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## Modern technologies and modern educators, or the readiness for new challenges

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### Abstract

The first part of the article highlights the dynamic development of technologies used in special needs education over the last fifteen years. EEG-Biofeedback method, Warnke method and RehaCom method are briefly characterized and their advantages and disadvantages are described. The second part of the article presents the results of the author's own research on readiness and openness of specialists related to pedagogy, psychology and speech therapy for current methods, techniques and tools based on modern technologies that are used in work with patients. The problems associated with the specialists' knowledge of the methods are pointed out and exemplary solutions are proposed.

### Introductory Remarks

Modern scientists cannot imagine current research without the use of modern technologies. Technological progress can be observed practically in every field of science, although some disciplines advance much faster than the other. The last decade has been marked by the dynamic development of special needs education. Many new devices have been introduced, making life of people with disabilities easier. Moreover, several new methods have been developed that make use of neurotechnology and are based on the usage of advanced technical equipment. However, a question remains: how many representatives of the widely understood pedagogy, psychology, and speech therapy actually make use of such solutions? Often situations occur when persons have heard about a given method, but do not show interest in exploring the subject. There may also be cases when the representatives of the aforementioned fields of science would be interested in a given method or device but they have no idea about their existence. The reasons behind this state of affairs are yet to be

identified, have those persons not heard about the newest solutions because they don't show interest in expanding their knowledge, do not read the trade journals which usually describe most of innovations, or perhaps simply don't have any access to them?

The abovementioned questions prompted the author of the article to conduct a survey on the readiness and openness of specialists in various fields to modern methods, techniques and tools based on modern technologies that are used in work with patients. The survey was completed by 95 professionals from the Lesser Poland Voivodeship (the vast majority having two or more specializations); among the surveyed there were pedagogues (31 persons), special needs pedagogues (41 persons), oligophrenopedagogues (35 persons) and surdopedagogues (13 persons), workshop therapists (16 persons), early development support therapists (18 persons), speech therapists (11 persons), neuro speech therapists (6 persons) and psychologists (12 persons). Detailed analysis of the survey results is presented in the second part of the article.

Besides asking universal questions regarding seniority, opinions about the courses, trainings, electronic equipment, computer programs and applications used in work with children, youth and also adults, the author of the article decided to ask questions about the respondents' knowledge of three methods that make use of innovative solutions based on neurotechnology and neuropsychology to improve the quality of life of persons affected by various disabilities. The methods include: EEG-Biofeedback, Warnke Method and RehaCom and each of them is shortly described in the following part of the article.

## EEG-biofeedback

EEG-biofeedback is a method whose basic assumption is to involve the participant in controlling their own physiological processes (Thompson M., Thompson L. 2012, p. 35). With this approach the patient can "train" their brain on their own. Brainwave activity is monitored by a therapist who watches it on the computer screen. Recording and monitoring brainwaves of the participant is possible by placing multiple electrodes on the patient's head by means of which both the patient and the therapist receive feedback in different ways. On the screen of the monitor. The therapist observes the charts showing as the brainwave activity increases and decreases, while the patient *by changing their psychical state modifies the brainwaves amplitudes of different frequencies, thus watches the change on the screen of their monitor and tries to alter their brainwave pattern in order to achieve a pre-specified goal (e.g. to put a car into*

*motion*) (Thompson M., Thompson L. 2012, p. 36). In this way the patient learns self-regulation by means of exchange of information between Thalamus, Basal Ganglia and Cerebral Cortex. Biofeedback sessions are adapted to the patient's individual abilities. In the case of children therapy it usually begins with ten one-minute trainings spread over ten sessions, in other words the whole session closes in 10 minutes (not including the breaks and relaxations) and as the child becomes more advanced, the training time is gradually extended. The optimal time for the whole session is 30 minutes (10 training sessions, 3 minutes each) additionally we allow for the time for breaks between the trainings as well as the time to relax after the session is over. It is very important to give the patient a possibility for a moment of relaxation after the training is over because the Biofeedback sessions are extremely exhausting. A large number of Biofeedback patients fall asleep after the training session. It is common practice that the offices which employ Biofeedback method are equipped with massaging chairs allowing patients the possibility of relaxation after the great mental effort. The method is gaining popularity in Poland, with a growing group of followers, yet, as it is the case for any other method, it is not suitable for everyone.

## Warnke Method

The method proposed by Fred Warnke was developed with a view to children who have problems with the development of cognitive processes. The method is commonly employed in work with children who have learning difficulties. It assumes that children with learning difficulties do not hear the correct sounds of words and therefore do not memorize them (since they don't understand) and, what follows, they are not able to identify the letters and phones the words consist of. A large number of children suffering from dyslexia make a lot of mistakes while reading, ranging from problems related with letters confusion, to avoidance of some words or even lines of text, to guessing the words basing only on the initial letters of a given expression (<http://www.metodawarnkego.pl/o-metodzie.html>). The work with Warnke Method is based on developing the correct automatic reactions through appropriate training. The most important advantages of automation include:

Consuming a small amount of energy to perform an activity;

- Faster course of automated actions;
- Multiple-track actions, i.e. the ability to perform several processes simultaneously;

- Reduced number of mistakes and improved continuity of processes; (Warnke F. 2014, p.15)

In the case when a child's automation is impaired, during performance of specific tasks it happens that the child tries to perform them by developing some compensation strategy, which in turn requires large deposits of energy and therefore quickly leads to fatigue, and the child does not have energy for further study.

The whole training with Warnke Metod is based on three assumptions:

1. *Automation of perception processing in the areas of hearing, sight, and motor skills* – this group comprises the following tasks: visual order threshold, auditory order threshold, spatial/directional hearing, tones discrimination, synchronous tapping out the rhythms, choice-reaction time, frequency pattern recognition, eye-hand coordination, reading texts consisting of pseudo-words, short-time memorizing of syllables, perception selectivity, dynamic perception, binocular interoperability tests, visual spelling.
2. *Automation of the coordination between cerebral hemispheres* – this group encompasses all the tasks listed for the automation of perception processing, however, in the case of perception selectivity two different variants appear: Variant A – training of phones recognition with the use of Alpha Trainer device, or Variant B – Wedemarker perception selectivity test.
3. *Development and automation of "Visual Language"* - this group includes the tasks and exercises from the area of: spoken language difficulties, exercising singing songs for children, educational fun with story telling, exercises called "a reading blackboard for gnomes", learning new words during synchronous dialogue, lingual rehabilitation of people with aphasia.

The frequency of the tasks is adapted to the child's individual needs and abilities. In order to be able to employ this method, one needs to finish a specialised course, purchase the suitable testing equipment (there are four professional devices available, three dedicated for specialists and one that can be operated by the child itself) as well as the software and practise materials. More and more centers in Poland employ this method, either using it as the leading method or as a support for other techniques. There are persons who criticize the Warnke method, accusing it of becoming boring for a child after some time. Not all children are able to work in a sitting position for over an hour. However, as in the case of any other method, there are supporters and opponents.

## RehaCom Method

The RehaCom method was developed for people showing difficulties with cognitive processes. In 1986 Prof. Hans Regel elaborated the theoretical foundations of the system, which over time have been improved and modified ([http://www.testy-rekrutacyjne.pl/reha-com.pl/wp/do\\_pobrania/Katalog\\_RehaCom\\_2012\\_web\\_m.pdf](http://www.testy-rekrutacyjne.pl/reha-com.pl/wp/do_pobrania/Katalog_RehaCom_2012_web_m.pdf)). The method is based on a specially developed training software controlled by a specialised panel. The advantage of the panel is undoubtedly a simple design and big buttons, which allow it to be operated practically by anyone, including people who have problems with mobility of the upper limbs. Both the software and the controlling panel are compatible with most computers. RehaCom consists of the following trainings:

- Attention training, which comprises tasks in the area of: attention and concentration – AUFM, divided attention – GEAU, vigilance – VIGI, acoustic responsiveness – AKRE, visual responsiveness – REVE, visuo-constructional abilities – KONS, two-dimensional operations VRO1;
- Memory training, which includes : figural memory – BILD, physiognomic memory – GESI, topological memory – MEMO, memory of words – WORT;
- Executive functions training (planning and logical reasoning): shopping – EINK, logical reasoning – LODE;
- Training of visual field that consists of: visual field (saccadic training) – SAKA, visual exploration – EXPL;
- Visuo-motoric coordination training – WISO.

Since every training activates different cognitive areas, they are tailored to the particular needs of the patient. The selected training begins with the lowest level of difficulty, which increases automatically with the correctness of the tasks performed by the participant. The subsequent training session begins with the last task the patient performed correctly. After each session the results are saved in an individual folder of the participant, allowing to monitor their progress across all the trainings in which they participated.

The creators of RehaCom believe that the biggest advantages of the method are:

- Possibility of selection of appropriate procedures for specific cognitive disorders;
- Possibility of selection of appropriate sets of procedures for specific profiles of cognitive disorders;

- Flexibility of training structure (amount of tasks during the session, changeable difficulty levels, etc.); ([http://www.testy-rekrutacyjne.pl/rehacom.pl/wp/do-pobrania/Katalog\\_RehaCom\\_2012\\_web\\_m.pdf](http://www.testy-rekrutacyjne.pl/rehacom.pl/wp/do-pobrania/Katalog_RehaCom_2012_web_m.pdf))

The RehaCom method is designed in a way that allows the patient to use it on their own at home or in the offices under the supervision of a therapist. According to the research conducted by the author of the article, the method is not well known among the participants of the survey, however the number of centers offering the RehaCom therapy is increasing.

## Analysis and the results of own research

In order to consult the opinion of specialists related to pedagogy, psychology, and speech therapy on the modern technologies used in work with patients, the author prepared a questionnaire on the readiness and openness of the professionals to innovative methods, techniques, and tools supporting the work with persons with various disabilities. The survey was completely anonymous and consisted of 43 closed questions and 2 open questions.

The vast majority of the respondents, 88.4%, were females, while 11.6% were males. None of the 95 surveyed specialists had participated in any training based on neurotechnology or neuropsychology, which is all the more surprising considering the fact that a significant proportion of the respondents were young professionals. As many as 67.3% were persons who had been working professionally for 1 to 4 years, which means that they are specialists who finished their studies relatively not long ago and therefore their knowledge concerning the research on the modern methods of work with patients should be quite extensive.

The following answers were provided to the question about courses completed by the respondents: Veronica Sherborne Developmental Movement Method, Munich Functional Developmental Diagnostics, Pedagogy of Play course, Sensory Integration Therapy, Hand Therapy, Behavioral Therapy. All of the surveyed unanimously believe that improving professional skills is very important in their profession, but also highlight the fact that the participation in all kinds of courses and trainings in Poland is associated with high costs. Regarding the finances, it is certainly a huge problem for a large part of the specialists. The prices of the trainings, courses and workshops prices start from 88 EUR for a one day meeting; often for a three-day course one must pay more than 300 EUR, whereas in the case of multistage courses, lasting altogether about thirty days, one has to be prepared for a cost reaching even over a dozen

thousands euros. Frequently the participation in a given course is impossible for the specialist just due to financial reasons. The question: *Can You afford the participation in the courses You are interested in?* was answered negatively by 26.3% of the respondents; 66.3% marked the answer – *partially*; only 7.4% of the respondents confirmed that they can afford it. Another problem that is worth noticing is related to the fact, that maybe if the institutions where the specialists are employed financed, at least partially, the participation of their workers in courses and trainings, a significant part of therapists would be able to afford the improvement of their professional skills. All of the respondents stated unanimously that the trainings and courses should be co-financed by the employers because the benefits of such a solution would be mutual; the specialists would improve their professional skills and the agencies could extend their offer for customers.

Yet another issue pointed out by the respondents appeared with the question: *Do You think that You receive sufficient information about the courses organized in Poland?* As many as 71.6% replied no to that question. Barely 15.8% stated that they received sufficient amount of information about the courses, while 12.6% admitted that they did not have any opinion on this subject. Without doubt, there are courses and trainings in Poland, for which the waiting time is up to three years, so the organizers do not seek customers, however, there is also a large number of interesting offers addressed to specialists, that, unfortunately, are not properly advertised in smaller localities, and consequently a large number of people cannot participate in them, simply because they don't know about their existence.

When the watchword – “modern technologies” is given, many people identify it with computer hardware, educational computer software, and all various kinds of applications available in the online stores that can be used on smartphones or tablets while working with patients. Increasingly often one can encounter statement that nowadays the therapists overuse solutions of this kind. According to the survey, 44.2% of the respondents claim that the educational software is partially overused in the work with children, 23.2% is of the same opinion when it comes to working with youth, while only 17.9% say that it is true for the work with adults. The situation is similar in the case of the opinion that electrical devices and multimedia equipment are overused in the work with patients: 14.2% of respondents state that it is definitely the case, 7.4% say that it is not true, 54,6% reckon that it is partly true, and 23.2% state that they have no opinion on the subject. The replies of the surveyed to the question: *How often do You personally use a computer or a tablet for work with*



patients? were as follows: 7.4% marked the answer – *often*, 20% – *sometimes*, 10.5% – *rarely*, 37.9% – *very rarely*, and 24.2% – *never*. The following answers were noted to the question: How often do You use free applications available online for work with patients?: 2.1% of the respondents stated that they use them – *very often*, 10.5% – *often*, 37.9% – *sometimes*, 22.1% – *rarely*, 3.2% – *very rarely*, 24.2% – *never*. When it comes to overusing the devices and multimedia software in work with patients, the opinions of respondents were similar: over half – 54.5% marked the answer – *partially*, while only 7.4% answered *no*.

The next set of questions concerned the field related to neurotechnologies. First of the questions from this group concerned the respondents' knowledge of the methods that utilize neurotechnologies. It turned out that as many as 85.2% of the respondents indicated that they know such methods, yet a problem appeared, when they were asked to list them; a large number of the surveyed wrote that they had heard of such methods, but were not able to list them, while the rest mostly mentioned the EEG-Biofeedback method. There also appeared such answers as: *computer software for children with ASD, therapeutic robots, Software based on the Eyes Gaze (eg. Tobi)*. On the other hand, the respondents, asked if they believe that the neurotechnology-based methods are effective? Replied in the following way: 55.8% stated that it is – *partially true*, 18.9% marked the answer – *yes*, 23.2% – *no opinion on the subject*, and 2.1% believed that the methods are not effective.

The last three groups of questions concerned only the specific methods. The first method in this set was EEG-Biofeedback: 93.7% of the respondents stated that they knew this method, but a smaller group of persons, only 75.8%, knew for whom it is dedicated. Only 45.3% had the opportunity to participate in the EEG-Biofeedback session as an observer, and merely 16.8% had a chance to test it themselves. 50.5% of the respondents stated that they would eagerly take part in a EEG-Biofeedback course, 36.9% marked the answer – *don't know*, while 12.6% declared that they would not want to take such opportunity. When it comes to working with patients who participated in Biofeedback sessions, the situation is different: only 20% of the respondents had an opportunity to work with a person who had attended therapy using Biofeedback method, 54.7% marked the answer – *don't know*, while 25.3% stated that they had not had such an opportunity. The next question concerned the observation of positive changes in the patients who participated in the Biofeedback therapy. Barely 8.4% of the surveyed stated that they had actually noticed such changes and 11.6% said that it was partially possible to observe positive changes in pa-



tients. Exactly the same answers appeared when the respondents were asked about the effectiveness of this method.

The last question concerning Biofeedback read: *Would You decide to employ the Biofeedback method in Your work?* The percentage results were as follows: 50.5% of the respondents replied – yes; 12.6% marked the answer – no; and the remaining 36.9% answered – *don't know*. Undoubtedly, the EEG-Biofeedback method is the most popular and best known method based on neurotechnologies and gains a growing group of followers each year. Certainly the advantage of Biofeedback is the fact, that it can also be utilized in the work with non-disabled people as a kind of brain exercise. The method is very popular among athletes and people working intellectually as a form of “brain training”.

Another method that the respondents were inquired about was the RehaCom Method. Unfortunately, it turned out that among the 95 respondents only, 5.3% heard anything about it, and the same number of persons knew for whom it is dedicated. Only one person had a chance to observe the therapy conducted with this method, furthermore, no-one had an opportunity to test the method on their own. When the respondents were asked about their willingness to participate in the RehaCom course, all of them marked the answer – *don't know*. In the case of this method it was also difficult to gather opinions concerning its effectiveness, since only one of the respondents had an opportunity to work with a patient attending such a therapy and this person also replied that he was not able to answer the question whether he had observed any positive changes in the patient. All the respondents commonly stated that they didn't know if the RehaCom method is effective in their opinion as well as they couldn't say if they would decide to employ the method in their work. As follows from the survey, the interest in the RehaCom method is definitely the lowest. The question remains: why? One can risk the statement, that one of the factors is the lack of proper advertising, due to which many people have never heard about it.

The Warnke method was the last that the respondents were enquired about. It is not as popular as the Biofeedback method, yet far more people heard something about it than in the case of RehaCom. 24.2% of the respondents declared that they had heard about this method, and 18.9% marked that they knew for whom the method is dedicated. 14.7% of the respondents had an opportunity to participate in the classes conducted with the use of Warnke method and 11.6% were able to test it themselves. When it comes to the declaration of willingness to participate in the Warnke Method course, 9.5% stated that they would do it willingly, while 5.2% said that they would not decide on that. As it

was the case with the RehaCom method, also here it was practically not possible to assess the effectiveness of Warnke method on the basis of the survey, since only 7.4% of the respondents replied that they had had an opportunity to work with patients treated with this method: 2.1% admitted that they noticed positive changes in the patients, while the remaining 5.2% underlined that the method partially brought the expected effects. When asked about the effectiveness of Warnke method: 1.05 % admitted that it is effective, 4.2% stated that it is partly effective, while 2.1% were not able to assess it in that regard. Inquired about the willingness to employ the method in their own work, 5.2% of the respondents declared they would use the method if they had such a possibility, 3.2% stated they would not decide to use it, while 6.3% marked the answer – *don't know*.

## Summary and reflections

As follows from the survey, in their work, the vast majority of therapists use the traditional methods, that have been known in pedagogy for a long time. On one hand, as the specialists, we want to utilize the newest methods, which emerge on the market, yet on the other hand, we approach the methods employing new technologies conservatively and with a distance. This may be caused by various reasons. First of all, we live in a society which is subjected to extreme “mediatisation”, computers, smartphones and tablets, are the indispensable part of everyday life for most of us. We have reached the point when a child is very skilful with operating small electronic devices, while at the same time she is not able to colour a drawing without crossing its boundaries or to cut a simple shape out of paper. As a consequence, the parents who bring their children to the classes expect the therapist not to use the educational software in their work but to conduct the child’s therapy with the use of the traditional methods. Secondly, methods such as EEG-Biofeedback, Warnke method or RehaCom require complete concentration from the child, involving work in a sitting position for at least half an hour, which in the case of a large group of children is practically unachievable. Also the financial aspect is not without meaning. Even if the courses are not very expensive, the cost of purchasing the specialized equipment necessary to conduct the therapy with a given method may become a real problem. Among the described methods, definitely the most expensive are the courses of the EEG-Biofeedback method: the first stage costs about 380 EUR and the second stage is the cost of about 300 EUR, while the price of the training in

Warnke method is the expense about 400 EUR for the bundle, i.e. the basic and developing course. Decidedly the cheapest is the RehaCom method course which, costs about 115 EUR. However, it is not enough to complete the course in order to work with this method. One has also to invest money in the equipment, prices of which reach even 4500 EUR. These are large sums of money for people working as educators and teachers because their monthly salary is about 625 EUR.

As can be seen from the results of the survey, the prices are not the only problem. The lack of sufficient information and poor advertising also cause serious problems. The companies usually run their informative campaigns in big cities and tend to forget about smaller localities, where they could also find potential purchasers.

The question remains: How to solve the abovementioned problems? Undoubtedly one of the ways to increase the interest of the prospective customers in the selected methods would be organizing presentations for the institutions and agencies located in a given locality. In this way the hypothetical customers could learn about the method and decide whether or not they are interested in it. Greater openness of the companies organizing the courses and selling the equipment is also a very important factor. They could, for instance, offer the institutions that decided to purchase their equipment, a discount for the trainings for their employees. Moreover the demo versions, which therapists could test without charge, for example during 30 days, would also be very helpful. The institutions should also apply for grants from various authorities or the communities, as well as try to gain the assets from EU funds for the development of their departments and raising the professional qualifications of their employees.

Presently science is evolving at an enormous rate, the number of devices and methods supporting the development of people with disabilities or persons at risk of disability is growing practically everyday. However, it should always be kept in mind that the person of the therapist is the key element in the therapy process, and that the effectiveness of the methods depends mainly on the therapist, since no machine can replace the human being.

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