

Daily motoric training at school to improve reading skills

A controlled sensoric - integration music- motoric programme (SIMMO) of daily exercises is conducted by teachers at a primary school in Austria with the aim of improving the children´s reading skills

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Abstract

The SIMMO programme is designed to reveal the full potential of each pupil by regular training of their motoric competences.

The project is implemented over a period of 2 years among the entire student body of the PVS Sacré Coeur primary school (274 pupils, aged 5 to 11) and investigates to what extent motor function exercises performed daily (15 minutes) under their teacher's supervision have an effect on the reading performance. The exercises are designed to be just as suitable for performance in the classroom. Principles lay down for the advancement of neurophysiological development.

The results exhibit statistically significant improvements across the board, mostly to a high statistical significance, both in terms of reading performance and the behavioural variables. While previous literature suggests that the correlation between the Head Righting Reflex and Reading is prevalent, the present study rather indicates a highly significant correlation (.348) between rhythmic movements and reading.

The findings of the study, i.e. of the daily practice of SIMMO, serve as guidance to a full scale implementation of the programme into the regular and systematic schooling procedure.

Introduction

Learning and behavioral disorders can be detected regardless of a person's intelligence. These disorders are often related to motor incoordination and a postponed complete development of the sensory system. As previous research has shown, a successful academic career at school is directly linked with motoric maturity[1]. Austrian school teachers do not receive much training in that context. A healthy motoric development

will allow children to perform better at school and master the tasks given by the education system more easily.

Severe changes in a child's lifestyle or direct environment seem to influence its neuro-physical development. These influences are evident in enduring primitive reflexes, the absence of basic motoric coordination and sensorial development. These could be witnessed in children not being able to balance on one leg for 5 seconds or not sitting at the table in an upright position.

As so-far used pedagogic concepts are decreasing in their success rate and teachers are overwhelmed by managing the variety of talents in their classrooms, new concepts need to be proven in their effectiveness. Teachers of Austrian schools mention that the learning achievement is decreasing due to the stress and exhaustion felt by the children[2]. The low performance is found in the poor reading performance across Austria's schools. According to the PIRLS-Test in 2011 20% of children attending primary school do not meet the expectations for their reading performance in Austria[3].

The body of thought behind SIMMO builds up to a high extent on the idea of being more productive to invest in children early in life than to remediate disadvantages later on[4].

Within the pedagogic context the public debate includes arguments about the interconnection of movement and learning. While a debate about movement and learning as such exists in a pedagogic context, it needs to be held more in terms of causality.

Starting position

The PVS Sacré Coeur Pressbaum is a catholic private school located close to the border of Lower Austria and Vienna. During the school year 2014/15, which is the time frame

relevant to this investigation, the primary school holds 13 classes. Four of them are integrated classes and two are multiple age classes. Out of all 13 classes 95% of the pupils grew up with German as their mother tongue.

Holding a high education level themselves, the parents frequently have a high expectation in their children and their academic performances. Sentences like “My child could perform better if it made greater efforts at school” are familiar to many children. The understanding of the parents that learning and behavioural difficulties are connected to an unhealthy motoric development is not given. Therefore the project also intends to integrate the parents as an important anchor and supporter.

Goals of SIMMO

SIMMO is designed to reveal the full potential of each pupil by regular training of the motoric basic competences. The project investigates to what extent motor function exercises performed daily (15 minutes) under teacher supervision would have an effect on reading performance of the pupils.

One prevalent question besides the causation of movement and a successful performance in reading was the actual ability to integrate such exercises into the everyday life of a school. More precisely the difficulty was the coordination with normal classes, as the primary school ends midday and therefore an issue with time management was given.

Besides defining the set-up for the project, the concrete goals aimed at the children's performance regarding:

- Reading skills
- Motoric basic competences

- Concentration and attention
- Impulse control
- Professional involvement of the teacher body and their training

Implementation of SIMMO

The SIMMO project was implemented among the entire student body of the PVS Sacré Coeur primary school. The exercises are designed to be just as suitable both in time effort and space requirement for performance in the classroom.

The teachers were trained in advance and informed verbally and in writing of the purpose of the project. There is a wide range of exercises (made available in book form). Some of the exercises are performed with music in the background, they are given fanciful animal names, have playful elements, but there is a set procedure. Principles lay down for the advancement of neurophysiological development (picking up on ideas put forward by Svea Gold and other neurophysiologists) formed a cornerstone of the project.

The project mainly evolves around a regular training. The training is composed of several exercises which are particularly designed for the specific age group of 5-11. The training necessitates the teachers' active involvement and special training beforehand. After these conditions are fulfilled it is up to the teachers to consequently follow up with these instructions:

- (1) Five motoric exercises to be undertaken four times a week inside the classroom.

These exercises could be done at a time preferred by the teacher.

- (2) Four motoric exercises to be undertaken in the gym at every start of the sports education lesson.

(3) Two exercises were given as homework and were to be done on a daily basis[5].

Supporting Measures

□ Index card

Every exercise is related to a specific animal. The animal version has the function to not only motivate the children, but also to show them that talents vary and are different in every person. Each animal is given an index card which helps the teachers. The children will learn to identify the exercise by seeing the animal and therefore time efficiency is ensured. Besides the animal layout is better suitable for the age group.

□ SIMMO-song

For an additional support and as a motivational factor specific music was composed. The music represents a kind of alarm to catch the children's attention and indicates that it is time to do their exercises. The music is designed to be easily remembered and therefore functions as an additional motivation and helps to create a community feeling.

□ Home exercises checkup

As mentioned before all children are supposed to do two exercises daily as their homework. Every child is given exactly the same exercises for homework. The alteration of exercises is in the time frame of one to two months, depending on the difficulty of the motoric exercises. The implementation of these motoric exercises is monitored by the teachers in a special checkup paper designed like a board game.

□ **Testimonial**

To further gain acceptance of the participants, including parents and teachers and as a marketing measurement the Junior European Champion in rock climbing, Georg Parma, was chosen as a testimonial.

Evaluation

Each of the following was tested at the beginning (September 2014) and again at the end of the project (June 2016):

■ **Reading performance**

As assessed by the partially standardized tests normally used in schools nationwide to monitor performance at different ages.

■ **Behaviour**

Teachers were given an informal list and asked to judge pupils' behaviour regarding their concentration, attentiveness, conflict avoidance, participation in class, ability to wait, willingness to get quickly down to work, completing tasks on time, as well as their handwriting, organization of their exercise books and general tidiness.

■ **Current level of motor function**

the tonic neck reflex, jumping jack, the tonic labyrinthine reflex backwards, the tandem gait forwards and backwards, rhythmic movement, jumping sideways back and forth, standing on one leg and the shape of the fist.

■ **Social variables**

Gender was noted at the beginning; because it was an homogenous group of pupils, all of them attending private school, there was considered to be little

relevance in including social variables. In addition it was noted whether music or sports activities were pursued outside of school, as these are seen as a supplementary support measurement.

Other important areas like auditory or visual processing, physical asymmetry or viewpoints of the parents could not be part of the project due to restricted resources in time and finance.

Classification

The project investigated the difference in performance depending on the gender. Out of the total of 274 children the gender distribution was the following: 56% were male and 44% were female.

Furthermore, two additional points might be of relevance: First, the data of the 12 children with special needs are not shown separately. Second, it is important to mention that the majority of children receives additional support measurements above Austrian average. These include the facts that 70.8% of the children are given breakfast every day and 63.2% of them learn to play a musical instrument at an external institution. On average 27.2% of the pupils aged 6 to 10 play a musical instrument as a study conducted in Vienna in 2012 shows[6].Also regarding the intake of daily breakfast the PVS Pressbaum is above average. Another study conducted in Vienna in 2013 reports that only 60% eat breakfast in the morning[7].

Results

The final evaluation in June 2016 showed statistically relevant improvements across the board, mostly to a statistically highly significant degree, in terms of motoric readiness, reading performance and the behavioural variables.

Motoric Readiness

Some of the results will be shown in the following:

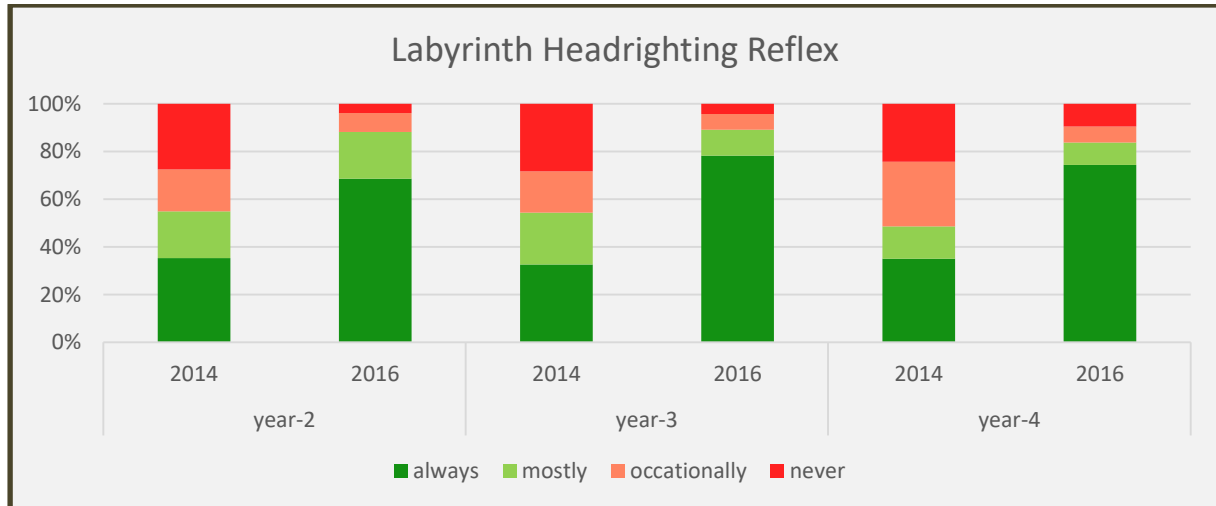


Fig. 1: Frequency of occurrences of the Labyrinth Headrighting Reflex (N=171)

As Figure 1 shows the labyrinth headrighting reflex improved significantly among all children, regardless their age.

While previous literature suggests that the correlation between the Head Righting Reflex and reading is prevalent, the present study rather indicates a highly significant correlation (.348) between rhythmic movements and reading in 2016. At this point it is noteworthy to mention that the correlation between the head Righting reflex and reading is not significant. Furthermore, we find that the coordination of arms and legs (.401) and standing on one leg (eyes closed) (.30) are highly significant correlated to a good reading performance.

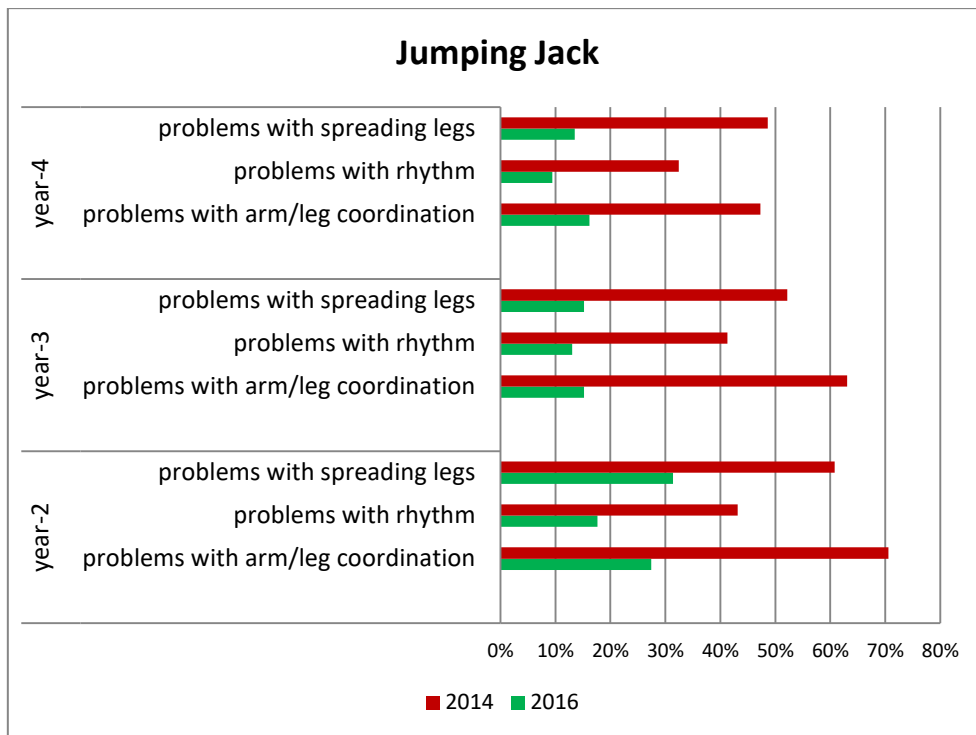


Fig. 2: Jumping Jack (N=171)

Figure 2 shows one example for the improvement in motoric competence. A correct performance of the jumping jack exercise was defined by the following variables: (a) continuance in rhythm, (b) coordination of extremities and (c) continuance of the leg movement.

All variables are tested with a contingency table and showed highly significant ($p=0.00$) improvements. The correlation after Kendall TAU-b is - rhythm: .47, coordination: .41 and leg movement: .491.

The statistic evaluation shows that the correlation between the reading competence and the correct performance of the jumping jack is highly significant. The focus hereby is on the rhythmic execution and correct arm and leg coordination.

The results are reaffirmed by the fact that the children, who show absolutely no improvements in their jumping jack performance, could not enhance their reading performance. Despite them not improving in their jumping jack performance, they

might have achieved higher results in other motoric exercises. This observation indicates that the improved reading performance is correlated with an improved jumping jack performance. It furthermore leads to the following research question to be investigated in prospective projects. How can children be helped to improve their rhythmic performance in motoric exercises in order to ultimately perform better at reading?

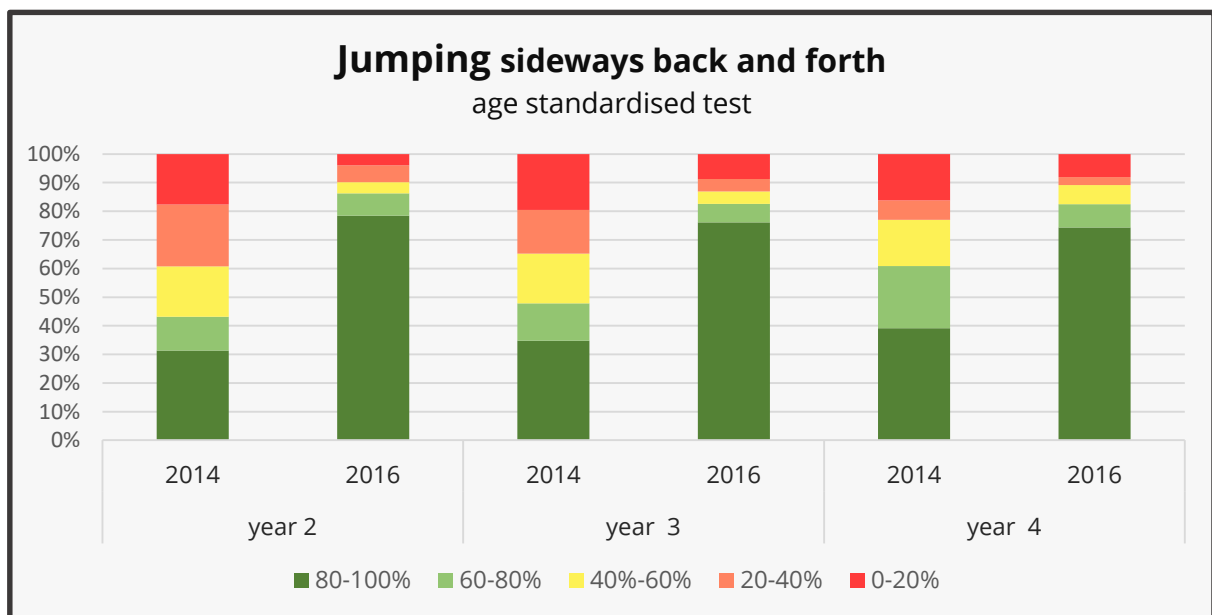


Fig. 3: Jumping sideways (age and gender standardised test; N= 171)

MOMO-Motoric tests are used to measure the motoric performance of children according to their age and gender group. The tests show how well children cope in certain motoric situations. Within the SIMMO project two specific exercises were chosen to be tested. One is called "jumping sideways" and is performed under time pressure. The test is used to indicate how well the motoric performance is developed. The results are highly significant to suggest how well the children will cope with motoric exercises necessary to master everyday life[8].

Figure 3 shows that in all age groups the children's performance improved.

The project furthermore focussed on eight specific motoric problems. This motoric coefficient was composed of: rhythm and arm-leg coordination of Jumping Jack, foot before foot, looking ahead and compensatory movements of the gait forward and backward.

As at the beginning of the project in 2014 the male participants had more problems than the female, the project aimed to equalize the troubles of both genders. As Figure 4 shows the project fulfilled its task in (a) reducing the motoric problems among both male and female participants and (b) to approximate the males' performance to their female counterparts. Both genders were tested to have foremostly 0-2 motoric problems in June 2016. This represents an improvement to the majority of males having 3-7 motoric problems and the females having 2-5 motoric problems in September 2014.

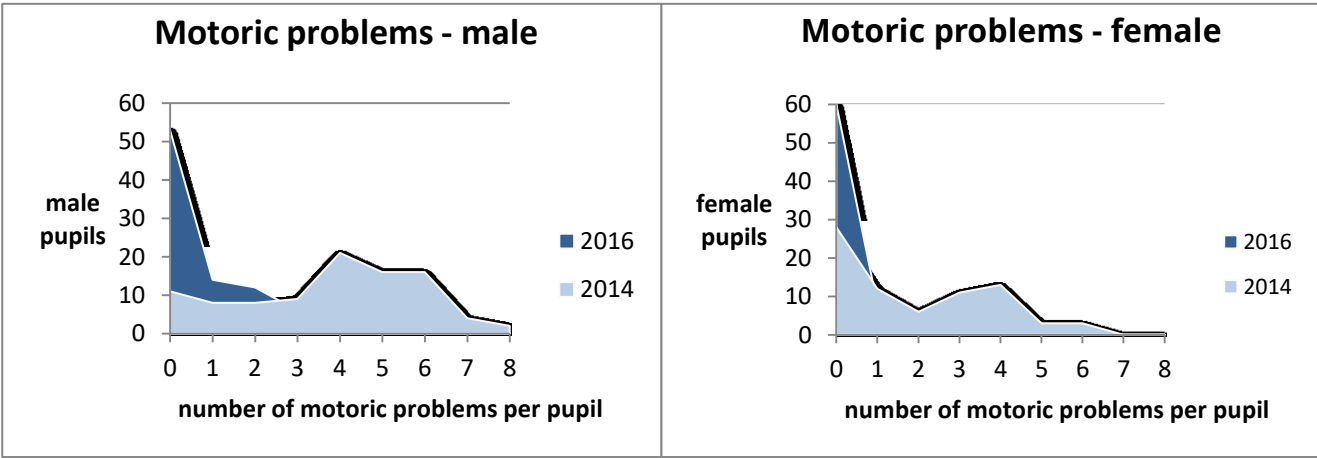


Fig. 4: Motoric coefficient in male and female 2014/2016

Behavioural Variables

In order to measure the behavioural performance an online survey was developed. Therefore, teachers were given the opportunity to evaluate the following 11 aspects of

each child's behavioural performance. These included (1) ability to wait, (2) general tidiness, (3) get quickly down to work, (4) concentration, (5) completing tasks on time, (6) attentiveness, (7) conflict avoidance, (8) follow rules, (9) participation in class, (10) organisation of exercise and (11) handwriting.

The survey is based on the subjective evaluation of the teachers. Definitions and standardised rating scales of the 11 behavioural aspects were not given. Every teacher had the chance to give their subjective opinion and evaluation.

The online survey was conducted at the start (September 2014) and at the end (June 2016) of the project. In every one of the 11 aspects the results show a highly significant improvement.

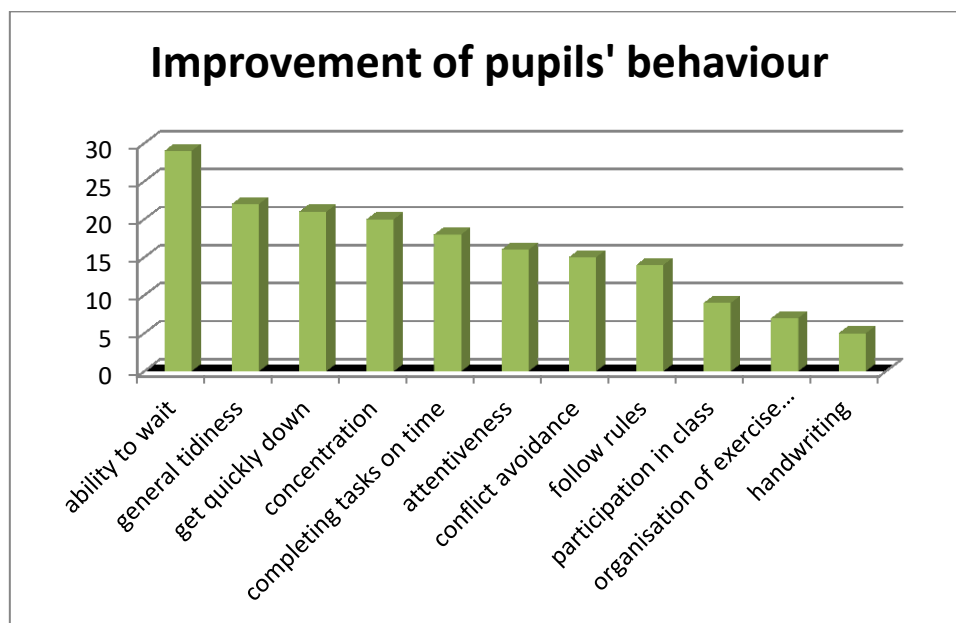


Fig. 5: behavioural questionnaire, (classification of absolute values, N=148)

Reading Performance

In order to evaluate the reading performance of each child, the Salzburger reading evaluation (also called SLS) was used. The test asks pupils to read content-wise easy sentences in a concrete order as fast as possible. After the reading of a sentence the

child needs to state whether the sentence is correct content-wise. The test focusses on the basic ability to read rather than the understanding of the text itself.

In order to evaluate the performance within the reading test the LQ-variable (Reading Quotient) is taken into consideration[9].

As the reading test is a simple version, focussing on the ability to read itself, the author is aware that only partial aspects of reading performance are tested. However, due to this reading test's (Salzburger reading evaluation) high validity and reliability the author considers this test to be suitable for this specific project.

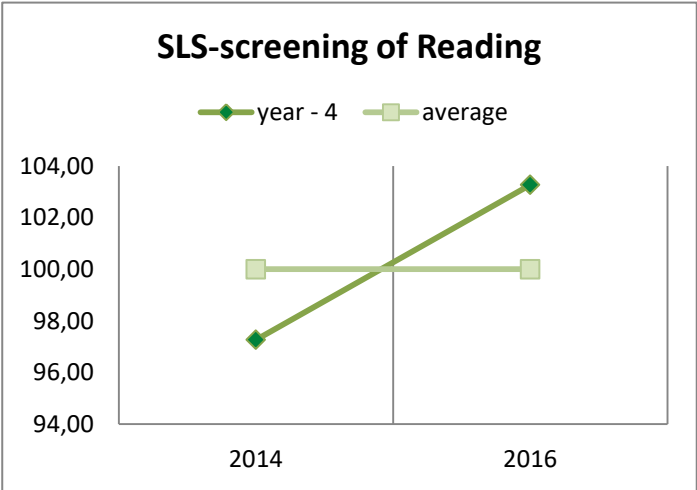


Fig. 6: T-Test measuring reading performance - year 4 (N=56)

The reading performance in year 4 raised highly significant, as shown in figure 6.

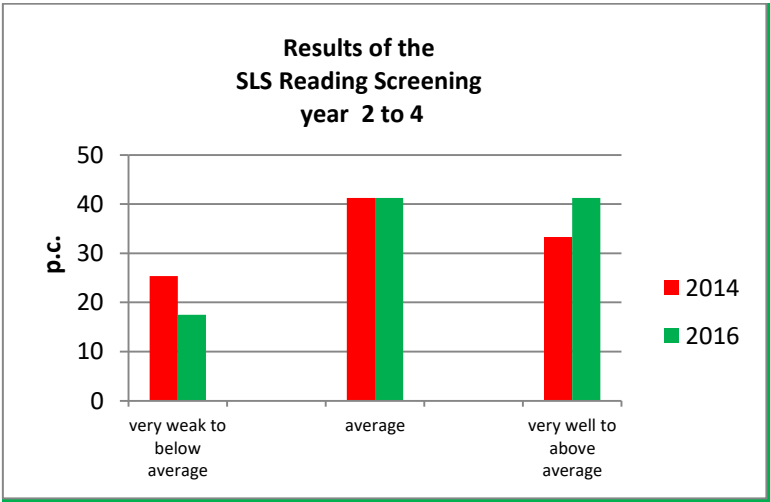


Figure 7: reading performance in SLS-groups

As Figure 7 indicates the results of 24% of the participants performed in the SLS in September 2014 were either very weak, weak or below average. The evaluation scale reaches from very weak, weak, below average, average, above average, well and very well. In Mai 2016 the negative results decreased to 18% whereas the positive results increased from 31% to 41%.

Lessons learned

Throughout the implementation of the project, the author realized that not only the precise, regular and correct conduction of the exercises were necessary for a successful outcome, but also the interpersonal interaction.

❑ Motivation of leading personnel

Throughout the two years, 2014-2016, the motivation and involvement of the school's headmaster Doris Gattermeyer MA were extremely helpful. Through the support of the school's principal and her identification with the project she managed to pass her energy and motivation on to the teachers. The principal was reachable at any time to answer questions and help with issues.

❑ Active and continuance involvement of the teaching personnel

Furthermore, an intensive involvement and training of the teachers was necessary. The teachers were informed beforehand about the basic information, their tasks within the project and the expected improvements for both – them and the children. Throughout the duration of the project several pedagogic conferences and training sessions were held. These included theoretical and background knowledge about the connection of movement and learning performance and allowed for teachers to

ask the project leader questions directly whenever they occurred. The aim of these conferences were to establish a good communication basis.

❑ **Target group suitable layout**

The project deemed it worth to adapt the layout suitable for children of the age 5-11. Especially the project's implementation based on animal and comic figures seemed to have helped to motivate the children. The whole project evolved around a story talking about the talented animals ("Talenttiere") and the superman-like figure of Simmolino. The story facilitated the children to memorize all the exercises and made the execution of the project vivid.

Difficulties and Challenges

Throughout the implementation period of the project several difficulties and challenges were detected:

❑ **Space problem in the classrooms**

The classrooms did not provide enough space for around 25 children to conduct some exercises laying on the floor. This problem could not be resolved throughout the entire project and needs further reconsideration.

❑ **Regularity of conduction of exercises throughout the entire academic year**

Despite the high commitment of the teachers at the beginning, the execution of the exercises either lacked regularity or the exercises were not exchanged often enough. The project undertook several measurements, such as continuous conversation with the teachers and more intense involvement of the principal, in order to ensure the regular execution of the exercises. However overall the execution fell below its intended regularity by 15 – 50%.

❑ **Monitoring of correct execution of exercises**

Another issue represented the monitoring of the correct execution of the exercises. Repeatedly teachers reported to be insecure about the correct execution of exercises and about what to focus when guiding the children. To overcome these issues the project undertook monthly meetings and established personal mentoring for the teachers.

❑ **Documentation of frequency of execution of exercises**

At the beginning of the projects teachers were instructed to document the frequency of the execution of the exercises. However, it turned out that every class filled out a report missing some information.

❑ **Active involvement of the parents**

The project was based on a continuous and open communication between all groups involved. By these parents, teachers, the principal, sponsors and children are meant. However, among the parents only limited involvement could be registered. Further inclusion and help from the parents could lead to an even more enhanced outcome of the project.

Conclusion and Outlook

The findings of the study, i.e. of the daily practice of SIMMO, serve as guidance to a full scale implementation of the programme into the regular and systematic schooling procedure. Moreover, they allow for future projects to be implemented successfully at other schools. Already institutions such as pedagogic universities of Lower Austria and the private catholic university of Krems integrated SIMMO in their curricula.

In prospective projects it will be interesting to concretise the program of SIMMO according to recent neurological research. The more in-depth analysis of the project arises some questions, which need to be handled in a wider context.

SIMMO was performed at a private school with an overall homogenic socio-economic level among the pupils. It therefore did not function as a remedy for disadvantaged children. Witnessing the catching up of basic motoric and sensoric skills within its context leads to the economical interesting field of dynamic complementarity. An investment in early childhood increases the skills and allows for a higher return for society in the future[10].

An interesting question therefore is whether such early investments as among others reflected in the SIMMO project are not only returned in improved sensomotoric, learning or behavioral aspects, but are also more economically efficient on the long term.

In this context SIMMO might facilitate for such training programmes being recognized in the political field as a highly effective investment in the skills of the next generation.

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