervention is used in the development of social skills in autistic children. ABA therapy involves behavioral techniques of training and socialization. The method is based on the idea that any behavior entails some consequences, and if the child likes the consequences, he will repeat this behavior, but if he doesn't like them, he will not. The main essence of the method is to break all complex social skills into small blocks, small steps, concrete actions. First, the child masters each individual action, and then they are all connected, forming a complex behavioral skill. This method does not involve creativity and transfer of initiative to the child. Adult controls the behavior of the child and his actions with clear direction and discipline. Correct actions are remembered, wrong actions are dealt with severely. Tips and incentives, both positive and negative, are used to achieve the desired behavior. A skill can be considered as learned only when the child is able to perform this operation correctly in 80% of cases, regardless of where the task was given and by whom.

ABA uses many techniques, including methods of learning non-verbal and verbal imitations, language understanding, objects naming, acts naming, classification of objects, construction of answers to the questions "What?" "Who?", "Where?" "When?" "How?", use of "yes", "no" and others. Among the programs of higher level there is learning of anticipation of action outcome, drawing up stories, action that follows the model presented by the adults in a previous session. ABA-therapy has important characteristics: the treatment can begin at the age of 3-4 years; the intervention itself should be intense (20-40 hours per week); intervention must be individualized and focused on the formation of a wide range of skills; an adaptive repertoire of behavior for a child with ASD is developed in the process of ABA; ABA intervention gradually passes from individualized training to group work; therapy goals are correlated with gradual development of a human in ontogeny; parents also learn ABA methods and become active co-therapists (Maurice, Green, & Foxx, 2001).

Positive results of ABA application were obtained to form daily living skills, to improve academic achievements, to develop social skills, to integrate children with ASD in schools (Virués-Ortega, 2010).

As a part of the applied behavior analysis (ABA) Bondy and Frost have developed PECS (Picture Exchange Communication System) (Bondy & Frost, 1994) in 1985. This technique includes a set of pictures that help children to communicate and interact with others. There is a large number of studies that confirm the effectiveness of this technology for the development of communication skills in people with ASD (Gordon et al, 2011; Hart & Banda, 2010). It is worth noting that, to date, PECS, in process of communication with autistic people, is increasingly using special iPad applications.

New types of interventions for social skills training can also be noted among behavioral techniques: Prompting; Time Delay; Reinforcement; Task Analysis and Chaining; Shaping; Differential Reinforcement of Other / Alternative Behaviors (DRO, DRA, DRI); Discrete Trial Teaching (DTT); Extinction; Functional Behavioral Assessment (FBA); Functional Communication Training (FCT); Positive Behavioral Intervention and Support (PBIS); Response Interruption & Redirection and others.

Social stories is another effective intervention for teaching children with ASD, developed by Carol Gray. This technique involves writing short stories that describe any social situation, difficult for a person with ASD to understand. Social story also has a description of reactions of characters, which are adequate in a given social context, and an explanation of why this reaction is expected and adequate in the given circumstances. And the final stage of creating a social story is in explaining the positive impact of a chosen reaction on the individual and the people around him (Gray, 2010).

To date, experts, teachers and parents of children with ASD have created entire collections of social stories, written in accordance with individual needs of each child. Social stories are created with pictures to facilitate understanding, especially in case of early childhood education or education of children with a low level of development of verbal skills. Children with ASD either read these stories independently or listen as a family member or a specialist reads them. Social story is read before a start of an activity or a situation, that represents complexity to children with ASD. Due to the simplicity of implementation of such intervention, Social Stories are widely used in clinical and educational institutions for learning various social skills, including skills of interaction with peers, skills of taking the initiative in contact and also the behavior that is alternative to problematic and undesirable behavior (Kokina & Kern, 2010).

Role plays provide opportunities for people with ASD to rehearse the desired behavior (Weiss & Harris, 2001). Role plays can be used to develop skills in communication and include learning how to preserve eye contact

when communicating, how to orientate in dynamics of social interaction, how to form skills of finding answers to questions of surrounding people. Role plays can involve drawn characters, puppets, people (including peers). Role plays are always used in conjunction with provision of feedback to the child with ASD.

Social Skills Training (SST) includes group or individual training of children with ASD in interaction with typically developing peers. SST sessions consist of instructing and learning the basic rules of interaction, feedback, role interactions. It helps children with ASD to acquire communication skills, to develop playing skills, it encourages positive interaction with peers. SST can be used effectively to address social, communicative, behavioral problems, to develop skills of imitation and cognitive abilities in autistic individuals (Cappadocia & Weiss, 2011; Reichow & Volkmar, 2010). The T.L.Otero et al article includes a meta-analysis of eight programs of Social Skills Training and conclusions about the effectiveness of this intervention in teaching children with ASD (Otero, Schatz, Merrill & Bellini, 2015).

Self-management (SM) – this method teaches people with ASD to regulate their own behavior. Self-management implies that a child with ASD will learn to distinguish and control their appropriate and inappropriate behaviors, accurately track and record their reactions. At first SM is implemented with support of adults, and then children with ASD develop skills of Self-management without support. This intervention requires special devices, such as tokens, checklists, wrist counters (using tokens, checklists, wrist counters). Self-management (SM) has been used to improve such social skills of people with ASD, as non-verbal communication, eye contact establishing, conversation maintaining, interaction, games (Weiss & Harris, 2001). American researchers have proven the effectiveness of Self-management for development of skills of maintaining a conversation, because this intervention has led to better communication among people with ASD, it raised their interest, naturalness and kindness when communicating with interlocutors (Koegel, Park, & Koegel, 2014).

Peer-Mediated Instruction and Intervention – PMII (interference mediated by peers) are used for training children with ASD in various methods of social interaction with support of neurotypical peers. These technologies help autistic people to develop new forms of behavior and communication, to acquire social skills in natural environment of communication with normally developing children. A form of reverse inclusion is practiced in Russia and other countries, when a neurotypical child is placed in a correctional environment of educational institution where children with ASD are educated, and he is involved in joint activity of the group within correctional lessons with a teacher. PMII can be effectively used to solve social problems of a child with ASD, to improve his communication with others and formation of skills of joint activities, games, learning (Carter, 2005).

Parent-Implemented Intervention – PII (intervention performed with help of parents) includes programs in which parents are responsible for implementation of some of the interventions that affect social development of their own child (Kaiser, Hancock & Nietfeld, 2000). Parents are taught by specialists individually or in groups. Such forms of parent education as instructing, discussion, modeling, coaching, performance feedback are commonly used. Parents are taught to develop communication skills, sports, self-service, control of undesirable behavior in their children.

Video modeling (VM) is a technology suggesting social skills training for autistic people by demonstrating these skills using video equipment. This is one of the few methods that are scientifically substantiated and verified as an effective way of formation and development of skills in people with ASD (Plavnick & Ferreri, 2011). The intervention itself involves several steps: defining the target behavior for the student; preparation of special equipment (camera, video receiver); video planning (breakdown of the skill into specific steps); collecting data on existing skills of the child; creation of the video; creation of conditions for a child to watch the video; demonstration of the video; skill development progress monitoring; solving problems associated with lack of progress; gradual decrease of demonstration of video and visual cues to form self-sufficiency of the skill (Sigafoos, O'Reilly, & de la Cruz, 2007). Some studies have indicated that use of video simulation in teaching a child with ASD is more efficient than use of live models. The uniqueness of the method is that video modeling can attract and hold the attention of the children with ASD and even teach them empathy and understanding of the other person's point of view, which is not possible with help of other methods.

Analysis of all interventions that promote development of social skills and socialization of children with ASD, shows the diversity of approaches and methodologies. Unfortunately, not all methods' effectiveness is proven. Often, in order to develop a new technology, authors of various methods and technologies forget the necessity to verify this intervention, its effectiveness and usefulness for people with ASD. Today there is an urgent need for further scientific study of these promising methods, for deeper researches and identification of the most effective ones in terms of support of socialization of individuals with ASD.

3. Using Virtual Reality Systems to Optimize Social Skills Development in Children with ASD

Today, virtual reality systems are used worldwide as an effective means of social-psychological adaptation and rehabilitation of people with disabilities, both adults and children (Zinchenko, Menshikova, Bayakovskiy, Chernorizov, & Voyskunsky, 2010; Jeffs, 2009; Levac, Miller, & Missiuna, 2012; Amaltea-spb.com, 2015). It is important that virtual reality technologies allow for full contact of the subject with a simulated environment, which, in turn, can cover virtually all systems of human interaction with the "usual" outside world - both objective and social.

In the last decade VR technologies became widely spread in therapy, psychological correction and social adaptation of children and adolescents with autism spectrum disorders. The majority of virtual reality technologies, developed for children with autism, are focused on modeling real environment and enabling the possibility of developing useful social and communication skills in virtual space, the formation and development of which are difficult or dangerous in natural conditions of life (Jung et al., 2006; Mitchell et al., 2007; Fabri, Awad Elzouki, Moore, 2007; Cheng & Ye, 2010; Ke, & Im, 2013). Each created to date computer model that use possibilities of virtual reality is based on a certain understanding of the best ways to improve a variety of patterns of social-communicative behavior of children with autism and offers its own virtual environment design, different variants of simulated virtual environments, and provides the possibility of feedback in various forms and sensory modalities.

For example, South Korea researchers have developed a model of sensory integrative therapy (SIT), based on a tangible virtual reality that allows to simultaneously train coordination, develop skills of social perception and develop communication strategies and they have implemented it in practice of therapeutic care for children with autism (Jung et al., 2006).

Portuguese scientists have created a virtual simulator that allows children with autism to develop skills of recognition and understanding of facial expressions of interlocutors in a playful way, which enables successful correction of one of the most serious problems of autistic children - incomprehension of emotions of dialogue partners (Alves, Marques, Queirós, & Orvalho, 2013).

Researchers from the UK (Fabri et al., 2007) have developed a virtual model that helps to improve the skills of understanding of emotions (happiness, sadness, anger and fear) by children of different ages (from 7 up to 16 years) and with different forms of autism. At the first stage of the experiment, the participants had to select an avatar with the emotion expression, which was designated in the list. The second stage included avatars with different virtual scenes of social interaction, and participants were required to interpret their emotions. On the third and final stage, the children participating in the experiment had to understand what caused different emotions of the avatar. They had to choose the correct version from listed events and situations. Results of the experiment showed that out of 34 participants, 30 children have come to understand the emotions of avatars and interpret them adequately in the situation. However, the remaining four participants with severe forms of autism, had continued to experience considerable difficulty in understanding emotions portrayed by avatars.

Mitchell et al. (2007) have developed a virtual training model named "Virtual Cafe", designed to teach teens with autism how to behave in public. Virtual cafe simulates an environment of a real cafe, which has a bartender, where you can buy drinks, there is a variety of people sitting at tables, standing in a queue to the counter, etc. The program has four social rules each more socially complex than the previous one, associated with the order, payment, orientation in a line and finding a free place at a table. A child gets voice and text prompts in course of his assignments.

After completing the tasks of the program, which includes two training sessions of 30-50 minutes each, teens are asked to describe their understanding of social regulations active in this simulated environment before they are able to expand these skills in other, more complex virtual scenarios. Teenagers with ASD who participated in the study expressed an interest in training with help of this program and demonstrated improved social skills in the process of completing tasks in a simulated virtual environment. Although there was no statistically significant evidence for the effectiveness of applying these skills in similar social situations of real life. Thus, the degree of generalization of these skills is still unclear (Mitchell et al., 2007).

Collaboration of scientists from Israel and Italy have developed multiuser gestural projection system "StoryTable", which is a 3D virtual environment in which two children are working together to come up with a virtual story by selecting and positioning various elements of story on the screen in real time including setting, plot and a main character in a logical sequence. Some elements of the story should be chosen by both children at the same time, requiring cooperation between them. Training emphasis in this case is placed on the development and reinforcement of such key social skills like eye contact, turn taking, exchange of views and combined action.

The program is designed for high-functioning autistic children from 9 to 11 years old and it includes more than 10 sessions of 20 minutes each. Children were divided into pairs to test the model. During the training session, each pair of children was instructed for the fact that they are asked to come up with a story together. Three pairs of children were studied using this program. At the end of the session, all children demonstrated more positive social behavior, which was successfully generalized and subsequently confirmed in a non-virtual game, built on interaction of children with each other. In addition, the quality of children's play improved from simple parallel "play" to complex, coordinated behavior, and their communication has evolved from simple to complex and insightful phrases, ie "understanding each other" (Gal et al., 2009). The success of StoryTable supported the assumption that VR technologies that offer a stimulating, rewarding visual interface and active virtual communications contribute to improvement of skills of interaction of autistic children with real people.

Features of multi-user virtual environments for treatment of autism in recent years have been extended to the concept of "Collaborative Virtual Learning Environment" (CVLE), which allows multiple people to interact with each other within the same virtual environment (Cheng & Ye, 2010). Design of the original CVLE-program includes two virtual environments: a classroom and a street. Virtual scenes involve avatars of the student and the instructor. The student is assigned with certain tasks associated with social interaction that require verbal and nonverbal communication between avatars. For example, an avatar of the instructor does something: asks a question or expresses an emotion, and the student should give an adequate response in return. This training program is designed for children with autism of school age and consists of five sessions of 30-40 minutes each. Reports of three children with autism have shown progressive improvement in degree and accuracy of social perception, as well as in verbal and nonverbal communication (in particular, improved eye contact, an adequate response to a situation, ability to listen to other people).

In the US, virtual computer technologies of teaching communication skills to children of different ages and adults with ASD, contributing to successful social behavior became widely used: the ability to communicate with peers and adults, to solve everyday problems, to ask for help and advice, to choose a profession, to be able to participate in an interview for employment, etc. (Orsmond, Krauss, & Seltzer, 2004; Higgins, Koch, Boughfman, & Vierstra, 2008; Kandalaf, Didehbani, Krawczyk, Allen, & Chapman, 2013; Ke & Im, 2013).

For example, American researchers Ke & Im (2013) have developed virtual environments for little children (4-5 years old) with highly functional autism, allowing to train social skills in different social situations. Children were required to recognize the body language and facial expressions of avatars, interact with avatars in a school cafeteria and interact with avatars at a birthday party. Using data from virtual environments, learning outcomes have shown that children's communicative competence consistently increased with transition from one task to another. But the question about the possibilities of a successful transfer of acquired skills to real-life situations was left unresolved in this study (Ke & Im, 2013).

Analysis of the above studies have shown that the feasibility and practical efficiency of using virtual computer technologies for the improvement of social functioning of children with ASD is defined by unique advantages of virtual reality:

- Possibility of programming the virtual environment, presentation of various stimuli with controlled parameters, sample allocation of required stimulation, creation of multimodal stimulation, as well as possibility of customizing the structure and sequence of appearance of virtual objects;
- Possibility of such a large number of repeated actions that is needed to achieve the desired effect;
- Realness of recreation of the world, which is necessary to achieve the effect of presence;
- Full control over the user's attention by means of brightness, dynamics and interactivity of virtual environment;
- Provision of an effective feedback in real time.

It is worth noting such advantage of VR technologies as provision of opportunities for *individualization of a program for each individual child*. Individualization can be achieved by determining the interests and preferences specific to the child and by his direct integration into the program. This increases the involvement of the child, that in turn, is one of the most powerful prerequisites for successful learning. Moreover, *the complexity of the virtual environment may be modified*. Reducing the complexity of the environment and increasing preferred stimulus will strengthen attention and interest of the child to what is happening (Wang & Anagnostou, 2014).

Children with autism function best in a predictable, familiar environment. VR technologies allow us to create exactly that - *predictable, clearly structured teaching environment*. Distractions in the virtual scenario can be

minimized and, along with it, additional support may be provided, for example, in form of various tips, visual signals and etc, which will facilitate the achievement of changes in the desired direction (Rogers, 1999) .

Overall, as emphasized by Wang & Anagnostou (2014), VR contains a powerful potential for support to social learning and development of communication skills in children with autism. Virtual technologies provide the ability to combine different therapeutic approaches in a single integrated program to meet specific needs of such children through a structured monitoring and systematic training (Wang & Anagnostou, 2014). In addition, virtual environment can provide safe (physically and emotionally) conditions for obtaining valuable communicative experience to children with ASD, experiencing difficult situations of social interaction in the real world.

However, the problem of generalization of skills formed in a virtual context, the possibility of their successful application by autistic children to address social problems and to establish interpersonal relationships in real life, remains unresolved and requires further research.

4. Russian Experience in Supporting the Socialization of Autistic Children

In preparing this material, we used a qualitative method of processing of results of the analysis of the documents placed in scientific, empirical-practical publications on official sites of special institutions of medico-social and psycho-pedagogical rehabilitation, social organizations, associations of parents of children with ASD, and so on.

Results of the analysis revealed the presence of several models of care and rehabilitation of children with autism.

In the first place is the *medical model*, that has been used successfully since the 70-ies of the last century. Furthermore, the *model of early intervention (functional rehabilitation)*, that was developed by the St. Petersburg Institute of Early Intervention more than 20 years ago and implemented by medical, psychological, pedagogical and social centers in many Russian cities. According to L. Samarina "the meaning of functional rehabilitation is in early detection of violation of a child's development, even if he does not have a medical diagnosis, and help him to develop diverse abilities. Early Intervention program consists of three phases: assessment of what a child already knows how to do and with what he has difficulties, the reason of their occurrence; development of functional abilities of a child; preparation and support of the family in transition to an educational institution. Assistance program is built individually for each family" (Samarina, 2015).

Psycho-pedagogical and medico-social models of rehabilitation and correction, the purpose of which is to improve adaptation and integration of autistic children in children's groups, in compliance with their abilities, parent training. *Inclusive model* is aimed at creating a positive environment for learning, development and socialization of children with ASD in pre-school and school education organizations. To date, scheme of work with autistic children is being tested in 90% of secondary schools from 17 regions of Russia, special programs for education of children with ASD are being developed.

In the last decade, efforts of specialists, parents and volunteers were aimed at creation and implementation of the *model of complex multi-level rehabilitation, socialization and help in solving various kinds of problems of autistic children, their parents and guardians*. This model involves interagency cooperation of medicine, psychology, pedagogy and social spheres in work with autistic children. The basic principles to help children with ASD are: 1) early intervention; 2) development of individual programs of work with a child; 3) organization of training; 4) work with families.

Currently, by efforts of state organizations, public funds, associations of parents of children with ASD a variety of projects (programs) aimed at helping children with autism in socialization and positive adaptation to the environment is created and successfully implemented in all Russian cities. As an example, we'll show some of them:

- "Inclusive molecule" project (Moscow). This project grew out of a parent query to the Department of Education in Moscow. The goal is a creation of "pilot" schools and kindergartens with service of psycho-pedagogical support and tutors;
- "Center for creativity of autistic people "Anton is near here"" project (Saint-Petersburg). It is Russia's first project of its kind. Creative activities on the basis of paper, decorative and sewing workshops, specifically designed for children with ASD, are one of the methods of social rehabilitation of children with autism;
- "Autism can be cured" and "Autism. Routes of aid" projects (Voronezh). The aim of these projects is to provide interdepartmental cooperation on early intervention, treatment, rehabilitation and education of children with ASD and their families, changing the environment in which children with autism live and their quality of life;

- "From Heart to Heart" project of helping autistic children (Kazan). "From Heart to Heart" is a long-term project designed to help children with disabilities to become a full-fledged personality, to develop spiritually and to be useful to society. It is based on the idea of systemic inclusive education of autistic children by means of art therapy. Art therapy is carried out to socio-culturally adapt special children, their creative activity, self-development and self-expression to the modern world;
- "Developmental center for autistic children based on the football club "Metallurg-Kuzbass"" project (Novokuznetsk). The aim of this project is to develop abilities of social interaction and communication in children with autism spectrum disorders;
- Project on museum education (Tula). According to experts of Valeocenter of Tula (the organizers of this project), museum is an ideal place for adaptation and socialization of children with ASD. For example, it is easier to explain the realities of the past and present to children with autism on example of exhibits, and also this is a good method of assimilation of patterns of behavior in society.

In 2016 the Russian resource centre of organization of the integrated support for children with autism spectrum disorders will start to operate. The objectives of the center will also include training of professionals for working with autistic children, and also counseling of children with ASD and their families; development and introduction of new technologies in working with such children. The main focus in the organization will be on the integrated inclusive education.

Analysis of activities of centers allows us to highlight the technologies of rehabilitation and support for children with ASD and other mental disorders, actively used by Russian centers, medical, education and social services institutions. This paper's framework does not permit to even briefly describe the abundance of technologies that are used by Russian specialists working with children with ASD. We will focus on some of them.

The basis in the practical work of special schools for children with ASD was the method which is considered in the world by far the most effective. This is the method of Applied Behavior Analysis (ABA).

Animal assisted therapy is a popular method to help children with autism in modern Russia (Nikol'skaja, 2012). Depending on capabilities and direction of activities of special public and private rehabilitation facilities, such methods as *hippotherapy* (Svinolupov, Trjapichkina, 2010), dolphin therapy (Lukina, 2012), canis therapy (Kogalovskaja, 2013) are used. An analysis of results of use of these methods allows us to speak about their effectiveness in various areas of development of a child, as they help to involve almost all sensory systems. In particular, muscle tone, coordination, balance, fine motor skills, and, in the process of communicating with dogs, large motor skills are all improved in a child with ASD, opportunities for development of speech are increased. There is positive influence of animal assisted therapy in regulation of emotional and volitional sphere, decrease of excitability, etc. An important effect of using these methods is an increase of motivation to communicate with parents and peers, self-esteem increase, self-confidence formation.

An important role in development of a child with ASD, according to experts, is played by various forms of art therapy. First of all, it is the involvement of children in art, pottery, "communication with sand" and others. In addition to development of fine motor skills, these forms of communication of a child with autism with the world of creativity contribute to development of creative imagination, fantasies, speech, sense of his own body, and mainly to acquisition of skills of interaction with parents, other adults and children (Suhotin, 2014).

Thus, for example, system of methods named "Folk games", developed by O.V. Ruban, is aimed at correction of communication disorders in children with ASD between the ages of 3 to 5 years. The system involves two successive stages of correction: the first stage is aimed at development of interaction between a mother and a baby with use of traditional nurturing, the second stage is aimed at development of communication with peers using round dance games. The method of "nurturing" gives an opportunity to significantly expand the repertoire of ways of mother's communication with her child which provides the basis for further development of communication of a child with ASD with peers and adults. The method of "round dance game" allows to develop initiative in the game communication with other children and adults, develop holistic models of communication, rules and norms of behavior, socially significant gestures, in children with ASD, to regulate their emotional reactions (Ruban, Belopol'skaja, 2013).

We'll also look into possibilities of sand therapy (sand-play). A child takes emotional relaxation while playing with sand. He begins to track the movement of his hands, learns to concentrate his focus. Playing with sand helps children with ASD to better learn possibilities of their body, it improves sensory system and develops fine motor skills (Dodonova, 2014).

Virtually all experts of medical, psychological and social rehabilitation centers use *sensory integrative therapy*. Sensory integration is the ability of a child with ASD to organize his own feelings to make movements, to learn and behave appropriately.

Use of sensory integration stimulates all sensory processes, it creates a positive emotional background, it helps to overcome the disturbances in emotional and volitional sphere. I.L. Shpicberg has developed a method of somatosensory correction, which is based on the concept of peripheral accent formed in a child with disturbances in the mechanism of operation of each sensor channel in allocation of the least informative, peripheral direction as the main one (Shpicberg, 2013).

Use of biofeedback (BFB) in work with children with ASD allows them to learn how to control their behavior, to manage physical activity and to develop the necessary skills of self-regulation.

Much work is being done with parents of children with autism. Individual programs are drawn up for them, which can be used at home to correct the child's behavior and, of course, to inform or educate them (Arshatskaja, 2004; Shmidke, 2012).

Currently, there is a positive shift in Russia in addressing the problems of children with autism and members of their families, as follows:

- 1) there is development and implementation of integrated approaches to provision of medical, psychological, educational, social care and support for children with ASD and their families;
- 2) programs of interdepartmental interaction of medicine, psychology, pedagogy and social sphere in work with autistic children are being developed;
- 3) role of inpatient care in treatment and development of a child with ASD is being reduced;
- 4) programs for treatment, rehabilitation and socialization of children with autism using virtual reality systems are being developed;
- 5) pilot projects of inclusive education are being developed and implemented;
- 6) orientation of rehabilitation programs to educational and other organizations is apparent.

5. Conclusion

Regardless of differences in symptomatology of autism spectrum disorders, each of them involves a sustainable violation of development of communication and social skills. Data of studies, carried out in different countries of the world, convincingly demonstrate that it is difficult for children with ASD to maintain contact with other people on verbal and non-verbal levels, to understand emotions of others and tell about their own feelings and experiences. Violations of social communication have serious psychological problems: loneliness, lack of close people and friendly relations with peers, high anxiety and depression.

Conducted surveillance-analytical study of contemporary approaches to overcoming this problem has shown that today quite a lot of effective interventions are used in the process of education of children with ASD. We can distinguish the most heuristic among them: *applied behavior analysis (ABA)*; *cognitive-behavioral training (CBT)*; *social stories method*; *social skills training (SST)*.

In the last decade, virtual computer technologies received a significant spread in therapy, psychological treatment and social rehabilitation of children and adolescents with ASD. They allow one to create a model of the real world in a virtual space with help of a computer, that provides a user with a well-structured multi-dimensional environment, with which he can interact in real time. Virtual technologies enable individualization of a program for each individual child, modifying the necessary complexity of the virtual environment, they allow to minimize distractions, and to provide additional support and systematic instructing that promotes achieving changes in the right direction. Thus, virtual environment allows children with ASD to obtain valuable communicative experience in conditions of safety and emotional comfort. The question of success of transfer of skills acquired in the virtual space to real-life situations, still remains particularly unresolved, and requires further research in this direction.

Russian experience in socialization of children with autism is characterized by an integrated approach to provision of medical, psychological, educational and social assistance for children and their families. The role of inpatient care in treatment and development of a child with ASD is reduced, the emphasis of rehabilitation programs shifts to inclusive educational institutions. Method of ABA is the basis of practical work in Russia, as well as in most of the world. Along with it, sensory types of correction, methods of animal-assisted therapy and various forms of art therapy are used.

The analysis of technologies of development of social skills and socialization of children with ASD shows the diversity of approaches and methodologies. Unfortunately, the effectiveness of not all methods is proven. Often their authors forget about the necessity of experimental verification of the proposed method's usefulness for a person with ASD. Today there is an urgent need for further scientific study of promising methods discussed in this article, there is a need for determination of their empirical validity.

Acknowledgements

This work was supported by The Ministry of Education and Science of Russian Federation and was prepared as a part of a state task in scientific research area: project № 3398 "Development of the model to support of positive socialization of children with autism spectrum disorders and complex defects".

References

- Alves, S., Marques, A., Queirós, C., & Orvalho, V. (2013). LIFEisGAME Prototype: A serious game about emotions for children with autism spectrum disorders. *PsychNology Journal*, 11(3), 191 – 211.
- Arshatskaja, O.S. (2004) Psychological help for a young child with a tendency to formation of infantile autism: joint work of experts and parents. Almanac of the Institute of Correctional Pedagogy RAE. No8 (8), 9-12.
- Autism spectrum disorder. (2013). Retrieved from <http://www.dsm5.org/Documents/Autism%20Spectrum%20Disorder%20Fact%20Sheet.pdf>
- Baenskaja, E. R. (2008). Violation of the affective development of a child at an early age as a condition of formation of infantile autism. (Unpublished doctoral dissertation). Institute of correction pedagogy RAO, Moscow, RF.
- Baron-Cohen, S. (2009). Autism: the empathizing-systemizing (E-S) theory. *Annals of the New York Academy of Sciences*, 1156, 68-80.
- Beresford, B., Tozer, R., Rabiee, P., & Sloper, P. (2007) Desired outcomes for children and adolescents with autistic spectrum disorders. *Children and Society*, 21, 4–16.
- Bondy, A., & Frost, L. (1994) The Picture Exchange Communication System. *Focus on Autistic Behavior*, 9, 1–19.
- Cappadocia, M. C., & Weiss, J. A. (2011). Review of social skills training groups for youth with Asperger syndrome and high functioning autism. *Research in Autism Spectrum Disorders*, 5, 70-78.
- Carter, E. W., Cushing, L. S., Clark, N. M., & Kennedy, C. H. (2005). Effects of peer support interventions on students' access to the general curriculum and social interactions. *Research and Practice for Persons with Severe Disabilities*, 30(1), 15-25.
- Cheng, Y., & Ye, J. (2010). Exploring the social competence of students with autism spectrum conditions in a collaborative virtual learning environment – the pilot study. *Journal Computers & Education*, 54(4), 1068–1077. <http://dx.doi.org/10.1016/j.compedu.2009.10.011>
- Didactic-correctional complex with video-bio-control "Timokko." (2015). Retrieved from http://amaltea-spb.com/index.php?path=76_93&route=product/category
- Dodonova, N. S. (2014) Sand therapy as a means of development and correction of children with special educational needs. *Scientific Search*, 4(1), 44-46.
- Fabri, M., Awad Elzouki, S. Y., & Moore, D. (2007). Emotionally expressive avatars for chatting, learning and therapeutic intervention. In J. Jacko (Ed.), *Human-Computer Interaction. Part III, HCII, Volume 4552*, (pp. 275-285). Springer-Verlag Berlin Heidelberg. http://dx.doi.org/10.1007/978-3-540-73110-8_29
- Gal, E., Bauminger, N., Goren-Bar, D., Pianesi, F., Stock, O., Zancanaro, M., & Weiss P. L. (2009). Enhancing social communication of children with high-functioning autism through a co-located interface. *AI & Society*, 24 (1), 75-84. <http://dx.doi.org/10.1007/s00146-009-0199-0>
- Gordon, K., Pasco, G., McElduff, F., Wade, A., Howlin, P., & Charman, T. (2011). A communication-based intervention for nonverbal children with autism: what changes? Who benefits? *Journal of Consulting and Clinical Psychology*, 79(4), 447-457.
- Gray, C. (2010). *The New Social Story Book, Revised and Expanded 10th Anniversary Edition: Over 150 Social Stories that Teach Everyday Social Skills to Children With Autism or Asperger's Syndrome, and Their Peers*. Arlington, TX: Future Horizons.
- Hart, S. L., & Banda, D. R. (2010). Picture exchange communication system with individuals with

- developmental disabilities: A meta-analysis of single subject studies. *Remedial and Special Education*, 31(6), 476-488.
- Higgins, K. K., Koch, L. C., Boughfman, E. M., & Vierstra, C. (2008). School-to-work transition and Asperger Syndrome. *Work*, 31, 291-298.
- Hughes, C., Golas, M., Cosgriff, J., Brigham, N., Edwards, C., & Cashen, K. (2011) Effects of a social skills intervention among high school students with intellectual disabilities and autism and their general education peers. *Research and Practice for Persons with Severe Disabilities*, 36(1), 46-61.
- Humphrey, N., & Symes, W. (2011) Peer interaction patterns among adolescents with autistic spectrum disorders (ASDs) in mainstream school settings. *Autism*, 15(4), 397-419.
- Jeffs, T. (2009). Virtual reality and special needs. Themes in science and technology education (Special Issue), 2(1-2), 253-268.
- Jung, K., Lee, H., Lee, Y., Cheong, S., Choi, M., Suh, D., ... Lee, J. (2006). The application of a sensory integration treatment based on virtual reality-tangible interaction for children with autistic spectrum disorder. *PsychNology Journal*, 4(2), 145-159.
- Just, M. A., Cherkassky, V. L., Keller, T. A., Kana, R. K., & Minshew, N. J. (2007). Functional and anatomical cortical underconnectivity in autism: evidence from an fMRI study of an executive function task and corpus callosum morphometry. *Cerebral Cortex*, 17(4), 951-961. <http://dx.doi.org/10.1093/cercor/bhl006>
- Kaiser, A. P., Hancock, T. B., & Nietfeld, J. P. (2000). The effects of parent-implemented enhanced milieu teaching on the social communication of children who have autism. *Early Education and Development*, 11(4), 423-446.
- Kandalaf, M. R., Didehbani, N., Krawczyk, D. C., Allen, T. T., & Chapman, S. B. (2013). Virtual reality social cognition training for young adults with high-functioning autism. *Journal of Autism and Developmental Disorders*, 43(1), 34-44. <http://dx.doi.org/10.1007/s10803-012-1544-6>
- Kanner, L. (1943). Autistic disturbances of affective contact // *Nervous Child*, 2, 217-250.
- Ke, F., & Im, T. (2013). Virtual-reality-based social interaction training for children with high-functioning autism. *Journal of Educational Research*, 106(6), 441-461. <http://dx.doi.org/10.1080/00220671.2013.832999>
- Klin, A., Pauls, D., Schultz, R., & Volkmar, F. (2005). Three diagnostic approaches to Asperger syndrome: Implications for research. *Journal of Autism and Developmental Disorders*, 35(2), 221-234. <http://dx.doi.org/10.1007/s10803-004-2002-x>
- Knott, F., Dunlop, A. W., Mackay, T. (2006) Living with ASD: How do children and their parents assess their difficulties with social interaction and understanding? *Autism*, 10(6), 609-617.
- Koegel, L. K., Park, M. N., & Koegel, R. L. (2014) Using self-management to improve the reciprocal social conversation of children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 44(5), 1055-1063.
- Kogalovskaja, A. S. (2013) Features of rehabilitation of disabled children with use of canis therapy. *Journal of Ivanovo State University. Series: Natural, Social Sciences*, 1, 41-46.
- Kokina, A., & Kern, L. (2010). Social Story Interventions for Students with Autism Spectrum Disorders: A Meta-Analysis. *Journal of Autism and Developmental Disorders*, 40, 812-826.
- Lasgaard, M., Nielsen, A., Eriksen, M. E., & Goossens, L. (2010) Loneliness and social support in adolescent boys with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 40, 218-226.
- Lebedinskaja, K. S. (1994). Drug therapy of infantile autism. *Defectology, Issue 2*, 3-8.
- Lebedinskij, V. V. (1985). Violations in mental development of children: Textbook. Moscow, Moscow University.
- Levac, D., Miller, P., & Missiuna, C. (2012). Usual and virtual reality video game-based physiotherapy for children and youth with acquired brain injuries. *Physical and Occupational Therapy in Pediatrics*, 32(2), 180-195.
- Lukina, L. N. (2012) Mechanisms of the therapeutic effects of dolphin therapy procedures. *Tauride Medical and Biological Bulletin*, 15(3-2), 162-165.
- Maurice, C., Green, G., & Foxx, R. M. (2001) Making a difference: Behavioral intervention for autism. Austin,

TX: Pro-Ed, Inc.

- Melillo, R., & Leisman, G. (2009). Autistic spectrum disorders as functional disconnection syndrome. *Reviews in the Neurosciences*, 20(2), 111-131.
- Mitchell, P., Parsons, S., & Leonard, A. (2007). Using virtual environments for teaching social understanding to 6 adolescents with autistic spectrum disorders. *Journal of Autism and Developmental Disorders*, 37(3), 589-600.
- Nikol'skaja, A. V. (2012) The effectiveness of non-directional animal-assisted therapy for children with various forms of dysontogenesis. *Psychology and psycho-technology*, 8, 87-99.
- Nikol'skaja, O. S., Baenskaja, E. R., & Libling M. M. (2007). Autistic child. Ways of help. Moscow, Publishing House Terevinf.
- Orsmond, G. I, Krauss, M. W., & Seltzer, M. M. (2004). Peer relationships and social and recreational activities among adolescents and adults with autism. *Journal of Autism and Developmental Disorders*, 34(3), 245-256.
- Otero, T. L., Schatz, R. B., Merrill, A. C., & Bellini, S. (2015) Social skills training for youth with autism spectrum disorders: a follow-up. *Child and Adolescent Psychiatric Clinics of North America*, 24(1), 99-115.
- Plavnick, J. B., & Ferreri, S. J. (2011). Establishing verbal repertoires in children with autism using function - based video modeling. *Journal of Applied Behavior Analysis*, 44(4), 747-766.
- Reichow, B., & Volkmar, F. R. (2010). Social Skills Interventions for Individuals with Autism: Evaluation for Evidence-Based Practices within a Best Evidence Synthesis Framework. *Journal of Autism and Developmental Disorders*, 40, 149-166.
- Rogers, S. (1999). Intervention for young children with autism: from research to practice. *Infants Young Child*, 12, 1-16.
- Ruban, O. V., & Belopol'skaja, N. L. (2013). Traditional round dance games as a method of correction of communicative disorders in children with autism spectrum disorders. *Defectology*, 4, 37-44.
- Samarina, L. (2014). Expert: early intervention system has proven its efficiency // Interview of the Director of the Institute of Early Intervention, St. Petersburg RIA Novosti. Retrieved from <http://ria.ru/adaptation/20140804/1018402173.html#ixzz3Zqa4n1Ny> (as of May 10 2015)
- Shmidke, I. V. (2012). Formation of communicative interaction skills in children with autism spectrum disorders. *Siberian Herald of Special Education*, 1(6), 13.
- Shpicberg, I. L. (2013). Correction of violations of development of sensory systems in children with autism spectrum disorders. *Autism and Developmental Disorders*, 2(41), 33-44.
- Sigafoos, J., O'Reilly, M., & de la Cruz, B. (2007). How to use video modeling and video prompting. Austin, TX: Pro-Ed.
- Stichter, J. P., Randolph, J., Gage, N., & Schmidt, C. (2007). A review of recommended social competency programs for students with autism spectrum disorders. *Exceptionality*, 15(4), 219-232.
- Strang, J. F., Kenworthy, L., Daniolos, P., Case, L., Wills, M. C., Martin, A., & Wallace, G. L. (2012) Depression and anxiety symptoms in children and adolescents with autism spectrum disorders without intellectual disability. *Research in Autism Spectrum Disorders*, 6, 406-412.
- Suhotin, M. A. (2014) Drawing as a means of developing and maintaining dialogic speech with a child having autism. *Autism and Developmental Disorders*, 1(42), 39-48.
- Svinolupov, A. G., & Trjapichkina, M. V. (2010) Factors of influence of hippotherapy on the personality of a child with autism. *Chelyabinsk humanities*, 2(11), 51-53.
- Travis, L. L., & Sigman, M. (1998). Social deficits and interpersonal relationships in autism. *Mental Retardation and Developmental Disabilities Research Review*, 4, 65-72.
- Vinogradova, K. N. (2014). Aetiology of autism spectrum disorders. *Modern Foreign Psychology*, 3(4), 112 - 131.
- Virués-Ortega, J. (2010). Applied Behavior Analytic Intervention for Autism in Early Childhood: Meta-Analysis, MetaRegression and Dose-Response Meta-Analysis of Multiple Outcomes. *Clinical Psychology Review*, 30(4), 387-99.

- Wang, M., & Anagnostou, E. (2014). Virtual reality as treatment Tool for children with autism. In V. B. Patel, V. R. Preedy, & C. R. Martin (Eds.), *Comprehensive Guide to Autism* (pp. 2125-2141). New York, NY: Springer Science+Business Media. http://dx.doi.org/10.1007/978-1-4614-4788-7_130
- Weiss, M. J., & Harris, S. L. (2001). *Reaching out, Joining In: Teaching Social Skills to Young Children with Autism*. Bethesda, MD: Woodbine House.
- Wood, J. J., Fujii, C., Renno, P., & Van Dyke, M. (2014). Impact of cognitive behavioral therapy on observed autism symptom severity during school recess: A preliminary randomized, controlled trial. *Journal of Autism and Developmental Disorders*, 44(9), 2264-2276.
- Zinchenko, Y. P., Menshikova, G. Y. Bayakovskiy, Y. M. Chernorizov, A. M., & Voyskunsky, A. E. (2010). Virtual reality technology in the context of world and national psychology: methodological aspects, achievements and prospects. *National psychological magazine*, 1(3), 54-62.

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