Reflexes and their Relevance to Learning

Chapter · February 2020

1 author:

Leanne Seniloli
Manukau Institute of Technology

Early Education

Volume 66 *Spring / Summer 2020*

- Teacher Led Innovation Round 3
- Teacher Led Innovation Round 4
- Peer learning in ECE
- Privatisation in ECE
- Children, families in prison and ECE practice
- Reflexes and support early learning

Contents

Early Education Volume 66 Spring / Summer 2020

Peer reviewed articles

Editor reviewed articles

Book reviews

Contributors

Early Education

Volume 66 Spring / Summer 2020

Early Education' is a professional journal for people involved and interested in early childhood education. A partially peer-reviewed journal, it is published yearly by the Wilf Malcolm Institute of Educational Research, University of Waikato.

Design and layout

Margaret Drummond

Our thanks to our reviewers

Karyn Aspden, Claire McLachlan, Linda Clark

Our thanks for the photos

Thanks to Jeremy and Morgana Smith for the cover photo.

This issue is the second issue of Early Education published by Wilf Malcolm Institute of Educational Research, The University of Waikato.

ISSN: 1172-9112

Contributions

Contributions of articles and photos are welcome from the early childhood community.

Early Education welcomes:

- Innovative practice papers with a maximum of 3,500 words, plus an abstract or professional summary of 150 words and up to five keywords.
- Research informed papers with a maximum of 3,500 words, plus an abstract or professional summary of 150 words, and up to five keywords.
- Think pieces with a maximum of 1500 words.
- Commentaries on management matters with a maximum of 1500 words.
- Book or resource reviews with a maximum of 1000 words.

Contributions can be sent to the 2021editors

Claire McLachlan:
cmclachlan@waikato.ac.nz

Karyn Aspden:
k.m.aspden@massey.ac.nz

Reflexes and their relevance to Learning

Leanne Seniloli

Knowledge and understanding of retained primitive reflexes and how they can impact learning is paramount for teaching to a diverse inclusive classroom especially with regard to children with non-specific and specific learning difficulties. It has ramifications for the physical, emotional, academic and social aspects of each child's school experience. Movement as the basis for learning is a well-known and accepted educational practice, and by incorporating reflex integration programmes teachers can help children consistently access higher brain centres. It is one more strategy to add to teachers' kete (basket) of knowledge to produce better outcomes in line with the government's mandate that all students should experience presence, participation, and achievement in schools. This paper outlines some research in this field relating to the prevalence of reflexes in older children, and the impact of reflexes on learning. It follows with discussion of behaviours of children with these reflexes, suggests practical applications for classroom practice, and concludes with a list of additional resources and references.

Diversity and school readiness

The need for children to 'be ready for school' has led to large amounts of governmental funding so that all children can access early childhood education to achieve this purpose (Ministry of Education, 2015). The ability to pay attention, hold a pencil correctly, sit still, and for the eyes to follow a line of print are needed for success at school (Goddard-Blythe, 2010). This then, is reliant upon a child having all primitive reflexes inhibited and postural reflexes developed to support correct sensorimotor integration and developed balance systems (Berk, 2009; Goddard, 1996; Goddard-Blythe, 2008, 2010).

Schools and early childhood centres are becoming more responsive to the diversity of individual children (Booth & Ainscow, 2011), as well as ensuring practitioners are reflective and informed with current research (Bourke et al., 2005). Diverse needs in the classroom include physical, mental, academic, behavioural and neurophysiological. Neurophysiological is the branch of physiology that is concerned with the study of the nervous system. Simply speaking it is how the brain and body communicate together, as well as the efficiency and accuracy of this communication. In the area of neurophysiological diversity many children fall into the category of 'non-specific learning difficulty' where there is a co-morbidity of presenting issues (Blythe, 2014; Goddard-Blythe, 2010). An example of this is seen in the Autism spectrum where children can exhibit a range of different behaviours and learning needs, diverse from each other, yet still be classified as 'on the spectrum.'

A non-specific learning difficulty is defined as "a learning disorder in one or more basic psychological processes involved in understanding or in using spoken or written language and executive functioning" (Hess, 2011, para. 9). This is often because higher cognitive processes are rooted in neurophysiological systems. This means that the brain can have trouble with executive functioning due to a miscommunication in their systems. These physical systems are the foundation of all learning and development. The vestibular system for example is where we gain our sense of balance. This is often said to be our sixth sense, and it develops when we are in the womb. All learning is reliant on a mature vestibular system (Goddard-Blythe, 2009), yet we rarely hear of it in teacher education programmes.

One way that our vestibular system can impact our learning is through the vestibular-ocular reflex arc. This is the pathways and communication between our vestibular system (located in our inner ear) and our eyes. It is the 'wiring' between our balance system and our eyes. Travel sickness and vertigo, for example, are examples of this mismatch. The eyes and the ears are telling the brain different messages. Other areas where the communication between these two systems are especially important is in maintaining eye control needed in tasks such as reading and writing, as well as sports and fluid movement of the body. These children are the ones who avoid sports, may place a paper or book on the side of their body rather than the middle, and the ones who need to rock when learning.

The vestibular-cerebellar loop is another physiological system that is needed for learning. This is underdeveloped in the child who moves clumsily or without coordination both in sports and regular movement. This child has been known as 'accident prone' or 'clumsy'. The cerebellum is the part of the brain that is responsible for the coordination and regulation of muscle activity (Goddard-Blythe, 2010). Therefore, if the cerebellum is not communicating well to the vestibular system then the child is imbalanced, insecure against gravity, and cannot make efficient body movements. The social ramifications of this for the child are immense.

Non-specific learning difficulties have been linked to the retention of primitive reflexes by Dr Peter Blythe (1990). It is through the above systems that primitive reflexes impact the body and brain communication, leaving a follow-on effect on classroom achievement.

According to Berk (2009), a reflex is an involuntary muscle reaction to a specific type of stimulation. Blythe and Goddard (2012) expand the definition, stating that particular sensations or movements are known to produce specific muscular responses. Primitive reflexes are our survival instincts which support birth and the first few months of life (Berk, 2009; Goddard, 2005; Connell & McCarthy, 2014). These then should develop into postural reflexes by four years of age (Goddard-Blythe, 2005).

The continued presence of primitive reflexes past the normal developmental period is known as Neuro-Developmental Delay (NDD) or more recently Neuro-Developmental Immaturity (NDI). NDI can be seen in some behaviours of the child such as immature baby behaviour, selective mutism, and the 'hit-first-think-later' response. Additionally, the child will move without synchronised coordination and will often not use both sides of their body in time (bilaterally). In academic issues NDI can be seen with a delay in reading, writing and math, a difficulty with reversing numbers and letters, writing that slopes up the page, a lack of a pincer grip and more (Institute for Neuro-Physiological Psychology [INPP], 1999). As primitive reflexes are only meant to remain active up to 12 months of life, they are aberrant if they present past this time, and are evidence of a structural weakness within the Central Nervous System (CNS) (Goddard, 2005; Goddard-Blythe, 2011).

The prevalence

There are many primitive reflexes that can hinder social, emotional, and educational achievement and as teachers we need to understand the best way to remedy these to improve the learning outcomes for children. In education there are four main reflexes which hinder academic achievement, and these are the Asymmetrical Tonic Neck Reflex (ATNR), the Symmetrical Tonic Neck Reflex (STNR), the Tonic Labyrinthine Reflex (TLR), and the Palmer Reflex. Assessing for the presence of these in schools can support teachers to understand the underlying issues for children's behaviour and underachievement.

A 2004 study of 672 children in Northern Ireland found that 48 percent of 4–5-year olds, and 35 percent of 8–9-year olds showed residual primitive reflexes (Goddard-Blythe, 2005). This number increased to 88.5 percent of 7–8-year olds in an area of social deprivation (Goddard-Blythe, 2005). The presence of primitive reflexes in students with speech impairments, special educational needs, or who are socially disadvantaged then jumps to an astounding 100 percent (Goddard-Blythe, 2005). This demonstrates the underlying presence of primitive reflexes in children with learning difficulties.

Practical applications

Many children in our schools are struggling with reading and writing tasks. The Asymmetrical Tonic Neck Reflex (ATNR) which is active between 0–5 months (McGowan, 2008) is largely responsible for this. This reflex causes the arm and leg to straighten when the head is turned (Goddard-Blythe, 2005) impacting the child's ability to cross the mid-line of the body. The eyes and hand of the child writing needs to track horizontally across a page, yet when an ATNR is present the head will also track (Blythe & Goddard, 2012). One side of the body finds it difficult, if not impossible, to operate on the other side of the body. It is as if there is an invisible wall running down through the centre of their body stopping the left and right sides of the body crossing over. Additionally, the eyes of the child will often jump at the midline when they are reading across a page causing the child to have to find the word on the page again, and immense frustration when this is repeated line after line.

Figure 9.

Writing is also often impacted being sloped up the page, or with the learner turning the page side on to write—compensating for the arm that continues to straighten. Balance can also be impacted, and the posture of the learner will also show signs of ATNR. Figure 1 demonstrates what an ATNR will look like in an adult or child making copying and handwriting difficult and untidy. These learners find it hard to keep their arms and legs still, the limbs will move when the head moves, causing disruptions in the class, and the brain to be focused on keeping the body still rather than the learning taking place.

Figure 10.

Another common classroom behaviour is a wriggly child. The one that cannot sit still or struggles to sit at a table and chair. In children both with an Attention Deficit Hyperactivity Disorder (ADHD) diagnosis and an Attention Deficit Disorder (ADD) diagnosis the **Symmetrical Tonic Neck Reflex [STNR]** has been found to be a significant factor (O'Dell & Cook, 1996). The STNR is normally active between 6–11 months of age. Whereas the ATNR caused difficulty in communication between the left and right sides of the body the STNR causes difficulty in communication between the top and lower parts of the body. With this reflex the position of the head determines the position of the arms and legs together (Goddard-Blythe, 2005). In addition to ADHD like behaviours the child will have a slumped upper body when sitting and the feet of the child are often tucked behind and around the front legs of the chair essentially 'armouring' the child's body in place, as seen in Figure 2.

Taylor et al. (2004) discovered that high scores for the STNR correlated to issues with impulsive, emotional, and problematic behaviours. A child with a residual STNR will often find it hard to sit still, constantly jiggling to adjust and readjust body posture. Also, the STNR will cause issues with coordination activities, such as ball sports as it impacts the eyes abilities to focus from far to near distance.

Tonic Labyrinthine Neck Reflex [TLR]

The ability of the eyes to process information is essential in education. Visual-perception (can the child see and perceive what is before them) difficulties, as well as poor sequencing skills and poor organisational abilities can be caused by a residual Tonic Labyrinthine Neck Reflex [TLR] (Goddard-Blythe, 2005). The TLR emerges at birth and should start to be 'put to sleep' around 6 months of age (Goddard-Blythe, 2005). As seen in Figure 3

Figure 11.

the movement of the head will determine follow on movements of the body. The TLR is seen in both flexion (forward movement of the head), as well as extension (backward movement of the head). The body will adjust its posture when the head moves. A child with a residual TLR will have issues with balance and movement and can often feel dizzy. The overall posture and muscle tone of the child will be slouched when the TLR is in flexion, or very stiff when it is in extension. The eyes are also impacted by the TLR with depth perception issues, figure ground effect and the eyes 'playing tricks' (Goddard-

Blythe, 2005). This child may also dislike heights and have difficulty recognising up and down. This has ongoing impacts in education where the child's eyes need to be at peak performance for conveying messages to the brain.

Palmer Reflex

A child with a Palmer reflex will use a writing instrument in the style shown in Figure 4. As pressure is applied on the palm of the hand it causes a fist-like grip to occur (Goddard, 1990). This makes the pincer grip needed for writing and correct formation of symbols impossible. If the palmer reflex remains, the child cannot proceed through the needed stages of release and finger mobility, preventing independent thumb and finger movements, which hinders fine motor control. The hands and fingers may also present as hypersensitive. In addition, it can have a lasting adverse effect on speech and articulation as the hands and mouth are on the same neurological loop (Goddard-Blythe, 2005).

Figure 12.

The Palmer reflex emerges 11 weeks in utero and should be inhibited by three months of life. In a neonate this reflex is needed to support feeding and sensory exploration. However, in an older child this becomes a hindrance to educational achievement.

Impact on the classroom

The prevalence and impact of primitive reflexes on academic achievement can be clearly seen. A study in Illinois linked poorly integrated primitive reflexes with visual development, balance issues and academic performance especially in reading (Wahlberg & Ireland, 2005). Therefore, retained reflexes negatively impact a child's learning as the body is automatically triggered into egocentric primitive movements (Bloomberg, 2015). The child then has to focus on maintaining control over the body causing multiple interruptions to the child's thinking (Green, 2015). Teachers must be aware that clumsiness, auditory and visual sensitivity, poor handwriting, reading difficulty, spelling difficulty and an inability to sit still, can all be by-products of poorly integrated reflexes (Blythe, 1990; Erdei, 2011).

Recent scientific studies support learning through movement as it increases deeper, longer lasting memory (Johnson-Glenberg, 2012). The New Zealand Curriculum also mandates physical education (Ministry of Education, 1993) and many schools also implement programmes such as Perceptual Motor Programme (PMP) (Moving Smart, 2015). Yet, these programmes do not address the underlying reflexes causing the above issues.

One UK study established that the INPP schools reflex programme made the most progress in reducing the impact of these reflexes and increasing academic success (Goddard-Blythe, 2010; Marlee, 2008). Furthermore, another study saw an increase in reading 22 words per minute when compared to a control group—leading the author to ascertain that a classroom reflex integration programme is warranted (Wahlberg & Ireland, 2005). Research conducted in Sanwick, UK with 93 children showed reading scores of the INPP schools programme group went from the lowest in the class to the highest in nine months (Goddard-Blythe, 2005); an astounding result rarely seen in other programmes. Other research also supports these findings (Goddard-Blythe & Hyland, 1998).

Summary

Movement and its powerful impact on learning is now generally accepted (Bloomberg, 2015; Connell & McCarthy 2014; Goddard-Blythe, 2010; Tomporowski, et al., 2011; Wahlberg & Ireland, 2005). The type, degree, and effort of the movement needed however, is still debated (Tomporowski et al., 2011). Yet, if educational achievement relies on effective cognition such as memory, working memory, executive functioning, and perception (McMorris et al., 2009), it is acknowledged that these functions rely on a mature central nervous system to operate. The physical body of the individual must be interacting efficiently with the environment to achieve these aims. In addition, many believe that for cognition to occur there must be physical output to integrate the knowledge (Connell & McCarthy, 2014; Goddard-Blythe, 2005; McGowan, 2008; Tomporowski, et al., 2011). Therefore, the child's level of movement needs to be organised and facilitated through a mature Central Nervous System otherwise the child will continue to interact with their environment through primitive reflex movements, which hinder the educational progress of the child.

When primitive reflexes are prevalent there is an increase in educational underachievement. A movement programme such as the INPP schools programme has been proven to remediate primitive reflexes and enhance the learning opportunities of children in schools. Just as all children have a right to educational equality so should all children have a right to neurophysiological equality. All movement is beneficial for children as the body trains the brain. However, not all movement remedies primitive reflex involvement. For children to have the best successes in education their physical bodies need to be operating at their fullest potential. By removing the impact of primitive reflexes and developing postural reflexes the underlying physical systems of the child free the brain for academic achievement.

Additional links and resources

For teacher training and implementation of the INPP programme in schools: https://withoutlimitslearning.com

Easy to understand information and videos on the brain centres and their learning impact: https://brainhighways.com/videos/tedx-san-diego

Simple definitions of reflexes and their impact: http://www.eaglecanyonwellness.com/old/docs/Primitive_Reflexes.pdf

A New Zealand based perspective of movement: http://www.movetolearn.com.au/sites/default/files/pdf/A%20Neurological%20Look%20at%20Writing%20in%20the%20Classroom.pdf

For information on the INPP schools and individual programme: www.withoutlimitslearning.com www.inpp.co.uk

A vision therapy perspective:
http://www.minnesotavisiontherapy.com/retained_reflexes
http://visiontherapyathome.com/what-are-primitive-reflexes/

References

Berk, L. E. (2009). *Child Development* (8th ed). Pearson.

Bloomberg, H. (2015). *The rhythmic movement method.* Lulu Publishing Services.

Blythe, S. G. (2014). *Neuromotor immaturity in children and adults: The INPP screening test for clinicians and health practitioners.* Wiley.

Blythe, P. ,& Goddard, S. (2012). Correcting clinical facts — abnormal primitive reflexes in behavioural optometry and vision therapy. *Journal of Behavioural Optometry,* 138–144.

Booth, T., & Ainscow, M. (2011). *The index for inclusion: Developing learning and participation in schools.* Centre for studies on Inclusive Education.

Bourke, R., Holden, B., & Curzon, J. (2005). Using evidence to challenge, change, and create new practices. In *National Leadership Proceedings; Ministry of Education* (GSE) (pp. 1–7). Ministry of Education.

Connell, G., & McCarthy, C. (2014). *A moving child is a learning child: How the body teaches the brain to think.* Free Spirit Publishing Inc.

Erdei, E. K. (2011, March 21). *Results of the INPP school exercise program 9. District Budapest.* Bakáts Tér Primary and Music school.

Goddard, S. (1990, November). *Developmental milestones: A blueprint for survival* [Paper]. Institute for Neuro-Physiological Psychology.

Goddard, S. (1996). *A teacher's window into a child's mind.* Fern Ridge Press.

Goddard, S. (2005). *Reflexes, learning and behavior.* Fern Ridge Press.

Goddard-Blythe, S. (2005). *Releasing educational potential through movement: A summary of individual studies carried out using the INPP test battery and developmental exercise programme for use in schools with children with special needs.* Child Care in Practice.

Goddard-Blythe, S. (2008). *What babies and children really need.* Hawthorn Press.

Goddard-Blythe, S. (2009). *Attention, balance, and coordination: The A.B.C. of learning success.* Wiley-Blackwell.

Goddard-Blythe, S. (2010). *Neuro-motor maturity as an indicator of developmental readiness for education.* Institute for Neuro-Physiological Psychology.

Goddard-Blythe, S. (2011). *The genius of natural childhood.* Hawthorn Press.

Goddard-Blythe, S., & Hyland, D. (1998). Screening for neurological dysfunction in the specific learning difficulty child. *British Journal of Occupational Therapy, 61*(10). https://doi.org/10.1177/030802269806101008

Green, N. (2015). *The cortex parent. Brain highways.* https://brainhighways.com/cortex-parent-blogs/attention

Hess, E. (2011). *Definitions of disorders.* Center for the Developing Mind.

http://www.centerforthedevelopingmind.com/disorders
Institute for Neuro-Physiological Psychology [INPP]. (1999). *Help by symptom.* http://www.inpp.org.uk/intervention-adults-children/help-by-symptom/
Johnson-Glenberg, M. (2012, May 16). How can embodied learning help students. *Getting Smart* http://gettingsmart.com/2012/05/how-can-embodied-learning-help-students/
Marlee, R. (2008). *Neurological Developmental Delay Research Programme.* Northumberland County Council.
McGowan, I. (2008). *Bilateral integration: Enhancing learning and releasing potential.* The Movement and Learning Centre.
McMorris, T., Tomporowski, P., & Audiffren, M. (2009, May 5*). Exercise and cognitive function.* Wiley-Blackwell Ltd.
Ministry of Education. (1993). *The New Zealand curriculum framework.* Learning Media Ltd.
Ministry of Education. (2015, May 13). *Benefits of early learning services.* http://parents.education.govt.nz/early-learning/early-childhood-education/benefits-of-early-childhood-education/
Moving Smart. (2015). *What is PMP? Moving Smart.* http://www.movingsmart.co.nz/home/schools/pmp/what-is-perceptual-judgement/
O'Dell, N., & Cook, P. (1996) *Stopping Hyperactivity — a new solution.* Avery Publishing Group.
Taylor, M., Houghton, S., & Chapman, E. (2004). Primitive reflexes and attention deficit/hyperactivity disorder: Developmental origins of classroom dysfunction. *International Journal of Special Education,19*(1) 23-37.
Tomporowski, P., Lambourne, K., & Okumura, M. (2011). Physical activity interventions and children's mental function: An introduction and overview. *Preventative Medicine*, *52(*1), 53-59. https://doi.org/10.1016/j.ypmed.2011.01.028
Wahlberg, T., & Ireland, D. (2005). Can replicating primary reflex movements improve reading ability. *Optometery Visual Development, 36*(2), 89-91.