

Rhythm, Tempo and Enhanced Academic Performance

Mary Mountstephen MA (SEN) is an Associate Member of British Dyslexia Association and a Member of Professional Association of Tutors of Students With Specific Learning Difficulties

She is also a qualified practitioner of The Institute for Neuro-Physiological Psychology, specializing in the field of Neuromotor Immaturity and in the use of movement programmes to address underperformance and underachievement academically in students aged 4-11

Key Words

Rhythm: a strong, regular repeated pattern of movement or sound

Tempo: the rate or speed of motion or activity; pace

Neuromotor Immaturity: The retention of immature patterns of movement control

Executive Function Processes: These include: planning, organizing, prioritizing, and working memory

Embodied Cognition: A concept that proposes that the brain's systems of understanding are rooted in bodily awareness.

In this article I would like to draw the reader's attention to research and practice in the use of physical, rhythmic movement programmes as part of interventions to improve literacy skills. This draws on the work of practitioners internationally, including Dr. Elizabeth McClelland of Oxford University in the U.K. and Professor Crispiani of The University of Macerata in Italy. I have been researching this field since 2005, and have trained in a number of approaches, in order to evaluate their effectiveness both in terms of the research available and to explore the ethics and practicality of using academic time for, it could be argued, non-academic purposes.

The programmes referred to in this article are primarily aimed at students aged 4 and above whose academic progress is causing concern. They share an understanding that exercise does not replace systematic phonological training, rather it harnesses the research on embodied cognition where 'the hypothesis is that improving attention and self-control through physical and visual bodily activities and auditory tasks can lead to enhanced academic attainment' (McClelland, Pitt and Stein).

'Schools still largely regard the mind and the body as two distinct things, with teaching designed to train only the mind. However, recent developments in cognitive science suggest that there is much more to thinking and learning than previously supposed....and has given rise to a radically different model of how the human brain thinks and learns. In the 'embodied

cognition' model, the body and brain work together in an inextricably linked brain-body system' (McClelland, Pitt and Stein).

McClelland has brought together a comprehensive overview of current research in psychology and neuroscience to provide an explanation of how physical interventions might help improve learning, based on the embodied cognition model.

Instead of having to represent knowledge about the world and using that knowledge to simply output commands, the brain is, according to this theory, part of a broader system that critically involves perception and action as well. Higher-level learning is seen as grounded in sensory awareness, which needs to be trained as a foundation for the development of higher-level learning. Thus programmes that require attention, inner focus, self-direction and physical coordination are being researched to establish whether they produce long-term and sustained improvements in academic performance.

The concept of using physical approaches to improving classroom performance has a long history, from the benefits of exercise to bringing improvements in overall health to more specific claims for improving cognition and behaviour. More recently the practice of relaxation exercises and mindfulness has re-focused attention on teaching students how to pay more attention to how they experience stress and emotions in their bodies. Teachers in the UK, for example, have, over the years, been encouraged to integrate physical activities into their timetable, but the theory and research underpinning this type of approach has not been particularly extensive.

Usha Goswami of the Centre for Neuroscience in Education at the University of Cambridge in the UK has written about the potential associations between music and dyslexia and in the perception of rhythm. She cites a study involving pre-school children in Germany that found significant links between rhythm *training* and phonological awareness. The training took place for 10 minutes daily over a period of 20 weeks. It included joint drumming, rhythmic exercises and dancing. The outcome suggested that the group showed significant gains in phonological awareness. Goswami provided several further examples to propose 'strong support' for a link between musical rhythm perception and reading in 10-year old children with and without a diagnosis of dyslexia.

McClelland provided illustrative examples of the role of rhythm in learning and that good rhythmic abilities are closely linked to good phoneme awareness and fluent reading. Dyslexic children often have poor ability to clap to a rhythmic beat and children's phonological awareness and reading ability can be improved by regular rhythmic exercises. Brain scans show that listening to music with a highly rhythmic melody actually helps the brain to organise other incoming information and improves attention. The underlying link between rhythm and literacy

is that it is essential to be able to hear the rhythm in speech before progressing to phonemic awareness and reading. Furthermore, it has been suggested that young infants need to learn tightly timed, rhythmically organised body movements in order to provide the underpinning foundations for the development of language.

The role of tempo, the rate or speed of the physical movements, is an interesting area that I intend to explore further in future publications in terms of the following programmes and their developers:

The Crispiani Method: Professor Crispiani

Move4Words: Dr. Elizabeth McClelland

Move To Learn: Barbara Pheloung

Each of these programmes aims to improve literacy skills and executive function through a daily set of physical movements that operate within the context of embodied cognition. All three programmes have been developed as a means to address those students whose literacy skills are cause for concern, and all share an approach that is rhythmic, although the tempo varies.

So how can physical, movement-based activities with rolling on the floor, bouncing balls, marching and cross lateral activities influence literacy skills and executive functioning?

What these programmes share is the structured development of:

- Visual attention and eye tracking skills
- Training in developing focused, precise, rhythmic movement
- Short daily (or regular) input for whole class or more specialist groups/ individuals
- Spatial awareness and a mindful awareness of physical sensations
- The use of varying tempo in relation to the activity
- The role of the teacher/ clinician as a support, enabling the children to plan their physical actions and effectively to teach themselves the sequences.

By working on these foundations for learning, the programmes appear to recalibrate brain-body interaction through addressing neuromotor immaturities. There is a growing body of evidence that physical activity interventions do have a positive impact on academic performance. Tomporowski, Lambourne and Okumura (2011) carried out a large review of evidence to date, and found significant impact of physical activity and exercise on children's intellectual function, cognitive abilities and academic achievement. There are also some indications that physical activity performed in the classroom may have a greater impact on academic achievement than exercise done outside/ in other settings (Donnelly and Lambourne,

2011). McClelland (2015) also makes reference to research in the links between students' phonological awareness and reading and participation in rhythmic exercise.

'Received wisdom would say that the only thing which will improve reading skills in children with SEN is literacy teaching. However, recent developments in cognitive science suggest that it may be time to reconsider this perspective.....The underlying link between rhythm and literacy is that it is essential to be able to hear the rhythm in speech before progressing to phonemic awareness and reading (McClelland 2015) The effect of poor rhythmic ability is to produce an experience of spoken language for a child, which is similar to listening to a non-native speaker speaking your language with the stresses in the wrong places. '(Goswami)

What is the Evidence?

Crispiani's programme can be seen as the most intensive, with sessions taking place on a 1:1 basis with a specialist trained practitioner, unlike the other 2 programmes. The method involves the student in 3 x 1 hour sessions per week for a 12-week period, using highly structured rhythmic activities at a fast tempo. Each session is physically demanding. Professor Crispiani has published extensively and his work is now beginning to be translated into English. The Crispiani Method conceives of Dyslexia as a disorder of timing and the intervention addresses this systematically. His method is in use extensively across Italy and is linked to the training of teachers in the recognition of dyslexia and methods of support.

McClelland's findings and longitudinal data indicate that the exercise programme schools used 'had significantly enhanced academic performance levels' compared to pupils who did not use the intervention, which lasted for a 12-week period. Activities developed in complexity, being delivered in short, highly prescriptive video segments. The tempo of these movements was moderate, with an emphasis on paying attention to physical sensations. The activities take place either seated or standing and the teacher is expected to participate and model the activities as the class follow the moves on screen.

In the article written by McClelland, Pitt and Stein, the authors describe pilot trials which they claim were very successful in terms of the impact for pupils performing below the 20th percentile in literacy assessments, although higher achieving pupils also achieved smaller, but still significant improvements. These improvements were long lasting and were achieved within an inclusive context, with all pupils participating. In terms of practicality, this is seen as a low-cost addition to school provision that can be justified over the time spent.

Pheloung has published several books about the Move to Learn approach and research has been carried out in Poland, South Africa and Australia. Move to Learn is unlike the other 2 programmes in that it is primarily floor based and comes from a joint perspective of learning differences and occupational therapy. The exercises are performed very slowly and with a

stress on rhythmic precision. Move to Learn is used in mainstream classrooms and it is an inclusive programme ' aimed at addressing some of the functional deficits that are commonly present in children with various learning differences. Sequenced to follow the natural stages of human development experienced by children in the preschool years, the program is designed to increase learning readiness' (Pheloung, Ten Gems for the Brain).

The evidence suggests that the students who participate in the year long programme make improvements in terms of executive functions, behaviour and focus in the classroom. More research is needed to establish more precisely the extent of improvement across specific skills and whether the gains are long-term.

Final Points

This continues to be a fascinating debate and I have seen interest grow in the relationship between the physical and cognitive dimensions of learning. The programmes described here 'suggest that working with the body offers a valuable tool to improve cognitive functioning in a very broad sense' (McClelland, Pitt and Stein). The key concepts of tempo and rhythm would benefit from a greater analysis and I am currently working with the creators of all three programmes to explore this in greater depth.

My understanding is that the programmes develop the pre-requisites for learning more effectively and remove some subtle barriers to classroom performance. Whereas Move 4Words has the most data on literacy improvements, Move to Learn appears to produce more developmentally age appropriate skills and processing. The Crispiani Method shares many similarities, but is a more specialist approach for students with dyslexia. In learning more about these methods, it will be interesting to see how much overlap there is between the three programmes and to make recommendations for a structure which incorporates the most effective elements for use in schools.

We know there are many students who do not access the support they need for undiagnosed dyslexic difficulties. There are also many students whose literacy skills are failing them, but who do not necessarily meet the criteria for a specialist intervention. My goal is to provide mainstream schools with a programme that can begin to produce a greater impact on these students within an inclusive, ethical and cost-effective paradigm.

Reference

Crispiani, P. (2013) Dyslexia and Dyspraxia: Crispiani Method, Centro Italiano Dislessia

Donnelly, J.E., & Lambourne, K. (2011) Classroom-based physical activity, cognition, and academic achievement. *Preventive Medicine* , 52 (Suppl.) S36-S42

Goswami, U., Huss, M., Mead, N., Fosker, T. and Verney J.P. 100 Perceptions of patterns of musical beat distribution in phonological developmental dyslexia: Significant longitudinal relations with word reading and reading comprehension :Cortex 49 (1363-1376) 2012 Elsevier Ltd

McClelland, E. (2013) Moving with the times, SEN Magazine, 67, p 69

McClelland E. (2013) Theoretical background to Move4Words and supporting academic references. Available online at <http://www.move4words.org.uk/pdf/Move4words>

McClelland, E., Pitt, A. and Stein, J. (2015) Enhanced academic performance using a novel classroom physical activity intervention to increase awareness, attention and self-control: Putting embodied cognition into action (*Improving Schools 2015*, Vol 18(1) 83-100)

Pheloung, B. (2014) Ten Gems for the Brain, Move To Learn

Tompsonski, PD., Lambourne, K. & Okumura, M.S. (2011) Physical activity interventions and children's mental function: An introduction and overview. *Preventive Medicine*, 52 (Suppl.), S3-S9

Mary Mountstephen MA (SEN)

October 2015