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Theses for doctoral thesis (PhD)

Evaluation of the impact of a movement programme to support learning among Year 3 pupils

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Introduction

The importance of the problem is driven by the search for group-based movement development methods to support the inclusion and school success of children with atypical signs (Lakatos, 2000; Marton Dévényi, 2005; Goodard Blythe, 2006; Gyarmathy, 2016). The importance of movement development in school settings, primarily not linked non-physical education classes, is becoming increasingly important (Csáki and Révész, 2018).

The variety of methods used in general education lessons and other areas of school life, and the movement activities integrated into the process of knowledge transfer, play an important role in supporting the learning process. Several studies have been carried out in recent years on the use of programmes to support the maturation of the nervous system and thus the development of movement (Csányi, 2013; Hámori, 2005).

Examining and evaluating the effectiveness of physical activity development to support learning in the school setting is difficult due to the complexity of the process. There is little empirical research on conscious neurological harmonisation, to which schools can make a major contribution. This topic is primarily a subject for special education and psychology because of the atypical symptoms of children. However, from a sports theory point of view, it makes us wonder, if the number of atypical children in schools is increasing and the development of these children is often addressed by physical education outside the school walls, how we can develop them within our speciality, how we can contribute to the topic from a sports science approach in schools.

As an influence of modern cognitive research, it is evident that learning is the result of higher order, coordinated central functions of the nervous system. Accordingly, the focus of interest is not on the teaching tasks of the teacher, but on the learning processes of the child (Csapó, 1992, 2022, Falus&Szűcs, 2022). The learning process takes place in the child's organism, and it is therefore essential to focus on understanding the child's information processing. The primary organ of information processing is the central nervous system, where prior information and experiences determine the learning process, but the central nervous system is in constant interaction with other organs and body parts (Csépe, 2005; Gyarmathy, 2017; Rácz, 2012; Szvatkó, 2018).

The first "language" of information acquisition in a child's life is movement, the state of which gives an idea of the child's level of development. In my thesis, I would like to draw attention to the fact that movement dysfunction is a clear signal for teachers about learning difficulties and how to compensate for them. This is because the regulation of movement, and thus the organisation of the nervous system, supports the development of learning abilities and, at the same time, school achievement (Fodorné Földi, 2004).

Children, and especially "Alphas" (born after 2010), grow up with their visual experience needs met, but their neurological systems are not stimulated enough to develop, so they have developmental difficulties and delays. Another result of the digital revolution is that children of the 'alpha' generation are finding it easier to find a story on a tablet independently than to walk or talk (Pálinkás-Purgel, 2019). We are hearing more and more about the growing number of atypical children. According to Gyarmathy (2012, 2015, 2020, 2021), the changing

cultural and physical environment of the 21st century contributes to the emergence and growth of many atypical signs.

An important task is to prepare children's physical and neurological tools for learning within the school walls. This is the development proposed by the non-subject-specific school physical activity programme that I have studied. It is therefore not linked to the physical education subject, but can be integrated into any lesson and is therefore cross-curricular.

The aim of the research

Building on the neuroplasticity of the brain, we can intervene in the development of children at any age. For this reason, the present research focuses on the condition and development of children in grade 3, with the aim of demonstrating the possibilities of developing the signs that occur in school settings through specific interventions and their effectiveness. This age group was chosen for the research because the children are already used to the school environment, they have acquired the basics of reading, writing and arithmetic. They feel at home and safe at school. Pupils in Year 3 are becoming more aware of themselves and the outside world, increasingly confident in applying what they have learned, able to abstract their own existing knowledge. At this age, the most important thing is to ensure that they have acquired general movement experience, and to develop large movements and coordination of movement to a skill level.

The reflexive exercise programme developed by the Institute for Neuro-Physiological Psychology (INPP) is based on neuroplasticity of the nervous system. The INPP reflex corrective movement program re-learns infant movements that have not been integrated due to lack of movement or other problems (Goddard Blythe, 2006). It is well known that if a child does not have enough opportunities to practice infant movements at optimal times and to move freely, if there are any problems around birth and in the first year, there is less chance that lower order primitive reflex function will be brought under higher order control of the brain (Andrich et al, As these reflexes can be triggered later in life, a primitive reflex movement program can provide a new chance for the child to relive the stages of movement development through practice, awareness, body image and body awareness development, to achieve higher order brain organisation and thus successful learning (Ivanovic et al, 2019).

Our research topic is derived primarily from empirical experience in schools and takes into account the dramatic changes in the environment. This justifies the need to change teaching methods in response to changing student abilities and skills (Halász, Fazekas, Lukács, 2020). The feedback of the child in response to the environment provides the real direction. We believe that primitive reflex testing and a movement program will help to make the child as successful as possible in learning.

Domestic studies in this area focus mainly on early and preschool development and the problem of the preschool to school transition (Rácz, 2015; Révész-Kiszela, 2018). Their hypothesis is that if early development results in children entering school with the basic skills necessary for learning, we can be confident that the chances of learning disabilities will be reduced. Studies and interventions confirm the authors' hypotheses, but children with atypical

signs are still appearing in school in increasing numbers (Grzywniak, C, 2017; Rácz, 2015; Révész-Kiszela, 2018; Sarlós, 2021).

Research questions, hypotheses

The main question of this dissertation is how and how effectively the INPP reflexive exercise programme, as a daily physical activity, contributes to the support of learning.

Our questions:

1. to what extent is primitive reflexivity evident in the groups studied and is it related to children's learning difficulties?
2. Can the impact of the one-year INPP reflexive intervention training programme in 2011 be demonstrated in terms of cognitive and motor function?
3. Can the results of the longitudinal INPP screening test show any evidence of generational changes?
4. What are the experiences and results of the INPP exercise programme in Hungary?
5. How is the role of physical education and health promotion in grades 1 to 4 in the pedagogical programme of schools in the chapter Physical Education and Health Promotion in grades 1 to 4 of NAT 2020?

Based on the preliminary literature analysis and our personal experience, the main hypothesis of this dissertation is that the INPP reflexive exercise programme, as a daily movement activity, contributes significantly to supporting learning.

H1. We hypothesize that primitive reflexivity is typically detectable in the study groups and is associated with children's learning difficulties.

H2. We hypothesize that the daily use of the primitive reflex corrective INPP-Exercise Program© will inhibit the tested reflexes of the experimental group.

H3. We hypothesize that the "newest generation" according to the generational model of the "Alphas" will show a deterioration tendency in their INPP reflex profile compared to the "Generation Z".

H4. We hypothesize that the INPP movement development exercise programme can be effectively applied in Hungarian primary schools in similar settings to the study sample.

H5. We assume that the learning support role of movement development is not sufficiently emphasised in the Pedagogical Programmes and in the chapter Physical Education and Health Promotion in Grades 1-4 of NAT 2020

Presentation of the research

The aim of this research is to present the empirical experience of the INPP school screening and reflexology exercise programme in Hungary. The specific aim of the research is to present the effects of the one-year INPP school screening and reflexology intervention programme in 2011 on a sample of grade 3 pupils and to compare the results of the INPP school screening in 2011 with the results of the INPP school screening in 2021 among grade 3 pupils of primary schools in Sárospatak. The study was conducted using the INPP programme's measurement tools and methods, and the data were processed using the Statistica for Windows program.

In order to present the experience of the INPP practice programme in Hungary, interviews were conducted with two teachers from two schools in Hungary that have implemented the programme, the representative of the programme in Hungary and the creator of the INPP programme.

We briefly reviewed the role of movement development in supporting learning in educational guidance documents and elaborated on this using the MAXQDA programme.

The data collection and analysis methods for all three study points are presented in Figure1.



Figure1. Methods of the study

In the 2011 intervention study, all 3rd grade students in Sárospatak were included in the sample. The study groups were formed by class, with three classes forming the experimental and three the control group. During data processing and data cleaning, the pre- and post-test sample consisted of 129 students, of which the experimental group consisted of 62 students and the control group of 67 students. As this was an intervention, it was important to treat both the experimental and control groups. The two samples consisted of pupils of the same age and with almost the same number of pupils.

For the 2021 data collection, all 3rd grade students in Sároszatak were also our target group (N=108). The same three schools were measured, only one of the schools has meanwhile become a church school, so students from two church schools and one state school participated in the study.

Expert sampling was used in the selection of interviewees, so that in-depth interviews were conducted with four of the four most relevant to our topic. The subjects were teachers from the founding school, the Hungarian representative and the schools using the programme.

Results

INPP study results

In the first measurement, we used our data to determine the number of children with reflex reactivity, which we rated on a scale of 0-4 using INPP's own reflex testing protocol. A value of "0" was assigned if no reflexivity was present, and "4" was assigned if there was a 100% difference, i.e. the child could not perform the task due to the presence of reflexivity. Thus a value of "1" means that some level of reflex is already present. Reflexivity of "1" or higher was observed in 80% of children. By gender, the percentages representing frequency are very similar, with no appreciable difference between genders.

Our results suggest that the differences between the means of the variables are significant in the 2011-2012 study period, and that the mean values and the standard deviations around the mean have also decreased appreciably over the intervention. Also for the control group, a significant decrease (improvement) in means was observed for all variables studied. When comparing the changes in the mean values of the experimental and control groups, it can be concluded that, although a positive change can be detected in both groups, the extent of the decrease in the experimental group seems to be much more significant than in the control group.

In our study, we wanted to see how we could detect effects in complex groupings between the intervention used, the characteristics studied, the groups and the time period. We examined the answer to this question using multivariate statistical analysis of the data (Repeated Anova). Beyond the groupings already presented, it was not possible to detect the effect of the intervention used in all aspects. The intervention did not show a significant difference as a combined result of time, group and variable, and no significant difference was found between the results of the experimental and control groups.

The baseline statistics for the 2011-2021 INPP trials and the differences in means in the reflex test showed better results in the 2021 sample compared to the 2011 results. The 2021 results were weaker for the Bender visuo-motor test, no significant change for the tansley and dyslexia test and minimally better results for the other tests.

Interview results

A strong feature of the interviews is that all four see the potential in school employment. By using group movement development, children are more likely to be able to carry out their school tasks with the appropriate neurological status. Alternatively, if they are behind, they have the chance to improve by practising movement tasks. Discipline and calmness were reported by the interviewees during the structured exercise programme aimed at orderly movement. Improvements were noted in the teaching of reading and writing, particularly in the second half of the one-year programme, with children reporting improved concentration skills.

The teachers highlighted the following ideas from their experiences: they became more sketchy, they sat more calmly on their butts, the initial distractedness was transformed into discipline, a sense of calmness appeared during gymnastics, children were more motivated. During the excursions, the following observations were made: five children with vertigo "suffered" from climbing into a lookout or water tower on class excursions. By the end of the fourth year, one of the four children remained, the others had no problems climbing the three-storey windmill and after six months they dared to slide down the largest slide in the swimming pool.

In both England and Hungary, the method has been difficult to adopt, especially in professional circles. As a result of the method, the interviewees highlighted the improvement of teacher awareness and the shaping of attitudes. All of them emphasised that a large number of children could benefit from the development during the school application and that this would be a good way to support any neurodevelopmental process that might be lagging behind.

Results of document analysis

In the Sárospatak school, the defined concepts appear with different emphasis and context. In the pedagogical programmes of the schools, we looked for the emphasis of the supporting role of movement learning and therefore we examined the concepts related to movement learning. The documentary analysis first covered the lower school aspect of the NAT 2020 Physical Education and Health Promotion and then the local Pedagogical Programme (also PP) of the schools in Sárospatak participating in the research. The codes were defined hierarchically according to the conceptual pyramid presented at the beginning of the dissertation. The order of occurrence of the codes for each school is in the first four places: pedagogical development process, support for learning, child in need of special attention, physical activity in schools.

In particular, in the first chapter of the NAT, the codes for the physical activity programme, physical activity in schools, physical activity development and children with special needs appeared in the order shown above. When examining the learning areas of physical education and health promotion, it is almost natural to focus on movement-related codes. The fifth ranked code for children with special needs draws attention to the topic of the paper and is closely related to the research question.

There are 122,763 words in the four papers, 145 words remained after adjusting the stop list function, which I felt was important to highlight in relation to the topic. After applying the stop list function, there was a large difference between the total word count and the selected words, but there were many terms in the texts that were not relevant to the topic. The frequency of conjunctions, verbs, number words, adverbs, pronouns and relative clauses in the text is high, hence the hundreds of thousands of words in the word list. From the reduced list, I examined which were the most frequently used terms in the three documents: 1. learner 2. programme, 3. development, 4. education, etc... the first term related to movement is physical education in 15th place, physical in 26th place, and sport in 45th place.

Summary, further options

In our research we have approached the topic from several angles. The first element of this was to compare the results of the one-year INPP© exercise programme in 2011-2012 and the INPP© screening study in 10 years' time, in 2021, with the 2011 input measurements. In order to further strengthen the relevance of the topic and to explore the issues in a complex way, interviews were also conducted with the founder of the above-mentioned programme, its representative and trainer in Hungary, and with teachers from schools that have successfully implemented the programme. The third element of the thesis was documentary analysis. In this context, the NAT 2020 document Physical Education and Health Promotion in Grades 1-4 and the pedagogical programmes of the schools studied were the focus of the analysis, in order to investigate the emphasis given to physical education and related issues in these documents.

Testing of the reflexes used to measure neurological dysfunction revealed that a high percentage of the 3rd grade children in Sárospatok were present with the reflexes under investigation. In the test conducted in 2011, results above "1" were obtained in 80% of children. The presence of reflex activity in these children affects learning activity and academic achievement. It affects motor coordination and thus literacy learning. The presence of such a high score certainly highlights the importance of movement control, which can be greatly improved by movement development, thus supporting learning. The conscious control that comes to the fore during reflex inhibition allows the child to operate more efficiently, which makes learning an easier activity, as it inhibits and rebuilds the habits that are under low nervous control. My first hypothesis is confirmed. The conscious control that comes to the fore during reflex inhibition allows the child to operate more efficiently, which makes learning an easier activity, as it inhibits and rebuilds the habits that are under low nervous control. My first hypothesis is confirmed.

The second hypothesis is during the daily use of the primitive reflex correction, INPP-Training©, the tested reflexes of the experimental group are inhibited.

For the movement and reflex tests, during the second data collection at the end of the year, there was a decrease in primitive reflex activity and thus a loss of balance, balance correction, and muscle tone changes to maintain balance in different areas of the body in different positions showed improvement. The more precise and concentrated execution of movements suggests that the children had less excessive muscle tone changes and less imbalance problems during the second data collection, thus the level of movement control

increased because of improvements in body experience, body image and spatial perception. As a result, there was a qualitative change in the development of both the experimental and control groups. At follow-up, we observed a more coherent movement execution in the experimental group, which is confirmed by our numerical results, which is also a proof of the effectiveness of the exercise programme that we have put together. However, my hypothesis was only partially confirmed, as the control group also showed an improvement, but to a lesser extent.

Since the exercise programme covers a whole school year, the time factor, the natural process of maturation and development of movement, cannot be excluded, and in the case of the chicken step forward and the backward external walking test, the control group achieved better results in the second test than the test group. The experimental group improved during the daily application of the primitive reflex correction, INPP-Training©. During the primitive reflex correction exercise programme, the results of the dyslexia pre-screening data collection showed a relationship for all reflexes, although no large differences or significant differences were observed. The hypothesis was partially confirmed.

The third hypothesis is that the "newest generation" according to the generational model has a tendency to deteriorate in the reflex profile of the "Alphas" compared to Generation Z, and that a link can be detected in the INPP assessment of the students. Our results from the INPP protocol in 2011 and 2021 show that our scores on the pre-screening tests for reflex and large motor, visuo-motor and dyslexia showed an improving trend and significant difference in 14 out of 15 tests. In one case we found a worsening score. This result contradicts our hypothesis. We found stronger reflexivity in the Bender visuo-motor test ($t=-4.76$, $p<0.00$). There was no significant difference in the Tansley and Dyslexia pre-screening results. In the other 12 cases, there was a positive change. The fact that the Hungarian Public Education Act introduced daily physical education in all public education institutions from 1 September 2012 may contribute to the improving trend. This binding legislation was introduced in the year just after the completion of our measurement. If we correlate this fact with the improvement of our results, it also proves that the physical education toolbox in Hungary is suitable for the effective development of children's motor skills, which supports the development of learning abilities.

Our study incorporated a specific series of exercises, measured by a specific method, into everyday school learning. However, between 2012-2021, legislative changes and methodological developments in public education in Hungary were introduced in primary schools. Our data suggest that these factors have also contributed to children's development and to the evolution of our outcomes. In the case of St. Elisabeth Primary School, the methodology of the Complex Basic Programme was also introduced during this period, which also provided a novel approach to children's development. The Complex Basic Programme's Physical Activity Sub-Programme also places a strong emphasis on movement control, bringing new approaches, innovations and the latest methods closer to teachers.

However, the results of the documentary analysis of the data from the pedagogical services show a significant increase in the number of children referred for development: 40% of all children in 2010/2011 and 59% of all children in 2020/2021. This is an increase of almost 20%, which can be linked to the effects of cultural changes under the generational model. The 2021 figures suggest that the number of upgrades has increased for almost all schools in Sárospatak, implying a more complex problem. Educational counselling and speech therapy appear in several cases at the same time. There is an increasing trend in the emergence of speech

disorders. After the screening, it is up to the parent to decide whether or not to take advantage of the development offered by the specialised service. According to reports, there are several cases where parents do not take their children for development.

Our hypothesis that the reflexivity of children in 2021 would be lower than the results measured in 2011 was partially confirmed. Our hypothesis is partially confirmed, raising the possibility of further testing.

The fourth hypothesis is that the INPP physical activity programme can be used effectively in Hungarian primary schools in similar settings to the study sample. The interviewees were direct participants of the INPP programme. Interviews with teachers clearly indicated the effectiveness of the intervention. In addition to the measurement in Sárospatak, the Szeged teacher interviewed reported on the results of seven years of development. In both interviews, the importance and sometimes difficulty of the organisation and the need for cooperation from the teachers was mentioned. The change in the teachers' approach, the new approach to children's development in terms of neurological maturity, was said to contribute to understanding the child and thus to the development of individual learning pathways and differentiation. In all cases, the role of movement, movement control and coordination has been enhanced. The hypothesis is confirmed.

The fifth hypothesis is that the role of physical activity development in supporting learning is not sufficiently emphasised in the Pedagogical Programmes and in the chapter Physical Education and Health Promotion in Years 1-4 of NAT 2020.

The documents were processed using MAXQDA 2020 software. Among the software's options, the Code system, Document portrait, Code Map, Code Cloud, Code Matrix Browser, and Code Relations Browser functions were used to evaluate the results. In the case of code frequency, it was clearly visible that in the Pedagogical Programmes, the physical activity code for schools was ranked 3rd in two cases and 4th in one case. Overall, it can be concluded that physical education and physical activity development play an important role in the Hungarian school system, but my hypothesis was not primarily directed at this issue. The code map function gave a more precise picture to understand my hypothesis, showing the relationships between the codes. In the examined part of NAT 2020, the codes "child with special needs" and "pedagogical development process", "pedagogical development process" and "learning support", were linked and co-occurred in the text. For one school, a link was found with the code 'physical activity in school'. It can be concluded that, based on the set of aspects we have examined and established, the role of physical activity is emphasised in the educational management documents, but the role of physical activity development in supporting neurodevelopment is not sufficiently emphasised. The hypothesis was partially confirmed.

With the novel approach of the dissertation, we would like to emphasize the need to emphasize the development of physical activity for the development of learning abilities of children in lower grades, the use of methods and tools for this purpose in schools, and to draw attention to the broad developmental effects of physical activity, physical education. Furthermore, we would like to help future kindergarten teachers and teachers to acquire a new neuro-preventive approach, which we would like to implement in kindergarten teacher and teacher training. We consider it important that in physical education and sports science training courses related to the development of children aged 3-10 years, greater emphasis is placed on the development of coordination skills, the vestibular system, the development of movement

regulation, movement transformation, movement adaptation and movement learning skills, and a sensorimotor-focused approach.

All kindergarten teachers and teachers need a much deeper understanding of the development of motor skills, the importance of coordination skills, movement control, balance, eye movements, sensorimotor in the learning process. The INPP movement programme is not linked to physical education but is inseparable from movement development. It is also proof of the cross-curricular role of movement and movement development, which should be emphasised in teacher training at all levels.

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